Dipterists Digest

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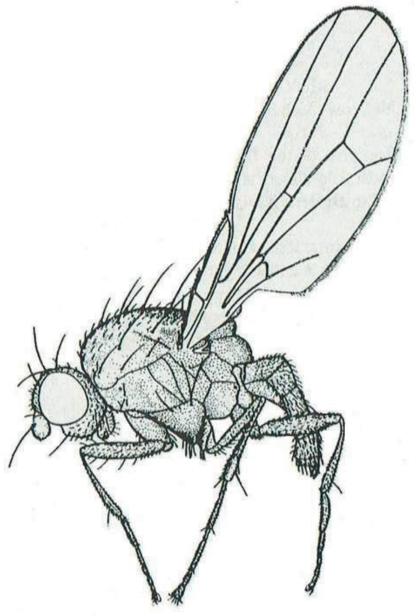
Cover illustrations: A celebration of Lauxaniidae.
Front cover: *Lauxania cylindricornis* (Fabricius, 1794), Fenn's Moss, North Wales, May 2011. Above: *Poecilolycia vittata* (Walker, 1849), Trawscoed, North Wales, May 2021. Both photos: © Janet Graham.

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, and should be submitted with a current postal and/or e-mail address, which the author agrees will be published with their paper. Articles must not have been accepted for publication elsewhere and should be written in clear and concise English. **Contributions should be supplied either as E-mail attachments or on CD in Word or compatible formats.**

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;
- 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 should be 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 (narrow) 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 welcomed. Figures and photographs should be supplied separately as hard copy or as jpegs at 300dpi.

Style and format should follow articles published in recent issues. 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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A provisional species-area relationship for British Diptera

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Summary
'The relationship between species richness and size of recorded area is investigated for Diptera in the British Isles. For well-recorded families comprising 43% of the British Diptera fauna, and sites ranging from a few square metres to the whole of Great Britain, the relationship conforms to a classic species-area power law with slope $z = 0.13$, a value comparable with those for Diptera in the limited number of similar studies of the European fauna. This provides a useful tool for assessing and comparing Diptera species richness patterns in sites and habitat patches of widely differing areas. While the analysis is based on a limited number of studies, further comparisons support its wider applicability to the British mainland.

Introduction

Species richness is a prime measure of biodiversity for a site, habitat or larger geographical area (Magurran 2004). By this measure the Diptera provide one of the largest contributions to the 70,000 species of animals, plants, fungi and single-celled organisms recorded in the UK (Natural History Museum 2022), with over 7,000 Diptera species recorded (Chandler 2022).

How species are distributed across the landscape is a fundamental question in ecology as well as being of major importance for nature conservation. One of the first large-scale patterns to be identified was the species-area relationship (SAR), the proportion of species found in a smaller area within a larger region. The form of this relationship and how it depends on underlying ecological processes has been the subject of research for over a hundred years (Williams 1964, Rosenzweig 1995, Matthews *et al.* 2021).

There have been very few investigations of the SAR for Diptera in Britain and Europe. Petersen and Meyer (2003) used it to estimate the number of Diptera species to be found in Denmark using checklists from several other European countries. Salmela (2012) studied the relation between the cranefly species numbers in the whole of Finland and in individual provinces. Plant (2014) and Plant *et al.* (2017) studied the geographical variation of species richness of the Empididae across Great Britain, though without explicit discussion of the SAR.

This paper presents data on the species richness of a wide range of Diptera families in Britain over an area range of over eleven orders of magnitude. The species lists cover areas ranging from the whole of Great Britain, through a selection of counties and Watsonian vice-counties; major sites of particular entomological interest covering several square kilometres and multiple habitats; smaller patches of a few hectares of a single habitat, and finally, at the other end of the scale, the results of surveys using emergence traps over a few square metres. These data are plotted on a log-log plot to assess the applicability of the classic power-law SAR, credited by Williams (1964) to H.C. Watson, the originator of the vice-county designations. The ecological significance of the findings is discussed, as well as their practical use as a framework for comparisons of Diptera diversity between sites and regions.

Taxonomic scope

The range of Diptera families covered in this study is limited to those more frequently recorded by general dipterists. This excludes large families such as Chironomidae and Phoridae, and all the fungus gnats. The families which are included fall into five broad groups as follows:

1) craneflies in the wide sense of Stubbs (2021);
2) hoverflies (Syrphidae);

3) the whole superfamily Empidoidea;
4) the calyptrates;
5) a miscellany of other families as follows: soldierflies and allies as defined by Stubbs and Drake (2014), Bibionidae, Conopidae, Dryomyzidae, Heleomyzidae, Lauxaniidae, Lonchopteridae, Megamerinidae, Micropezidae, Opomyzidae, Pallopteridae, Platystomatidae, Pseudopomyzidae, Psilidae, Sciomyzidae, Sepsidae, Tephritidae and Ulidiidae.

Taken together these groups are referred to as the "larger Diptera" for the purposes of this paper; however, they do include species smaller than 3mm in body length, while the excluded groups do include some large species. Altogether they constitute 43% of the species listed by Chandler (2022).

Data

Table 1a lists the regions and sites included in the study. Table 1b gives the areas in square kilometres and the actual or estimated number of recorded species in each of the five taxonomic groups specified above, together with the total numbers of "larger Diptera" used for the analysis. When numbers of species were not given explicitly in the source references, lists were copied and counted using a spreadsheet for web documents, or counted manually where only printed lists were available. The area of Great Britain is taken to be the United Kingdom minus Northern Ireland. Areas of the vice-counties and larger regions have been taken from internet sources, or in the case of Lancashire and Cheshire, where the vice-counties are rather different from the current administrative areas, estimated from the maps in Brighton (2020).

The datasets for sites fall into the following distinct groups according to the area and the nature of the surveys undertaken.

Larger Sites

Skidmore (2006) compiled an invertebrate inventory from many years of recording on the Thorne and Hatfield Moors in South Yorkshire, the largest area of lowland mire remaining in England. The centres of the two sites are about 10km apart and they are separated by about 5km of agricultural land. The individual sites and the combined area have both been used in the analysis. The habitats and vegetation of Thorne Moors were described by McDonald and Wall (2014), who also gave the figure for the total area. I have judged the split of area between the two moors from the maps.

Chandler (2015) presented the full species list from surveys between 2010 and 2015, mainly carried out by himself, in Bushy Park, an area of varied habitats within the Greater London conurbation. It is an SSSI on the basis of its saproxylic invertebrates and acid grassland flora and fauna. Chandler (2021) also provided an historical and ecological account of Windsor Forest and Great Park, together with the full data from a long history of Diptera recording there.

Sites in Lancashire and Cheshire

Brighton (2020) discussed the results of sweep-net surveys at six sites varying in extent from 0.19 to 9.72 sq. km., and thus overlapping in extent with the sites surveyed by Skidmore and Chandler. The taxonomic scope was similar though not identical to the "larger Diptera" defined above, covering families totalling 3,300 of the 7,000 plus species on the British list, though this scope was expanded during the course of the surveys, which took place between 2012 and 2019. The numbers for the total numbers of species of "larger Diptera" presented in Table 1b are taken from Table 3 of Brighton (2020): they were extrapolated from the recorded numbers using the "Chao1" estimator (Magurran 2004). The same extrapolation factor has been applied to the above five subgroups.

In 2020 a further survey using the same methods applied more systematically and intensively was carried out at Houghton Green Pool (SJ6292), a discrete area of willow scrub surrounding a fluctuating water body (Brighton 2022b). While I had hoped that this concentrated effort would give a definitive estimate of total species richness within a uniform patch of habitat, this proved not to be the case, and so the Table 1b data are also the result of extrapolation using the Chao1 estimate.

Table 1b also contains results from two further intensive surveys which I carried out in the course of 2021 in a small patch of secondary woodland bounded by housing and agricultural land at Croft, Warrington (SJ6397), and at Chester Zoo Nature Reserve (SJ4070), which includes areas of young woodland, flower-rich grassland, hedgerows, ponds and marshland. The records from these surveys have been placed on iRECORD (https://irecord.org.uk/all-records).

Wyre Forest Orchards

In a comprehensive survey of the biodiversity of traditional orchards in Worcestershire (Smart and Winnall 2006), Diptera were recorded from a Malaise trap in each of two orchards, a few hundred metres apart. Table 1 combines the areas and the species numbers from both of them.

Devon sites

Data have been published for five surveys in a variety of habitats and using a variety of methods in Devon. Drake (2011) ran a Malaise trap for 9 months of 2005 in a wet woodland at Burridge Common (ST3105) and in 2007 carried out additional sweep net surveys there. The taxonomic scope covered the families considered in this study, apart from the Anthomyiidae. Drake did not specify the area of the woodland surveyed, but I have estimated it by reference to his description and to an internet satellite map. This assumes of course that the Malaise trap sample is representative of the patch as a whole.

Wolton *et al.* (2014) used a Malaise trap, a mercury-vapour light trap, emergence traps, sweep-netting and searching by eye to produce a species list for an 85m-long stretch of hedge within a matrix of small pastures at Locks Park Farm (SS5102) over a two-year period. They stated that their study was limited to species recorded within 2m of the hedge, which, with the width of the hedge itself, limits the area surveyed to under 0.1ha. However, they considered that the high species richness they found reflected the wider landscape within a 1km radius, with its network of hedges and patches of woodland. I have assumed an effective area for this survey conservatively as 1 hectare.

Wolton *et al.* (2017) deployed Malaise traps at three locations at Scadsbury Moor, a different part of Locks Park Farm, over a three-year period (though not all three were deployed at any one time). These were placed along a 300 m transect in order to compare the fauna well within the woodland with that in an area of wet grassland area enclosed by it. Sweep-netting was also carried out though not systematically. Species were identified mainly from the "larger Diptera" as defined above, with the addition of fungus gnats. 845 species were recorded altogether, but numbers are given only for those families for which ten or more species were recorded. Table 1 contains estimates for the other families according to their proportions in the national checklist. The combined area of the wood and grassland area is as given in the paper.

Wolton and Field (2021) used emergence traps from May to July and in September of 2020 in the same woodland in a comparative study of areas with and without cattle grazing. The results of further emergence trapping in nearby dry woodland were presented by Wolton (2022). As emergence traps limit the catch to the area and vegetation enclosed, their area has been taken as the surveyed area.

Apart from the Scadsbury Moor Malaise-trap study, the actual species numbers recorded have been used for the Devon sites. Drake (2011) did apply the Chao1 estimator to his individual

Malaise samples taken at a fortnightly interval. This resulted in estimates averaging 2.3 times the observed number, which he regarded as unrealistically high. This contrasts with the approach for my Lancashire and Cheshire surveys, where the estimator was applied to the data accumulated over the complete survey. This results in smaller estimates of the number of unobserved species relative to the empirical number, though still subject to much uncertainty (Brighton 2022b).

Table 1a. The regions and sites included in the study.

Region or site	Source of Diptera species numbers	Comments
Great Britain	Chandler (2022)	The British checklist
Ireland		The Irish checklist
Yorkshire	Grayson (2015)	Combined checklist for V.Cs 61-65
Cumbria	Hewitt (2014)	Summary of recording data
Lancashire and Cheshire	Brighton (2022a)	Separate lists for each of the three V.Cs. 58, 59 and 60.
Cheshire		Checklist for V.C. 58
West Lancashire		Checklist for V.C. 60
Thorne & Hatfield Moors	Skidmore (2006)	Now the Humberhead Peatlands National Nature Reserve: lowland mires – all-time inventory
Thorne Moor		
Hatfield Moor		
Windsor Forest and Great Park	Chandler (2021)	An all-time compilation of records
Bushy Park	Chandler (2015)	Surveys over 2010-2015 in mixed habitats
Delamere Forest	Brighton (2020)	Mainly coniferous woodland with peat basin mires
Smithills Estate		Mainly upland acid grassland and wooded stream valleys
Birkdale		Coastal sand-dunes, slacks and transition scrubland
Cholmondeley		Farmland, woodland and inland waters
Astley Moss		Lowland raised mire and wet woodland
Holcroft Moss		Lowland raised mire and wet woodland
Houghton Green Pool	Brighton (2022b)	Willow scrub, intensive sweep-net survey in 2020
Chester Zoo Nature Reserve	Data on iRECORD	Varied habitats, intensive sweep-net survey in 2021
Croft Wood		Secondary woodland, intensive sweep-net survey in 2021
Wyre Forest orchards	Smart and Winnall (2006)	Data from two Malaise traps in 2004
Scadsbury Moor (Malaise)	Wolton *et al.* (2017)	Three Malaise traps in wet woodland over 3 years
Burridge Common	Drake (2011)	9 months Malaise trap survey in 2005

Region or site	**Source of Diptera species numbers**	**Comments**
Locks Park Farm (hedge)	Wolton *et al.* (2014)	Hedge, multiple survey techniques over 2 years
Wet wood (emergence)	Wolton and Field (2021)	Emergence traps at Scadsbury Moor for 4 months
Dry wood (emergence)	Wolton (2022)	Emergence traps in dry woodland at Locks Park Farm over 6 months

Table 1b. Number of "larger" Diptera species recorded from checklists and surveys of regions and sites ranging in area from the whole of Great Britain to small groups of emergence traps. See Table 1a and main text for further details and sources of data.
*** Extrapolated numbers using the Chao1 estimator. Totals may differ because of rounding.**
 # Numbers estimated for families with fewer than 10 species recorded.

Region or Site	**Area (sq km)**	**Crane-flies**	**Empid-oidea**	**Hover -flies**	**Calypt -rates**	**Misc.**	**Total "larger" Diptera**
Great Britain	229000	353	702	283	1041	592	2971
Ireland	84403	218	345	182	458	330	1533
Yorkshire	11903	279	531	211	649	442	2112
Cumbria	6768	270	415	197	345	335	1562
Lancashire and Cheshire	6890	271	417	220	619	415	1942
Cheshire	2610	242	385	202	555	352	1736
West Lancashire	1430	218	229	148	275	256	1126
Thorne & Hatfield Moors	28.87	97	202	98	324	219	940
Thorne Moor	16	72	140	87	257	163	719
Hatfield Moor	13	55	150	73	240	162	680
Windsor Forest and Great Park	18.66	127	212	160	290	227	1016
Bushy Park	4.45	64	123	61	186	157	591
Delamere Forest*	9.72	107.0	122.9	68.0	157.6	122.9	578.4
Smithills Estate*	6.86	97.0	111.3	58.8	205.1	162.2	634.4
Birkdale*	2.96	40.2	73.5	26.3	141.4	169.1	450.5
Cholmondeley*	2.4	52.5	84.9	43.2	158.9	142.0	481.4
Astley Moss*	0.37	83.8	103.0	78.6	143.2	139.7	548.3
Holcroft Moss*	0.19	92.1	95.2	65.1	152.4	136.5	541.3

Region or Site	Area (sq km)	Crane-flies	Empid-oidea	Hover-flies	Calypt-rates	Misc.	Total "larger" Diptera
Houghton Green Pool*	0.105	43.1	97.4	32.0	185.1	174.0	531.7
Chester Zoo Nature Reserve*	0.067	62.9	121.6	44.3	167.4	187.4	583.7
Croft Wood*	0.03	79.7	103.2	20.9	105.8	155.4	465.0
Wyre Forest orchards	0.0394	29	65	49	181	73	397
Scadsbury Moor (Malaise)#	0.0723	78.0	99.7	69.0	156.1	89.5	492.3
Burridge Common	0.02	76	99	27	63	72	337
Locks Park Farm (hedge)	0.01	82	116	129	136	123	586
Wet wood (emergence)	4×10^{-6}	49	36	9	30	19	143
Dry wood (emergence)	2×10^{-6}	8	18	1	11	7	45

Analysis and Results
For each region or site, the total number of species was divided by the total for Great Britain and expressed as a percentage. The data were then plotted on log-log scales with the results in Fig. 1. Using the least-squares method, a straight line was added, passing through the British data with 100% species coverage for the total area $A_{tot} = 229{,}000$ km^2. The two data points for emergence traps were excluded as they are a very small sample which may not be typical, but would have an overwhelming influence on the result for the best-fit slope. Also Ireland was excluded from the fit as it is clearly an outlier.

The best-fit slope z was found to be 0.13, ie $\log S = 0.13 \log A +$ constant. For comparison, lines with $z = 0.1$ and $z = 0.15$ have also been included in Fig. 1: this range covers most of the data. Fig. 2 shows similar plots for the five taxonomic subgroups, compared with the same line with $z = 0.13$.

A value of z can also be obtained for an individual data point from the relation

$$z = \frac{\log A_{\text{tot}} - \log A}{\log S_{\text{tot}} - \log S(A)}$$

where $S(A)$ is the number of species in area A, and the suffix "tot" refers to the numbers for the whole of Great Britain. In the case of Ireland this gives a very large value of $z = 1.51$. At the other extreme of our data, the Locks Park Farm hedge (Wolton *et al.* 2014) has $z = 0.096$.

Discussion
Fig. 1 shows that the mainland data are well described by a straight-line on log-log axes, corresponding to the classic power law SAR:

$$S(A) = S_{\text{tot}}(A/A_{\text{tot}})^z$$

As noted above there are very few studies for comparison. Salmela (2012) *assumed* a value 0.15 for *z* derived from the wider literature, to adjust values of cranefly species richness in individual provinces in Finland. Petersen and Meyer (2003) obtained a value of $z = 0.0875$ from the Diptera species numbers recorded in 12 European countries or regions including Great Britain. A large meta-analysis of 794 SAR studies by Drakare *et al.* (2006) across a vast range of animals and plants in different geographical locations, terrestrial and marine, found that *z* decreases as the range of areas studied increases, the size of the individual organisms decreases, and the latitude increases. The value found in this account fits in well with the overall picture presented by these authors: there was a very wide scatter in the overall data with *z* ranging from 0 to around 1 with an average of 0.27.

Fig. 1. Log-log plot of the data of Table 1 for species numbers of "larger Diptera" expressed as a percentage of the British total. Lines passing through the point for the whole of Great Britain are shown for three values of the slope parameter *z*. 0.13 is the best fit according to the least-squares technique (excluding the point for Ireland and the two points on the extreme left from the Devon emergence trap surveys as explained in the text).

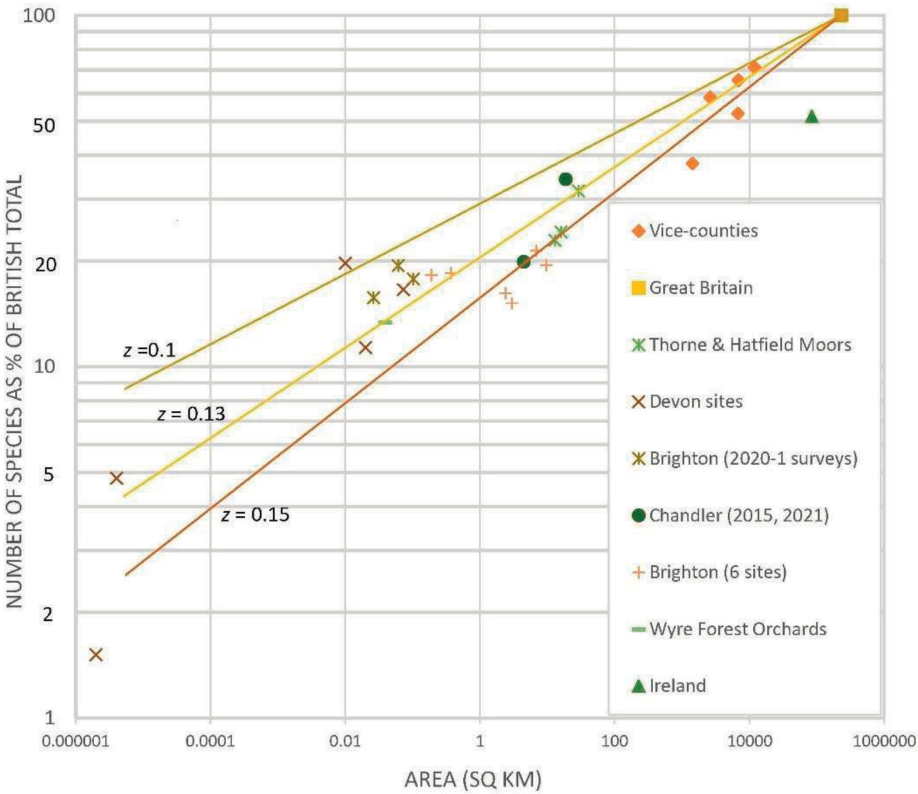
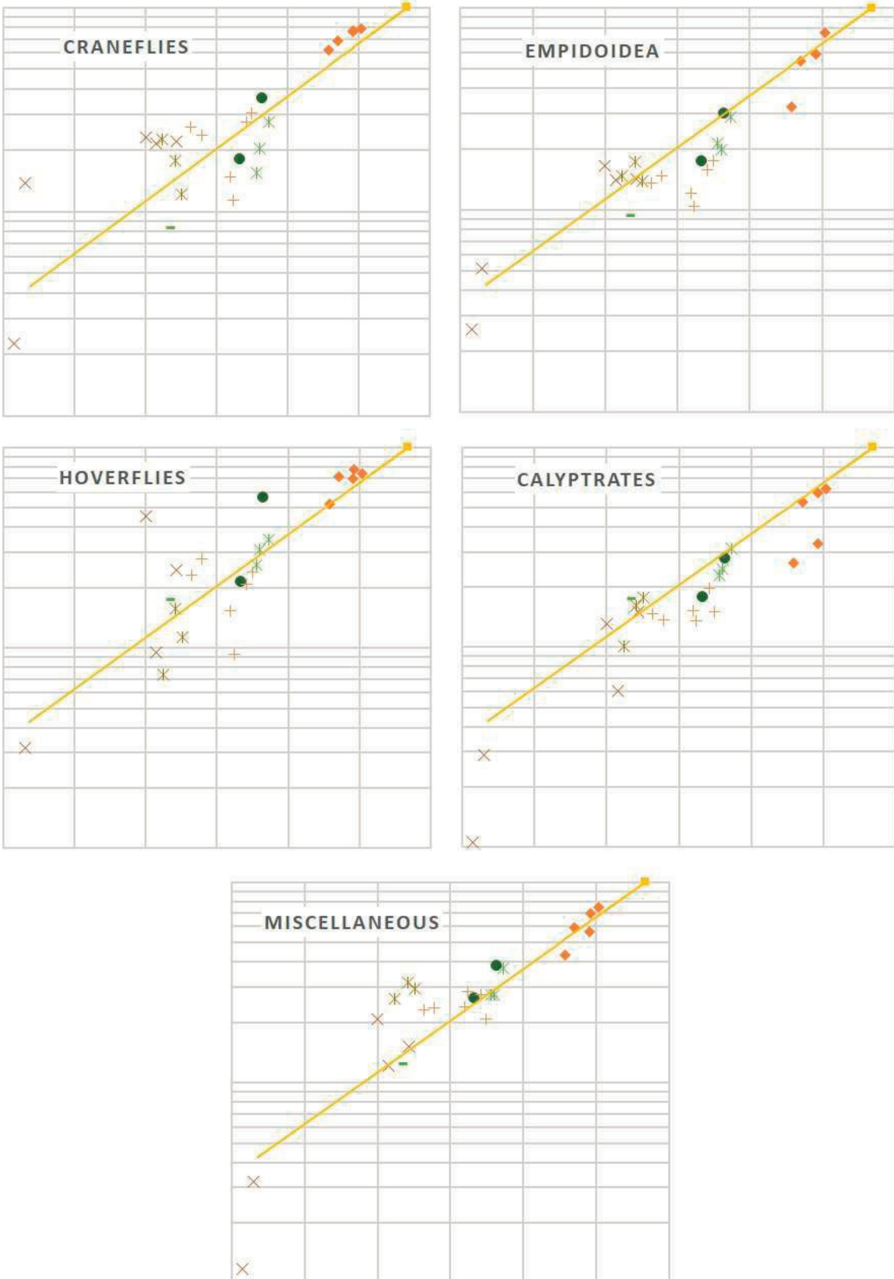


Fig. 2. As for Fig. 1 but for each of the subgroups making up the "larger Diptera". The best-fit line with $z = 0.13$ is the same as for the overall data, as are the symbols and axes.



Rosenzweig (1995), Drakare *et al.* (2006) and Matthews *et al.* (2021) have discussed the many ecological factors that may affect the shape of the SAR and the many theories and mathematical models that attempt to understand or describe this. Different processes operate over different scales. Species richness may vary from the north to south of the country, if the number of species with a northern distribution is different from the number of those mainly found in the south. On the scale of the vice-counties, habitat variations will contribute to the decrease in species richness as the area sampled decreases. Even at individual sites, the area sampled is important because of the tendency of some species to be localised by variations in conditions, as illustrated in Table 3 of Brighton (2022b).

Another factor affecting the SAR for the Diptera is the nature and completeness of the sampling. The species lists for the country and the better-recorded vice-counties are the results of over a century of endeavour, and continue to grow albeit at a decreasing rate. Lists for larger sites are also often the fruit of several individuals' work over many years. In the range of areas from a 100m square (0.01 km^2) to 10km^2, surveys varied in effort and duration. There are results from sweep-netting and Malaise-trapping alone, and from combinations of these with other techniques. Within this range of areas Fig. 1 shows a high degree of scatter, and the overall trend is not clear. Four of the six site surveys reported by Brighton (2020) fall well below the best-fit line, while those for the two smallest sites are close to it. A similar amount of effort was deployed at all six sites and so the results probably reflect this rather than the actual areas of the sites. The three more intensive and systematic surveys on smaller sites (Brighton 2022b) follow the overall trend well. Two of the Devon site surveys and the Wyre Forest orchards survey also fall close to the line. The hedge survey of Wolton *et al.* (2014) is the furthest outlier above the line. This may be partly attributable to the wider range of recording methods used, but as noted above there are reasons to suppose that the effective area sampled was considerably larger than that assumed for the analysis.

The emergence trap data are in themselves the most reliable as they captured all the Diptera emerging from the soil and low vegetation in a defined area and excluded those just passing by. Indeed, as most of the "larger Diptera" (as defined here) develop in the soil or on ground-level resources, their numbers in the square-metre plots across the whole country are the basic driver of the overall SAR. So how representative are the two measurements by Wolton and Field (2021) and Wolton (2022)? To answer this, comprehensive data for all the habitats in Britain are not readily available, but studies by Hövemeyer (1999) and Nielsen and Nielsen (2007) provided some comparisons from European habitats. Hövemeyer ran emergence traps in a meadow, in an adjoining hedge, and in three types of woodland in Germany, and reported species numbers from 129 to 247. Nielsen and Nielsen studied an arable field and an adjacent beech forest in Denmark and reported annual levels of species richness from an array of emergence traps of between 78 and 176. The respective figures for our wet and dry woodlands are 159 (Wolton and Field 2021) and 69 (Wolton 2022). The taxonomic scope and area covered by traps in the European studies were somewhat larger than the latter studies, but this is sufficient to show that the data for the smallest areas in Fig. 1 may well be representative of the wider lowland landscape.

Fig. 2 shows the species numbers versus area for the five subgroups making up our selection of "larger Diptera". The line with $z = 0.13$ is a reasonable representation in each case though with increased scatter, particularly for the craneflies and hoverflies as the smallest of the five subgroups. Hoverfly species richness in the Devon hedge study (Wolton *et al.* 2014) is particularly high, perhaps because of the frequent recording by eye. For these two groups, the vice-county data cluster more closely around the fitted line, indicating more comprehensive recording. On the other hand, calyptrates have poor coverage in Cumbria and West Lancashire.

This suggests that the power law SAR with $z = 0.13$ can be used as a reference point or yardstick for the species richness from a site survey of any Diptera taxon or group of taxa expressed as a proportion of the respective British checklist numbers. This is further illustrated by the following examples.

Further comparisons
Vincent (2013) carried out an intensive water-trap survey of Dolichopodidae in eight different habitats spread over the Walberswick National Nature Reserve in Suffolk. The total area is given as 810 ha, so the SAR gives a proportion $(8.1/229000)^z$ = 27%. The recorded number of 76 species is 26% of the British total of 308 species of Dolichopodidae given in the 2022 checklist.

Laurence (1997) reported the results of water-trap surveys in areas at various stages of the coppicing cycle in Bradfield Woods, also in Suffolk and a National Nature Reserve of 70ha. The SAR produces 20%. Within the scope of our "larger Diptera" the number of species recorded was 210, just 7% of the British total. Laurence acknowledged that not all Anthomyiidae and Tachinidae were named, but this can hardly account for the difference. 36 sites were surveyed; these were widely distributed in Felsham Hall Wood, which forms the main part of the reserve. The small number of species recorded may reflect the small range of habitats and the limited duration of sampling (4 weeks total, though spread from May to October).

Chandler (2021) gave a comparison of species numbers from several large sites, with particular reference to saproxylic species and fungus gnats. Table 2 shows the comparison of recorded numbers of fungus gnat species against those according to the SAR for those sites from Table 1, for which this group was comprehensively recorded. The sites are arranged in decreasing order of area, but the actual recorded numbers show a far from steady decrease, with a high for Windsor Forest and a low for Thorne and Hatfield Moors (which have fewer habitats suitable for fungus gnats). This shows that habitat preferences for smaller groups of Diptera can overwhelm the overall effect of area, as seen above for craneflies and hoverflies.

Table 2. Comparison of recorded numbers of fungus gnat species with the number predicted by the species-area relation derived from the larger Diptera (Fig. 1).

Region or site	Number of species from SAR	Recorded number
Great Britain	575	575
Ireland	507	301
Yorkshire	394	361
Thorne and Hatfield Moors	182	53
Windsor Forest and Great Park	172	300
Bushy Park	143	168
Scadsbury Moor (Malaise)	84	223
Burridge Common	71	81
Locks Park Farm (hedge)	65	141

The number of vice-counties in Britain is 112, so the SAR gives a proportion of species in an average vice-county of $(1/112)^z$ = 54.5%. For the Empididae this gives a figure of 113.4 species: this is fairly consistent with fig. 2 of Plant (2014), which is a map of species recorded by vice-county with an upper range of 111-140 attained in some of the vice-counties in Cumbria and Yorkshire. However, Plant also placed Lancashire and Cheshire in his lowest range of 30-50 species. This is well below current numbers, which are close to the SAR line for V.Cs 58 and 59

(Brighton 2019), because much of the data has not been entered in the Empididae and Dolichopodidae Recording Scheme.

Plant *et al.* (2017) looked at the species richness of the whole Empidoidea in an array of 50×50km squares across the whole of Britain. The SAR gave a species richness of 392.7 for a square of this size, only slightly greater than the average vice-county, while Plant *et al.* found a range from 1 to 413 with an average of 152.3. The contour map in their fig. 3A again showed Lancashire and Cheshire to be severely under-represented in their dataset. They also noted that species richness in hectads (10×10km squares) ranged from 1 to 223. This compares with a figure of 259.6 from the SAR, suggesting a significant degree of incompleteness in the species list even for the best recorded hectad.

Chandler (2022) enumerated species recorded in Ireland for each family, and these have been included in Tables 1b and 2 and in Fig 1. The proportion of species from the SAR is 88% but actual number for the larger Diptera is only 52%. The highest values for the subgroups are 62% for craneflies and 64% for hoverflies, which would be expected to be the most thoroughly recorded. Does this reflect the barrier to dispersal presented by the Irish Sea? As a counter to this interpretation, the number of chironomid species on the Irish list amounts to 83% of the British total.

Conclusion

The species-area relation is a powerful tool for assessing and comparing Diptera species richness patterns in sites and habitat patches of widely differing areas. It has been frequently described as one of the few general laws in ecology, though the term "macroecological pattern" might be preferable (Lawton 1999). Our results are derived from a small number of readily available datasets in a limited range of locations, but they are consistent with the general understanding of the SAR in data studies from flora and fauna across the world. The pattern becomes apparent only by looking at the full range of areas spanning over 11 orders of magnitude. If attention is restricted to the cranefly and hoverfly data over scales from the 100m square to the hectad, the trend is scarcely perceptible.

The overall findings of this study can be summarised in Table 3 as a "ready reckoner" of the percentage representation for any group for different areas across the range of *z* values in which most of our data lies.

Table 3: variation of the percentage representation of any species group with area and value of the power-law slope *z*

	Area				
Slope *z*	1 sq. m.	1 ha.	1 sq. km.	10 km. square	100 km. square
0.1	7%	18%	29%	46%	73%
0.13	3%	11%	20%	37%	67%
0.15	2%	8%	15%	31%	63%

While individual species distribution maps are readily available from sources such as the NBN Atlas, there is still only limited understanding of the overall Diptera species richness in different regions and habitats. Is there an overall decrease with latitude, or just a turn-over in the species mix? Laurence (1996) reported comparative surveys in five contrasting habitats spread over the whole country. Only 14 out of over 1000 species were recorded at all five sites; 90%

were found only in one or two of the sites; and the highest species count was from Orkney and Shetland!

Matthews *et al.* (2021) provided examples of use of the SAR to identify biodiversity hotspots, to predict the likelihood of extinction from habitat loss, and to examine the effects of habitat fragmentation (see also Phillips *et al.* 2018). All of these may be relevant to Diptera conservation in Great Britain. The amount of recording has greatly increased in recent decades, so there is a great potential for exploring these issues if the data are collated and made available in ways that allow them to be readily processed.

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Dipterists Digest 2023 **30,** 14-16

Thoracochaeta lanx Roháček & Marshall (Diptera, Sphaeroceridae): the first new records for the British Isles since the holotype was collected in 1999

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Summary

Thoracochaeta lanx was first found at Pagham Beach, West Sussex (UK) in 1999 by M.P. Gallagher and subsequently described by Roháček and Marshall (2000) in their World Revision of the family. No further records of *T. lanx* have been made until 2022, when a single specimen was identified from material collected in 2004 in Kent. Subsequently, more specimens have been discovered from strandlines on several beaches in Devon.

Introduction

Seven species of *Thoracochaeta* are in the current checklist of Diptera of the British Isles (Chandler 2022): *T. zosterae* (Haliday)*, T. brachystoma* (Stenhammar)*, T. valentinei* Roháček & Marshall*, T. erectiseta* Carles-Tolrá*, T. seticosta* (Spuler)*, T. johnsoni* (Spuler) and *T. lanx* Roháček & Marshall. *Thoracochaeta lanx* has not been recorded since the holotypes were collected in 1999 (Roháček and Marshall, 2000; Roháček *et al*. 2001; Marshall *et al*. 2011). Without close inspection *T. lanx* could be mistaken for the widely distributed, frequently abundant and less habitat-dependent *T. zosterae* (Roháček and Marshall 2000), which may account for the lack of records of *T. lanx* thus far. As with many species of Sphaeroceridae, to gain a reliable determination, dissection and clearing of the abdomen are usually required, although some paler specimens (e.g. tenerals) show enough detail to allow accurate species determination. Once the abdomen is cleared, identification is quite straightforward, as the genitalia of both the male and female are distinctive.

Methods

The discovery of a single female *T. lanx* was made by DB in 2022 whilst working on material collected from Deal in Kent by SH in July 2004. The specimen had been collected from sieved and washed strandline material whilst surveying for beetles and spiders. It was subsequently stored in alcohol for 17 years, and although faded and discoloured, was in generally good condition. The remaining material from seven other sites in Kent was identified and included *T. zosterae, T. brachystoma, T. erectiseta and T. seticosta*, but no other *T. lanx* specimens were found in the Kent collection.

Subsequently, several more specimens of *T. lanx* have been collected from beaches in East Devon: Budleigh Salterton, SY076819 (DB), Seaton, SY239897 (DB), Beer, SY229889 (DB and MW) and Weston Mouth, SY164879 (AC). All but one of the Devon specimens were collected along or close to strandlines on pebble beaches, either by sweeping, sieving, or by using an adapted hand (car) vacuum. In all cases, strandline material was very dry and often sparse. The single specimen not collected from strandline material was swept from bare mud at low tide by DB from the edge of a tidal inlet behind a banked pebble beach at Budleigh Salterton.

Date	Locality	Males	Females
22 Mar 2022	Budleigh Salterton	1	0
24 Mar 2022	Beer	2	1
28 Mar 2022	Seaton	2	0
12 Apr 2022	Budleigh Salterton	0	1
23 May 2022	Weston Mouth	1	0
24 May 2022	Beer	3	3

Table 1. Dates and number of specimens of *T. lanx* collected in Devon in early 2022

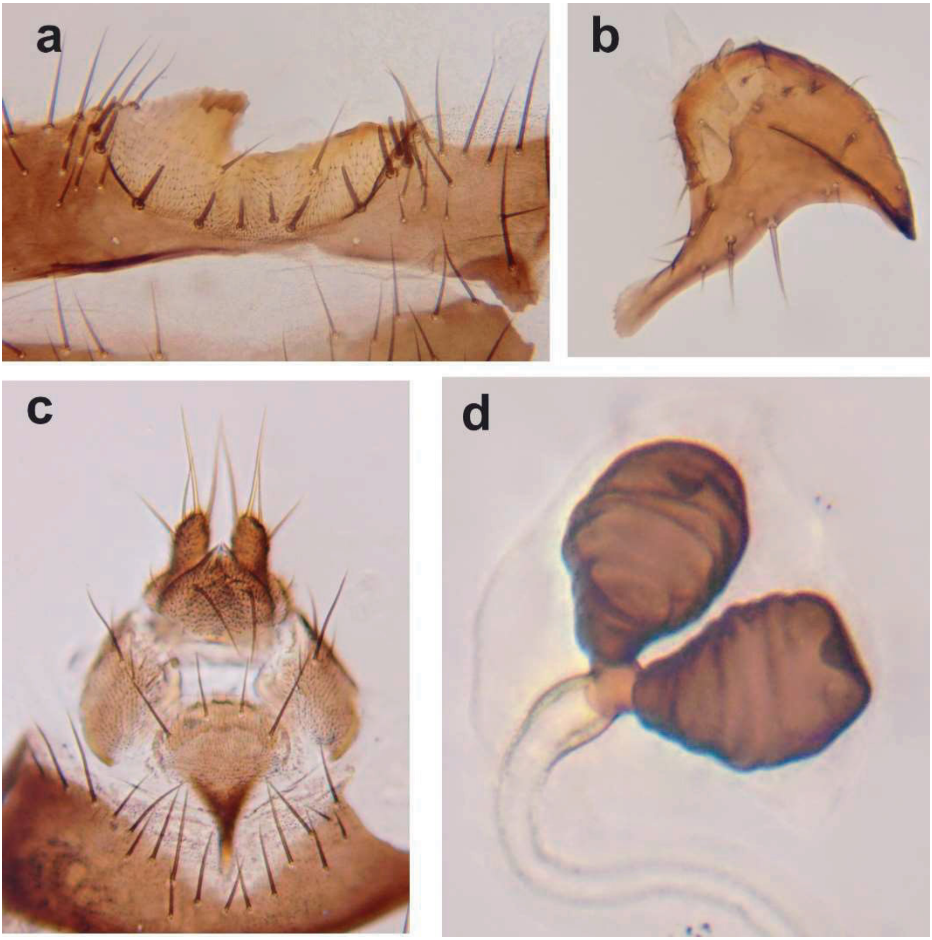

Fig. 1. Morphological features used in the identification of *Thoracochaeta lanx*: (a) male sternite 5, (b) surstylus, (c) female postabdomen (ventral), (d) spermathecae.

Identification

All specimens were identified from the key and illustrations in Roháček and Marshall (2000), with the dissected and cleared abdomens accurately matching descriptions. Fig. 1 shows some important features for the identification of *T. lanx*: the male sternite 5, surstylus, female (ventral) postabdomen and spermathecae. Photographs of slide-mounted material were taken using a GXSMART compound microscope (GT Vision) at magnifications between x100 and x400 and a 5.1Mp GXCAM camera (GT Vision). All images were taken by MW.

Discussion

Records of *Thoracochaeta* species in the British Isles seem to be sporadic, and the re-discovery of species that have been unrecorded for many years would suggest that they are much more widespread than previously thought. There are also very few records of this genus from Ireland, although a recent study (Hodge and Brice 2022) found five different species from 11 east coast marine strandline sites, including three species (*T. erectiseta, T. seticosta and T. valentinei*) new to Ireland. With *T. lanx* being present in Devon, it is possible that this species is also present in Ireland, especially along the south-east coast.

A recent study of strandlines in West Norfolk, V.C. 28 (Welch and Brice 2021) found over a thousand specimens of *T. johnsoni*, a species that had only three prior records and all of which were single specimens. With greater recording of strandline Diptera over the next few years it is hoped that a more widespread coverage of shorelines in Britain and Ireland can be achieved, together with a more accurate understanding of species' distribution and status, with the possibility that new species are present in the strandline.

DB would be happy to receive any 'unwanted' specimens from Britain and Ireland that fellow dipterists may have, or that are subsequently collected over the coming year.

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Dipterists Digest 2023 **30,** 17-20

Crabro scutellatus (von Scheven) (Hymenoptera, Crabronidae) is a host of *Metopia staegerii* Rondani (Diptera, Sarcophagidae)

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Summary
Based on the presence of *Metopia staegerii* Rondani, 1859 at an aggregation of the crabronid wasp *Crabro scutellatus* (von Scheven, 1781) over two years, this wasp is regarded as a probable host. The fly was recorded in 2001 and 2003, and these records are the first so far confirmed for Dorset, vice-county 9.

Introduction

The genus *Metopia* belongs to the sub-family Miltogramminae of the family Sarcophagidae and comprises around 40 species worldwide. All are cleptoparasites of wasps and/or bees, whereby their larvae eat the larval food provisions of their hosts; these may be flesh or pollen/nectar. Some species are specific to bees or to wasps, others exploit both types of hosts. There are five *Metopia* species on the British list (Chandler 1998, updated July 2022): *M. argyrocephala* (Meigen, 1824), *M. campestris* (Fallén, 1810), *M. staegerii* Rondani, 1859, *M. grandii* Venturi, 1953, *M. tshernovae* Rohdendorf, 1955.

Metopia staegerii was introduced to the British list by Wyatt and Falk (1995), who also recorded the presence of another new species *Metopia grandii* Venturi, 1953. As the records for *M. staegerii* date back to 1903 and span much of mainland Britain, from Devon to Scotland, this was clearly an example of an overlooked species, rather than of a new colonist. There are currently 32 confirmed records of *M. staegerii* on the NBN database (accessed 30/08/22). No hosts were recorded for these two new species, whereas hosts from the aculeate families Pompilidae, Vespidae, Sphecidae and Apidae were noted (by Wyatt and Falk 1995) for two widespread and common species, *Metopia argyrocephala* (Meigen) and *M. campestris* (Fallén)

Observations/Fieldwork

On 19/06/2001, I made a study of the nesting habits of the crabronid wasp *Crabro scutellatus* (von Scheven, 1781) (Fig. 1) at a heathland site in Dorset (SY802868). During the course of two hours of observations I became aware that a species of *Metopia* was in constant attendance, with several individuals present, including a mating pair. Aware of the significance of this observation - no cleptoparasitoids having been recorded for this wasp - plus the bonus of having access to a pair *in copula*, I retained the two mating flies. This was particularly fortunate as females of *M. argyrocephala, M. staegerii* and *M. tshernovae* are not currently separable, so it is useful to have access to a named female.

On 25/06/2003 I observed *M. staegerii* at the same site. On this occasion a full count of the number of host nests was made. 64 nests were present in two smaller aggregations of 52 and 12 nests, the two clusters separated by about 80m. Each aggregation occupied no more than two square metres, mainly clustered along the edge of the track but occasionally in open sand. Again, several individuals of both sexes of *M. staegerii* were present – unfortunately none *in copula* on this visit. The females showed interest in the burrows of *C. scutellatus,* frequently alighting on the sand in the vicinity of the nests. On both the 2001 and 2003 visits a male and female voucher of the attendant *Metopia* was retained. Both males proved to be *M. staegerii* and, although the presence of *M. argyrocephala* cannot be excluded, none were recorded.

Identification

Identification was based upon the 2001 and 2003 males, using the key in Wyatt and Falk (1995) and the excellent images on Falk's flickr pages for the UK *Metopia*. The setulae on the male fore tarsus allow diagnosis as *M. staegerii*. These setulae, while obvious, are much shorter than those of the fore tarsus of male *M. campestris*.

Discussion

The host ranges of the two commoner species of *Metopia* encompass an astonishing range of British aculeate superfamilies: Pompiloidea, Vespoidea and Apoidea (Wyatt and Falk 1995). When a fifth species, *Metopia tshernovae* Rohdendorf, 1955 was added in 2019 (Chandler 2020), the situation arose in which three of the five British species had no recorded hosts. Although it is possible that the five species are equally adaptable in their choice of host, a more likely scenario is that 'lumping' of data for the five taxa may have concealed ecological or taxonomic specialisations. It would be useful to have observations on the biology for the less common species *M. grandii*, *M. staegerii* and *M. tshernovae*; the current observations may shed some light on the issue.

Crabro scutellatus is a specialised predator of female dolichopodid flies. These are paralysed, then brought back in flight to the nest. Generally, nests are left open while the wasp is away hunting. This means that, on returning and after a brief moment of hovering, the wasp usually flies in without pause or alighting. These open and unguarded burrows are of great interest to *Metopia*. However, if for some reason the nest entrance has become obstructed, the wasp will set its prey down momentarily while it clears the entrance (Fig. 2).

Fig. 1. *Crabro scutellatus* (von Scheven).

Gathering data on hosts for cleptoparasitic insects is fraught with difficulties. There is a temptation to assign hosts on the basis of simple association at nest sites or observations of visits to nests where the occupier is known. The pitfalls with this approach are many. Good nest sites are at a premium and the very best may host a multitude of species nesting alongside. A visit to a nest may be exploratory and need not lead to one belonging to a suitable host. Above all, it is not always possible to confirm that the original nest-builder is the actual host, which may instead be a usurper or even another cleptoparasite.

Fig. 2. *Crabro scutellatus* female and *Dolichopus* species female prey

Pärn *et al*. (2015) used rigorous trap-nesting methods in a study of hole-nesting aculeates to exclude false host records. They were able to demonstrate a high degree of host/cleptoparasite specificity among the Chrysididae which was not apparent using only field observations or less thorough methods. This explained how a number of species of *Chrysis*, a morphologically homogeneous and speciose genus, could co-exist. Could it be that similarly tight relationships exist between miltogrammine species and their preferred hosts, something concealed by the paucity of detailed prey records? Such a study, though, is at a level of rigour that can generally only be aspired to. If we were to exclude any observations that didn't match this 'gold standard' the number of records would be vanishingly small. Furthermore, trap-nesting studies have the advantage that artificial nests can be deployed in numbers and subsequently brought into the laboratory, where individual nests can be isolated and opened for detailed examination. This is not an easy option with fossorial species nesting in loose sand.

In Dorset I was able to study what appeared to be a 'pure' aggregation of *Crabro scutellatus*. Of more significance was the observation that *Metopia staegerii* was present in two different years, two years apart. This adds support to the relationship being genuine, and not the result of a one-off chance encounter.

Crabro scutellatus is unlikely to be the only host for *Metopia staegerii*. The wasp has a limited range, extending from Dorset in a narrow, diagonal band across the heaths of Hampshire, Sussex, and Surrey to East Anglia (Else 1997). By contrast, the records listed in Wyatt and Falk for *M. staegerii* far exceed this distribution, extending as far west as Devon and north to Scotland. It would be interesting to see what other host records from other parts of this range might reveal.

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The status of *Cryptonevra consimilis* (Collin) (Diptera, Chloropidae)

─ There are differing opinions on the status of *Cryptonevra consimilis* (Collin, 1932). M. Grochowska (2007. The morphology of adults of *Cryptonevra* Lioy, 1864 species (Diptera, Chloropidae) occurring on the common reed (*Phragmites australis*). *Acta zoologica Academiae Scientiarum hungaricae* **53**(2)**,** 97-106) considered *C. consimilis* to be a synonym of *C. flavitarsis* (Meigen, 1830). This was followed by M. Ebejer and R. Andrade (2015. The Chloropidae (Diptera: Brachycera) of mainland Portugal with description of a new species of *Lasiosina* Becker. *Entomologist's Monthly Magazine* **151,** 227-271). J.W. Ismay (1994. A revision of the British *Neohaplegis* Beschovski and *Cryptonevra* Lioy (Dipt., Chloropidae). *Entomologist's Monthly Magazine* **130,** 1-18) considered the species to be distinct, and was followed by E.P. Nartshuk and H. Andersson (2013. The Frit Flies (Chloropidae, Diptera) of Fennoscandia and Denmark. *Fauna entomologica scandinavica* **43,** 1-282).

The external differences between *C. flavitarsis* and *C. consimilis* are slight. The abdominal setulae are dark in *C. flavitarsis* and white in *C. consimilis*, although there are some specimens considered to be *C. flavitarsis* that have partially or entirely pale abdominal setulae. The anterior tibia is black or black with a yellow apex in *C. flavitarsis*, but yellow in *C. consimilis.*

The male genitalia are similar in both species, but there is a constant difference in the internal sclerite that projects into the back of the epandrium from the cerci. This sclerite connects the hypandrial arms to the bases of the cerci. It is narrow and apically pointed in *C. consimilis* but finger-like and rounded apically in *C. flavitarsis*. The sclerite is difficult to see without mounting the epandrium on a slide or mount and examining it under a monocular microscope. An examination of the genitalia of the specimens, together with the variant abdominal colouration mentioned above revealed their identity.

It is worth noting that the two other British species of *Cryptonevra* (*C. diadema* (Meigen, 1830) and *C. nigritarsis* (Duda, 1933)) show differences in the internal sclerite of the epandrium (Ismay 1994. *op. cit*.). Furthermore, K. Kanmiya (1983. A systematic study of the Japanese Chloropidae (Diptera). *Memoirs of the Entomological Society of Washington* **11,** 1-370) illustrated those Japanese species of *Cryptonevra* (*C. sasae* (Nartshuk, 1978), *C. inquilina* Kanmiya, 1983 and *C. praestans* Kanmiya, 1983) that have a similarly developed internal sclerite of the cerci, but differently shaped in each species. Kanmiya's illustration of the internal sclerite of *C. diadema* from Japan agrees well with the illustration by Ismay (1994) from a British specimen. This indicates that the sclerite is a reliable character.

It is concluded that *C. consimilis* is a good species, distinguishable from *C. flavitarsis* ─ **J.W. ISMAY,** Life Collections, Oxford University Museum of Natural History, Parks Road, Oxford, OX1 3PW, UK

Dipterists Digest 2023 **30,** 21-24

The aspen hoverfly *Hammerschmidtia ferruginea* (Fallén) (Diptera, Syrphidae) in Deeside

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Summary
After a gap of some 30 years the presence of the aspen hoverfly, *Hammerschmidtia ferruginea* (Fallén,1817), is confirmed in Deeside, Aberdeenshire. The methods used to re-establish the population are discussed.

Introduction
The aspen hoverfly *Hammerschmidtia ferruginea* (Fallén, 1817) is a saproxylic species which is reliant on a regular supply of large, over 25cm diameter, fallen aspen (*Populus tremula,* Salicaceae) to sustain its larvae (Rotheray *et al*. 2009). Previously only known in Britain from a few Scottish records, the first comprehensive survey of the aspen hoverfly was carried out in 1990 (MacGowan 1990). This report found that the British population is centred in Strathspey, with several smaller, more isolated, populations along the River Findhorn, Loch Ness-side, south-east Sutherland and on Deeside. Since that time the aspen hoverfly has been intensively studied and monitored in Strathspey, with adults or larvae also being recorded at relatively regular intervals at the smaller outlying sites.

The exception to this is Deeside. One larva was observed in wet decaying cambium below the bark of a large fallen aspen in Dinnet Oak Wood SSSI (NO4697) by Graham Rotheray and myself in 1990; the specimen was not retained and no photograph was taken. Apart from this record, the species has not been seen in Deeside since that date. The Dinnet site comprised a rather small stand of aspen in what was primarily an oak wood. However, it is situated some 3.5km SE of the largest aspen stand in Deeside at Muir of Dinnet NNR (NO4399), a distance which is well within the dispersal range of the aspen hoverfly (Rotheray *et al*. 2014).

As part of a national review of all known aspen hoverfly sites, Rotheray (2006) included details of survey work undertaken at Dinnet Oak Wood and Muir of Dinnet in 1999, 2003 and 2005. It revealed that, as expected, the small Dinnet aspen stand did not produce the continuity of large dead aspen which is required to sustain aspen hoverfly populations. Although two dead trees of suitable size and state of decay were found in 1999, there were none in 2003 or 2005. In contrast, the Muir of Dinnet site, with an estimated 9.5ha of aspen, contained seven, five and two pieces of suitable decaying wood in these respective years. A larger amount of suitably-sized fresh dead wood was also available at this site to maintain the resource into the future. Despite almost annual visits to Muir of Dinnet since 1995 and to many of the other larger aspen stands along the 30km of the River Dee between Dinnet and Braemar, no further adults or larvae of the aspen hoverfly were ever found. The larvae and puparia of this species are not too difficult to locate once the micro-habitat of decaying cambium in large fallen aspen is known. Similarly, the adults are relatively obvious when feeding on the flowers of trees such as rowan and bird cherry in early summer. However, after a period of nearly 30 years without a confirmed sighting of the aspen hoverfly in Deeside, the conclusion was reached that the species had become locally extinct.

The most likely reason for the local extinction would seem to have been a break in the continuity of large dead aspen available in the area, perhaps due to past management which had reduced the number of large trees, inhibited regeneration and increased the isolation of stands.

Influencing factors in re-instating the population

It was considered that climatic factors in Deeside were likely to be favourable for the hoverfly. The area is one of the most "continental" areas of Scotland with relatively lower rainfall, higher sunshine and lower winter temperatures than most of the country. As such it is well suited to many species of boreal woodland insects, many of which, like the aspen hoverfly, are more common in Scandinavia. Since the aspen hoverfly was last seen in Deeside, the Cairngorms National Park has been established, in 2003. The Park area includes not only all of the Strathspey aspen sites, but also all those in Deeside. The National Park has promoted the expansion of native woodlands and has also highlighted the importance of aspen within the Park, with several initiatives in place to regenerate existing aspen stands or to plant in appropriate areas. The aspen stand at Muir of Dinnet has also matured and expanded over the last 30 years under a policy of encouraging woodland regeneration. It was against this background that the conditions seemed favourable to bring the aspen hoverfly back to Deeside.

Fig 1. Large standing and fallen aspen at Muir of Dinnet NNR, May 2019.

In early 2019, I visited the Muir of Dinnet site with SNH staff, including the reserve officer. We assessed the capability of the site to provide sufficient habitat for aspen hoverfly larvae at that time and into the foreseeable future (Fig. 1). We were all in agreement that, based on the experience gained of working with this species in Strathspey, the conditions were favourable for bringing the species into the site. Subsequently the relevant consents were obtained from SNH to allow this action to take place. This proposal was also endorsed by the Hoverfly Steering Group, with advice on conservation efforts relating to the aspen hoverfly and also to the pine hoverfly *Blera fallax* (Linnaeus, 1758).

Fig. 2. Sandwich box containing puparia in position below a large fallen aspen.

Establishing the population

In spring 2019 there was a substantial amount of large decaying aspen present in Strathspey, and accordingly on 1 May twelve puparia were collected, eight from two aspen logs at a site north of Aviemore and four from a single log at a site near Alvie. The puparia were found in areas of dry cambium adjacent to the wet decay in which the larvae had developed. These were placed in a plastic sandwich box along with sections of the material in which they were found. On 5 May the sandwich box, with the lid taped approximately 2cm open to allow emerging adults to escape, was placed below a large fallen aspen at Muir of Dinnet (Fig. 2). This particular tree was over 25cm in diameter and was estimated to have been dead for approximately 18 months, as patches of wet decaying cambium were forming under the bark. Other suitable large decaying trees were in the vicinity.

The intention was to revisit the aspen stand in the spring of 2020 to look for any resulting larvae or adults, but this had to be put on hold due to the restrictions of the Covid pandemic, a situation which persisted into 2021. It was not until 10 June 2022 that the site was next visited, and I was pleased to find eight adults feeding on rowan and elder flowers on the edge of the aspen stand (Fig. 3). No doubt there were other individuals in the vicinity which were not observed. Whilst there is of course the possibility that these individuals originated from an undetected population which had persisted in the area, it seems more probable that they were descendants of the flies that emerged from puparia introduced in 2019. If this is the case, the aspen hoverfly had gone through three entire generations since the puparia were placed in the site in the spring of 2019, indicating that the conditions were favourable for sustaining a population.

Fig. 3. A male aspen hoverfly feeding on elder flower. Muir of Dinnet NNR, June 2022.

It is hoped that the establishment of this new population will act as a locus from which further expansion of the aspen hoverfly into the Deeside aspen stands can be achieved and, in time, facilitate the establishment of a viable metapopulation in the area.

Acknowledgement
Thanks to Graham Rotheray for comments on a draft.

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Dipterists Digest 2023 **30,** 25-26

A new host plant for *Euleia heraclei* (Linnaeus) (Diptera, Tephritidae)

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Summary
Euleia heraclei (Linnaeus, 1758) is recorded as a leaf miner of columbine *Aquilegia vulgaris*.

On 16 May 2022 BPW observed tenanted leaf mines on a single plant of *Aquilegia vulgaris* (Ranunculaceae) from his garden at Hessle, East Yorkshire, V.C. 61, which did not agree with either of the Agromyzidae species *Phytomyza aquilegiae* Hardy, 1849 and *Phytomyza minuscula* Goureau, 1851, both known to mine the leaves of this host. The mines started with a relatively short but broad initial corridor, quickly turning white and soon broadening into a blotch, with conspicuous secondary feeding lines and frass deposited in large individual grains (Figs 1-3). Only one larva per mine was observed, with the larva being able to vacate the mine and start a new one in a fresh leaf.

Figs 1-2. Early mines of *Euleia heraclei* on *Aquilegia vulgaris*.

As the mines developed, it was clear they did not belong to Agromyzidae owing to the cephalo-pharyngeal skeleton and size of the larvae. From the collected mines, three puparia were obtained which showed them to belong to Tephritidae, and BPW contacted LC, organiser of the Tephritidae Recording Scheme, to ascertain if any species had been reported from this plant previously. A perusal of the major European literature of the family (Hendel 1927, Séguy 1934, Merz 1994, Smit 2010 and White 1988) by LC proved negative, but it was also known that some species of Tephritidae have anomalous host plants. For example *Trypeta zoe* Meigen, 1826 was assumed to have been a leaf miner exclusively on Asteraceae until reared from *Ajuga reptans* (Lamiaceae) by Bland and Rotheray (1994) whilst Niblett (1957) stated that *Euleia heraclei* (Linnaeus, 1758), a broadly oligophagous species on Apiaceae, is a leaf miner on *Cirsium arvense* (Asteraceae); this was repeated by White (1988), where *Arctium lappa* (Asteraceae) was queried.

All three puparia produced adults, with females emerging on 13 and 14 June; upon examination these were identified as the distinctive *Euleia heraclei* (pale form). This rearing result represents the first known occurrence of *Euleia heraclei* on a host within the

Ranunculaceae. None of the known host plants of *Euleia heraclei* is present at the collecting site and, while a single member of the Apiaceae *Ligusticopsis wallichiana* occurs in the same herbaceous border, no mines were observed on this individual plant.

Fig. 3. Completed *Euleia heraclei* mine on *Aquilegia vulgaris*.

Euleia heraclei can be a pest on parsnip *Pastinaca sativa*, celeriac *Apium graveolens* var. *rapaceum*, parsley *Petroselinum crispum*, lovage *Levisticum officinale* and related plants, often causing a serious check to growth resulting in smaller plants with a bitter taste. Although the leaves of *Aquilegia vulgaris* were severely eaten, there was no effect on the flowering or seed-production capability of the plant.

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Heleomyzidae at a deer corpse in East Yorkshire 2020

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Summary
Heleomyzid flies visiting a fallow deer (*Dama dama*) corpse in East Yorkshire were collected throughout the months February to October. *Heleomyza serrata* and the three UK inland carrion species of *Neoleria* were abundant at the corpse at different times and there appears to be a clear succession in the peak appearance of each species.

Introduction

Allerthorpe Common (SE755480) is a small Forestry Commission plantation of mainly Scots and Corsican Pine on a former area of lowland heath on the eastern edge of the Vale of York. There is a population of roe deer within the Common, and it is not unusual for the occasional one to be found victim to a vehicle strike beside the main road through the wood, at any time of year. Casual observation of a couple of corpses in recent years had shown that, on deer which die early in the year, Heleomyzidae are one of the most obvious components of the dipteran fauna, particularly *Neoleria* species.

On 26.i.2020 a fallow deer doe was discovered dead on a roadside a few miles away from Allerthorpe Common and was moved to a secluded part of the Common for observation, with the deer estimated to have died three days earlier on 23.i.2020. The deer had no open wounds apart from some grazing around the nose and some fresh blood exuding from the mouth. There was an obvious impact mark on the left mid abdomen, but it did not yet show any signs of a distended abdomen, nor any sign of fly strike, which is understandable as the temperature was only a few degrees above freezing at the time.

Observations

The corpse was visited when demands of work would allow through January and February; the intention of closer monitoring through the spring and summer was somewhat constrained by Covid-19 restrictions, but visits were still made when possible through to the year end, and at least 5 visits per month were achieved. The benefit of a corpse laid out so early in the year at this site is that Calliphoridae and Muscidae scarcely visit a corpse at all until the temperature regularly rises to over 10°C (in mid-March, this year) and so decomposition is very slow, with minimal larger maggot infestation. Indeed, at no stage of this deer's decomposition did calyptrate flies dominate and so for the first three months Heleomyzidae, Sphaeroceridae and the sepsid *Themira nigricornis* (Meigen, 1826) were the predominant larger Diptera visible around the corpse, often in very large numbers.

At each visit, three figure-of-eight sweeps of a 15 inch diameter net were made over the corpse, as close as possible to the body in order to disturb any flies on the surface. All heleomyzid flies caught were retained in pots for later identification. The number of each species and dates of collection are in Table 1 below. This method of collection worked quite well as heleomyzids are not quick to disperse when approached, unlike muscids and calliphorids. It was obvious, however, that on certain occasions numbers of flies present on vegetation around the corpse (mainly bramble *Rubus fruticosus* agg. and ground elder *Aegopodium podagraria*) were far higher than the swept results would suggest.

Seven species of Heleomyzidae, as listed below, were found in this manner. In addition *Heteromyza rotundicornis* (Zetterstedt, 1846) was found through collection of larvae from below the deer's head on 3.iii.2020. Several of these larvae pupariated and five females emerged on 23.iv.2020. The species was not seen upon, or collected from, the corpse as an adult, so it appears not to have used the corpse for daytime displaying and mating unlike this behaviour by the *Neoleria* species and *Heleomyza serrata* (Linnaeus, 1758).

The first and last dates for each species were as follows:

Neoleria propinqua Collin, 1943	3.ii – 28.iii (196 individuals over 54 days)
Neoleria ruficauda (Zetterstedt, 1847)	14.iii – 31.v (271 individuals over 61 days)
Neoleria inscripta (Meigen, 1830)	11.iv – 2.x (163 individuals over 252 days)
Scoliocentra villosa (Meigen, 1830)	7.iii – 24.iii (5 individuals over 17 days)
Heleomyza serrata (Linnaeus, 1758)	4.iii – 26.iii (109 individuals over 22 days)

In addition, *Tephrochlamys rufiventris* (Meigen, 1830) and *Morpholeria ruficornis* (Meigen, 1830) were each represented by single flies, which may just have been incidental visitors to the corpse.

There are six species of *Neoleria* in the British Isles, of which two (*N. maritima* (Villeneuve, 1921) and *N. prominens* (Becker, 1897)) are predominantly coastal. Of the remaining four, *N. ruficeps* (Zetterstedt, 1838) is common in woods, but is fungus-associated and has no particular association with carrion. The three species attending this fallow deer represent the inland carrion-associated species of the genus, and these observations suggest that there may be a clear succession in the timing of each species at a corpse when it is present from early in the year (Fig. 1).

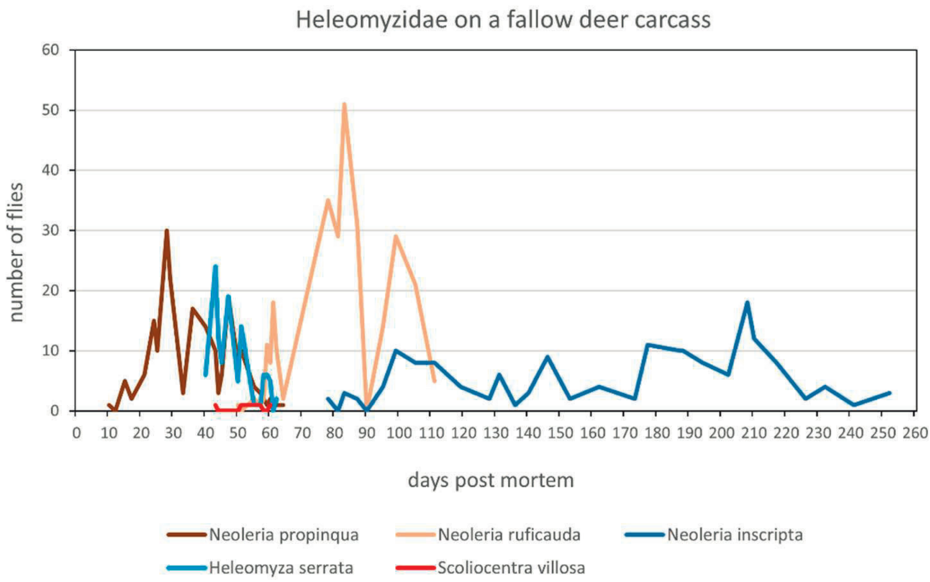

Fig. 1. Numbers of each species at the deer carcass to show the separate peak periods for each species.

Neoleria propinqua seems to be the species most active early in the year. Sivell and Hall (2018) noted the appearance of *N. propinqua* in the London NHM garden in December and then through the months January–March, and Andrews (2020) reported it in East Yorkshire on a badger corpse in February 2019 and in a bottle trap baited with chicken livers in January 2020. On this fallow deer, the first male appeared on the corpse on 3.ii.2020, estimated as 10 days post mortem (Figs. 2- 3). That increased to 5 males by 15 days and to 16 males by 21 days. Before the arrival of any females, males tended to congregate around the nose, ears or anus of the deer, those being the only areas where blood or body fluids were exuding from the corpse. The first females appeared 28 days post mortem, with two pairs *in copula* on the deer's head and over 30 males posturing around the corpse. In the presence of females, males walk around actively flicking their wings, both on the corpse and especially on vegetation around it, apparently jostling for the most prominent bramble stems and twigs upon which to display. The species was present on the corpse as adults for 54 days, with the peak being from 28–47 days post mortem. In the Provisional Assessment of the Status of Acalyptrate flies in the UK (Falk *et al*. 2016), this species was listed as flying between April and November and was given pNear Threatened status, though the comment was made that it is probably under-recorded. Sivell and Hall (2018), commenting on that status, encouraged more winter recording to clarify distribution and abundance. Records coming in to the UK Heleomyzid Recording Scheme suggest that it is not uncommon in England north to Yorkshire on carrion in winter, with recent records from pheasant, hare, fallow deer and roe deer — all between November and March. There is also a single record from a fish-baited bottle trap in Fife, Scotland in January.

Fig. 2. Fallow deer 10 days post mortem, when the first *Neoleria propinqua* appeared on the corpse.

Fig, 3. ***Neoleria propinqua*** **male on the corpse, 28 days post mortem.**

Fig. 4. ***Neoleria ruficauda*** **male on vegetation beside the corpse, 62 days post mortem.**

Neoleria ruficauda is also a species appearing in spring, but apparently a little later. The first male appeared on the corpse on 14.iii.2020, 50 days post mortem and 40 days after *N. propinqua* appeared, and past the peak of that species (Fig. 4). Numbers remained in single figures and male-only until 25.iii.2020, from which date the species was present in large numbers, peaking at 49 males and 2 females swept on 16.iv.2020. In the period from 78–105 days post mortem, there were very large numbers on the corpse and on nearby vegetation, often in excess of 100 males, behaving in a very similar manner to *N. propinqua* – that is they sought prominent positions from which to wing-wave and posture, within a two metre ring around the corpse.

Neoleria inscripta, stated by Smith (1986) to be the most common heleomyzid on carrion, was the last of the three to appear on the corpse, appearing first on 11.iv.2020, 78 days post mortem. It then remained on the corpse right through the summer, peaking in July and August, between 177 and 208 days post mortem. However, the peak numbers were lower than for the other two species and at no stage were males at all as obvious as those of *N. propinqua* and *N. ruficauda*. Males seemed to make less use of nearby prominent vegetation for displaying, preferring to posture and wing-wave on the ground close to the corpse.

Fig. 5. *Heleomyza serrata* male swept from the corpse in March, between 40 and 62 days post mortem.

Apart from the genus *Neoleria, Heleomyza serrata* (Fig. 5) was the most abundant heleomyzid to visit the corpse, peaking as *N. propinqua* numbers fell away and before *N. ruficauda* numbers started to increase – it seemed to take advantage of a small window of opportunity, wherein displaying by *Neoleria* males had largely ceased around the corpse. Compared to *Neoleria*, mating pairs were swept much more often, and perhaps copulation of pairs on top of the corpse rather than on nearby vegetation is more common in this species. It is worth noting that there has been much confusion in Britain surrounding the identification of *Heleomyza* *serrata* and *Heleomyza captiosa* (Gorodkov, 1962); all those checked in this study either conformed exactly to Papp's (1981) diagram of the male surstylus of *serrata* or exhibited surstyli apparently intermediate between his diagram of each species. The view is taken here that those intermediate types are variation within *serrata*, and that true *captiosa* as shown by Papp seems not to be present in any material seen by the author so far.

Scoliocentra villosa was swept five times as single males between 07.iii.2020 and 24.iii.2020. Observation prior to sweeping suggested that in the absence of females, these males were not displaying, rather just statically awaiting the arrival of females to kick-start them.

Clearly this was only one corpse and it was a warm year, with daytime temperatures above 5°C throughout the whole period; it would be worth repeating the observation to confirm the phenology.

Date	**Days post mortem**	***Neoleria propinqua***	***Neoleria ruficauda***	***Neoleria inscripta***	***Scoliocentra villosa***	***Heleomyza serrata***
03/02	10	**1**				
05/02	12	**0**				
08/02	15	**5**				
10/02	17	**2**				
14/02	21	**6**				
17/02	24	**15**				
18/02	25	**10**				
21/02	28	**30**				
22/02	29	**22**				
26/02	33	**3**				
29/02	36	**17**				
04/03	40	**14**				**6**
07/03	43	**10**			**1**	**24**
08/03	44	**3**			**0**	**12**
09/03	45	**6**			**0**	**8**
11/03	47	**19**			**0**	**19**
14/03	50	**8**	**1**		**0**	**5**
15/03	51	**10**	**0**		**1**	**14**
19/03	55	**4**	**2**		**1**	**1**
21/03	57	**3**	**1**		**1**	**1**
22/03	58	**2**	**2**		**0**	**6**
23/03	59	**1**	**11**		**0**	**6**
24/03	60	**2**	**8**		**1**	**5**
25/03	61	**1**	**18**			**0**
26/03	62	**1**	**10**			**2**
28/03	64	**1**	**2**			
11/04	78		**35**	**2**		
14/04	81		**29**	**0**		
16/04	83		**51**	**3**		
20/04	87		**31**	**2**		
23/04	90		**0**	**0**		
28/04	95		**14**	**4**		
02/05	99		**29**	**10**		

08/05	105		**21**	**8**		
14/05	111		**5**	**8**		
22/05	119			**4**		
31/05	128			**2**		
03/06	131			**6**		
08/06	136			**1**		
12/06	140			**3**		
18/06	146			**9**		
25/06	153			**2**		
04/07	162			**4**		
15/07	173			**2**		
19/07	177			**11**		
29/07	187			**10**		
30/07	188			**10**		
05/08	194			**8**		
13/08	202			**6**		
19/08	208			**18**		
21/08	210			**12**		
28/08	217			**8**		
06/09	226			**2**		
12/09	232			**4**		
21/09	241			**1**		
02/10	252			**3**		

Table 1. Exact numbers of each species swept over the deer with date and days post mortem.

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The bee-louse *Braula* (Diptera, Braulidae) in Scotland

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Summary
Braula coeca Nitzsch, 1818, a generally harmless commensal of the Western honey bee *Apis mellifera* Linnaeus, 1758, has declined markedly in Scotland since the arrival of the parasitic mite *Varroa destructor* Anderson & Trueman, 2000 in Britain in 1992. It is killed by the treatments used to control *Varroa*, and now persists only on a few islands which are free of the mite. Options for conservation action should perhaps be discussed with the apiarist community.

Introduction

The bee-louse *Braula coeca* Nitzsch, 1818 (Plate 1) has long been known as an inquiline of the Western honey bee *Apis mellifera* Linnaeus, 1758 in Britain. Another species of the same genus, *B. schmitzi* Òròsi Pál, 1939 has become established as an alien of unknown origin in Bulgaria, Spain, France, Greece, Italy and Portugal (Skuhravá *et al.* 2010). It was found in England in 1994-95 in a pooled sample from locations in England and Wales (Dobson 1999). Of 157 specimens, 41 (26%) were *B. schmitzi*. A single male was found in Oxford in 2000 (Mann 2001). Recent work has revealed potential for transmission of viruses by *B. schmitzi* (Avalos *et al.* 2019). I have found no subsequent mention of *B. schmitzi* in Britain, but its potential presence means that while any *Braula* encountered in Scotland seem likely to be *B. coeca*, this cannot be assumed. Hence the use in this paper of the generic name, except where technical determination of the species has been made. *Braula coeca* has been confirmed since 2018 on Orkney, Raasay and Colonsay.

Once widespread in Britain, *Braula* has suffered serious decline as collateral damage in the efforts to control the parasitic mite *Varroa destructor* Anderson & Trueman, 2000[1].   Since it was first recognised in Britain in 1992, *Varroa* is now present in most bee-hives throughout the country, and its routine control has largely eliminated *Braula* from most of Scotland, England and Wales (Anon 2018; Sunderland 2021), and Ireland (Coffey 2007). Very recently some interest in *Braula* has arisen. The Iceni Microscopy Study Group[2] began an international survey in 2021. The Darwin Tree of Life Project[3] has included *B. coeca* in its work for 2022, stating "Formerly widespread, this species is now scarce in the UK, largely due to the increased use of pesticide treatments used to control varroa mites. It is the only species in the family Braulidae found in the UK, making it an important representative of this part of the Dipteran (fly) taxon". That statement ignores the discovery of *B. schmitzi* in Britain (see above). This paper attempts to describe the history and current status of *Braula* in Scotland, a country which is potentially very important to its survival in Britain.

[1] *Varroa destructor* Anderson & Trueman was separated from *V. jacobsoni* Oudemans only in 2000, so literature before that date uses the latter name.
[2] http://s600401157.initial-website.co.uk/Braula%20Survey.png accessed 8 September 2022.
[3] www.darwintreeoflife.org/news_item/9-species-our-scientists-are-excited-about-sequencing-in-2022/ accessed 8 September 2022.

Plate 1. *Braula coeca* females collected on Raasay. The scale bar represents 1mm.

The biology of *Braula*

Braula is commensal with the honey bee as a larva, burrowing through the comb and feeding on wax and pollen. They do not harm the bee larvae (Bailey and Ball 1991). Adults are mildly kleptoparasitic, feeding on food regurgitated by the bees in response to stimulation by the fly (Skaife 1921[4]; Digges 1944). They are phoretic and can be seen on foraging workers as well as in large numbers on queens in the hive. Digges (1944) cited a total of 133 *Braula* on a single queen, but that is dwarfed by the 187 *Braula* quoted by Phillips (1925), though usually only a few tens are seen on queens, and single adults on workers. Martin and Bayfield (2014) have described the chemical mimicry that allows *Braula* to remain unmolested by the hosts, while Büscher *et al*. (2021) have described the intricate adaptations which allow secure attachment to the hairs of the host.

In general, apiarists are unconcerned by its presence. Some of their comments are:

- *Braula* seldom cause great concern to bees, but … [tunnelling of the comb by the larvae] … detracts from the appearance of the finished product (Couston 1977).
- *Braula* spp. are not generally considered to cause any significant harm to honey bees, and the main impact of *B. coeca* occurs when the wax-lined larval tunnels spoil the appearance of honeycombs intended for show or sale (Dobson 1999).
- The main economic impact of braula fly occurs as a result of the larval stage burrowing under the cappings of honey combs. As most honey is extracted mechanically, braula fly does not pose a threat to regular liquid honey producers (Somerville 2007).
- The adults appear to do no significant damage in a bee colony, and most beekeepers ignore them. (Anon 2018).
- This visible tunnel is the most noticeable hive damage attributed to *Braula*. Although some consider this damage, it is only aesthetic damage and of minor economic importance (Ellis *et al*. 2010).
- They are never much of a problem, apart from disfiguring cut comb sections (Abrahams 2020).
- Beekeepers wishing to sell comb honey need to put the comb in a freezer for 24 hours; this process will kill the larvae. The customers now eat faeces and dead larvae as against eating live ones! (Sunderland 2021).
- Braula flies do little harm to honey bees (Dubash 2022).

[4] Skaife refers to the fly as *Braula caeca* throughout. I have not found this listed as a valid name. It appears to be a spelling error that has been repeated in a number of later publications in print and online.

The spread of *Varroa destructor*

The threat to *Braula* stems directly from the control of *Varroa destructor*, so it is valuable to have an overview of the origin of the problem. The biology of *Varroa*, its effects on bees, and methods of control are described by Noël *et al.* (2020). Its origin as a pest of honey bees and its subsequent global spread is well-documented by Traynor *et al.* (2020). Briefly, it was first described in 1904 in Japan as a parasite of the Asian honey bee *Apis cerana* Fabricius, 1793. In the 1950s it switched host to *A. mellifera*, and through the global trade in honey bees it has spread rapidly to every continent except Australia and Antarctica. Some remote island groups remained free of *Varroa*.

It was first detected in Britain in 1992, and by 2011 had spread to hives over much of Scotland[5]. Brown and Marris (2010) reported that it has "spread to affect nearly all apiaries in the UK, though it has not been confirmed in the Isles of Scilly or the Isle of Man and some parts of Scotland". It is difficult to determine the current distribution of *Varroa* in Scotland from published sources. SASA, a part of the Scottish Government previously known as the Scottish Agricultural Science Agency and latterly Science and Advice for Scottish Agriculture[6], has a map produced by the Scottish Beekeepers' Association dating from 2011. BeeBase[7], managed by the Animal and Plant Health Agency has no information on its distribution. The NBN Atlas[8] contains only three records, one each from Berkshire (vice-county 22) in 1997, Breconshire (vice-county 42 in 2019) and East Inverness (vice-county 96) in 2022. This low number surely reflects a lack of conversation between naturalist and apiarist communities. Contact with Scottish apiarists has clarified the position, which can be summarised with ease (see sources below). *Varroa* is present in hives throughout Scotland except for Orkney, Shetland, Raasay, Colonsay, Islay and possibly some other islands or remote areas. Some islands lack *Varroa* and *Braula* because they lack honey bees, often because the climate or weather there is unsuitable for apiculture.

Recent work (Andino *et al*. 2016) has shown that *V. jacobsoni*, previously considered a parasite only of *A. cerana* has evolved to affect *A. mellifera* in Papua New Guinea and the Solomon Islands. Given the history of spread of *V. destructor* this represents another potential threat to the honey industry and, indirectly, to *Braula*.

Control of *Varroa destructor*

Incidence of *Varroa* is reportable by law in Scotland under the Bee Diseases and Pests Control (Scotland) Order 2007[9] as amended by the Bee Diseases and Pests Control (Scotland) Amendment Order 2021[10]: "Any owner or person in charge of a hive who knows or suspects that any species of the *Varroa* mite is present in the hive must report, as soon as practicable, that fact to the Scottish Ministers". There is a legal distinction between a 'reportable' pest and a 'notifiable' one. *Varroa* is not 'notifiable', and so is not subject to the stringent control measures applicable to that category. The Scottish Government is currently implementing a strategy for control of *Varroa* and European Foulbrood[11].

Brown *et al.* (2020) described the UK Government's advice on all aspects of *Varroa*, including details of chemical and non-chemical (biotechnical) control, and their respective advantages and disadvantages. There is no reference to the lethal effects on *Braula*.

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[5] http://www.sbai.org.uk/varroamapping/ accessed 8 September 2022.
[6] https://www.sasa.gov.uk/wildlife-environment/bee-health/varroa accessed 8 September 2022.
[7] https://nationalbeeunit.com/index.cfm?pageid=93 accessed 8 September 2022.
[8] https://species.nbnatlas.org/species/NHMSYS0020546308 accessed 8 September 2022.
[9] https://www.legislation.gov.uk/ssi/2007/506/contents
[10] https://www.legislation.gov.uk/ssi/2021/91/made
[11] https://www.gov.scot/publications/scotlands-honey-bee-health-strategy-implementationplan/pages/varroa-controls/

In 2022, the UK Government's Veterinary Medicines Directorate[12] listed as currently AVM-GSL [= authorised veterinary medicine general sales list] 'over the counter' products for treating *Varroa* infestations, that is those treatments containing formic acid, oxalic acid, thymol, tau fluvalinate, Amitraz, camphor, Eucalyptus oil, and levomenthol. These are intended as acaricides but are lethal to *Braula* as well.

Decline of *Braula*

Two 19th Century works on bee-keeping in Britain (Howatson 1827; Neighbour 1865) do not mention *Braula* or effects on the comb that might have been attributed to its presence. Hunter (1884) wrote "I have found this pest [*Braula*] several times on imported Ligurians [i.e. Italian honey bees]; but the climate of England does not, fortunately, appear to suit them, for they have soon disappeared". Despite the dearth of detailed information it seems clear (e.g. from Digges 1944) that in the 20th Century *Braula* was a common and widespread commensal of *Apis mellifera* in Britain, including Scotland (Fig. 1), and mainland Europe. This raises the possibility that it might be a 19th Century introduction from mainland Europe to Britain.

Comments from apiarists, while anecdotal, confirm the serious decline in *Braula* as a consequence of *Varroa* treatment. Some examples follow.

- The chemicals which kill *Varroa* are also effective against *Braula* so *Braula* is now becoming a rarity (Anon. 2018, from Scotland).
- *Braula* used to be quite common but Bayvarol saw them off and I haven't seen one in the UK since the 90s. The last one I saw was in Eire in 2000 and it was so long since I had seen one that I had forgotten about them and thought for a moment that I had made the first discovery of *Varroa* in Eire (https://adventuresinbeeland.com, 2013, from UK and Ireland).
- Since beekeepers started treating against varroa with miticides, *Braula coeca* numbers have plummeted, but they used to be regularly observed riding the back of adult bees like little jockeys (https://adventuresinbeeland.com, 2013, from England).
- *Varroa* miticides have all but eradicated it. Maybe Isle of Man and Colonsay bees have it (https://beekeepingforum.co.uk, 2020, from Wales).
- [*Braula*] is eradicated by *Varroa* treatments so hardly ever seen anymore (https://beekeepingforum.co.uk, 2020, from England).
- The bee louse (*Braula coeca*), now absent in most of the world's honey bee populations, still makes a living on Colonsay (Abrahams 2020).
- They are rarely seen on the UK mainland where varroa treatments have pretty much eliminated them (Dubash 2022).

Strauss *et al.* (2014) showed that *Braula* coexists with *Varroa* on *A. mellifera scutellata* Lepeletier, 1836 in South Africa where acaricide use in hives is very low. This suggests that acaricide treatment rather than competition is a cause of the decline of *Braula*.

Distribution

Information on the current distribution of *Braula* in the entomological literature is very limited. Mann (2001) examined 32 specimens of *B. coeca* in museum collections. Most were taken between 1894 and 1977 from four vice-counties in England and Wales, but 10 were from Scotland at Muir of Ord, vice-county 106, East Ross, in 1954. Other old pre-*Varroa* records in entomological resources are from Perth in 1907 (Waterston 1910); from Edinburgh in 1912 and Brechin in 1963 (specimens in the collection of the National Museums of Scotland); and from Aberdeen in 1985 (NBN Atlas[13]). These and the SASA data from 1989-1993 plotted in Fig. 1

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[12] https://www.gov.uk/government/organisations/veterinary-medicines-directorate accessed 8 September 2022.

[13] https://records.nbnatlas.org/occurrences/search?q=lsid:NBNSYS0000131008 accessed 8 September 2022.

show that *Braula* was widespread in Scotland pre-*Varroa*. Records from entomologists since the arrival of *Varroa* are from Orkney in 2018 and 2022 (Johnson 2018, D. Mayes *pers. comm.*). Else and Edwards (2018) in their account of *A. mellifera* mention only that *Braula* has "been observed recently in Orkney and the Isle of Man".

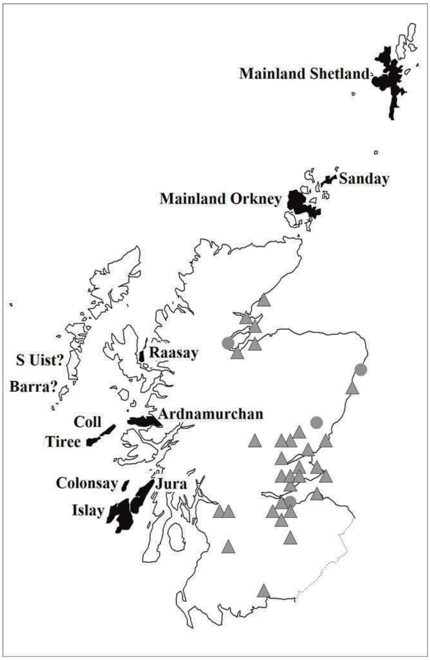

Fig 1. Current distribution of *Braula* in Scotland at island or peninsula precision (black fill). The situation on the Western Isles is uncertain. Symbols show pre-*Varroa* records at hectad precision though some may properly belong in adjacent hectads. Triangles are from SASA, circles from other sources (see text).

The apiarist community is, unsurprisingly, much more informed, and have reported that *Braula* is present in hives on Mainland Shetland, vice-county 112 (A. Nicol *pers. comm.*); Mainland and Sanday in Orkney, vice-county 111 (H. Aiton and S. Clackson *pers. comms.*); Raasay, vice-county 104 (S. Letzer *pers. comm.*); Colonsay, Coll and Tiree, vice-county 103 (A. Abrahams, B. Reynard, M. Vale *pers. comms.*); Jura (G. Kitching, *pers. comm.*) and Islay, vice-county 102[14]. These are all islands from which *Varroa* is absent. It is also present in hives on the Ardnamurchan peninsula, vice-county 97 (J. O'Rourke *pers. comm.*).

The current known persistent distribution of *Braula* in Scotland is shown in Fig. 1, along with its pre-*Varroa* distribution. Bee-keepers reveal that *Braula* appears transiently elsewhere as apiarists routinely move bees around the country, but, as soon as *Varroa* treatment at the destination starts, *Braula* disappears. Locally-based bee-keepers and naturalists have established that there is neither *Varroa* nor *Braula* on the Knoydart peninsula in West Inverness-shire (F.

[14] https://www.beelistener.co.uk/other-insects/pollinators/beekeeping-on-islay-fiona-macgillivrays-guest-blog/ accessed 8 September 2022.

Greig *pers. comm.*), and on the Argyll island of Lismore (J. Baker *pers. comm.*); and that there are currently no bee-hives on the islands of North Ronaldsay in Orkney (A. Duncan *pers. comm.*), Rum, Eigg or Canna (S. Morris, N. Barnes, E. Holden *pers. comms.*). The situation on the Western Isles is uncertain. Existing hives on Lewis are sometimes treated for *Varroa* even though it does not occur on the islands (D. Myles, *pers. comm.*). The current status of hives on Barra, which had originated from Colonsay[15] and of 'black bees' of unknown origin in Harris[16] [17] is not known, and I have been unable to determine the situation on other islands.

Given that wild or feral honeybee colonies will never be treated with acaricides, it is at least possible that *Braula* persists in the wild, though establishing its presence there will be difficult. Examination of foragers in the vicinity of such nests might be a first step.

Discussion

A very substantial reduction in range of *Braula* in recent decades has been largely overlooked by entomologists, and *B. coeca* has no current conservation designation in the UK. Given the nature of its biology. any measures to retain or enhance the UK population will require the co-operation of apiarists. There is considerable interest in both communities in maintaining hives that are currently *Varroa*-free in that state, as the impacts on *Braula* do not exist where chemical control of *Varroa* is unnecessary. There are several initiatives to conserve the 'black bee' *A. mellifera mellifera* on the Scilly Isles[18], Colonsay[19], and more widely in Britain[20]. Keeping these hives free of *Varroa* is important. Research in the USA into development of *Varroa*-resistant strains of Western honey bee has shown that there is potential for establishing resistant colonies, though the implementation of this on a wide scale seems a long way off (O'Shea-Wheller *et al.* 2022) and might be incompatible with the aims of the black bee project.

Any move to promote conservation of *Braula* will involve wide and varied debate. It is possible that *B. coeca* in Britain is a relatively recent introduction. However, it is not an insect that will engender much public engagement: it does not deliver ecological services, it is not a keystone species, nor is it in danger of global extinction. It has some deleterious effects on honey-comb production, but these are considered trivial by the industry, yet it is in danger of extermination in Scotland, and conceivably all of Britain, as a result of treatments against a non-native parasite which has enormously damaging impacts on the honey industry. These facts raise interesting and difficult philosophical questions. Is local conservation of such a species, remarkable in many biological respects, justified for its own sake? One might suspect that, if the collateral damage was causing national decline of a colourful butterfly, action would have been taken a long time ago. The general problem of conservation of parasites has been addressed by Dougherty *et al.* (2015) who have suggested a protocol which might easily be applied to *Braula*.

A significant factor that would need to be addressed is the disagreement over the status of the Western honey bee as a native British species. This is accepted by apiarists and is fundamental to their 'black bee' initiatives, and also by some entomologists. Engel (1999) and Ilyasov *et al.* (2020) accepted that the nominate subspecies originally occurred in the British Isles. The evidence accrued by Carreck (2008) would suggest that it has been present in Britain, possibly including Scotland, since the Bronze Age at least, and that modern populations of native *A. m.*

[15] https://roaringbees.com/?p=298
[16] https://www.pressandjournal.co.uk/fp/news/1219190/undefined-headline-2671/
[17] http://www.hebrides-news.com/rare-bees-stolen-29818.html
[18] https://www.facebook.com/The-Scillonian-Bee-Project-106951674899732 accessed 8 September 2022.
[19] http://www.snhbs.scot/colonsay/ accessed 8 September 2022.
[20] https://biobees.com/blackbees.php accessed 8 September 2022.

mellifera are still present, though his conclusions are not accepted by Ollerton (2013)[21] and others. Else *et al.* (2016) referred to "the **supposedly** native north-west European population being *A. mellifera mellifera*" (my emphasis). Some ecologists (e.g. Goulson 2003; Randall and Sheppard 2007) maintain that commercial honey bees are non-native and not to be encouraged, as they might compete with the native fauna. This is correct for the indisputably introduced races, but any native race could justifiably be considered as much a candidate for conservation action as any other taxon, even if it exists primarily as a domestic animal. Further, the name *A. mellifera mellifera* does not appear in the current version (52) of the UK Species Inventory (it does list 11 breeds of pig, 21 of horse, 36 of cattle, 63 of sheep, and *Canis lupus* subsp. *familiaris*!). Nor is *A. mellifera* included at all in the ten-volume *Provisional Atlas of the Aculeate Hymenoptera* produced by the Biological Records Centre from 1997-2018. Some bridge-building with apiarists might be required.

If conservation action for *Braula* is desired, agreement on the native status of *A. mellifera* may not be essential, but acceptance of opposing views would probably help. Entomologists will need access to *Varroa*-free hives and co-operation with the apiarist community, and as both communities would want continued control of *Varroa*, this co-operation should be relatively easy. The entomological community should perhaps be discussing options with the apiarists and statutory agencies.

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The leaf-mining fly *Phytomyza tanaceti* Hendel (Diptera, Agromyzidae) new to Wales – In May 2019, an Agromyzidae study was undertaken of the River Dee, Wales [see Warrington, B.P. 2019. *Dipterists Digest* (*Second Series*) **26,** 175-177]. Amongst the species collected was a single male *Phytomyza tanaceti* Hendel, 1923; Shotton, SJ305695, 14.v.2019, Flintshire, V.C. 51, swept from *Tanacetum vulgare*. At the time, its status in Britain was not checked but subsequent examination of records held in the National Agromyzidae Recording Scheme database indicates this is the first confirmed record for Wales. There are only 15 confirmed records of this relatively uncommon species within the Recording Scheme database, covering just eight vice-counties: West Kent (V.C. 16), North Essex (V.C. 19), East Norfolk (V.C. 27), Cambridgeshire (V.C. 29), Warwickshire (V.C. 38), South-east Yorkshire (V.C. 61), South-west Yorkshire (V.C. 63) and Mid-west Yorkshire (V.C. 64) – **BARRY P. WARRINGTON,** 221A Boothferry Road, Hessle, East Yorkshire, HU13 9BB; agromyzidaeRS@gmail.com

Dipterists Digest 2023 **30,** 43-50

The bumblebee robberfly *Laphria flava* (Linnaeus) (Diptera, Asilidae) in Scotland

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Summary
Laphria flava (Linnaeus, 1761) is confined in Britain to a restricted area in the north of Scotland, where it is associated with mature Scots pine *Pinus sylvestris*, with dead wood for development. Adults are active principally from June to August with a peak in July. Despite the limited range it appears to be under no immediate threat. An association with ancient Caledonian forests has perhaps been overstated, and consideration should be given to the possibility that it was introduced in imported timber.

Introduction

The bumblebee robberfly *Laphria flava* (Linnaeus, 1761) was added to the British faunal list by Vice (1874) from a specimen collected by H. Williamson in Strathdon in vice-county 92, South Aberdeenshire, hectad NJ31. Vice wrote that he "sent the insect up to Mr G.H. Verrall, and he has identified it as *Laphria flava* L., new to Britain". It remains an insect with an extremely limited distribution in Britain, confined to a relatively small area of north-east Scotland. Elsewhere, it is widely distributed in Eurasia[1], from the south of France, Greece and Turkey, north to Scandinavia; east to the Lower Volga, Siberia, India, and Mongolia; and Algeria (Hayat *et al.* 2008; Astakhov 2013; Astakhov *et al*. 2019).

Remarkably, little seems to have been published on the ecology of the species, despite a recent accumulation of records in the public domain. This paper attempts to describe its current status, and review what is known more generally of the fly in Scotland.

Plate 1. *Laphria flava*, Ryvoan, 17 June 2022. © Genevieve Tompkins.

[1] https://www.gbif.org/species/1660674 accessed 4 September 2022.

Methods
158 confirmed records (after removal of duplicates) were obtained from the Highland Biological Recording Group (HBRG) database and from datasets on the National Biodiversity Network (NBN) Atlas on 4 September 2022. Sources are shown in Table 1.

	date of records				
Source	**<1900**	**1900-1949**	**1950-1999**	**2000 on**	**Totals**
Highland Biological Recording Group	1	1	2	57	**61**
Biological Records Centre	5	24	20	0	**49**
Soldierflies and Allies Recording Scheme	0	0	7	25	**32**
NE Scotland Biological Records Centre	0	0	0	10	**10**
National Museum of Scotland collection	0	0	4	0	**4**
National Trust for Scotland	0	0	0	1	**1**
Royal Horticultural Society	0	0	0	1	**1**
Totals	**6**	**25**	**33**	**94**	**158**

Table 1. Source of records of *Laphria flava* used in this paper. Data from organisations other than HBRG were obtained from the NBN Atlas.

60% of the records were made since 2000, and all derive from non-systematic recording. In contrast to most asilids, *L. flava* is large and distinctive and easily identified from images (Plate 1). It has a loud wing-beat, so is more frequently noticed and photographed by non-specialist naturalists than are other species of Asilidae. This is aided by its tendency to alight on people it encounters – sometimes causing panic in the uninitiated.

34 examples of prey taken by adults were obtained by a general search of photographs of *L. flava* on the Internet. Only three of these were from Scotland, the others from mainland Europe from Norway south to Spain and from Belgium east to Russia.

Distribution
The distribution of *L. flava* is shown in Fig. 1. It is confined to east of the Great Glen and north of approximately latitude 57°N. It is recorded in 29 hectads in total, in 22 hectads since 1990 and in 19 hectads since 2000. The overall range extends to only about 65 hectads, around 2.7% of the UK land area and 8% of the land area of Scotland. There is no suggestion of any significant reduction in overall range, though some sites may have been lost.

Habitat
Laphria flava is associated in Scotland with Scots pine *Pinus sylvestris* woodland (Rotheray *et al.* 2001; Stubbs and Drake 2014), eggs being laid in burrows or cracks in dead wood. Stubbs and Drake suggested that "ancient Caledonian pine forests … provide the required habitat" though several old and recent records of adults are in plantations and even in village gardens. Scots pine forest is far more extensive than the range of the fly (Fig. 1). An association with pine is also noted in Lithuania (Petrašiunas and Bernotien 2012), but Hayat *et al.* (2008) stated that it occurs in oak forests in Iran and Wolff *et al.* (2018) mentioned larvae in spruce *Picea*, birch *Betula* and beech *Fagus sylvatica*.

Stubbs and Drake (2014) cited an association with the burrows of large long-horned beetles (Cerambycidae), and specifically mention the rare *Arhopalus rusticus* (Linnaeus, 1758). That species has a very restricted distribution in Scotland[2], but others in the family, such as the three large *Rhagium* species, *bifasciatum* (Fabricius, 1775), *inquisitor* (Linnaeus, 1758) and

[2] https://species.nbnatlas.org/species/NBNSYS0000010997 accessed 4 September 2022.

mordax (De Geer, 1775), are common and widespread across Scotland, are associated with *Pinus* to a greater or lesser extent, and are found in the same sites as *L. flava*. Other potential hosts in the area are *Acanthocinus aedilis* (Linnaeus, 1758) and *Anastrangalia sanguinolenta* (Linnaeus, 1761).

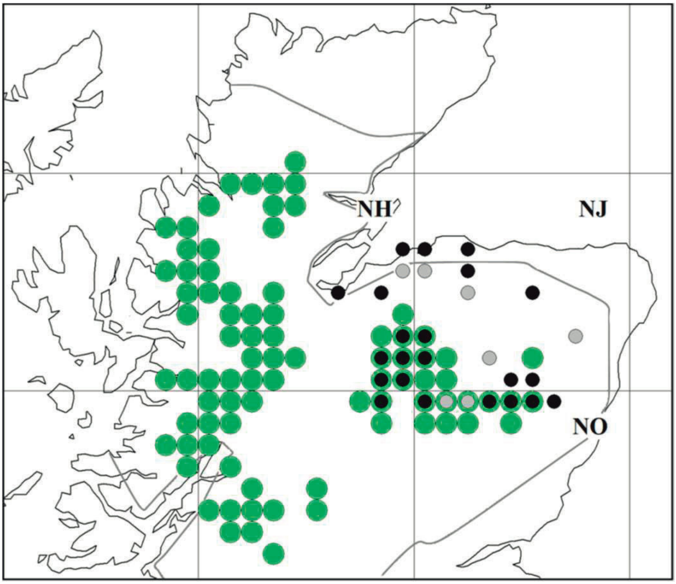

Fig. 1. Distribution of records of *Laphria flava* and of the 84 Caledonian Pinewoods H91C0 (=w2a5 Caledonian forest) recognised by the Forestry (Exemptions) (Scotland) Regulations 2019[3]. Green symbols show the pinewoods; grey symbols *L. flava* to 1989; black symbols *L. flava* 1990-2022. The grey line shows the boundary of the distribution of Caledonian Forest H91C0 under the EU Habitats Directive Annex 1[4].

Phenology

Fig. 2 shows the flight season of *L. flava* in Highland. Our extreme dates are 31 May and 9 September, covering 101 days. 95% of records were in the 80 days between 6 June and 25 August. July had 51% of records, but as the recording was casual the July peak is likely to be exaggerated in the data because of the coincidence with holidays. Copulation was noted on 17 June, 19 June, and 13 July, and oviposition on four occasions from 23 June to 21 August.

Prey

Information on the diet of larval asilids generally is very sparse. Melin (1923) made a detailed study of asilid larvae and concluded that they were primarily vegetarian, including those of *Laphria*, and that insect larvae were only taken incidentally when encountered. This is discussed by Knutson (1972), who concluded that the larvae were carnivorous, though he did not mention *Laphria* specifically. Ulyshen (2018), however, described asilid larvae, especially Laphriinae, as 'predatory in rotting wood' while other authors (Wood 1981; Cannings 2010; Dennis *et al*. 2013;

[3] https://www.legislation.gov.uk/ssi/2019/126

[4] https://jncc.gov.uk/jncc-assets/Art17/H91C0-SC-Habitats-Directive-Art17-2019.pdf

Londt and Dikow 2017) accept that they are indeed predatory. Reliance on beetle larvae (see above) by *L. flava* will presumably determine oviposition sites and the suitability of the wider habitat.

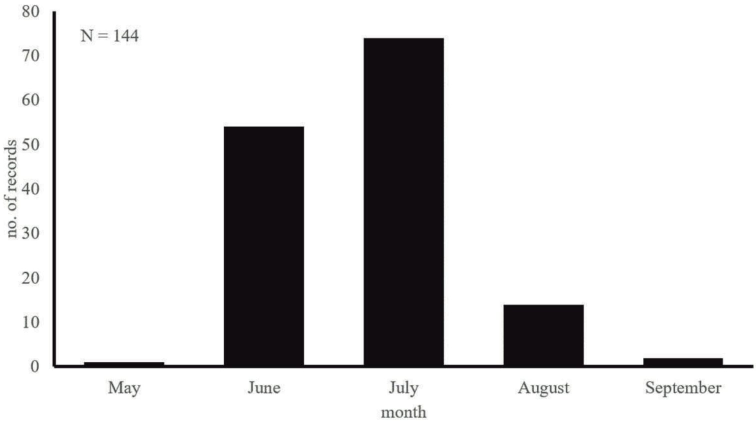

Fig. 2. Phenology of adult *Laphria flava* in Scotland.

Specific information on the prey taken by adult *L. flava* is scarce. Only seven records used in this analysis cited prey items. Images on the Internet added a little to the detail. The data on prey are summarised in Table 2.

Order	Suborder/Family	Genus/species	Non-UK	Scotland	Total	Total per Order
Coleoptera	Cantharidae		5	2	7	**29**
	Coccinellidae		4		4	
	Cerambycidae		2		2	
	Chrysomelidae		2		2	
	Elateridae		2	1	3	
	Scarabaeidae		1		1	
	Unknown		10		10	
Diptera	Syrphidae	*Volucella bombylans*	1	1	2	**8**
	Asilidae	*Dioctria*	1		1	
	Empididae			1	1	
	Rhagionidae			1	1	
	Unknown		1	2	3	
Hymenoptera	Symphyta		2	1	3	**4**
	Formicidae	*Formica* male		1	1	

Table 2. Prey records of adult *Laphria flava*.

The conclusion must be that adult *L. flava* prey on a wide variety of insects, ranging in nature from small soft-bodied alate ants to large hard-bodied long-horned beetles. Coleoptera form 71% of all prey records, but as these are non-systematic that figure might be significantly biased by photographer choice. Scottish records – a very small sample, but based on direct observation by naturalists – were 50% Diptera. Melin (1923) working in Sweden reported a similar wide range of prey (Table 3).

Order	Suborder/Family	Species
Coleoptera	Cantharidae	
	Coccinellidae	
	Curculionidae	
	Scarabaeidae	
Diptera	Asilidae	*Choerades marginatus* (as *Laphria marginata*)
	Empididae	
	Limoniidae	*Metalimnobia bifasciata*, *M. quadrinotata* (as *Limnobia*)
	Tipulidae	
Hemiptera	Homoptera	
	Pentatomidae	
Hymenoptera	Formicidae	*Lasius niger*

Table 3. Prey of adult *Laphria flava* in Sweden cited by Melin (1923).

Conservation

Laphria flava is listed as 'Nationally Scarce' (Drake 2017) and is on the Scottish Biodiversity List as 'Watching brief only' with a recommendation to 'Protect large pines'[5]. This seems to be a pragmatic approach, given that there have been 38 casual records in the 5 years 2018-2022, the principal habitat is not under manageable threat, and the historic range has been maintained. However, given its requirement for dead wood for development, more emphasis should perhaps be placed on the maintenance of the supply of dead wood. A substantial part of the range falls within Cairngorms National Park, providing additional safeguards. While unarguably scarce even in the Scottish context, there seems no immediate threat, though potential effects of future climate change can only be guessed. It is a component of the Invertebrate assemblage in the Notified Natural Features of the following Sites of Special Scientific Interest: Alvie, NH80; Culbin Sands, Culbin Forest and Findhorn Bay, NH95, NH96; and Glen Tanar, NO49 (Littlewood 2017). Alvie and Glen Tanar lie in the Cairngorms National Park.

Discussion

Despite the limited British range of *L. flava* the population seems healthy and stable, giving no immediate cause for concern. The reason for the restricted distribution is unclear, though subtle climatic factors and inadequate habitat connectivity might be considered. The concentration of reports from the 'honeypot' areas for dipterists in Strathspey and Deeside is not at all surprising, but much superficially suitable habitat is present to the south into Perthshire and west to the Great Glen and beyond (JNCC 2019).

Rotheray and Rotheray (2012), discussing the syrphid *Blera fallax* (Linnaeus, 1758)[6], a fly with an even more restricted distribution than *L. flava* and also saproxylic as a larva on *Pinus sylvestris*, considered that organisms dependent on the tree had colonised Britain soon after the retreat of the ice sheet. The authors accept that evidence is lacking for that scenario, which is plausible, but is not the only possibility. It does not, for example, easily explain the absence of these species to the south and west of the current range. It is worth considering the potential for human assistance in conveying larvae in timber or other goods transported from Scandinavia. Such transportation, while much enhanced in the era of modern international trade (Meurisse *et al*. 2019), would have been possible in the past few centuries with timber trading across the North Sea. That source is suggested by Stubbs and Drake (2014) as a possible mechanism for the brief colonisation of southern England by the asilid *Choerades gilvus* (Linnaeus, 1758) between 1938 and 1951, and is cited by Quinlan and Gauld (1981) as the source of occasional appearances in Britain of *Urocerus* sawflies (Symphyta: Siricidae), insects which have a similar life cycle to

[5] https://lists.nbnatlas.org/speciesListItem/list/dr34 accessed 4 September 2022.
[6] https://species.nbnatlas.org/species/NBNSYS0000007099 accessed 4 September 2022.

Laphria. One, *U. augur* (Klug, 1803), seems to be established in Ireland[7]. These authors also describe the frequent and widespread *U. gigas* (Linnaeus, 1758) as 'a *possible* native in Caledonian forest' (my emphasis) while GBIF[8] describes it as 'introduced' to Great Britain, and Andrew Green's website[9] as 'long established'. Trade in timber from Scandinavia to Scotland was sufficiently important from the 17th to the early 19th centuries (Åström 1989) to be given its own name, *Skottehandelen* (Kay 2011). Given the necessary minimum 450km journey over the North Sea, any colonisation from Scandinavia would almost certainly require assisted passage.

The often-quoted association between particular species and 'ancient' or 'natural' Caledonian forest can be misleading. The JNCC definition of Caledonian Forest w2a5 (=H91C0 in Annex 1 of the EU Habitats Directive) is: *Relict, indigenous pine forests of* Pinus sylvestris *var.* scotica*, endemic in the central and north eastern Grampians and the northern and western Highlands of Scotland and associated* Betula *and* Juniperus *woodlands of northern character within this area* (UK Habitat Classification Working Group 2018). Smout (2014) has exposed some of the misconceptions that have arisen around this appellation, and increased recording away from sites that are loosely considered to be 'ancient Caledonian forest' has shown that some insect species previously associated in that way are happy to thrive in modern plantations as long as the essential ecological components are present. Among these are the mason-bee *Osmia uncinata* Gerstäcker, 1869 (Hymenoptera, Megachilidae) (Sears *et al.* 2014) and, perhaps most strikingly, the slave-making ant *Formica sanguinea* Latreille, 1798 (Hymenoptera, Formicidae). Hughes (2006) considered that the core population of *F. sanguinea* was 'around Speyside' and 'associated with the lower slopes of the Abernethy-Glenmore-Rothiemurchus forest complex'. However, recording over the whole of Highland Region has shown that it is distributed far more widely and that its principal habitat is, in fact, clear-felled south-facing commercial plantation sites and bare banks along access roads in plantations, situations in which it can occur in very high densities (Macdonald 2013).

Laphria flava has been recorded recently from several plantation sites and disturbed and degraded forest, including on the edge of the city of Inverness, and it is a frequent visitor to gardens in Strathspey villages. Significantly, it has been present in Culbin Forest, an entirely man-made forest[10], since at least 1961. Presence in these sites conflicts with the statement by Drake (2017) that 'the habitat used is very specific … and cannot be replaced by plantation trees'. Fig. 1 seems to provide no justification for emphasising its habitat as 'ancient Caledonian forest'. Given that several sites do fit that definition and are outside the accepted range of its habitat, its current known range comprises only a small part of that of old Scots Pine forest, and at least some plantation sites appear to meet its needs. It is most often encountered in open forest, clearings or rides, and on forest edge, situations where prey is likely to be especially abundant. Targeted recording in suitable habitat in other areas across the north of Scotland might be informative.

Acknowledgements

I am grateful to all the naturalists who provided the records to HBRG and the other datasets. Ashleigh Whiffin provided access to the collection at the National Museum of Scotland. Martin Harvey, Brian Little, Stephen Moran, David Tompkins and Genevieve Tompkins (who also supplied the photograph) read and commented on early drafts. The map was prepared with DMAP. Mobilisation of the HBRG data to the NBN Atlas is funded by NatureScot (formerly Scottish Natural Heritage). Dataset providers and the NBN Trust bear no responsibility for analysis or interpretation of data from the NBN Atlas.

7 https://www.sawflies.org.uk/urocerus-augur/ accessed 4 September 2022.
8 https://www.gbif.org/species/159505551 accessed 4 September 2022.
9 https://www.sawflies.org.uk/urocerus-gigas/ accessed 4 September 2022.
10 https://apps.snh.gov.uk/sitelink-api/v1/sites/478/documents/3

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***Eudasyphora cyanicolor* (Zetterstedt) (Diptera, Muscidae) confirmed in Ireland** – I found this species whilst undertaking an autumn entomological survey on 2 October 2021 at Glenarm Nature Reserve in County Antrim (Irish Grid Reference: D304111). The site is 154 hectares of high-quality parkland and woodland habitats, with many old and veteran deciduous trees, most noticeably oak (*Quercus* species), and is managed by the Ulster Wildlife Trust. A single female *Eudasyphora cyanicolor* (Zetterstedt, 1845) was collected and later identified using the key by F. Gregor, R. Rozkošný, M. Barták and J. Vaňhara (2002. The Muscidae (Diptera) of Central Europe. *Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia* **107,** 1-280). That work mentioned that the adults overwinter and are attracted to flowering umbels, decaying fruits, carrion and excrement, and suggested that the larvae are probably coprophagous, presumably because that is the known larval biology of *E. cyanella* (Meigen, 1826), a common species in the same genus.

Eudasyphora cyanicolor was originally recorded in Ireland (as *Pyrellia cyanicolor*), from Stradbally in County Waterford, by H.W. Andrews (1914. Notes of some Diptera taken in the south of Ireland. *The Irish Naturalist* **23**(6)[June]**,** 136-143). However, that record was queried by R. Nash and P.J. Chandler (1978. The Irish species of two-winged flies (Diptera) belonging to the families Fanniidae and Muscidae. *Proceedings of the Royal Irish Academy* **77,** B(2), 13-43) because the surviving specimens in H.W. Andrews collection from Stradbally, collected in 1907, did not include *E. cyanicolor* but there are two females with that data of *E. cyanella*, which was not recorded by Andrews. He did also list *Pyrellia cadaverina* (Linnaeus, 1758) from the same locality; that is presumed to be a misidentification of *P. rapax* (Harris, 1780) but, as also noted by Nash and Chandler (*op. cit*.), there are no corresponding specimens in Andrews' collection. Thus it will remain uncertain whether Andrews did find these species at Stradbally.

Eudasyphora cyanicolor is possibly overlooked in Ireland rather than a recent arrival; however, this is difficult to establish as Diptera, and in particular calyptrates, are generally under-recorded in Ireland – **RYAN MITCHELL**, 4 Rochester Court, Pevensey Gardens, Worthing, West Sussex BN11 5PL

Dipterists Digest 2023 **30,** 51-54

The correct name for the montane *Hydrophorus* species (Diptera, Dolichopodidae) occurring in the British Isles

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Summary
The presence of *Hydrophorus pilipes* Frey, 1915 is confirmed in the British Isles, the species being previously mis-identified as *Hydrophorus rufibarbis* Gerstäcker, 1864.

Introduction

The National Museum of Scotland (NMS) is fortunate to have in its collections over 100 specimens of the Nationally Scarce dolichopodid *Hydrophorus rufibarbis* Gerstäcker, 1864. The majority of these were collected by David Horsfield and IM over the past four decades as part of a study of montane Diptera. In more recent years we have identified *H. rufibarbis,* a species associated with montane flushes and pools, as a good candidate for monitoring the effects of a changing climate in the uplands. It has the advantage of being a relatively large species, which is not uncommon on the higher mountains and is usually easy to locate in its habitat. In addition, using available keys it does not provide any significant identification difficulties. The specimen data in NMS can potentially provide a unique baseline against which any change in distribution, either in terms of range or altitude, can be assessed. It was with this objective in mind that the specimens in the collection were recently reassessed.

One notable observation when studying the NMS material was a variation in body colour. Specimens from the Ben Nevis area in particular had a greater amount of metallic-green colouration on the sides of the thorax when compared with those from other areas. In order to confirm that there was not another species involved, the genitalia of a metallic-green male and a more characteristic male from the eastern Highlands were removed and cleared in KOH. Under microscopic examination the genitalia of both specimens were found to be similar. However, the surprise came when these were compared with the genitalia figures of *H. rufibarbis* in Negrobov (1977) and were found to differ in several respects, particularly in the shape and chaetotaxy of the ventral lobe (Fig. 4).

Photographs of the genitalia were sent to an authority on European Dolichopodidae, Igor Grichanov, who suggested that they might belong to the related species *Hydrophorus pilipes* Frey, 1915. When the figures in Negrobov (1977) were re-examined this proved to be correct; indeed the keys to the genus *Hydrophorus* in both Negrobov (1977) and Grichanov (2006) make it clear that *Hydrophorus rufibarbis* males have a silvery-white clypeus, unlike the golden-brown clypeus in Scottish specimens (Fig. 2).

Further confirmation was sought from Jere Kahanpää at the Finnish Museum of Natural History, University of Helsinki, whose collections contain specimens of both *H. rufibarbis* and *H. pilipes*. A male and female specimen from Scotland were sent to Jere and he confirmed that they were a very good match with the Scandinavian *Hydrophorus pilipes* in the collection.

Based on this evidence our conclusion is that all British specimens formerly identified under the name of *H. rufibarbis* are in fact *H. pilipes.* The distribution pattern of *H. pilipes* and *H. rufibarbis* would support our conclusion. The GBIF dataset for *H. pilipes* (GBIF 2022), although far from complete, shows it occurring in the Bergen area of south-west Norway, which has a similar climate to parts of the Scottish Highlands. There are no records of *H. rufibarbis* for this area, although it does occur in northern Norway and Sweden and in most of Finland. It is worth noting that Gerstäcker described *H. rufibarbis* from specimens from Berlin and from Stettin (now Szczecin, north-west Poland) in the lowlands of the North European Plain.

Figs 1-3. *Hydrophorus pilipes* Frey: 1-2, male: 1, imago, lateral; 2, face and coxae. 3, female, left hind femora and tibia, anterior view. Both specimens from Cairn of Claise, Aberdeenshire.

In the genus *Hydrophorus*, *H. pilipes* belongs to a group of three British species distinguished by the presence of two, usually obvious, dark spots on the wing, one situated on the apical section of vein M_1 and one on cross-vein dm-cu just below its junction with M_1 (Fig. 1). Of the other two species, *H. bipunctatus* (Lehmann) occurs in more lowland areas whilst *H. albiceps* Frey occurs in moorland and upland habitats. All three are separable using d'Assis-Fonseca (1978), with *H. pilipes* running to *H. rufibarbis*. *Hydrophorus pilipes,* with its entirely golden-brown face (Fig. 2) in both sexes, should be easily distinguishable from *H. albiceps* but the following features clarify the differences between it and *H. albiceps*, whose range overlaps in part with that of *H. pilipes.*

H. albiceps males are distinguished from those of *H. pilipes* by having, near the apex of the front femora, a small excavation with anteriorly a small lobe with an associated group of 5-6 black spines. The front coxae are covered in black setae and setulae and the clypeus is silvery-white, the latter a good character for identification in the field. Separation of the females is more difficult as the face colour is generally similar but the setae and setulae on the front coxae are black in *H. albiceps* as opposed to being pale in *H. pilipes* (a few dark setulae may be present on occasion). The legs of *H. albiceps* are short haired with the strong ventral setae near the apex of the mid and hind femora clearly standing out from the pilosity, whilst in *H. pilipes* the weaker ventral setae are only slightly longer than the pilosity (Fig. 3).

We speculate how this error arose in the British literature. Verrall (1905, p. 193) introduced *H. rufibarbis* to the British list, saying "I am compelled to assign this name to a male taken at Callater, near Braemar, on July 20th, 1873, as it certainly does not belong to any other known European species." This sentence implies that Verrall had checked the descriptions of other European species, of which he had a choice of eight that were not known from Britain at that time. However, it is difficult to see how he came to the conclusion that his fly was *H. rufibarbis* as this species has a whitish face, not 'orange' as Verrall (1905) has it in his key to the genus. A more appropriate choice might have been *H. rogenhoferi* Mik, 1874, with a golden face and similar setae on the front femur, although he would have had to reject this on other grounds. Perhaps the problem lay in Gerstäcker's 1864 description of *H. rufibarbis* which was based on a female, whose face he describes as dusted greenish-yellow. But in a footnote, Gerstäcker briefly described a male that he regarded as the same species; its face is lighter yellowish-grey towards the bottom. Verrall may well have interpreted this face colour as 'orange' rather than nearly white. The error may have become entrenched as, under *H. rufibarbis*, Kertész's (1909) world catalogue of Diptera referenced only Gerstäcker's original description and Verrall's 1905 paper. For example, Wingate (1906) has a key that is not a straight copy of Verrall's but it seems certain that he based it on Verrall's, as he too used the orange face to distinguish *H. rufibarbis*. Why no-one until IM noticed the error is an embarrassment to British dipterists as Becker (1917) had the species correct in his monograph over a century ago. The detailed treatment by Negrobov (1977) may not have been available to d'Assis-Fonseca (1978) when he was preparing his Handbook.

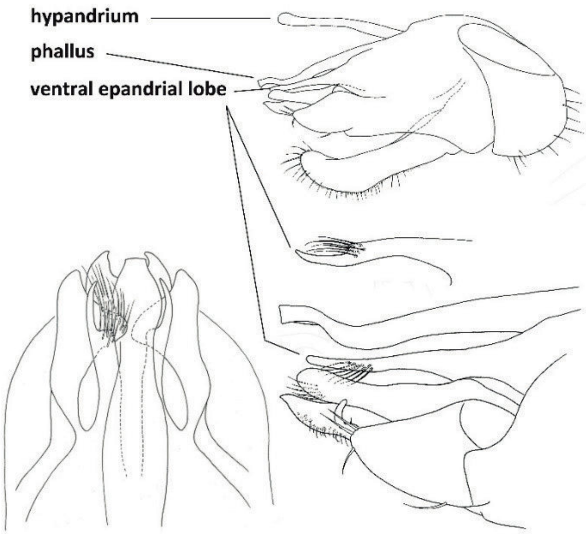

Fig. 4. Hypopygium of *Hydrophorus pilipes* Frey, whole capsule and enlarged view of appendages in lateral and ventral view. The ventral view shows the phallus cut away to show the setae on the surstylus and epandrial lobe. Specimen from Meall Ghaordaidh, Stirling.

Acknowledgements
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The leaf-mining fly *Cerodontha* (*Poemyza*) *lateralis* (Macquart) (Diptera, Agromyzidae) reared from European marram grass – In August 2022, I visited several sites in South Northumberland (V.C. 67) and recorded the larval mines of the following species, all of which are new to the vice-county: *Ophiomyia melandricaulis* Hering, 1943, *Amauromyza* (*Cephalomyza*) *labiatarum* (Hendel, 1920), *Aulagromyza luteoscutellata* (de Meijere, 1924), *Aulagromyza tridentata* (Loew, 1858), *Calycomyza artemisiae* (Kaltenbach, 1856), *Cerodontha* (*Poemyza*) *incisa* (Meigen, 1830), *Cerodontha (Poemyza*) *lateralis* (Macquart, 1835), *Chromatomyia lonicerae* (Robineau-Desvoidy, 1851), *Liriomyza amoena* (Meigen, 1830), *Liriomyza cicerina* (Rondani, 1875), *Liriomyza congesta* (Becker, 1903), *Phytomyza agromyzina* Meigen, 1830, *Phytomyza autumnalis* (Hering, 1957), *Phytomyza ranunculi* (Schrank, 1803) and *Phytomyza ranunculivora* Hering, 1932. Larval mines were observed on European marram grass (Poaceae, *Ammophila arenaria*) along the coast; the general appearance of the mines and the presence of dark, metallic, puparium/puparia within placed them in the genus *Cerodontha*. Only the following species are known to use this as a host: *C.* (*P.*) *incisa*, *C.* (*P.*) *pygmaea* (Meigen, 1830) and *C.* (*P.*) *superciliosa* (Zetterstedt, 1860). Several mines were collected which, a week later, produced adult males of *C.* (*P.*) *incisa* and *C.* (*P.*) *lateralis*, the latter being the first record of this species using *Ammophila* as a host genus. Y. Guglya (2021. *Zootaxa* **5014,** 1-158) added two further new host genera (*Lolium*, *Milium*) and listed all ten further known hosts including the second dominant dune grass "*Elymus"* [= *Leymus*] *arenarius*. The observations of *O. melandricaulis*, *A. luteoscutellata*, *C. artemisiae* and *C.* (*P.*) *lateralis* represent the most northerly UK records to date – **BARRY P. WARRINGTON,** 221A Boothferry Road, Hessle, East Yorkshire, HU13 9BB; agromyzidaeRS@gmail.com

Dipterists Digest 2023 **30,** 55-59

Syntormon metathesis (Loew) (Diptera, Dolichopodidae) new to Britain

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Summary
Syntormon metathesis (Loew, 1850) was recorded at several fenland sites in Norfolk and one in Kent in eastern England. The important features of the male and the antenna of the female are illustrated. The synonymy of *S. dobrogicus* Pârvu, 1985 with *S. metathesis* proposed by Grichanov (2013) is supported.

Introduction

Species of *Syntormon* are moderately small metallic green flies whose males usually have ornamented legs and elongate pointed antennae. Sixteen species are known from Britain, and another one if *S. setosus* Parent is regarded as a valid species (Drake 2021). These include most of the species that are widespread on mainland Europe, leaving three that may occur in Britain: *S. punctatum* (Zetterstedt), *S. subinerme* (Loew) and *S. metathesis* (Loew). The last of these has now been recognised from specimens collected in Kent and Norfolk in eastern England. This species has nomenclatural significance as it is the type species of the genus *Syntormon* which Loew (1857) erected to accommodate several species previously included in *Rhaphium*, selecting his own species for this purpose; this was fixed subsequently by Coquillett (1910).

Records

All the specimens were collected during two of the summer field meetings of Dipterists Forum. The first specimen found was a female collected by Rob Wolton from Ham Brooks Wood, Kent in 2016. I had tentatively identified this specimen as *S. sulcipes* (Meigen) but when I re-examined it three years later I recognised it as *S. metathesis* using Parent (1938). The record remained unpublished until a male could be found to confirm the presence of *S. metathesis* in Britain. Subsequently during the Forum's meeting in Norfolk in July 2022, specimens were found at several sites by myself (CMD) and Rob Wolton (RJW), who passed many dolichopodids to me for identification. Males from Thompson Common collected in association with a female confirmed the identification. All specimens were collected by sweep netting.

Material examined: 1♀ Kent, V.C.15, Ham Brooks Wood, TR333550, 4 July 2016, RJW; the following records are from Norfolk, V.C. 27: 1♀, Hickling Broad, TG426220, 3 July 2022, CMD; 1♀, same site and date, TG429215, RJW; 1♀ How Hill Fen, TG370193, 3 July 2022, RJW; 3♀ Sutton Fen, TG368233, 3 July 2022, CMD; 1♀ same site and date, TG373235, RJW; 3♀, Woodbastwick Fen, TG338167, 6 July 2022, CMD; Norfolk, V.C. 28, 4♂ 1♀, Thompson Common, TL936965, 3 July 2022, CMD.

All the sites are wetlands. The Norfolk sites, with the exception of Thompson Common, are fens with high botanical species richness, in which *Phragmites* is always present but usually not dominant. At Thompson Common, *S. metathesis* was swept from the margin of a pingo pool with abundant common spike-rush *Eleocharis palustris*. Ham Brooks Wood in Kent is, despite its name, partly grazed fen.

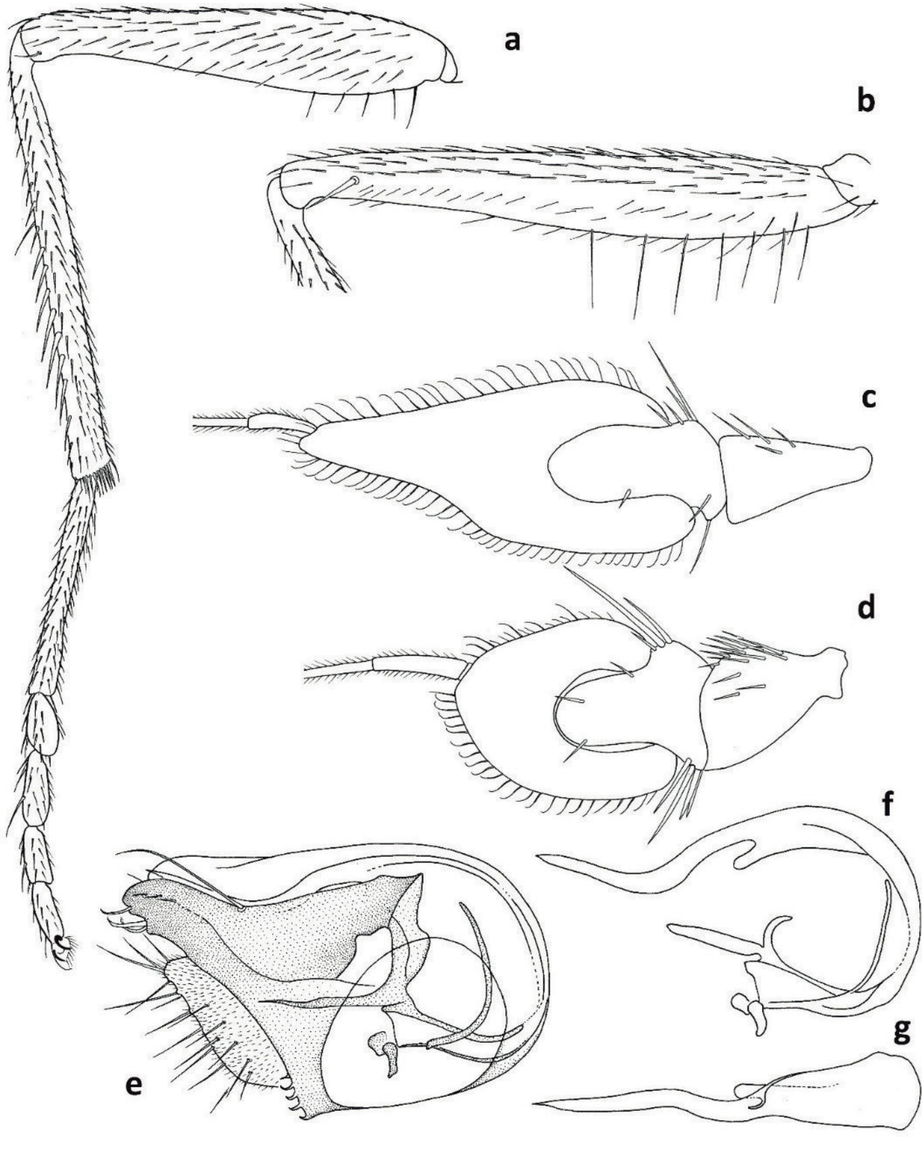

Fig. 1. ***Syntormon metathesis*** **(Loew): (a) male front leg, anterior view; (b) male mid femur, anterior view; (c) male antenna, inner face; (d) female antenna, inner face; (e) hypopygium; (f) phallus in lateral view; (g) phallus ventral view. Following the convention for dolichopodid genitalia, the morphologically ventral side is shown uppermost in the figure, as in its orientation in the fly.**

Identification

Both sexes were identified as *S. metathesis* using Parent (1938). In Grichanov's (2013) key to males, the four British males fall into his *metathesis* subgroup that includes *S. metathesis* and *S. rhodani* Vaillant, which Grichanov (2013) suspected to be a synonym of *S. metathesis*. Even if *S. rhodani* is a valid species, it is unlikely to be the same as the British species from lowland fens, as it was described from the uplands of south-east France (Vaillant 1983). Using the keys by d'Assis-Fonseca (1978), males of *S. metathesis* fall out as *S. pumilum* (Meigen) but have different leg setae, and females fall out as *S. sulcipes* but do not have a darkened hind tibia and basitarsus.

Males have characteristic leg setae. The most obvious is a line of 4-6 fine hair-like setae on the mid femur ventrally in the basal half (Fig. 1b). Parent (1938) described and illustrated these as a double row of similar-sized setae but the British specimens have only a single row, sometimes with another row in front of this of a few shorter and inconspicuous hair-like setae. Grichanov (2013) said that the femoral setae vary in *Syntormon*, and the differences between the British specimens and Parent's may be such an example. Loew's (1850) original detailed description omitted any mention of the long fine ventral hairs on the mid femur, but instead mentioned long and extremely fine hairs on the underside of the hind femur that are directed somewhat outwards (An der Unterseite der Hinterschenkel steht längere, äusserst zarte, helle, etwas nach Aussen gerichtete Behaarung). The hind femur does have a cluster of fairly long dense fine pale hairs on the anteroventral face, which none of the other British species has, so perhaps Loew was indeed describing these, rather than the far more conspicuous mid-femur hairs, or perhaps he made a mistake when referring to the hind femur. The front femur has a few irregular short setae in the basal quarter (Fig. 1a). The front tarsus is similar to those of *S. monile, S. pumilum* and *S. submonilis* in having the basitarsus about equal in length to the remaining four tarsomeres together; *S. metathesis* differs from these in its second tarsomere being wider than the following tarsomere (Fig. 1a) but without a ventral projection below the third tarsomere (as *S. pumilum* has) and without short strong anteroventral hairs (as *S. submonilis* has; illustrated in Drake 2021, fig. 7). The postpedicel is about twice as long as wide, resembling those of several other species of *Syntormon* such as *S. monile* (Haliday in Walker) and *S. sulcipes* (Fig. 1c). The hypopygium resembles those of several other species in having a long seta on the ventral surstylus (Fig. 1e) but the phallus cannot be confused with other British species, illustrated in Drake (2021), in particular in having a short peg on the dorsal side (lower side in figure) some distance from the tip (Fig. 1f, g).

Females most closely resemble those of *monile*, *submonilis* (Negrobov), *pumilum* and *sulcipes*, which each differ in at least one of the following characters: *Syntormon metathesis* females are distinguished by the combination of a glossy violet frons; the scape bears tiny dorsal hairs; the arista is just dorsal of the rounded tip of the postpedicel (Fig. 1d); several apical setae of the front coxa are black; the mid coxa bears a seta on the outer face; the front tibia has a distinct posterodorsal seta and a strongly developed anterodorsal pecten (line of stout short setae); the hind tibia and basitarsus are yellow.

An unsafe reliance on the colour of the tergites of *S. metathesis* appears to be the source of problems in one published key and in the description of a new species of *Syntormon*. Loew (1850) described the abdomen of *S. metathesis* as metallic, with the first segment and sides and hind margin of the following segments 'bronzegelb', which appears to mean yellow in contrast to the remaining segments which he described as coppery violet (kupfrig violett). In contrast, Parent (1938) described the abdomen as 'bronzé cuivreux' (coppery bronze), which implies that all segments were equally dark. Of the British specimens one of the four males and five of the 11 females have very distinct yellow side spots, while the remainder have entirely dark tergites. This is trivial, since such variation is known in other species of *Syntormon*, but Negrobov (1975) used the presence or absence of yellow side-markings on tergites 2 and 3 for a couplet in his key to males. It would seem that, on this basis alone, Pârvu (1985) described a new species, *S. dobrogicus* which has yellow spots on tergites 2 and 3, after failing to recognise *S. metathesis*, which in Negrobov's key falls into the group without spots. This key and that provided by Negrobov and Matile (1974) appear to be Pârvu's only source of information, and perhaps he did not have access to Parent (1938) or Loew (1850), which would have allowed him to recognise *S. metathesis*. Based on Pârvu's description and his careful figures of the legs and aedeagus, there is almost no difference between *S. dobrogicus* and the descriptions of *S. metathesis* by Loew (1850) and Parent (1938) and the British specimens, with the exception of two characters: the British specimens of *S. metathesis* have a few very obvious dark apical setae on the front coxa, as described by Parent but which Pârvu does not mention, although his figure 2 appears to imply the presence of strong black setae here, and the front femur does not have such a robust seta at the base as Pârvu shows. Therefore, although I have not examined the type specimen, I agree with Grichanov (2013) that *S. dobrogicus* is a synonym of *S. metathesis*. Pârvu should be credited for his accurate figures, even though these have helped to show that his species appears to be the same as *S. metathesis*.

Occurrence in Britain

Although *S. metathesis* is widespread in Europe (Pollet 2011), it may be rare in some well-studied countries. For instance, in Flanders it is regarded as 'very rare' (Pollet 2000) and in Germany 'rare' although with no obvious change in status (Meyer and Wagner 2011). A localised population with a low density may explain why the species has not been found before in Britain. Another explanation is that the populations are strongly female-biased, as in *S. macula* Parent (Drake 2021). This suggestion is based on perhaps flimsy evidence that females in the British sample were more frequent (six sites) than males (one site). While males would have been recognised as 'new', females would have been shoe-horned into *S. sulcipes* when using the key of d'Assis-Fonseca (1978), as I had done with my first specimen. Earlier dipterists may have ignored females as Verrall (1905) did not include them in his keys; this assumes that British dipterists did not use Parent (1938). Thus it is possible that there are female specimens in collections under the name *S. sulcipes*. I checked this using my own records. At 26 sites where only female *S. sulcipes* had been found, without confirmatory males, all but one of the records were entirely plausible, coming from the west of Britain or in upland areas at sites where the geology is moderately acidic, and fitting the habitat preference of this species. The single highly improbable record was from a wood on the Chalk in Kent but the specimen had not been kept. This result suggests that *S. metathesis* may not have been overlooked as the most likely alternative species, and that it is more probable that it has been present in Britain for some time, living at a low population level in fens of eastern England. It is impossible to say whether the species is changing its range or abundance but it is remarkable that, among nine species of *Syntormon* recorded during the Dipterists Forum summer field meeting based in Norfolk in 2022, *S. metathesis* was the second most frequent, being present in seven samples at five sites, behind *S. pumilum* (14 samples, seven sites).

I had surveyed many fens in the Norfolk Broads over several years from 2007, with a wide variety of aims, including recording Diptera (e.g. Drake 2018). *Syntormon pumilum* was usually the most frequent species in the genus in most surveys where dolichopodids were included. *Syntormon monile* occurred several times, and it possible that females collected in four samples that contained no males could have included overlooked *S. metathesis*, but it is more probable that no *S. metathesis* were collected. The species does, therefore, appear to have become more prominent. It is known from five hectads in England, so would currently have the status of 'rare', but its moderate frequency in the Norfolk fens compared to an apparent absence a decade earlier suggests that it may be found more widely.

Acknowledgements
I am most grateful to many participants in the Dipterists Forum meeting at Norfolk for passing numerous specimens to me for identification. In particular, I thank Rob Wolton whose samples included *S. metathesis*. I also thank Tony Irwin and Laurence Clemons for organising the field meetings and arranging access permission to so many excellent sites.

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Dipterists Digest 2023 **30,** 60-67

Addition of *Myospila bimaculata* (Macquart) to the Irish list of Muscidae (Diptera)

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Summary
Two female specimens of *Myospila* from the Henry William (H.W.) Andrews collection held by the British Entomological and Natural History Society were sent to EH for identification. Both were identified as *Myospila bimaculata* (Macquart, 1834). These observations confirm the initial determination of *M. bimaculata* as an Irish species by Adrian C. Pont (Nash and Chandler 1978). *M. bimaculata* is now added to the Irish list of Muscidae.

Introduction
The dipteran genus *Myospila* (Rondani, 1856) is in the Mydaeinae, a subfamily with about 150 species and subspecies worldwide (Zhou and Wei 2018). *Myospila* is characterised by setulose eyes (Gregor *et al*. 2002), a slight to strong curvature of wing vein M_{1+2} towards vein R_{4+5} (Savage and Vockeroth 2010), setulae on the radial node on both sides of the wing (Gregor *et al*. 2002), arista enlarged on the basal third (Carvalho and Couri 2002) and a bare hind coxa on the posterodorsal surface (Savage and Vockeroth 2010). Females have a pair of interfrontal setae and their ovipositor and egg are of the *Mydaea*-type (Carvalho and Couri 2002). In Britain there are two species: *Myospila meditabunda* (Fabricius, 1781) and *Myospila bimaculata* (Macquart, 1834) [synonym: *Myospila hennigi* (Gregor & Povolný, 1959) (Pont 1970; Zielke 2016; Chandler 2022)]. Macquart (1834) took a single French male of *M. bimaculata* from the outskirts of Lille [“environs de Lille”].

***M. bimaculata* (Macquart, 1834)**
M. bimaculata is a widespread but apparently uncommon species in Britain (Pont 1970). Consequently, there are few records. In **ENGLAND** specimens have been taken in **May** (Pont 1970 [10.v.44, 1♂; 10.v.64, 1♂; 12.v.63, 1♂; 21.v.08, 1♂; 23.v.61, 1♀; 26.v.63, 1♂ & 29.v.01, 1♂]), **June** (Pont 1970 [8.vi.1888, 1♀; 8.vi.35, 1♂; 11.vi.28, 1♀]), **July** (Pont 1970 [4.vii.03, 1♀; 5.vii.41, 1♂; 13.vii.1898, 1♀; 17.vii.61, 1♂; 27.vii.23, 1♀]) and **August** (Pont 1970 [7.viii.32, 1♂; 8.viii.1898, 1♀]). In addition, a single female has been caught from Sutton Park, Birmingham and a male from Bentley Priory, Middlesex (Falk 2022). In **SCOTLAND** one male was recorded in **June** (Pont 1970 [22.vi.43]) and in **WALES** a single female was also caught in **June** (Pont 1970 [1.vi.32]). Note that all the British records are for individual specimens.

Single *M. bimaculata* males were taken in **April** in **AFGHANISTAN** (Zielke 2020 [13.iv.1966]) and the **CZECH REPUBLIC** (Gregor 1968 [iv.89]). Sightings have been reported in **May** for **ARMENIA** (Pont 2018 [28.v.2012, 1♀ at 2240 m]), **AUSTRIA** (Gregor 1968 [8.v.11, 1♂]), **REPUBLIC OF BELARUS** (Makovetskaya and Vikhrev 2020 [16-17.v.2019, 1♀]), **BULGARIA** (Zielke 2016 [18.v.1972, 1♀]), the **CZECH REPUBLIC** (Gregor 1968 [10.v.40, 9♂♂; 10.v.07, 1♀; 21.v.58, 1♂]), **DENMARK** (Michelsen 1977 [8.v.1923, 1♀; 28.v.1924, 1♀]), **GERMANY** (Pont 1970 [23.v.1883, 1♂; 24.v.60, 1♀]) and **POLAND** (Gregor 1968 [16.v.09, 1♂]). In **June** records are from **ARMENIA** (Pont *et al*. 2005 [05.vi.2003, 1♀]), **AUSTRIA** (Pont 1970 [14-19.vi.64, 2♀♀]), **BULGARIA** (Zielke 2016 [16.vi.1968, 4♀♀ at 1800 m; 24.vi.1969, 3♂♂]), the **CZECH REPUBLIC** (Gregor 1968 [7.vi.64, 2♀♀; 23.vi.64, 2♀♀; 26.vi.59, 1♀]), **DENMARK** (Michelsen 1977 [5.vi.1923, 1♂; 7.vi.1924 1♂; 7.vi.1970, 1♀]), **FRANCE** (Pont

1970 [26.vi.63, 1♀]), **RUSSIA** (Sorokina 2012 [18.vi.2005, 2♂♂ at 2000-2200 m; 22.vi.2004, 1♀; 23.vi.2009, 1♀ at 545 m and 30.vi.2009, 1♂ at 1252 m and another ♂ at 1748 m]), **SLOVAKIA** (Gregor 1968 [12.vi.64, 3♀♀ at 1400 m; 13.vi.64, 8♀♀; 17.vi.61, 1♀; 19.vi.58, 1♂; 20-23.vi.56, 13♀♀ at 1200 m]) and **SLOVENIA** (Gregor 1968 [22-25.vi.1957, 55♀♀ at 600 m]) and in **July** from **ARMENIA** (Pont 2018 [9.vii.2016, 1♀ at 1500 m]), **AUSTRIA** (Gregor 1968 [12.vii.61, 2♀♀ at 700 m; 14.vii.61, 7♀♀ at 1750-2000 m; 20.vii.61, 3♀♀ at 1900 m; 22.vii.61, 1♀ at 2000 m; 23.vii.61, 2♀♀ at 750 m; 27.vii.11, 1♀]); Pont 1970 [15.vii.64, 1♂ at 2000-2400 m]), **BULGARIA** (Zielke 2016 [13.vii.1966, 1♂]), the **CZECH REPUBLIC** (Gregor 1968 [11.vii.60, 2♀♀]), **DENMARK** (Michelsen 1977 [27.vii.1964, 2♀♀]), **FINLAND** (Pont 1990 [10.vii.1988, 2♀♀ in a cattle pasture; Silfverberg 1991 quotes Pont 1990]), **GERMANY** (Gregor 1968 [vii, 1887, 1♀]), **SLOVAKIA** (Gregor 1968 [28.vii.63, 2♀♀ at 1500 m]) and **POLAND** (Gregor 1968 [vii.28, 1♂, leg. Riedel); Zielke 2019 [23.vii.1969, 1♀]). In **August** there are records for **BULGARIA** (Zielke 2016 [5.viii.1964, 3♀♀]), the **CZECH REPUBLIC** (Gregor 1968 [11.viii.59, 1♂ & 3♀♀]), **DENMARK** (Michelsen 1977 [6.viii.1929, 1♂; 14.viii.1929, 1♀]), **SLOVAKIA** (Gregor 1968 [6-12.viii.60, 7.viii.58, 1♂ & 11♀♀]; 7.viii.64, 1♀ at 1200 m]); 13.viii.59, 2♀♀) and **POLAND** (Zielke 2019 [12.viii.1968, 3♀♀]). Furthermore Zielke (2016) noted a **BULGARIAN** record for **October** ([7.x.1963, 2♂♂]. Observations of *M. bimaculata* have also been reported from the **ITALIAN mainland** (Fauna Europaea 2022), **HUNGARY**, **KYRGYZSTAN** (as Kirghizstan) (Gregor *et al*. 2002), **NORWAY** (Pont 1990), **RUSSIA (**Pont 1990, as USSR), **SWEDEN** (Pont 1990) and **SWITZERLAND** (Gregor *et al*. 2002). Michelsen (1977) stated that the species is widespread in central Europe ["Udbredt i Mellemeuropa"].

In 1978 Nash and Chandler wrote "?*M. hennigi* Gregor and Povolný, 1959? Some Irish specimens in the H.W. Andrews collection have been determined as *M. hennigi* by A.C. Pont but none of them possess the entire complement of characters supposed to apply to this species. We can therefore only tentatively regard it as being an Irish species".

Two female *Myospila* specimens (163 and 164) from the H.W. Andrews collection held by the British Entomological and Natural History Society (Chandler 2009) were sent by Marc Taylor to EH for identification in April 2022 (Figs 1 and 8). Andrews dated and numbered all his specimens for each locality (Figs 2 and 9) and these correspond to numbers in his diaries, also held by the British Entomological and Natural History Society (Peter Chandler *pers. comm.*). Detailed descriptions for the identification of the female of *M. bimaculata* can be found in Gregor (1968), Pont (1970) and Gregor *et al*. (2002).

Results

Material examined.

Specimen 163. Photos taken by EH in May 2022 (Figs 1-7).

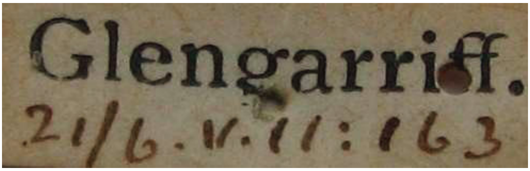
Fig. 1. Dorsally pinned female of *M. bimaculata*. Note the right wing is missing. Fig. 2. Data label showing that specimen 163 was collected from Glengarriff on 21-26 **May** 1911. Fig 3. The strong curvature of wing vein M_{1+2} towards vein R_{4+5} at the apex of the left wing is black starred. Fig. 4. Left mid tibia and Fig. 5. Right mid tibia, both have 0 anterodorsal (ad)- and 3 posterior (p) setae. Fig. 6. The abdomen lacks conspicuous spots. Fig. 7. The longest aristal hairs are not distinctly longer than the width of the postpedicel. They are widely spaced in the apical two-thirds and very short on the ventral side of the basal third.

Specimen 164. Photos taken by EH in April and May 2022 (Figs 8-13).

Fig. 8. Dorsally pinned female of *M. bimaculata*. The strong curvature of wing vein M_{1+2} towards vein R_{4+5} is present on both wings. Fig. 9. Data label showing that specimen 164 was collected from Glengarriff on 21-26 **May** 1911. Fig. 10. Left mid tibia with 4 p setae. Fig. 11. Right mid

tibia with 3 p setae. Ad setae are absent on both mid tibiae. Fig. 12 shows the setulae (yellow star) on the radial node on the dorsal side of the wing. Fig. 13. Abdomen with very faint brown spots on tergite 3 (yellow star).


1



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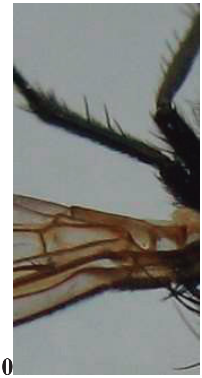
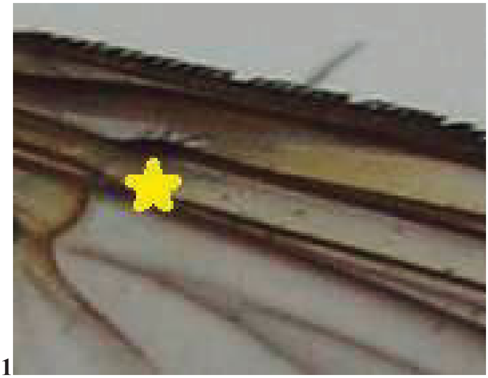
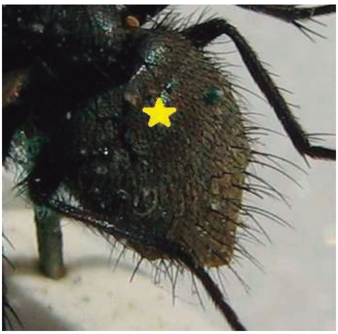


11



12



13

Discussion

M. bimaculata females are easily confused with *M. meditabunda* females in the field because (1) both are on the wing at the same time (Pont 1990), (2) they are sympatric (Pont 1990) and (3) identification of the distinguishing characters is difficult by sight, in particular the length of the aristal hairs in relation to the width of the postpedicel, and the number of p setae on the mid tibia. However, these features can be observed with a x8 hand lens and/or from macro photographs of collected specimens. Observations of the length of the aristal hairs of specimens 163 and 164 were consistent with descriptions in Gregor (1968). In contrast, the longest aristal hairs of *M. meditabunda* are 1.5-2.0 times as long as the width of the postpedicel ["...die längsten Fiedern gut 1.5-2.0 mal länger als die Breite des 3. Fühlergliedes."] (Gregor 1968; Falk 2022).

The number of ad and p setae on the mid tibia on specimens 163 and 164 were also consistent with the literature. Gregor *et al*. (2002) stated that the number of p setae on the mid tibia of female *M. bimaculata* can vary between 3 and 5 (see Gregor 1968: fig. 3d). In the female of *M. meditabunda* there is usually 1 ad seta and only 2 p setae present on the mid tibia (see Gregor 1968: fig. 3a). However, the ad seta on the mid tibia of female *M. meditabunda* can be absent (see Gregor 1968: fig. 3b) e.g., in specimens from North America ["Bei den nordamerikanischen Populationen fehlt vielleicht ad der Mitteltibie regelmässig"] (Gregor 1968) but it is rare for it to be absent in European populations (Eberhard Zielke *pers. comm.*). In addition, 2 ad setae can also be present on the mid tibia ["ad 1 (selten keine oder 2)"] (Gregor 1968).

The pair of brownish spots on tergite 3 were absent in specimen 163 and small, round and inconspicuous in specimen 164. Gregor (1968) wrote for the female of *M. bimaculata* "...spots are absent or [rarely] brownish on the third tergite ["...Flecke fehlen oder sind ausnahmsweise am 3. Tergit bräunlich angedeutet"]. In specimens 163 and 164 the spots were absent on tergite 4. Conversely, the spots on the third and fourth tergites of the female of *M. meditabunda* are distinct, although they can differ in size ["Flecke sehr unterschiedlich gross, aber immer gut abgehoben"] (Gregor 1968).

The female specimen of *M. bimaculata* collected by Falk (2022) is illustrated on-line. His photograph "*Myospila bimaculata* female mid tibia - Sutton Park, Birmingham" has 0 ad- and 4 p setae on the mid tibia of the right leg; the shortest is closest to the apex. Moreover, several of his photographs illustrate the width of the postpedicel and aristal hairs in detail. These features are the same as in specimens 163 (Fig. 7) and 164. The faint brown spots present on tergite 3 in his photo "*Myospila bimaculata* female abdomen - Sutton Park, Birmingham 2" are also visible in specimen 164 (Fig. 13).

H.W. Andrews' trip to the village of Glengarriff in County Cork, Ireland is documented in Andrews (1914). In his "Notes" he wrote that he visited Glengariff (sic) (which he abbreviated to G.) on 2-8 August 1908 and 20-26 May 1911, and he described the village as a well-known tourist resort. He collected "**Myiospila* (sic) *meditabunda*" [Muscidae] at "G. [in] '08". The * was used by Andrews for species mentioned in Colonel Yerbury's list of 1901. Note, though, that *M. meditabunda* is not present in Yerbury's (1902) article "A list of the Diptera met with in Cork and Kerry during the summer of 1901", although other species are recorded by Yerbury from Glengarriff (also as Glengariff), e.g. "*Graphomyia* (sic) *maculata*, Scop. [Muscidae]" on 15 June.

Chandler (2009) gave an account of the collection and diaries of H.W. Andrews. For the dates 20-26 May 1911 Andrews wrote "May 20. Went on from Cork to Bantry & by boat thence to Glengarriff arriving about 4.0pm. Went out after tea & took several Diptera. May 21. Fine but cool wind, collected in the morning taking *E*[*ristalis*] *cryptarum* [(Fabricius, 1794)] among other things...saw but did not get *E. aeneus* [*Eristalinus aeneus* (Scopoli, 1763) (Syrphidae)]....May 22. Went up the Kenmare River & round a stony lane bordering the (Lady Bantry) Park, home thro' the Park. Took numerous Empids & *Rhaphium longicornis* [*Rhaphium longicorne* (Fallén, 1823) (Dolichopodidae)] but not much else. In the afternoon went ... up the Sugar Loaf (1887 ft). Very tired. May 23-25. Wet all three days had indigestion & could do no collecting or setting. May 26. Dull in the morning, fine in afternoon. Much better, did some collecting taking 2 more *E. cryptarum*...".

Located to the south and north-west of Glengarriff village is the Glengarriff harbour and woodland Special Area of Conservation (SAC) (NPWS 2013). The SAC is noted for its "old sessile oak [*Quercus*] woods with *Ilex* and *Blechnum*, and alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)" (NPWS 2015). Goodwillie (1986) stated that the woodland is the only sizeable remnant of *Quercus* forest in west Cork. The underlying rock of the area is old red sandstone, with the soil varying from acid brown earths to alluvial brown earths and peat (NPWS 2013).

Crucially Gregor (1968) wrote "*M. bimaculata* [as *M. hennigi*] prefers deciduous and mixed forests, but it can also occur in subalpine coniferous forests and above the tree-line, although in the latter case it has only been found where there are groups of trees or shrubs [near-by]. The highest locations of *M. bimaculata* were at 2000 m in a widely spaced pine forest in the Alps (Obergurgl) [Austria] and 1500 m at the tree-line in the High Tatra Mountains [Slovakia]. In the dry and warm places in central Europe the species also occurs in alluvial forests...["*M. hennigi* bevorzugt Laubwälder und gemischte Wälder, kommt aber auch in den subalpinen Nadelwäldern und über der Waldgrenze vor, obzwar sie im letzten Fall immer nur dort gefunden wurde, wo sich nahestehende Baum- oder Strauchgruppen befanden. Der höchsteuns bekannte Fundort von *M. Hennigi* ist bei 2000 m in einem lockeren Zirbenwald in den Alpen (Obergurgl) und bei 1500 m an der Waldgrenze in der Hohen Tatra. In trocken warmen Gebieten Mitteleuropas kommt die Art auch vor und zwar in den Auwäldern…"].

In addition, Pont caught one female of *M. bimaculata* in a faeces trap in a forest (Pont 2018) and single males of *M. bimaculata* from Bagley Wood, Wytham Wood and The New Forest (Pont 1970). Interestingly, the New Forest SAC is also noted for its alluvial forest with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) (JNCC 2022). Zielke (2016) wrote that a single female had been collected from an oak forest in Bulgaria in May, and in Austria one male was captured at a height of 2000-2400 m in a pine forest in July (Pont 1970). Furthermore, *M. bimaculata* has been taken from Danish forests ["I skove"] (Michelsen 1977) e.g., Jelling Skov is an old forested area dominated by *Fagus* and *Alnus* (Verner Michelsen *pers. comm.*). These records strongly suggest that woodland and forest sites are essential habitats for *M. bimaculata*.

Goodwillie (1986) stated that the spread of rhododendron is a major danger to the Glengarriff woodland and "every assistance with its clearance should be given". Grazing by the sika or Japanese deer [*Cervus nippon* (Temminck, 1838)] is also a problem since it prevents the regeneration of the trees (Goodwillie 1986). Consequently, it is vital that Glengarriff woodland is restored and preserved to maintain Ireland's rich flora and fauna heritage. Much is still unknown about *M. bimaculata*, for example, when do females lay their eggs and where? Are the larvae predatory? Do the larvae form cocoons similar to *M. meditabunda*? (Ferrar 1980) and do adults visit flowers for nectar and/or pollen? A study of tree-hole fauna in the Glengarriff woodland would be of interest.

Acknowledgements

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***Phytomyza agromyzina* Meigen (Diptera, Agromyzidae) new to Scotland** – On 18 July 2022, I found a single mine (Fig. 1) of *Phytomyza agromyzina* Meigen, 1830 on a dogwood (*Cornus sanguinea*) leaf along the footpath around Bingham's Pond, NS553682, Glasgow (V.C. 77); the site is in a large urban area and has just been granted Local Nature Reserve status.

Fig. 1. *Phytomyza agromyzina* larval mine on *Cornus sanguinea*.

An image of the leaf mine was sent to the National Agromyzidae Recording Scheme organiser, Barry Warrington, who confirmed the identification and added that this represents the first known record for Scotland, with the previous most northerly records from County Durham (V.C. 66) and Cumberland (V.C. 70) – **DEAN STABLES,** glasgowbirder@gmail.com

***Liriomyza eupatorii* (Kaltenbach) (Diptera, Agromyzidae) new to Scotland** – A new gravel path has recently been installed at RSPB Scotland Loch Lomond that enables access to the loch shore. Where the path passes through an area known as Limehill Rough, which has a rather heathy feel with lots of bracken, there has been an explosion of common hemp-nettle (*Galeopsis tetrahit*) along the path edge in response to the recent disturbance, much to the delight of bees. There is also a small amount of bifid hemp-nettle (*G. bifida*). On 27 July 2022, I found a mine of *Liriomyza eupatorii* (Kaltenbach, 1873), with its characteristic spiral shape, on the common hemp-nettle (NS430877) (Fig. 1).

Fig. 1. Mine of *Liriomyza eupatorii* on common hemp-nettle, showing the characteristic spiralled start (Photo: Sam Buckton)

Fig. 2. Habitat view showing the shady side of the path where *L. eupatorii* mines were observed (Photo: Sam Buckton).

Returning to the same site a few days later, I counted around ten mines in total, all on common hemp-nettle and all on the shady north-facing side of the path (Fig. 2), despite an abundance of the host on both sides. Perhaps *L. eupatorii* prefers slightly cooler and damper conditions. The record was submitted to iRecord, where the National Agromyzidae Recording Scheme organiser, Barry Warrington, confirmed my identification and added that the record represents the first known occurrence in Scotland – **SAM BUCKTON,** sjb312@cantab.ac.uk

***Napomyza merita* Zlobin (Diptera, Agromyzidae) new to Great Britain** – On 10.v.2022, I collected a single male of an Agromyzidae species unknown to me. The specimen was collected from Martham Smee in East Norfolk (V.C. 27). Martham Smee is a small area of common land with some open grassland, hedges, mature trees and an area of damp woodland, and is within the boundary of the Broads National Park. As is customary in these situations I forwarded the specimen to Barry Warrington of the Agromyzidae Recording Scheme. He determined the specimen as *Napomyza merita* Zlobin, 1993 and this represents the first known record for Great Britain; Fig. 1 shows the structure of the male genitalia.

Napomyza is a difficult genus to identify, with some 59 valid species currently known worldwide; *N. merita* is placed within the *lateralis* group. Given the difficulty in identification and the relatively low level of recording of this group, it seems quite likely that the species is an overlooked resident species, although the possibility of recent colonisation due to environmental or climatic changes can't be ruled out.

Fig.1. *Napomyza merita* Zlobin, male genitalia of the British specimen (Photo: Barry Warrington).

Some discussion of the *Napomyza* complex of species was provided by Barry Warrington (2021. A new *Napomyza* Westwood (Diptera, Agromyzidae) species of the *lateralis*-group. *Dipterists Digest* (*Second Series*) **28,** 149-162) – **TIM HODGE,** Belvedere Cottage, Horsey Corner, Horsey, Norfolk NR29 4EH; tim.hodge@btinternet.com

Dipterists Digest 2023 **30,** 70-79

Hercostomus rusticus (Meigen) (Diptera, Dolichopodidae) new to Britain in urban London

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Summary
Hercostomus rusticus (Meigen, 1824) is recorded as new to Britain from London. It was frequent in Malaise trap samples taken in an urban allotment and found once at a nearby recreational park. The flight period in the three years in which it was recorded was from early June to early September. Males were marginally more frequent than females but there was no difference in their relative abundance through the flight period. Its high abundance in an apparently well-established population suggests that it was probably recently introduced rather than has been overlooked in the past. It resembles *H. nigrilamellatus* (Macquart), from which it is distinguished by several characters illustrated here.

Introduction
The genus *Hercostomus* falls within the large subfamily Dolichopodinae, which in Britain includes many of the larger and more easily identified species. The genus has been used to place dolichopodines that do not fall within clearly defined genera but it is paraphyletic, whether analysed using morphological or molecular characters (Brooks 2005, Pollet *et al*. 2010, Germann *et al*. 2011). The resulting heterogeneous assemblage does, however, make their identification relatively easy as they are often quite different from one another. This was the case with *Hercostomus rusticus* (Meigen, 1824) that was recognised by CMD among material collected by DP at Arnos Park and East Finchley, London.

Fig. 1. Aerial photograph of the East Finchley Allotments indicating the position of the Malaise trap (Google Maps).

Site

At East Finchley, DP had run a Malaise trap at her allotment (a community area for growing vegetables and other produce) for many weeks in 2017, 2018 and 2020. The allotments (TQ2718 9001, V.C. 21 Middlesex) are situated to the west of a small fragment of one of London's 'ancient' woodlands, Coldfall Wood, and south of the large sprawling cemetery of St Pancras and Islington (Fig. 1), with gardens and a school playing field enclosing the other margins. The site has proved to have an abundance of previously unrecorded (in Britain) and under-recorded insects such as *Microterys tricoloricornis* (De Stefani) and *M. nietneri* (Motschulsky) (Encyrtidae, Hymenoptera) (Painter 2020), and other, yet to be published, species of Aphelinidae, Mymaridae and Encyrtidae.

A single male *H. rusticus* from Arnos Park (TQ295927, 8.viii.2018) was swept whilst DP was collecting with colleagues searching for species described by Francis Walker (1809-1874) who lived in the area and who was the author of the three volumes of *Insecta Britannica Diptera* published in the 1850s. The Pymmes Brook treeline, open grassy areas and parkland shrubbery were sampled on that particular trip. This site is about 3.5km from the allotment.

Fig. 2. *Hercostomus rusticus* photographed in alcohol (so the cuticle appears shinier than in dry material).

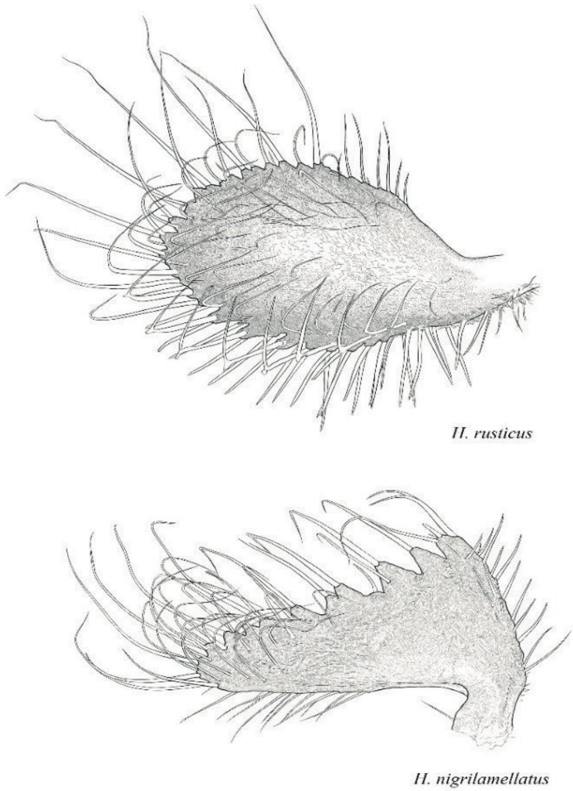


Fig. 3. *Hercostomus rusticus* and *H. nigrilamellatus* inner surface of cercus.

Identification

The specimens ran easily to *H. rusticus* in the keys by both Parent (1938) and Stackelberg (1933, 1934), and fitted their detailed descriptions and figures. Negrobov and Nechay (2009) included several more recently described Palaearctic *Hercostomus*, and using their key the specimens were again identified as *H. rusticus*.

Hercostomus rusticus is a moderately small fly with dark body and legs (Fig. 2). It resembles *H. nigrilamellatus* (Macquart) in being completely black, having large dark slightly oval cerci (Fig. 3), and the front tibia possessing a long fine posteroventral apical seta about twice the shaft's width (Fig. 4). It differs from all other British *Hercostomus* in having a long antennal postpedicel (third segment) with the arista placed near the tip, compared to the usual arrangement in *Hercostomus* of a round to short-oval postpedicel and centrally placed arista (Fig. 5). The hypopygia of *H. rusticus* and *H. nigrilamellatus* are distinctly different, most obviously in the narrow apicoventral epandrial lobe and dorsal surstylus of *H. rusticus* compared to much broader structures in *H. nigrilamellatus* (Figs 6 and 7). Females are also completely dark and their postpedicel is pointed although not as long as that of the males. However, *H. rusticus* has white lower postocular setae whereas those of *H. nigrilamellatus* are black so, in the key by d'Assis-Fonseca (1978), males will fall out at couplet 18 as *nigriplantis* (Stannius) and females at couplet

20 as *sahlbergi* (Zetterstedt); both these are large species with yellow tibiae. The wing length (mean and range) measured to the basal sclerites of males is 3.1 (2.8-3.2) mm and of females 3.2 (3.1-3.4) mm, N=10 for each sex.

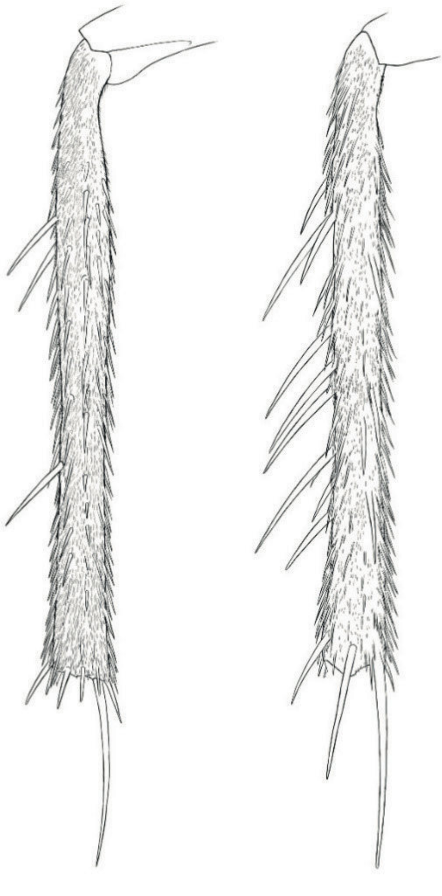
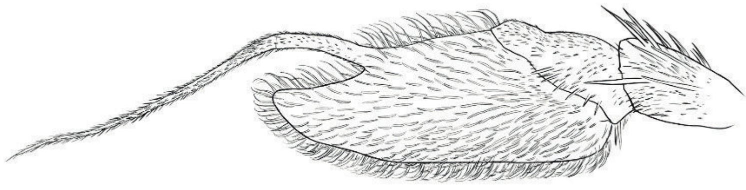
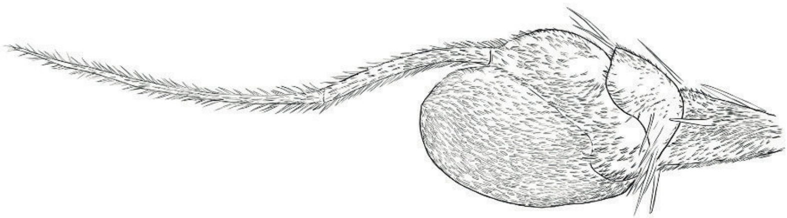


Fig. 4. *Hercostomus rusticus* and *H. nigrilamellatus* front tibia posterior view.

Zhang *et al*. (2008) described *H. subrusticus* from a single male from western China. They listed features of the hypopygium that differ from those in the small figure of *H. rusticus* by Stackelberg (1934, his fig. 136) but it is probable that these differences are illusory as a result of the more cursory earlier drawing. The detail of the internal structures and cercus of the hypopygium of both species are essentially identical (Figs 3 and 6; figs 33 and 34 of Zhang *et al*.). An explanation for this is that the British material is *H. subrusticus*, but we consider this highly improbable. It is more likely that they are the same species, as *H. rusticus* is given a very wide distribution that includes the West and East Palaearctic (Pollet 2011).



Hercostomus rusticus



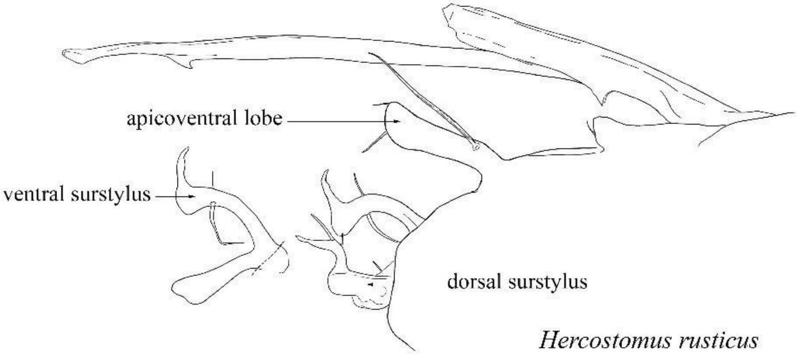
Hercostomus nigrilamellatus

Fig. 5. ***Hercostomus rusticus*** **and** ***H. nigrilamellatus*** **antenna.**

Flight period

Remarkably, *H. rusticus* was the second most common species of Dolichopodidae in the trap samples after the super-abundant *Poecilobothrus nobilitatus* (Linnaeus), whose females dominated catches in midsummer. Over the years 2017, 2018 and 2020, 193 specimens of *H. rusticus* were collected, all but one (which was swept from Arnos Park, the remaining 44 acres of the Arnos Grove estate), by Malaise-trapping at East Finchley. Males were more numerous (106 specimens) than females (87) but the slight bias may be an artefact of active males being more prone to being trapped. There is no marked difference in relative abundance of the two sexes through the year, when all three years' data are combined and plotted by day number taken as the midpoint between servicing the traps (Fig. 8). The earliest and latest records were from the trapping periods 2-10 June 2018 and 2-10 September 2017, with a peak in late June to mid-July. Trapping started in early to late May in all years (with short periods in March and late April 2017) and ended in September 2017, October 2018 and October-December 2020, but no early or late individuals of *H. rusticus* were found in these periods.

Several authors have quoted flight times for mainland Europe. Bährmann (1993) recorded the species from the first half of May to the second half of July, Meuffels (1978) for several dates in June, Keiser (1947) from 7 to 31 July, Pollet (2000) from the beginning of June to the beginning of August, and Pârvu (1984) in mid-September. Germann and Bernasconi (2010) gave dates that they found most surprising for a species in this genus of 29 December, 6 and 13 February and 29 April, recorded for specimens at the window on an upper floor of an apartment block; Christoph Germann (*pers. comm.*) clarified that these were outside the building. Thus the current trapping results confirm the usual midsummer flight period but did not add to the unusual winter-active period recorded in Switzerland.



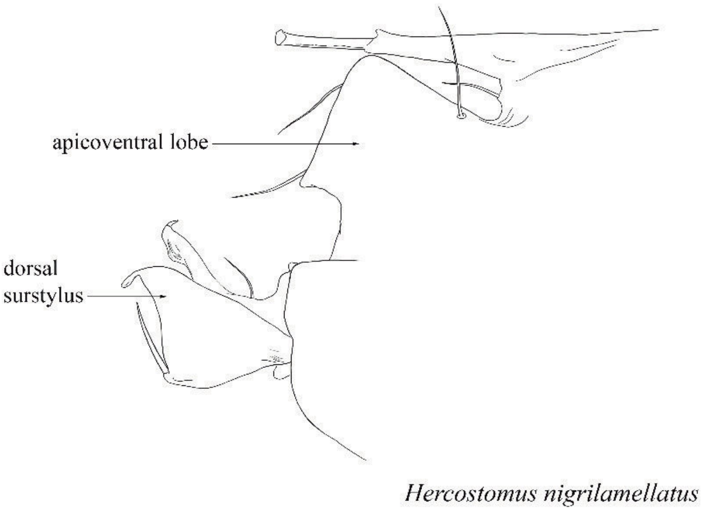
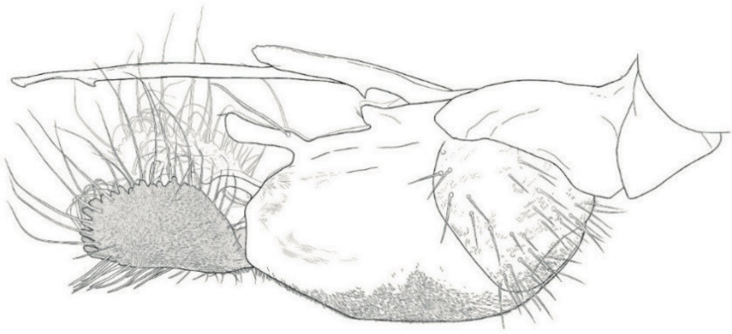


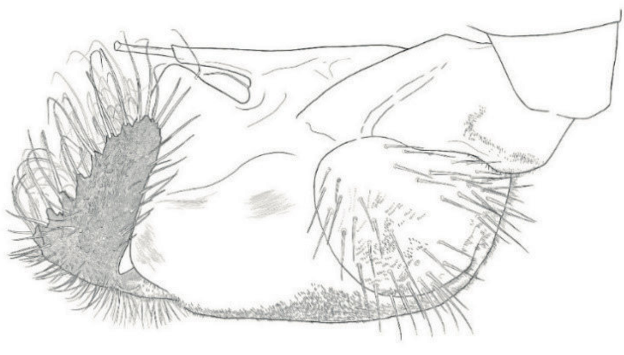
Fig. 6. *Hercostomus rusticus* and *H. nigrilamellatus* internal structures of hypopygium.

Habitat
Although the species is widespread in the Western Palaearctic, there are few indications of its habitat preferences. The consensus is that *H. rusticus* is a species of dry and sunlit habitats. In Germany *H. rusticus* has been found in warm dry grasslands and dwarf-shrub heaths, including south-facing slopes on gypsum and limestone soils, where highest numbers of specimens were trapped or collected at sparsely vegetated areas with *Calluna* on sandy soils (Stark 2003; *pers. comm*.). Pollet (2000) described it as a drought-loving species of deciduous forests and south-facing wooded slopes. Keiser (1947) gave more detail of localities in Switzerland where he described it as typical of meadows, especially hay meadows; it was found even in dry localities exposed to the south (presumably a dry aspect in upland Switzerland), and in sparse larch forest,

where Keiser appears to have regarded it as a stray (Zufällig, im lichten Lärchenwald). Also in Switzerland, in a survey of upland peat bogs, Rampazzi (2002) recorded *H. rusticus* only in a dry stand of heather (*Calluna*), and classified it as xerophilic. In contrast to these dry places, Strobl (1893) described it as very common at streams and in mountain forests around Steinbruck, Germany, in July ("An Bachen und in Bergwaldern um Steinbruck sehr haufig. Juli") but Andreas Stark (*pers. comm.*) suggests that these records may be suspect.



Hercostomus rusticus



Hercostomus nigrilamellatus

Fig. 7. *Hercostomus rusticus* and *H. nigrilamellatus* entire hypopygium.

It is not obvious how the fly's apparent preference for dry habitats fits with its well-established population at the North London allotment. The site is crossed by several small watercourses that eventually feed into the River Lea. The Malaise trap was situated alongside one of these watercourses, lined with a mixed hedge of hawthorn (*Crataegus*), apple (*Malus*), hazel (*Corylus*), birch (*Betula*), fig (*Ficus*) and cherry (*Prunus*) and underplanted with various fruit and vegetable plants. Different methods of land cultivation exist in proximity, for example, orchard plots lie beside highly cultivated plots, and softer garden-like plots next to wildlife spaces. There are ponds and 'boggy' spots which remain saturated year round, as well as areas that may be baked in the sun and dry out. Coldfall Wood adjoins the eastern edge of the site; the cemetery is large and overgrown in places along the northern periphery and completes the enclave where this species may have established itself. Because of this eclectic mix it is difficult to say which habitat *H. rusticus* prefers at this location, but perhaps the species' preference for sparsely vegetated sunlit ground is met by the frequently disturbed conditions created by gardeners.

Given the urban location where *H. rusticus* was found, the other dolichopodid fauna recorded in the Malaise trap was surprisingly species-rich and included some uncommon species. Altogether, 54 species were recorded. Frequently-found species that may be expected from a moderately dry habitat included *Dolichopus festivus* Haliday, *D. griseipennis* Stannius, *D. trivialis* Haliday and *D. virgultorum* Haliday in Walker, while some less frequently recorded species also indicated a dry habitat, for example, *Xanthochlorus silaceus* Chandler & Negrobov, or at least indicated well drained substrates, for example, *Chrysotus suavis* Loew. These species may confirm the preference of *H. rusticus* for dry conditions. On the other hand, there was clearly some permanent wetland nearby, as the catches included occasional individuals of *Campsicnemus picticornis* (Zetterstedt), *Hercostomus plagiatus* (Loew), *Lamprochromus bifasciatus* (Macquart), *Rhaphium brevicorne* Curtis, *Syntormon bicolorellum* (Zetterstedt), and both sexes of *Syntormon macula* Oldenberg, along with many other common wetland dolichopodid species.

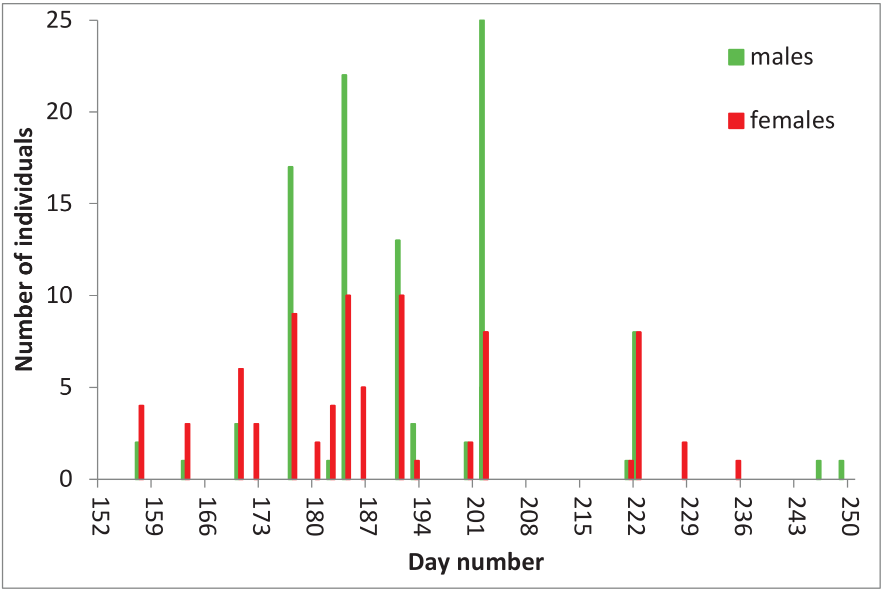


Fig. 8. Occurrence of *Hercostomus rusticus* in Malaise trap samples by day number for three years of trapping combined. Day 152 = 1 June, day 250 = 6 September.

Distribution

Hercostomus rusticus is widespread in Europe, being found in most countries from Spain to Ukraine, south to Italy and Greece, and in the East Palaearctic, but absent from Scandinavia and small countries bordering the Baltic Sea (Pollet 2011). It seems that it was only a matter of time before the species was found in Britain. As with many newly discovered species, it is not clear whether this is a rare species that has been present at very low densities or a recent immigrant. Its distinctive appearance mitigates against it having been overlooked in a part of Britain well populated by entomologists. It may particularly be noted that DP made her visit to Arnos Grove to try to re-find the species described by Francis Walker, who lived there. As the species is associated with drier habitats, it is possible that larvae may have been introduced with horticultural plants, for instance, the currently popular old olives, figs and vines imported with a large amount of soil. Another aspect of the species' local abundance is that London offers a particularly warm climate all year, owing to the heat island effect, as suggested by Sivell (2019) as a reason for the occurrence of an extraordinarily large population of a newly discovered dolichopodid, *Sciapus pallens* (Wiedemann) in the garden of the Natural History Museum in central London. It would seem more probable that *H. rusticus* is a recent import rather than a species released from a long-standing but suppressed tiny population.

Several other species of *Hercostomus* are widespread in Europe and stand a chance of being found in Britain. On the basis that most British species occur in northern countries, including those in Scandinavia and bordering the Baltic Sea (Pollet 2011), the most likely to occur in Britain are *H. chaerophylli* (Meigen), *H. fugax* (Loew) and *H. vivax* (Loew), followed by *H. convergens* Loew, *H. exarticulatus* (Loew), *H. longiventris* (Loew) and possibly *H. pilifer* (Loew). This 'shopping list' is longer than for many other genera of dolichopodids, but it emphasises the importance of not attempting to shoe-horn an unusual specimen into the keys of d'Assis-Fonseca (1978).

Material examined: All sites are in V.C. 21 (Middlesex), leg. D. Painter, det. C.M. Drake. 1♂ Arnos Park, TQ295927, 8 viii 2018. East Finchley, TQ27189001: 3♀ 17-25 vi 2017; 2♀ 25 vi 2017-2 vii 2017; 5♀ 2-9 vii 2017; 3♂, 1♀ 9-16 vii 2017; 2♂, 2♀ 16-23 vii 2017; 1♂, 1♀ 6-13 viii 2017; 2♀ 13-20 viii 2017; 1♀ 20-27 viii 2017; 1♂ 2-10 ix 2017; 2♂, 4♀ 2-10 vi 2018; 1♂, 3♀ 10-15 vi 2018; 3♂, 6♀ 15-23 vi 2018; 17♂, 9♀ 23-30 vi 2018; 22♂, 10♀ 30 vi 2018-7 vii 2018; 13♂, 10♀ 7-14 vii 2018; 25♂, 8♀ 14-28 vii 2018; 1♂, 4♀ 20 vi 2020-11 vii 2020; 5♂, 8♀ 11-30 vii 2020; 8♂, 8♀ 30 vii 2020-20 viii 2020; 1♂ 20 viii 2020-15 ix 2020.

Acknowledgements
We thank Duncan Sivell of the Natural History Museum, London, for the use of the first Malaise trap, and Darwyn Summer for the subsequent replacement Malaise trap. We are most grateful to Andreas Stark and Christoph Germann for responding so helpfully to our enquiries, and to Marc Pollet for his useful suggestions on an earlier version.

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Confirmation of *Melanagromyza oligophaga* Spencer (Diptera, Agromyzidae) as a valid species

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Summary
Melanagromyza oligophaga Spencer, 1990, a previously established junior synonym of *Melanagromyza dettmeri* Hering, 1933, is hereby confirmed to be a valid species. A detailed study of reared material of both species revealed slight but consistent differences in the male genitalia, with notable difference being observed in the larval posterior spiracles. Comparison images of the male genitalia and posterior spiracles are provided. *Erigeron* and *Jacobaea* are reported as probable new host plant genera for *M. oligophaga*.

Introduction
In his European revision of the genus *Melanagromyza*, Spencer (1966), when discussing *Melanagromyza dettmeri* Hering, 1933, stated 'although the ten male genitalia examined show definite variations, this is not constant between different food-plants and on the material so far available there is no justification in considering this is a species complex. The adults and larval characters are in all cases identical'. Spencer (1976) later commented on *M. dettmeri* [in relation to specimens reared from various genera of food plants] citing 'significant differences in the male genitalia which suggest that this might represent a complex of closely-related species. More detailed studies with additional bred material will be required before this question can be further clarified'. At the time, it was thought that *M. dettmeri* utilised several genera of Asteraceae as hosts: *Achillea*, *Artemisia*, *Centaurea*, *Crepis*, *Hieracium* and *Senecio* (Spencer 1976).

Spencer (1990) re-examined reared specimens [from *Achillea*, *Artemisia*, *Centaurea*, *Crepis*, *Hieracium* and *Picris*] previously determined as *M. dettmeri*, which resulted in *Melanagromyza oligophaga* being described as a new species based on the 'minor' genitalic differences compared to the almost identical *M. dettmeri*, mentioning that the differences in the genitalia between *M. dettmeri* and *M. oligophaga* are 'particularly striking in side view' (Spencer 1990: 252, 260). The host genera for *M. oligophaga* are given as *Achillea*, *Artemisia*, *Crepis*, *Hieracium* and *Picris*, with *M. dettmeri* restricted to *Centaurea*. The larval posterior spiracles of *M. oligophaga* are described as being 'on two adjoining plates, with a strong central horn surrounded by an ellipse of 15 pale pores' (Spencer 1990), while those of *M. dettmeri* were 'almost touching each other, with a large, strongly chitinised spine, surrounded by an incomplete circle of papillae' (Hering 1957, Spencer 1957).

Sasakawa (2015) formally synonymised *M. oligophaga* with *M. dettmeri*, citing that the differences in genitalia between the two species are 'not clear-cut and the ventral view of *dettmeri* is quite similar to that of *oligophaga*' and that the figures of the distiphallus in ventral view drawn by Spencer are 'so incorrect, that they are here presented with accuracy' (Sasakawa 2015: figs. 6 and 7). Prior to this synonymy, all previous articles discussing *M. oligophaga* treat it as a valid species, with no proposal that the species is a junior synonym of *M. dettmeri*: Černý 2009, Černý and Vlk 2004, Černý *et al.* 2005a, Černý *et al.* 2005b, Iwasaki 2000, Kahanpää 2014, Karpa 2008, Ostraustas *et al.* 2005, Pakalniškis 1997, Pakalniškis 1999, Pakalniškis *et al.* 2000, Schmitz 1999, Stickroth 1996, von Tschirnhaus 1992, von Tschirnhaus 1994, Vikberg and Malinen 2012. Four subsequent articles also treat *M. oligophaga* as a valid species: Papp and Černý (2015), Papp and Černý (2020), Silfverberg (2017) and Warrington (2019).

Discussion

Although no authors followed Sasakawa in the synonymy of *M. oligophaga* with *M. dettmeri*, the situation merited further investigation to formally clarify the current treatment of these species. Between 2017 and 2022, the author reared both species in good numbers [112♂, 63♀ *M. dettmeri* and 71♂, 28♀ *M. oligophaga*] from material obtained throughout Britain, on various host genera. Detailed examination of the material resulted in seemingly reliable, stable features which are sufficient to confirm that the two species are distinct.

Host plants

When Spencer described *M. oligophaga*, its host genera were given as *Achillea*, *Artemisia*, *Crepis*, *Hieracium* and *Picris*. Later, Pakalniškis (1997) reared adults from *Centaurea* and *Hypochaeris*. Two seemingly unpublished hosts, *Erigeron annuus* and *Jacobaea vulgaris*, are hereby added as confirmed host genera for *M. oligophaga*: 10.i.1999, Unkel at river Rhein, Nordrhein-Westfalen, Germany, 50°35'33"N, 7°13'06"E, leg. Gregor Schmitz, fly emerged iv.1999, det. M. von Tschirnhaus, reared from *Erigeron annuus* stem; 1.ii.1998, Ascot, Berkshire, leg. M. Gilman, det. H.C.J Godfray, reared from *Jacobaea vulgaris* stem; 1.v.1989, Lewes, Sussex, leg. M. Gilman det. H.C.J. Godfray, reared from *Jacobaea vulgaris* stem; 20.xi.2021, Downham Market, Norfolk, leg. R. Edmunds, puparium in *Jacobaea vulgaris* stem. In addition, the author has reared *M. oligophaga* from *J. vulgaris* on 53 occasions.

As previously highlighted, it was initially thought that *M. dettmeri* was monophagous, restricted to *Centaurea*. However, subsequent workers have also reared it from *Jacobaea* (Kunin 1999, Keith Bland [records held in the National Agromyzidae Recording Scheme database]) and *Tragopogon* (Parkman *et al.* 1989). The author has only rarely reared *M. dettmeri* from *Jacobaea*. Ellis (2022) gave only *Centaurea* as a host but his comment that 'records from other plant genera are almost certainly incorrect' must be disregarded. Based on the rearing results of the author, the table below indicates the preferred host genera for *M. oligophaga* and *M. dettmeri*:

Host	***M. oligophaga* (99 specimens)**	***M. dettmeri* (175 specimens)**
	% of specimens reared from this host	
Achillea	37	0
Artemisia	2	0
Centaurea	6	96
Crepis	1	0
Erigeron	0	0
Hieracium	0	0
Hypochaeris	0	0
Jacobaea	54	4
Picris	0	0
Tragopogon	0	0

*numbers in red indicate species not known from this genus.

M. dettmeri is almost exclusively restricted to *Centaurea* but can, very infrequently, be found to use *Jacobaea*, whilst *M. oligophaga* shows a distinct preference for *Jacobaea* but is sometimes encountered using *Centaurea*. During the process of obtaining puparia, the author observed on several occasions that two species may be found inside the same stem; individual stems of *J. vulgaris* were often found to possess the puparia of *M. aeneoventris* (Fallén, 1823) with *M. eupatorii* Spencer, 1957, or *M. aeneoventris* with *M. oligophaga*. All other host genera listed in the table yielded only single puparia in individual stems.

Larval detail

Although no active larvae were examined for this study, the puparia of each species were examined in detail, revealing constant features that would permit safe identification. In total, 274 puparia were examined (175 *M. dettmeri*, 99 *M. oligophaga*); the table below summarises the observations made:

Puparium:	***M. oligophaga***	***M. dettmeri***
Size	♂ 2.7-3.3mm, ♀ 2.9-4.0mm	♂ 2.9-3.2mm, ♀ 3.1-4.1mm.
Colour	Pale, whitish-grey	Pale, whitish-grey [sometimes with a yellowish tinge]
Posterior spiracles:		
Position	Virtually adjoining	Virtually adjoining but slightly less so than in *oligophaga*
Base	Pale brown	Dark brown
Horn	Darker than base, slightly smaller than that of *dettmeri*	Dark, same as base
Bulbs	Pale, same colour as base	Dark but slightly paler than base
No. of bulbs	10-15	13-18

The most notable difference between *M. dettmeri* and *M. oligophaga* is the posterior spiracles (Fig. 1). The author has reared several hundred specimens of *Melanagromyza* species and the posterior spiracles are a very stable feature within each species, with respect to their positioning, colour and overall form. The very pale base is only ever present in *M. oligophaga* whilst that of *M. dettmeri* is consistently extremely dark; no overlap or variation was detected in the 274 puparia which were examined. The number of bulbs on each spiracle is variable within both *M. dettmeri* and *M. oligophaga*, with the latter tending to have slightly less than the former; however, the number of bulbs is not a reliable identification feature as it is often variable within individual *Melanagromyza* species (Warrington 2018, 2019). Both species possess a strong 'horn' which is, on the whole, slightly smaller in *M. oligophaga*.

Fig. 1. Posterior spiracles of (left) *Melanagromyza oligophaga* and (right) *Melanagromyza dettmeri*.

Imago

Externally, adults of *M. dettmeri* and *M. oligophaga* are virtually identical and cannot be reliably separated; the most recent dichotomous key to *Melanagromyza* (Papp and Černý 2015) places some reliance on the shape of the lunule [lunule with straight upper margin in *dettmeri*, lunule very high with rounded upper margin in *oligophaga*] but this is open to misinterpretation, and there is very little difference in the illustrations by Papp and Černý of these species. A revision of British *Melanagromyza* spp. will be published in due course, in which detailed morphological descriptions for both species will be included.

Genitalia

Female : Pakalniškis (1997) described and illustrated the female terminalia of *M. dettmeri* and *M. oligophaga* (Fig. 2) and also included a dichotomous key to determine female *Melanagromyza* based on the terminalia. In the key, *M. dettmeri* and *M. oligophaga* run to couplet 4 where they are separated by the size of the egg guide; it is approximately 5 times as long as wide in *oligophaga*, but approximately 4 times as long as wide in *dettmeri*. Reared females of both species [10 *dettmeri*, 10 *oligophaga*] were dissected by the author and compared with the description and illustrations of Pakalniškis; the egg-guide, ninth abdominal segment and spermathecal capsules all agree with Pakalniškis. The egg guide of *M. dettmeri* ranged from 4 to 4.5 times as long as wide, with that of *M. oligophaga* 5 to 6 times as long as wide.

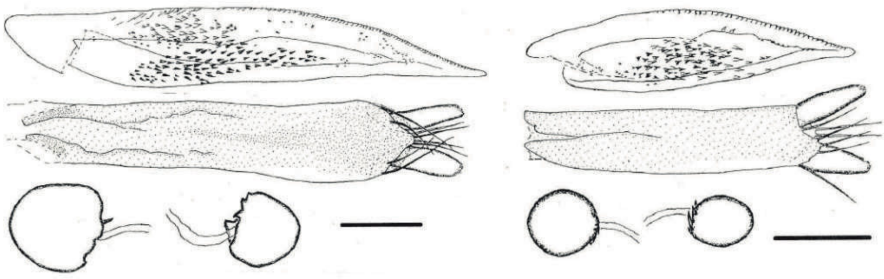

Fig. 2. Female terminalia of (left) *M. oligophaga* and (right) *M. dettmeri*. Top, egg guide. Middle, ventral view of ninth abdominal segment. Bottom, lateral view of spermathecal capsules. Scale bar : 0.1mm. Taken from Pakalniškis (1997).

Male : Within Agromyzidae in general, the male genitalia of a species are often depicted quite differently by individual workers, even though natural variation within a species is usually only very minor. Differing depictions may occur due to over maceration, damage caused during the dissection process, orientation issues or inadequate optical equipment.

The illustrations of *M. dettmeri* distiphallus by Sasakawa (2015: 16), Spencer (1990: 252) and Papp and Černý (2015: 218) are extremely different from one another, which results in workers being unsure as to which is a true representation of the species. To resolve this issue, the author dissected all 112♂ reared *M. dettmeri* specimens and found the distiphallus showed very little variation; the only features which could be considered slightly variable are the gap between basi- and distiphallus [but this is easily affected during the dissection process] and the density of spiculae on the dorsal lobes.

The illustrations by Papp and Černý (2015) agree very well with the dissections of the author, and it can be concluded that the distiphallus as depicted by the author (Fig. 3. right) and Papp and Černý are a true representation of *M. dettmeri*. Sasakawa (2015) stated that his figures of *M. dettmeri* are 'presented with accuracy' but they bear no resemblance whatsoever to reared *M. dettmeri* examined by the author or those depicted by Papp and Černý [who correctly describe the phallus as 'entirely distinctive']. As it is unclear if the material examined by Sasakawa was reared or field caught, these illustrations of '*dettmeri*' must be disregarded, and they are highly likely to represent a different species, known or undescribed.

The distiphallus of 71♂ reared *M. oligophaga* specimens was examined by the author and, again, little variation was detected within the series. As with *M. dettmeri*, the only very minor variations observed related to the gap between basi- and distiphallus and the number of spiculae present on the dorsal lobes. Spencer (1990) mentioned that the difference [in the phallus] between *M. dettmeri* and *M. oligophaga* in side view is 'particularly striking'; as shown in Fig. 3, top, this difference is quite notable.

Comparison of the distiphallus of both species revealed consistent differences; the distal tubule of *M. oligophaga* is slightly stouter and shorter than in *M. dettmeri*, particularly so when viewed from above/below (Fig. 3, middle and bottom); in lateral view, the lower, distal part of distiphallus in *M. dettmeri* possesses a distinctly round 'opening', while in *M. oligophaga* this is much more slit-like; when viewed from above/below, the distiphallus of *M. dettmeri* possesses distinctly darkened, thickened edges on the distal half, which is never present in *M. oligophaga*; when viewed from above, spiculae on the dorsal lobes in *M. dettmeri* form a clear Sigma [Σ] shape [Fig. 3. middle right, Papp and Černý (2015: 218, fig. 99D)], while in *M. oligophaga* spiculae are always less-defined, forming a different shape, concave anteriorly [Fig. 3, middle left, Papp and Černý (2015: 229: fig. 107E)].

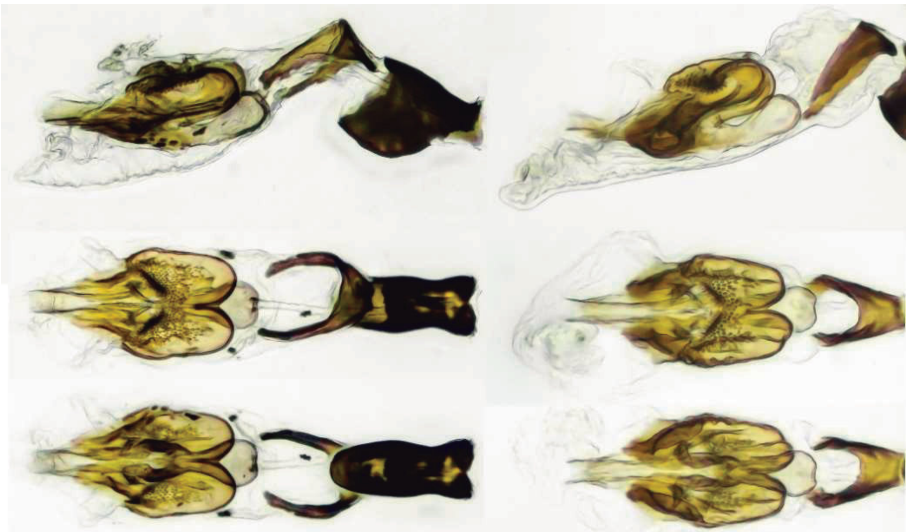

Fig. 3. Comparison of male distiphallus of (left) *Melanagromyza oligophaga* and (right) *Melanagromyza dettmeri*. Top, distiphallus in left lateral view. Middle, distiphallus viewed from above. Bottom, distiphallus viewed from below. (Top and bottom relate to the rest position of the phallus pointing anteriorly).

Conclusion

Based on the detailed study of reared material discussed within this paper, *Melanagromyza oligophaga* is hereby confirmed to be a valid species. Although there may have previously been some misinterpretation with regards to the larval host genera and male phallus, the long series of reared material examined by the author throws much-needed light on the matter. The male distiphallus of *M. dettmeri* and *M. oligophaga* are accurately portrayed in Fig. 3 [as well as in Papp and Černý 2015], whilst the distinctive larval posterior spiracles, illustrated comparatively for the first time, also aid identification.

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Dipterists Digest 2023 **30,** 87-88

Eight flies new to Ireland from Glengarriff Woods Nature Reserve, County Cork

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Summary
An invertebrate survey of Glengarriff Woods Nature Reserve, Co. Cork, between 23.v and 29.vii.2015 yielded records of eight species of fly new to Ireland: *Euphylidorea phaeostigma* (Schummel, 1829) (Limoniidae), *Mycetophila eppingensis* Chandler, 2001 (Mycetophilidae), *Trichonta submaculata* (Staeger, 1840) (Mycetophilidae), *Platypalpus albifacies* (Collin, 1926) (Hybotidae), *Phyllomyza rubricornis* Schmitz, 1923 (Milichiidae), *Ditrichophora fuscella* (Stenhammar, 1844) (Ephydridae), *Coenosia pudorosa* Collin, 1953 (Muscidae) and *Macquartia nudigena* Mesnil, 1972 (Tachinidae). A single female *Mycetobia* (Mycetobiidae) specimen appeared to be *M. gemella* Mamaev, 1968, which would also be new to Ireland, but a male specimen was required for confirmation.

Introduction
Glengarriff Woods Nature Reserve is a large state-owned reserve, covering about 300 ha, which extends north-west from the town of Glengarriff, Co. Cork (V.C. H3) along the Glengarriff River. Ancient woodland predominates, especially in the lower and more sheltered parts of the reserve. The woods are noted as being amongst the best examples of oceanic sessile oak woodland in Ireland.

One of us (MGT) carried out a survey of woodland invertebrates at the reserve for the National Parks and Wildlife Service over the course of three visits in 2015: 23-25 May, 17-18 June and 29-30 July. The survey compared wood-pasture-type habitat (open woodland) (Site A, V917570), closed-canopy woodland (site B, V919569), and parkland-type habitat (scattered, open-grown trees) (Site C (Big Meadow), V910571). Most of the Diptera records covered by this article were from aerial interception traps or yellow pan traps, though some aerial netting was also carried out. The aerial interception trap design was required to be portable on international flights, and was built from a single 2 litre sparkling water bottle (Telfer 2020). Further details of the survey and the trapping methods used may be found in Telfer (in prep.).

All of the Diptera records in this article were identified by DJG. After all the identification work had been completed and the records entered into a MapMate database, the species list of 180 Diptera was compared to an electronic version of the Irish Diptera checklist using a database query, which revealed ten species as new or potentially new to Ireland. Had these species been recognised as new to Ireland at the time, the identifications would have been double-checked and voucher specimens would have been prepared. However, although that recognition came much later, we are confident that the identifications of these eight species new to Ireland are accurate, and we regard a ninth as probably accurate.

Although voucher specimens have not been prepared, all the specimens and their dissected parts were returned to the sample tubes in alcohol after identification. These tubes will be deposited by MGT at the National Museums of Ireland, Dublin, where voucher material could be recovered, albeit by a laborious process.

Species new to Ireland

Euphylidorea phaeostigma (Schummel, 1829) (Limoniidae). Recorded from two aerial interception traps in site C and one yellow pan trap in site B during 24.v-6.vi.2015.

Mycetophila eppingensis Chandler, 2001 (Mycetophilidae). The record from an aerial interception trap, 23.v-5.vi.2015, in site B has already been published as new to Ireland by Chandler (2018), along with a second Irish record from Breen Wood in 2017.

Trichonta submaculata (Staeger, 1840) (Mycetophilidae). Recorded from an aerial interception trap in site B during 23.v-5.vi and 1.vii-15.vii.2015.

Platypalpus albifacies (Collin, 1926) (Hybotidae). Recorded from a yellow pan trap in site B during 17.vi-1.vii.2015.

Phyllomyza rubricornis Schmitz, 1923 (Milichiidae). Recorded from an aerial interception trap in site C during 25.v-5.vi.2015.

Ditrichophora fuscella (Stenhammar, 1844) (Ephydridae). Netted in flight over an Exposed Riverine Sediment bar on the Glengarriff River (V9157) on 23.v.2015. Also recorded in yellow pan trap samples from site A during 23.v-5.vi, 5.vi-17.vi and 17.vi-1.vii.2015, and in a yellow pan trap sample from site C during 17.vi-1.vii.2015.

Coenosia pudorosa Collin, 1953 (Muscidae). Recorded in site A from a yellow pan trap during 23.v-5.vi and from an aerial interception trap during 1-15.vii.2015.

Macquartia nudigena Mesnil, 1972 (Tachinidae). Recorded from a yellow pan trap in site A during 15-29.vii.2015.

A possible ninth species new to Ireland

A single female *Mycetobia* (Mycetobiidae) specimen was recorded from an aerial interception trap in site B during 24.v-5.vi.2015. After careful scrutiny, this individual was identified as *M. gemella* Mamaev, 1968 rather than *M. obscura* Mamaev, 1968. However, with the realisation that *M. gemella* would be new to Ireland, this record was withdrawn as not meeting the burden of proof desirable for a first for Ireland. That proof would best be provided by a male specimen, which has now been achieved by the find of a male in the Killarney National Park, Co Kerry during 2022 (Peter Chandler *pers. comm.*) of which details will be published elsewhere.

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Observations of hill-topping *Gasterophilus intestinalis* (De Geer) (Diptera, Oestridae) in the Brecon Beacons

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Summary
Observations of the horse bot fly *Gasterophilus intestinalis* (De Geer, 1776) hill-topping at Fan Frynych in the Brecon Beacons are described. These are compared with descriptions of similar behaviour observed by previous authors.

Introduction

Gasterophilus intestinalis (De Geer, 1776) is a globally distributed bot fly, whose larvae develop in the mouth and stomach of horses. It is regarded as Nationally Scarce and declining in the UK due to modern veterinary practices, but can sometimes still be frequent where feral horses are found (Falk and Pont 2017; Grayson 2007).

Gasterophilus intestinalis is believed to have two main mating patterns: one occurring near their equine hosts and another at hilltop aggregations (Grayson 2007; Catts 1979), though mating near hosts may be rare in some situations (Cogley and Cogley 2000). Hill-topping is believed to be a response to high numbers of males around the hosts, which increases competition. In addition, many females near to hosts are likely to have already mated and are seeking a host to oviposit on. Hill-topping at prominent features is thought to provide an alternative that reduces male competition and still provides a chance of encountering virgin females (Cope and Catts 1991; Catts 1979).

Catts (1979) described the hill-topping behaviour of *G. intestinalis* in California and Washington State, USA in detail. Males were described as hovering in a horizontal arc of less than 1 m on the windward side of prominent objects. This occurred when the temperature reached 19°C, with most activity ceasing at 34°C, and was sustained even in strong winds (15-20 km/h).

Observations at Fan Frynych

Several male *G. intestinalis* were observed hill-topping around the trig point (SN957227) and cairn (SN953224) on Fan Frynych, within the Craig Cerrig Gleisiad a Fan Frynych NNR in the Brecon Beacons, on 23 September 2021. Three were captured to confirm their identity, all of which were males. The observations made at this encounter are compared with those of Catts (1979).

Three *G. intestinalis* were observed at the trig point and a minimum of three were observed at the cairn between about 13.00 and 14.00. The wind was extremely strong during this period, which made it difficult to keep track of numbers of flies. Few other flies were attempting to fly in such strong winds: ten *Helina reversio* (Harris, 1780) (Muscidae), six *Sarcophaga variegata* (Scopoli, 1763), and one each of *S. subvicina* Rohdendorf, 1937 and *S. nigriventris* Meigen, 1826 (Sarcophagidae), all male, were also collected near the trig point or the cairn, but spent most of their time resting on nearby rocks. In contrast, the *G. intestinalis* males flew for extended periods, and maintained their position around the highest point to within approximately 1 m. The flies clearly flew facing the wind in a pendulum-like arc cutting across the wind. In general, these observations agree with Catts (1979), but the flies were not observed to fly windward of the cairn or trig point. This may have been due to frequent stronger gusts of wind that prevented the flies from maintaining their position.

Fig 1. Male *Gasterophilus intestinalis* resting on a cairn at Fan Frynych, Brecon Beacons National Park, Wales.

Gasterophilus intestinalis activity was greatest at the cairn, despite the trig point being at the summit of Fan Frynych and therefore higher. The greater level of activity at the cairn may suggest that the flies were arriving from the Cwm Du valley and the cairn was the first prominent feature they encountered. Feral ponies were visible near the valley bottom. Fresh dung was found nearer the top of a south facing slope at SN951221, though no *G. intestinalis* puparia were found in about 15 minutes of searching.

Flights were not timed, but lasted for a few minutes, following which the flies would rest on the rocks making up the cairn (they were not seen to land on the white trig point). Catts (1979) described flights of up to 30 minutes, but noted that this is affected by temperature. Given the energy demands required, flights are also likely to be shorter in strong winds.

Catts (1979) described how *G. intestinalis* would readily switch their attention to artificial high points, including their human observers. This was certainly true at the cairn on Fan Frynych, where it was necessary to crouch down low to observe their behaviour. When the author was standing, the *G. intestinalis* flew too fast and close around his head to be observed.

Whether in flight or resting, the male *G. intestinalis* appeared otherwise undisturbed by the presence of a human observer. Acceptance of foreign objects as high points has also been described for females (Cogley and Cogley 2000). Resting flies provided an opportunity for the author to get within a few centimetres to photograph them (Fig. 1), though the strength of the wind made it impossible to get movement-free images. At these close quarters a distinct high-pitch hum could be heard coming from the flies, though there was no perceptible wing movement. The hum gradually increased in pitch to a whistle, at which point the flies once again resumed flight. This sound whilst resting and just before flight was not described by Catts (1979). It may be a reaction to the cold conditions at the time these observations were made, which meant that the flies needed to keep their wing muscles warm even when otherwise at rest. This suggests that during the period in which they were hill-topping on this day they never fully rested.

No females or mating activity were observed. Catts (1979) recorded a male to female ratio of 20:1 at one site, whilst in two years of his observations at another site not a single female had been seen.

The weather prior to these observations had been generally unpromising for insect activity: cold, wet and windy. The rain had abated at about 12.00, but the relatively cold and windy conditions continued until about 14.30 and therefore covered the period during which these observations were made. The conditions required the author to wear warm clothes and a full set of waterproofs to keep warm, even once the rain had stopped. The temperature during the *G. intestinalis* flight period was not measured, but it was likely to be lower than the 19°C minimum observed by Catts (1979).

In contrast, by about 16.00 the wind had abated, it was sunny and the temperature had increased (and the author was comfortably warm in a t-shirt and trousers). Repeat visits were made to both the cairn and the trig point. However, despite the warmer, calmer conditions, there was no visible activity at the cairn – two *G. intestinalis* were resting on the cairn, but these quickly dispersed when the author arrived and did not return. No *G. intestinalis* were seen on revisiting the trig point.

The disappearance of *G. intestinalis* when the weather improved disagrees with Catts (1979), whose observations suggested that activity should have increased along with temperature. A possible explanation for this is the weather conditions and the reported lifespan of adult males. *Gasterophilus intestinalis* males are believed to be relatively short lived: up to 3 days held inactive in laboratory conditions, but estimated to be one day on average in the wild (Catts 1979, 1994; Cope and Catts 1991). Lifespans are therefore likely to be dictated by activity levels and the inability of *G. intestinalis* to feed. Flying in suboptimal conditions is likely to be a good strategy when conditions are poor, as it may present the only opportunity for males to mate before they die. However, flight in suboptimal conditions will also require more energy and increase wear on wings and muscles, and so may shorten lifespan. This strategy is therefore a gamble that has greatest potential benefit if the weather conditions do not improve. Should conditions improve it would presumably have been better for males, and potentially females, to delay activity.

It is unlikely that the male *G. intestinalis* were flying during the cold, wet and windy conditions that dominated the morning when these observations were made. Flight may have started as soon as the conditions allowed and before the author arrived, but these conditions would nevertheless have been suboptimal. The energy demands for flying in cold temperatures and strong winds will be high, so the *G. intestinalis* may have exhausted themselves before the weather improved further. This would explain the lack of activity in apparently better conditions.

Acknowledgements
I am grateful to Andrew Grayson for confirming the fly as *G. intestinalis*.

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A new larval host genus for the leaf-mining fly *Phytomyza marginella* Fallén (Diptera, Agromyzidae) – During May and June 2022, I was frequently observing and collecting adult *Phytomyza marginella* Fallén, 1823 from chicory (*Cichorium intybus*, Asteraceae) in a wild flower area of our garden (Hessle, East Yorkshire, V.C. 61), where several of its known host genera [*Crepis*, *Hieracium*, *Hypochaeris*, *Lapsana*, *Leontodon*, *Picris*, *Jacobaea*, *Sonchus* and *Taraxacum*] are also present. On 15 June, whilst examining the chicory for larval signs of species known on this host [*Chromatomyia horticola* (Goureau, 1851), *Chromatomyia syngenesiae* Hardy, 1849, *Liriomyza puella* (Meigen, 1830), *Liriomyza sonchi* Hendel, 1931, *Liriomyza strigata* (Meigen, 1830), *Napomyza cichorii* Spencer, 1966, *Ophiomyia pinguis* Fallén, 1820, *Phytomyza continua* Hendel, 1920 and *Phytomyza penicilla* Hendel, 1935], I discovered tenanted mines on the lower surface of the most basal leaves which did not agree with any of the aforementioned species: a long, winding, initially pale corridor containing frass in scattered grains, with pupariation occurring externally. Fresh mines (Fig. 1) are quite difficult to observe, becoming more obvious with age as the mine darkens considerably (Fig. 2).

Fig. 1. *Phytomyza marginella* tenanted larval mine on underside of *Cichorium intybus*.

Fig. 2. Old, vacated *P. marginella* mines on *Cichorium intybus*.

On 3 July 2022, two adults [1♂, 1♀] were successfully reared from puparia obtained from the mines, and upon examination [externally and the male phallus], these proved to be *P. marginella*, representing the first reported record of this species using *Cichorium* as a larval host – **BARRY P. WARRINGTON,** 221A Boothferry Road, Hessle, East Yorkshire, HU13 9BB; agromyzidaeRS@gmail.com

Changes to the Irish Diptera List (34) – Editor

This section appears, whenever 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. The gain of 10 species brings the total Irish list to 3476.

Limoniidae
Euphylidorea phaeostigma (Schummel, 1829) (added by Telfer and Gibbs in the present issue)
Mycetophilidae
Trichonta submaculata (Staeger, 1840) (added by Telfer and Gibbs in the present issue)
Mycetobiidae
Mycetobia gemella Mamaev, 1968 (added in Telfer and Gibbs in the present issue)
Hybotidae
Platypalpus albifacies (Collin, 1926) (added by Telfer and Gibbs in the present issue)
Milichiidae
Phyllomyza rubricornis Schmitz, 1923 (added by Telfer and Gibbs in the present issue)
Ephydridae
Ditrichophora fuscella (Stenhammar, 1844) (added by Telfer and Gibbs in the present issue)
Muscidae
Coenosia pudorosa Collin, 1953 (added by Telfer and Gibbs in the present issue)
Eudasyphora cyanicolor (Zetterstedt, 1845) (queried in checklist, confirmed by Mitchell in the present issue)
Myospila bimaculata (Macquart, 1834) (added by Harris in the present issue)
Tachinidae
Macquartia nudigena Mesnil, 1972 (added by Telfer and Gibbs in the present issue)

Dipterists Digest 2023 **30,** 94-98

Diptera (Mycetobiidae, Fanniidae and Muscidae) reared from decaying sap in pine, with a note on tree species preference in some saproxylic flies

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Summary
An unusual combination of Diptera species was reared from a small seam of decaying pine tree sap. The species are itemised, with comparative data describing the context for tree species selected by saproxylic Diptera.

Introduction
Following a heavy snow fall during the night of 17 January 2022, a large branch from the crown of a Scots pine (*Pinus sylvestris*) was brought down by the weight of snow in a garden near Strathaven, South Lanarkshire (NGR: NS714425). The single tree is isolated from other pines locally, which mainly grow in the shelterbelt woodland strips of local farms. When examined it became clear that the fallen branch had been weakened at its axis with the main trunk where water had collected and initiated some rot (Fig. 1).

Fig. 1. Fallen branch of pine tree on the ground on 18 January 2022 with breaking off point arrowed.

This seems to have been exacerbated by past twisting in the wind, resulting in a split along the length of the branch. A narrow channel of decaying sap about 80cm in length was revealed as the wood was sawn and split for firewood on 1 February. A number of dipterous larvae from the families Mycetobiidae, Fanniidae and Muscidae were found and gathered for rearing, and it was then possible to identify them to species level.

Results

Adults of three species emerged from the pine branch. One was *Mycetobia obscura* Mamaev, 1968 (Mycetobiidae) of which five females and two males emerged between 8 and 18 March 2022 (Fig. 2); a larva was preserved for reference. Two males and one female of *Fannia aequilineata* Ringdahl, 1945 (Fanniidae) emerged on 8-9 March 2022, and one female of *Helina pertusa* (Meigen, 1826) (Muscidae) on 7 March 2022. Emergence was over a period of several days, with the dates earlier than might be expected due to the relative warmth of a building interior where they had been kept for rearing. DH identified one *Fannia* puparium (another was badly damaged) as *F. aequilineata* using the key by Rozkošný *et al*. (1997) while Lyneborg (1970) gave useful extra comparative information on *F. aequilineata* and similar species to confirm the identification.

Fig. 2. *Mycetobia obscura* with pupal exuvium, larva collected 1 February 2022, female adult emerged 10 March 2022.

Species accounts

Mycetobia obscura

This record of development in pine [together with previously unpublished data from a specimen reared by David Robertson from a sappy stump of Sitka spruce, *Picea sitchensis*, from Twiglees, near Lockerbie, Dumfries & Galloway (NGR: NY22-95-)], provides the first definite association for *M. obscura* with coniferous trees. Kurina and Süda (2021) recorded *M. obscura* at several sites in a study using trunk window traps set in mixed woodland of aspen, birch and oak. At one of their sites where pine was predominant, but with about 10% birch and alder, a female adult *Mycetobia* was found that was not identifiable to species level. The authors admit there was a possibility it might have been *M. gemella*, a known conifer associate; no searches were made for larvae to confirm a link to any particular tree species. *Mycetobia gemella* was described from a coniferous forest habitat, and the only known larval observations are from pine rot holes (Hancock *et al*. 1996), with several more recent Scottish field observations. It is one of the beneficiaries of habitat creation devised to supply opportunities for the continued survival and re-introduction of the syrphid *Blera fallax* (Linnaeus). By cutting holes in felled pine stumps, pools of rainwater accumulate that have a bacterial content associated with nutrients in pine sap. This medium provides for filter-feeding bacteriophages. *Mycetobia gemella* larvae can be seen swimming freely in these pools with their characteristic snake-like motion (Fig. 3). However, several records of this species linked with deciduous woodland situations have become known from sites in England and Ireland (Peter Chandler *pers. comm*., 7 November 2022) so it appears not to be exclusive to coniferous trees.

Fig 3. *Mycetobia gemella* in an artificial pine stump rot hole near Grantown-on-Spey, Inverness, with *Myathropa florea* also present.

Mycetobia obscura has been recorded quite widely in Britain since it was first recognised as occurring here; five of these records are Scottish (Alexander 2016). All earlier rearing records are from deciduous tree species, summarised in Hancock *et al*. (1996). A sample of larvae from two small birch tree sap runs, near Carrbridge, Inverness-shire was taken by EGH on 24 April 2022 (NH875214); this produced adults on 14 May 2022, further reinforcing the species' preference.

Fannia aequilineata
F. aequilineata has been found in Scotland as adults (Horsfield and Robertson 2002; Alexander 2020) and records reported in this paper are likely to be the first rearing records for Scotland. It is known to be especially associated with saproxylic habitats. d'Assis-Fonseca (1968) referred to its being reared from wood debris and the fungus *Pseudoinonotus* [as *Polyporus*] *dryadeus* and added that it is particularly attracted to exudations from trees damaged by *Cossus* borings. Rozkošný *et al*. (1997) referred to the species as having been reared from dung, from an old blackbird's nest, a wasp's nest, wood debris, rotting wood and from fungi (*Daldinia concentrica*, *Pseudoinonotus* [as *Inonotus*] *dryadeus* and some Polyporales), while adults are associated with sap runs. E.B. Basden reared *F. aequilineata* from birds' nests on several occasions, most frequently from a nest of little owl (Rotheray 1991). More recently, Keith Bland reared a male specimen, which emerged from its puparium on 24 April 2006, from a larva found in bird droppings and invertebrate frass in a hollow birch tree used as a bird roost in Maggie Bowies Glen (NT3860), near Crichton, Midlothian.

Alexander (2020) mentioned one Scottish record of *F. aequilineata* from Cartland Craigs in 2012 and points to all his data from the British Isles being derived from ancient woodlands (specifically veteran trees), old orchards and hedgerows. Therefore this record from a seam of decaying pine tree sap represents a different habitat in which this species can develop.

Helina pertusa
H. pertusa is also known to be especially associated with saproxylic habitats. Skidmore (1985) stated that this is the only known Palaearctic *Helina* associated exclusively with dead or sickly trees, where it usually develops behind loose bark, while he also gave records of larvae from heart rot and birds' nests of *Parus* species. Previous Scottish rearing records of *H. pertusa* given below are from the Malloch Society saproxylic database. Iain MacGowan collected a larva in a rot hole on a live oak tree at Quarry Wood, near Elgin (NJ1963), in October 1995. An adult male emerged from a puparium later in the month. Kenn Watt found a puparium under a Scots pine log at Arniston, Midlothian (NT3259) on 22 May 1993, from which an adult male emerged. Also, Keith Bland reared a male *H. pertusa*, which emerged from its puparium on 19 April 2006, from the same source at Maggie Bowies Glen as *F. aequilineata*.

Discussion
For many saproxylic Diptera the choice of tree species is often less important than the state of decay although generally there is a dichotomy between deciduous and coniferous trees. Some species have a restricted selection of a medium or of a host tree for oviposition. *Callicera rufa* Schummel, 1842, is known colloquially as the pine hoverfly in the UK, although it has been reared once from larch in Scotland (MacGowan 1994). Also as far as known the aspen hoverfly, *Hammerschmidtia ferruginea* (Fallén) is restricted to aspen trees.

There are generalists among the Diptera associated with a variety of deciduous and coniferous tree species which are not restricted to saproxylic situations, and which can be found to occur in other saprophagous habitats and decaying detritus. Examples include *Lonchaea sylvatica* Beling, 1873, which can develop in compost heaps and similar situations. The other British lonchaeids that are associated with trees are found in either deciduous or coniferous trees but never both (MacGowan and Rotheray 2008). The syrphid *Myathropa florea* (Linnaeus) is happy to develop in old buckets of dead leaves and cattle troughs as well as tree rot holes of any kind. *Sylvicola cinctus* (Fabricius) (Anisopodidae) is ubiquitous where fungal and bacterial decay is present, even including dead vertebrate carcases (Hancock 1990). Larvae of *S. cinctus* have been found in a sappy, resinous medium under bark of recently sawn pine logs at Allt Druidh, Coylumbridge, NH916098, 27.iv.2022, which is believed to be the first record of its development in pine. Considering the amount of work investigating saproxylic Diptera, it is surprising that *S. cinctus* larvae have not been recorded previously from conifers.

Acknowledgements
The energetic field work of fellow members of the Malloch Society, Keith Bland, Iain MacGowan, Kenn Watt and the late David Robertson provided the additional supporting records.

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Dipterists Digest 2023 **30,** 99-103

The lesser dung fly *Phthitia* (*Collimosina*) *spinosa* (Diptera, Sphaeroceridae) in East Anglia

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Summary
A female of the lesser dung fly *Phthitia spinosa* (Collin, 1930), which has Data Deficient conservation status, was swept from a muddy pond margin in calcareous fen at Watermill Broad Nature Reserve, near Cranwich, West Norfolk (V.C. 28). This is the third British occurrence of this minute fly. Here we report details of this record and, at the suggestion of Jindřich Roháček, take the opportunity to provide an updated description of the species.

Background

The genus *Phthitia* Enderlein contains some of the smallest sphaerocerids, its members often being less than 1.5 mm long. There are ten European species, of which four are on the British list: *P.* (*Kimosina*) *longisetosa* (Dahl, 1909) [previously *Kimosina longisetosa*], *P.* (*Alimosina*) *empirica* (Hutton, 1901) [*Kimosina empirica*], *P.* (*Kimosina*) *plumosula* (Rondani, 1880) [*Kimosina plumosula*] and *P.* (*Collimosina*) *spinosa* (Collin, 1930) [*Kimosina* (*Collimosina*) *spinosa*]. *Phthitia* (*Collimosina*) *spinosa*, a Palaearctic species, and the Nearctic species *P.* (*Collimosina*) *quadricercus* Marshall (Marshall and Smith 1992) are the only members of the subgenus *Collimosina* Roháček. According to Roháček (1983) *P. spinosa* [as *Kimosina* (*Collimosina*) *spinosa*] is widespread in continental Europe. He considers it to be a very elusive species, primarily terricolous and probably a reluctant flier. He also states that it may be highly localised within a site where it has been found, e.g. within an area 20 m × 20 m.

In their paper on Sphaeroceridae recorded in the Welsh Peatlands Invertebrate Survey of 1987-89, which covered 118 sites across Wales, Holmes *et al*. (1991) reported 570 specimens of *P. longisetosa* (as *Kimosina longisetosa*) from 54 sites, and a single specimen of *P. plumosula* (as *Kimosina plumosula*). *Phthitia spinosa* and *P. empirica* were not recorded in the survey. There are no records of *P. spinosa* in the NBN database; there are five NBN records of *P. empirica* and seventeen of *P. plumosula*. The original description of *P. spinosa* (as *Limosina spinosa*) by Collin (1930) was for a single male found at Burwell Fen, near Newmarket, Cambridgeshire (V.C. 29) on 20.iii.1910. Ivan Perry found 1♂ and 1♀ at Chippenham Fen, Cambridgeshire on 26.viii.2016 (Perry and Brice 2020). As far as we are aware, there are no other British records of this species.

Fieldwork

On 26.viii.2022 MW visited Watermill Broad Nature Reserve (TL777958) in Norfolk. This reserve (52 ha) is privately owned, and its habitat management and study are overseen by a board of trustees and undertaken by volunteers. Most of the reserve comprises six lakes fringed by willows and tall-herb borders. This reserve also includes a field (2 ha) containing three small ponds. The specimen was collected by sweeping the exposed muddy edges of one of these ponds (TL77599539). Other sphaerocerids collected included *Rachispoda limosa* (Fallén, 1820), *R. lutosoidea* (Duda, 1938), *R. lutosa* (Stenhammar, 1855), *Opacifrons coxata* (Stenhammar, 1855) and *Philocoprella quadrispina* (Laurence, 1952). The pond habitat (Fig. 1) is calcareous fen and has well-developed *Chara* mats. The underlying bedrock is Cretaceous chalk of the Holywell Nodular Chalk formation. This habitat differs from that described by Roháček (1983) for Czech occurrences in "upland bogs" and "lowland boggy meadows". On 11.ix–14.ix.2022 MW revisited the small pond where the specimen was taken. Four white bowls of soapy water were deployed around the muddy margins in the hope of collecting more specimens of the species and an hour was also spent at the pond sweeping. However, no further specimens of *P. spinosa* were obtained on the day.

Fig. 1. The calcareous fen pond at Watermill Broad NR where *Phthitia spinosa* was found. Photo Nick Owens.

Identification

Important identification features of the Watermill specimen are shown in Figs 2 and 3. The specimen, 1.15 mm long, was dissected under alcohol within a day of capture. The abdomen was removed and the post-abdomen and spermathecae slide-mounted in Berlese liquid and photographed using a GX Smart compound microscope and 5 Mp camera at magnifications up to ×400. The remainder of the specimen was pinned. The alternating longitudinal dusted and shiny stripes on the frons (Roháček 1983) are very noticeable, as can be seen in Fig. 2. Sternite 7 of the post-abdomen (Fig. 3a) has a membranous, unsclerotised, posterior embayment that is bordered by numerous long setae; the membranous area is densely covered with short setulae of even length. Spermathecae (Fig. 3b) are sub-spherical with truncated terminations having a central invagination; their surface is highly textured and "raspberry-like", as occurs in the only other member of the subgenus *Collimosina*, the Nearctic species *P.* (*Collimosina*) *quadricercus* (Marshall and Smith 1992).

MW keyed the Watermill specimen to *P. spinosa* (as *K. spinosa*) using Pitkin (1988) and Roháček (1983, 1985), but found that sternite 7 illustrated in the latter key (fig. 851), while similar to that of the Watermill specimen, lacked its long setae bordering the unsclerotized membranous embayment. Pitkin (1988) did not illustrate sternite 7 of this species. Furthermore, spermathecae of this species illustrated by Pitkin (1988, fig. 323) and Roháček (1985, fig. 852) do not represent their true aspect, i.e. they do not show the highly textured surfaces, only a basic outline of the shape.

Fig. 2. Stacked image of the head of the Watermill specimen showing the longitudinal stripes of heavy dusting on the frons and on the knob between antennal bases. Photo DB.

In view of the ambiguity relating to sternite 7 and spermathecae described above, MW sent the pinned residual specimen and photographs of the whole Watermill specimen, sternite 7, sternite 9, tergites 8-10 and spermathecae to DB for his opinion. DB agreed that *P. spinosa* was a good match but, given the concerns about spermathecae and sternite 7, decided to compare the female post-abdomen, spermathecae and external morphology of the Watermill specimen with the Chippenham female collected by Ivan Perry. There is close agreement between these two specimens. To remove any doubt about the identity of the Watermill and Chippenham specimens, DB sent photographs of both to Jindřich Roháček for his opinion, who, after examining specimens in the Silesian Museum, Opava, Czech Republic (females from Řásná, W. Moravia), confirmed the identification as *P. spinosa*. At his suggestion we include photographs of sternite 7 and spermathecae in this paper (Fig. 3) for diagnosis of the species.

Discussion

As far as we are aware, this record is only the third reported occurrence of the species in Britain after the original 1910 record of Collin, and the pair collected by Ivan Perry in 2016. The absence of records of the species in the Welsh peatlands study (Holmes *et al*. 1991), which indicated that *P. longisetosa* was common and widespread, suggests that *P. spinosa*, and possibly *P. plumosula*, could be genuinely rare. Further studies aimed at trapping terricolous sphaerocerids may clarify the status of these two species in Britain. We shall deploy pitfall traps at Watermill Broad NNR in 2023 to try to quantify the population and ecology of *P. spinosa* at this site.

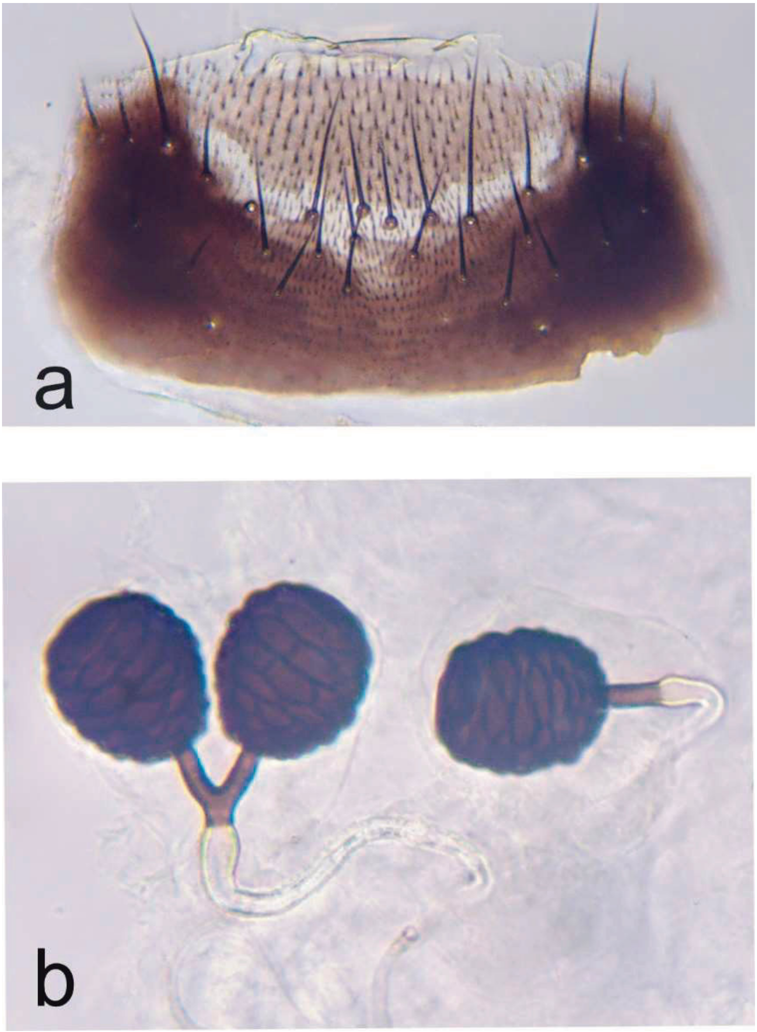

Fig. 3: (a) Sternite 7 of the Watermill female *Phthitia spinosa*, magnification used ×200; (b) spermathecae of the same specimen showing the highly textured surface and central invagination. Magnification used ×400. Photos MW.

Acknowledgments

We thank the trustees of Watermill Broad Nature Reserve for allowing MW to record Diptera there. Dr Jindřich Roháček is thanked for checking *Phthitia spinosa* specimens in the Silesian Museum collection, for confirming the identification of the Watermill and Chippenham specimens and for his helpful review of this paper. We are very grateful to Ivan Perry for sending us his Chippenham Fen female for comparison with the Watermill specimen.

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Chromatomyia blackstoniae **(Spencer) (Diptera, Agromyzidae) new to Wales -** On 20 August 2022, I visited the Montgomeryshire Wildlife Trust reserve of Llanymynech Rocks in Powys, Wales. The site is a long-disused limestone quarry about 17 miles west of Shrewsbury (Grid Reference SJ265217). Lying at the southern end of the Carboniferous limestone outcrop that stretches from Anglesey and the Great Orme, the site now contains a mix of deciduous woodland, calcareous grassland and early successional open mosaic habitat. It is often visited by students from Preston Montford Field Centre as a readily accessible site with a suite of regionally uncommon calcicole plants, including yellow-wort (*Blackstonia perfoliata*) at its only naturally occurring station within Montgomeryshire. An empty leaf-mine of *Chromatomyia blackstoniae* Spencer, 1990 was photographed on the pair of stem leaves immediately below the flower of *Blackstonia perfoliata*. As the only known miner of *B. perfoliata*, identification was straightforward using the National Agromyzidae Recording Scheme website and was later confirmed by Barry Warrington. The specimen itself was found in the deepest and most humid part of the reserve. Known locally as Cul-de-sac quarry, this is a small gorge-like feature with steep overhanging walls approximately 30 metres below the rest of the quarry floor. Even after the heatwaves of summer 2022, yellow-wort plants remained green here, rather than yellow and desiccated as in less shaded parts of the reserve. This is the first record of *C. blackstoniae* in Wales, as well as the first for Montgomeryshire (V.C. 47). The species is only known from seven other vice-counties, all in England: South Somerset (V.C. 5), West Kent (V.C. 16), Surrey (V.C. 17), Oxfordshire (V.C. 23), Buckinghamshire (V.C. 24) Shropshire (V.C. 40) [from records within the National Agromyzidae Recording Scheme database], and West Gloucestershire (V.C.34) [Spencer, K.A. 1990. *Host Specialization in the World Agromyzidae* (*Diptera*). xii + 444 pp, p. 396]. It is also known from Ireland. Before the record discussed here, *C. blackstoniae* was last recorded in Great Britain and Ireland in 2015. I am very grateful to Barry Warrington for confirming the species identification – **SIMON NORMAN,** Field Studies Council, Preston Montford, Shrewsbury, SY4 1HW

Dipterists Digest 2023 **30,** 104-106

The black fungus gnat *Bradysia radicum* (Brunetti) (Diptera, Sciaridae), a first confirmed UK interception from India

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Summary
The first confirmed UK interception of the black fungus gnat *Bradysia radicum* (Brunetti, 1912) is reported from reared larvae found within decomposing *Cardiocrinum giganteum* bulbs imported from India. Notes on the identification and distribution of this species are provided.

Introduction

On 15 February 2022, numerous larvae and adult females of the black fungus gnat species *Bradysia radicum* (Brunetti, 1912) (Diptera: Sciaridae) (Fig. 1A) were discovered feeding within and around the rotting tissues of a Giant Himalayan lily (*Cardiocrinum giganteum* (Wallich) Makino) (family Liliaceae) bulb that had been imported from India. The specimens were collected by Lewis Galloway, a Plant Health & Seed Inspectorate (PHSI) Inspector of the Animal and Plant Health Agency (APHA) and sent to the FERA Science Ltd. Entomology Laboratory, Sand Hutton, York, UK for identification. In addition to *B. radicum*, the decomposing substrate also contained numerous larvae of a short-palped crane fly species (Deady *et al.* in prep.).

Identification

Bradysia radicum was identified morphologically with reference to Brunetti (1912) and Steffan (1972), and this was supported by DNA sequencing data, where our specimens were a match to a single published sequence on GenBank (Accession number: OM713239) and to over 100 sequences published on the BOLD database (BOLD:AAG6389).

Bradysia radicum is small in comparison with other species of this genus, and was described by Brunetti (1912) from several specimens of both sexes in the Indian Museum gardens. In Brunetti's original description no figures are given, and the male genital structures were not described. For this reason, *B. radicum* was for a long time better known by the synonymous name *spatitergum* Hardy, 1956. Detailed descriptions and figures based on additional characters (especially of males) are given in Hardy (1956: 85, fig. 10), Hardy (1960: 229, fig. 77) [both as *Sciara* (*Lycoriella*) *spatitergum* Hardy; in part, misidentifications], Steffan (1972: 593, fig. 2) [as *Bradysia radicum* (Brunetti)], Menzel and Smith (2009: 28, figs 1.11-1.13), and Mohrig (2016: 24, fig. 28) [both as *Bradysia spatitergum* (Hardy)]. The larvae of *Bradysia radicum* are known to feed on rotting lily bulbs (Mohrig *et al.* 2019). Adult females (n = 5) measured on average 2.7 mm from tip of ovipositor to the anterior margin of the prothorax and are characteristically "stripy" i.e. having a central trident-like pattern made up of three dark brown stripes on the scutum, with the outer stripes forming upside down "U's" with the bend anterior. The stripes also progressively narrow posteriorly and inwards towards the median stripe (Fig. 1B). However, Steffan (1972) remarked that the stripes can be "indistinct in some specimens". The female wings measure approx. 2.5 mm in length, and in our specimens the stem of M and the vein bases of M_1 and M_2 are very weak and indistinct (Fig. 1C). All specimens identified were deposited in the FERA Plant Health Reference Collection (PHEARC).

Distribution and previous British records

The majority of the published DNA data on BOLD (BARCODE OF LIFE DATA SYSTEM v4) relates to specimens originating in the Neotropics: (Costa Rica [109], Puerto Rico [23], Panama [17], Mexico [3] and Argentina [2]) and Africa (South Africa [37], Egypt [6], Kenya [3] and Ghana [1]). However, we also know that the species is present in the Hawaiian Islands, India, Zimbabwe, Madagascar, the Galápagos Islands, Seychelles Islands and Papua New Guinea [published distribution data summarised, corrected and discussed by Mohrig *et al*. 2019].

From a British perspective, and prior to the interception from India reported here, we know of only one other record of this species being found in England, a single male specimen collected by William Ely on 16.vii.2000 at Lower Kennel Wood (SK378940), Grange Park, Rotherham, Yorkshire. However, this specimen is no longer extant (Bill Ely *pers. comm.*) and cannot be verified; in view of the outdoor location it seems unlikely to be correct. An earlier record of a specimen taken at Kew Gardens and identified by F.W. Edwards was the basis of the species being included in the checklist provided by Kloet and Hincks (1945). That was considered as unconfirmed by Freeman (1983) [as noted by Chandler 2022: 70], although he considered that the specimen, in the Natural History Museum collection, agreed quite well with the figure of *B. radicum* given by Steffan (1972).

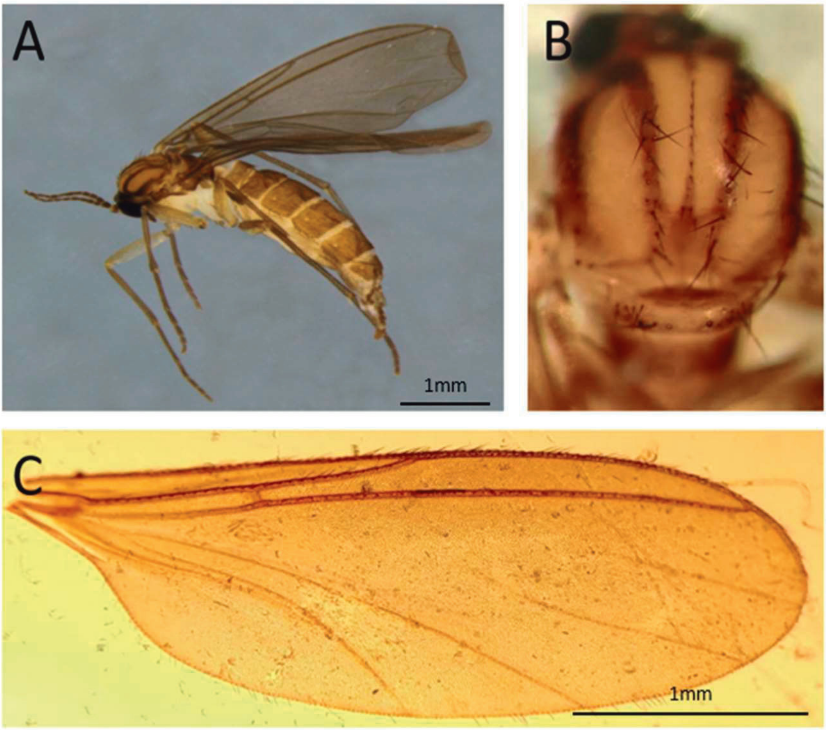

Fig. 2. *Bradysia radicum*, female: (A) habitus, lateral view; (B) scutal stripes in "trident form", dorsal view; (C) wing with weak and indistinct M veins, dorsal view (scale bars approximate).

Acknowledgements
With thanks to William Ely and Paul Leonard (Biological Records Officer, Rotherham Biological Records Centre) for providing information on the specimen caught in Rotherham. The authors are grateful too for suggestions and edits by Frank Menzel and Peter Chandler. This work was supported by the UK Government's Department of Environment, Food and Rural Affairs (Defra) under the Defra-Fera long term services agreement.

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Corrections and changes to the Diptera Checklist (49) – 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 the addition of 5 species and loss of one due to synonymy, resulting in a total of **7247** species (of which 41 are recorded only from Ireland).

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

Sciaridae. An importation of the following species is confirmed in the present issue (it was treated as an excluded species in the 1998 checklist):
Bradysia ***radicum*** (Brunetti, 1912 – *Sciara*)

Cecidomyiidae. The following genus and species were added by T. ROOT (2021. Gall of the midge *Janetia cerris* (Kollar, 1850) – first findings on UK *Quercus cerris*. *Cecidology* **36**(1)**,** 29-33):
JANETIA Kieffer, 1896 (in tribe Dasineurini)
Janetia ***cerris*** (Kollar, 1850 – *Lasioptera*)

Dolichopodidae. The following species are added in the present issue:
Hercostomus ***rusticus*** (Meigen, 1824 – *Dolichopus*)
Syntormon ***metathesis*** (Loew, 1850 – *Rhaphium*)

The following nomenclatural correction is made in the present issue:
Hydrophorus ***pilipes*** Frey, 1915 = *H. rufibarbis*: British authors, misident. (not Gerstäcker, 1864)

Pipunculidae. The following species was cited in error as having been described in *Alloneura* and should not have brackets around the author's name:
Tomosvaryella kuthyi Aczél, 1944

Conopidae. The following species was added by P.F. WHITEHEAD (2022. *Thecophora cinerascens* (Meigen, 1804) (Diptera, Conopidae) new to mainland Britain. *Entomologist's Gazette* **73,** 55-57) [it had previously been recorded from Jersey, Channel Islands]:
Thecophora ***cinerascens*** (Meigen, 1804 – *Myopa*)

Agromyzidae. The following species is added in the present issue:
Napomyza ***merita*** Zlobin,1993

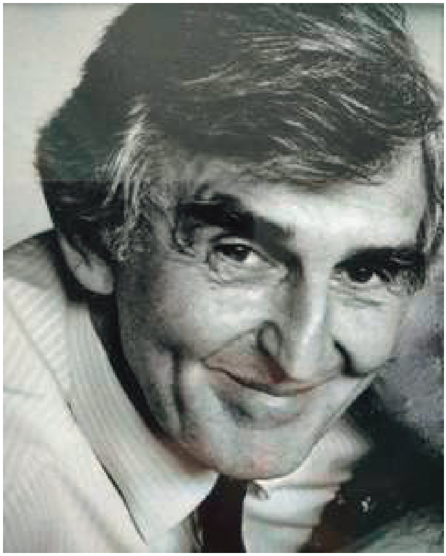
The following species are synonyms according to L. PAPP and M. ČERNÝ (2020. Agromyzidae (Diptera) of Hungary. Volume 4. Phytomyzinae III. 708 pp. Pars Ltd, Nagykovácsi):
Phytomyza gilva Spencer 1971 = *Phytomyza rostrata* Hering, 1934

Periscelididae. The following changes result from J. ROHÁČEK (2022. The true identity of *Periscelis winnertzii* and description of *P. laszloi* sp. nov. from Europe (Diptera: Periscelididae). *Acta entomologica Musei nationalis Pragae* **62**(2)**,** 301-323):
Periscelis winnertzii Egger, 1862 = *P. fugax* Roháček & Andrade, 2017, new synonym
Periscelis ***laszloi*** Roháček, 2022 = *P. winnertzii*: authors, misident. (not Egger, 1862)

Ephydridae. The following changes result from T. ZATWARNICKI (2022. Notes on selected genera of shore flies (Diptera: Ephydridae), with removals to Drosophilidae, Heleomyzidae and Milichiidae. *Annales Zoologici* (*Warszawa*) **72**(3)**,** 389-432):
Hydrellia maura Meigen, 1838 is a junior synonym of *Hydrellia* ***albiceps*** (Meigen, 1824 – *Medeterus*)
Hydrellia stratiotae Hering, 1925 (added in 1998 checklist) is formally added here
Ditrichophora nectens (Collin, 1942) is a junior synonym of *Ditrichophora* ***moraviae*** (Becker, 1926 – *Discocerina*)
Eutaenionotum olivaceum Oldenberg, 1923 (as variety in 1998 checklist) is a junior synonym of *E. guttipenne* (Stenhammar, 1844)

Dipterists Digest 2023 **30,** 108-119

JON COLE 1929 – 2021



Jon Cole at St Ives, October 2008

With the passing of Jon Cole we have lost a leading all-round dipterist, who recorded extensively in Huntingdonshire (vice-county 31) for over fifty years, as well as exploring many other parts of Britain by participating in Diptera Field Meetings and conducting his own field trips. His friendly help and encouragement was always available to other dipterists, while his wide knowledge and experience, based on over 60 years of studying flies, will be greatly missed at Dipterists Forum events and elsewhere.

Jonathan Henry Cole, known as Jon, was born on Saturday 6 April 1929 in Edmonton, North London. He died in Addenbrookes Hospital, Cambridge on Thursday 25 November 2021 after a fall at The Cambridgeshire Care Home, Great Shelford on 14 October 2021, where he and his wife Rosemary had moved to earlier that same day. Jon was the only child of Charles Jonathan Cole and Ethel Alice (née Christie). His father originated from Kilkenny, Ireland while his mother was born in Edmonton.

At the start of the Second World War Jon was evacuated to Hadlow Down, East Sussex and he enjoyed the rural surroundings there for 18 months, a contrast to his previous suburban situation in North London. The Sussex skies were filled with the action of the Battle of Britain in 1940 and Jon witnessed the conflict overhead, including the downing of a German fighter whose pilot was later buried in the local churchyard. Some of Jon's classmates felt that an enemy combatant should not be given the dignity of a church burial, while Jon and others stood up for the principle that he was a human being worthy of the same respect in death as an Englishman. Outside school, the surrounding Sussex countryside gave him the chance to see more wildlife than could be found in Edmonton, and those interests stayed with him thereafter.

After WWII he did his National Service in the Royal Navy from 1947 to July 1949, serving on a destroyer that patrolled the Irish Sea, often in rough conditions. He was proud to have served in the Navy with its long history and traditions. After being discharged from the Navy Jon started a scientific career and read for a Zoology BSc external degree at the University of London, graduating with second class honours in 1955. Jon had a son, Charles, from his first marriage. He joined Avebury Research Laboratories, Ltd., Goring-on-Thames, Oxfordshire where his work included investigations into insect pests of textiles (see Cole (1962) and Cole and Whitfield (1962)). Here he met his second wife Rosemary (née Allen) who worked in the same laboratory as Jon. They married at Wokingham in 1955 and went on to have a family of three daughters Jenny, Liz and Sarah.

The Reading and District Natural History Society was established in 1881 and their meetings were held in Reading Museum; on moving to Goring-on-Thames Jon soon became a member of this long-established Society, meeting a variety of other naturalists including the well-known bryologist Eric Vernon Watson, a member of staff in the Botany Department at the University of Reading, who led bryophyte forays and encouraged others to take up mosses. For a time Jon recorded bryophytes, but luckily for entomology he then became more interested in insects, and particularly flies.

The 1950s was an era when there were relatively few up-to-date identification works on the British Diptera fauna, although the first edition of *Flies of the British Isles* by Colyer and Hammond (1951) summarised the available literature and enabled specimens to be placed at least to family. Alternative keys to families had already been published by Oldroyd (1949). Soon *The Reading Naturalist* contained Jon's first short papers on Diptera, with Hoverflies well to the fore. The recently published RES Handbook by Coe (1953) was probably largely responsible for Jon tackling this family, while the RES Handbook to various Nematocera by Ralph Coe and colleagues (1950) enabled Jon to identify craneflies. This resulted in his discovery of *Tipula livida* van der Wulp at Goring-on-Thames in July 1958, at the time the second known British locality after Chiswell (1954) first found it at Ford, Castle Coombe, North Wiltshire in 1952. James Edward Collin's British Flies volume on Empididae (Collin 1961) sparked his interest in these flies, resulting in Jon's first "new to Britain". Jon sought advice from the venerable Collin himself and was delighted as a relative beginner to receive a helpful reply from the great man. The species *Euthyneura albipennis* (Zetterstedt) was published by Cole (1964b), later corrected to *Euthyneura inermis* (Becker) by Cole (1987c) when more information was available on this genus.

In two papers published after he left Goring-on-Thames, Jon summarises his records of Empididae and Syrphidae from the Reading area (Cole 1966a, 1966b). For the Empididae he had found 96 species (including one new to Britain) between 1963 (when he bought a copy of Collin 1961) and June 1965. For the Hoverflies he found 140 species and varieties between 1956 (when he started recording the family) and 1965, which was over half the known British fauna (230 species) at the time. Another early RES Handbook on Diptera was the volume on the families Tachinidae and Calliphoridae (as defined then) by van Emden (1954). This enabled Jon to tackle identifying these calyptrate flies (albeit not with the easiest keys) and resulted in a reported list of 8 scarce species in Baker (1965).

In the pages of *The Reading Naturalist* Jon was also credited by other entomologists for finding noteworthy records in orders apart from Diptera. For example, clearwing specialist Brian Baker (1964) reported that members Mr Jon Cole and Mr Arthur Price (a coleopterist) found a thriving overlooked colony of the six-belted clearwing moth (*Bembecia ichneumoniformis* (Denis & Schiffermüller)) on a chalk slope near Fawley, Buckinghamshire by sweeping, a technique not frequently adopted by lepidopterists!

In 1965 Jon and his family moved to Brampton, when Jon joined Huntingdon Life Sciences, becoming Head of Entomology and remaining there until his retirement. The family were the first occupants of a new home where Jon and Rosemary established an attractive and colourful garden and were keen observers of visiting birds. Family life was central to Jon, and in due course the arrival of grandchildren and then later on great grandchildren was a source of pleasure; he took pride in their varied lives and achievements. Family parties and celebrations were great fun, and subsequently Jon recalled with amusement his party for a decadal birthday when an impromptu Conga round the house ended with everyone dissolving into collective laughter. Jon had a gentle, dry sense of humour that is hard to convey, so one anecdote must suffice here. At the Dipterists Cornwall Summer Field Meeting in 1983, while Jon was busy at his microscope, somebody drew attention to a spectacular sunset outside. Not wishing to be distracted from his flies Jon's instant riposte was "Sunsets – seen one and you've seen them all!", which led to several teasing replies.

When their daughters moved away the smallest bedroom became Jon's study, where, in a miracle of compression, his storeboxes, reference literature, entomological equipment and a binocular microscope were neatly arranged for maximum convenience and utility within easy reach of his desk. His working reference collection was laid out in taxonomic order, well-organised for efficient consultation. He adopted a system of giving each specimen a number to enable unambiguous reference to any specimen he retained, as well as recording full lists for each locality visited, for which critical or dissected specimens only might be kept.

Jon soon joined the Huntingdonshire Fauna and Flora Society (HFFS) after moving to Brampton, and then took on the role of county Diptera Recorder in 1966 in partnership with Brian Davis (ITE Monks Wood) until 1997/98 when Brian retired, then continuing as the sole Diptera Recorder. In the mid-1960s there were several entomologists based at Monks Wood who were actively involved with the HFFS. It was a time of increasing awareness of environmental issues, and ITE was at the forefront of scientific research into topics such as the effects of pesticides on wildlife and deploying alternative management regimes for semi-natural habitats. Huntingdonshire became a county where environmental research and natural history were thriving, and locally receiving more attention. Jon appreciated and valued social contacts with other naturalists, and he found the HFFS field and indoor meetings stimulating and congenial events to look forward to each month.

Before Jon arrived in Huntingdonshire there were very few published Diptera records for vice-county 31, but over more than 50 years he built up an impressive county list, with many notable discoveries, including species new to Britain. Jon was an accomplished all-round dipterist, who tackled the majority of families, with the exception of largely intractable taxa such as the Cecidomyiidae (gall midges). He favoured sweeping as a collecting technique, selecting insects for retention using a pooter within his net. He would often visit a locality regularly, building up an impressive list by accumulating records through the seasons to gain a detailed overview of the fly fauna. He also had success rearing flies, with two of his additions to the British List found this way – *Euthyneura inermis* (Hybotidae) and *Scythropochroa quercicola* (Sciaridae).

When Jon and his family moved to Brampton, a noticeable feature of the local landscape in the River Ouse valley, was a succession of gravel workings all the way from Great Barford (50 km to the South) along to Earith (40 km to the East). Today gravel extraction has largely finished and the pits are submerged, forming lakes surrounded by maturing scrub and woodland communities. In the 1960s and 1970s many pits were being worked for gravel, and had areas where tailings were washed out to form gently shelving sandy slopes at the margin of open water. These artificial features proved to be home to a distinctive insect fauna, including interesting flies, and Jon investigated this assemblage until the pits were closed and the tailings deposits vegetated over and lost this aspect of their importance (although these gravel pits continue to be of interest for different insects, including other flies). In his first report on the Dolichopodidae of Huntingdonshire (Cole 1977) Jon lists 89 species, many marked "GP" from gravel pits, although not all these species will have been associated with fine sediment tailings. A scarce and unexpected find beside gravel pits in the Ouse valley was *Dolichopus lineatocornis* Zetterstedt, found by Jon in 1980 at Galley Hill gravel pit, new to the area at the time and now designated a Vulnerable species (Drake 2018).

Jon also took advantage of other opportunities to increase his knowledge of the Huntingdonshire Diptera fauna, notably when he identified the by-catch of fungus gnats from eight suction traps established by Mike Service to catch biting flies in Monks Wood NNR in 1971 and 1972 (Cole and Chandler 1979). In conjunction with Peter Chandler a total of 153 species was identified (one of which was found only by rearing but not in the traps), one of the longest site lists for fungus gnats in Britain at the time, although intensive sampling elsewhere has since resulted in other localities overtaking this total.

He published accounts of Diptera in HFFS Annual Reports for most years from 1966 until his 37th account published in 2018, coinciding with his standing down as county Diptera Recorder at the AGM of the HFFS in March of that year. Jon also contributed to the HFFS as Editor of the Annual Report from 1968 to 1980, as well as attending many field meetings and indoor events. He set himself high standards for accuracy, whether editing or in his entomological studies, and was exemplary in his care and attention to detail when using identification keys. One of the very few things that resulted in perceptible irritation on his part was finding avoidable mistakes that crept into publications through lack of care.

As well as his extensive work on flies in Huntingdonshire, Jon was an acknowledged national expert on flies, who joined in the expanding activities of dipterists throughout Britain in recent decades. Jon was elected Treasurer at the inception of Dipterists Forum in November 1994 and served in this role until 2007. He was a regular participant at Summer Field Meetings arranged by Diptera Recording Schemes from the mid-1970s onwards, and then latterly those organised by Dipterists Forum. Jon enjoyed walking, whether around his home village of Brampton or when away on fieldwork, when he could stride away over hills and mountains faster than many of his younger companions. He was fortunate to retain his fitness well into his eighties, even after two hip replacement operations. He found upland habitats with their specialised fauna particularly interesting, perhaps also partly because they are entirely absent from Huntingdonshire! However, coasts, ancient woods, all kinds of wetlands and water margins all got their fair share of his attention, a result of his broad interests in many families of flies.

Jon's bibliography listed here contains 100 items published from 1959 to 2018, the majority on Diptera, with just two items on pest insects of other orders. Jon found 25 flies new to Britain, two of which have subsequently been synonymised. He had one species named after him, a member of the family Sciaridae, *Cratyna colei* described by Paul Freeman in 1990. Jon's extensive Diptera collection, card indexes and records have been deposited in the Oxford University Museum, where they will be available for study alongside the other major holdings of Diptera stored there.

Jon will be remembered by dipterists as an outstanding vice-county recorder who transformed our knowledge of the Diptera fauna of Huntingdonshire, as well as being a leading all-round student of flies, who added species to the British List from no less than 15 families, an exceptional total that demonstrates his versatility and breadth of knowledge. He will also be recalled fondly for his kindness and for sharing freely his broad experience of flies with others in an easy and generous manner. His significant contributions to the study of Diptera over many years were greatly appreciated by all those who knew him, and he will be much missed from future gatherings of British dipterists.

Ian F.G. McLean

Diptera of Huntingdonshire

Cole (2015) stated that after almost 50 years of his recording flies in Huntingdonshire, the total list stood at approximately 2,400 species. This is a tribute to his diligence and persistence, because the vast majority of this fauna had been collected and identified by Jon and then reported in the *Annual Report of the Huntingdonshire Fauna and Flora Society*. Jon's paper records were loaned by him to the county record centre for entry onto a database, with over 11,500 records abstracted. Unfortunately this process was not carried out with sufficient care and lacked appropriate validation, which resulted in errors that irritated Jon greatly. He was upset that his accurate identifications and careful record-keeping could be disseminated in this corrupted form to national recording schemes or local users.

Diptera species named after J.H. Cole

Sciaridae: *Cratyna* (*Spathobdella*) *colei* (Freeman, 1990). The Holotype male was found by Jon at Rake Beck, North Yorkshire on 9 June 1976 and is deposited in the Natural History Museum, London; see Freeman (1990). It had previously been misidentified in Britain as *Plastosciara brachialis* (Winnertz). The status and synonymy of the species were confirmed by Menzel and Mohrig (2000). Menzel *et al*. (2006) list further British records, including two more by Jon Cole.

Diptera species added to the British List by J.H. Cole

Agromyzidae

Agromyza graminicola Hendel, 1931 (Cole 1998c)
Agromyza luteitarsis (Rondani, 1875) (Cole 1998c)
Cerodontha scutellaris (von Roser, 1840) (Cole 1998c)
Metopomyza nigriorbita (Hendel, 1931) (Cole 1998c)
Phytoliriomyza bornholmensis Spencer, 1976 (Chandler and Cole 2006; now synonymised with *Phytoliriomyza dorsata* (Siebke) by Zlobin 2005).

Anthomyiidae
Egle subarctica Huckett, 1965 (added by Cole 1988a)
Dolichopodidae
Medetera parenti Stackelberg, 1925 (added by Ivan Perry; Cole 1989a)
Medetera veles Loew, 1861 (Cole 1989a)
Microphor strobli Chvála, 1986 (Plant and Cole 2006; added in Microphoridae)
Neurigona biflexa Strobl in Czerny & Strobl, 1909 (Cole 1989b, 1991)
Sciapus basilicus Meuffels & Grootaert, 1990 (Cole 1998b)
Hybotidae
Euthyneura inermis (Becker, 1910), several reared from rotten log, Hartslock Wood (now SSSI), Berkshire, April-May 1963 and 1964 (Cole 1964b, 1987c)
Platypalpus pallidiseta Kovalev, 1978 (Cole 1985b)
Lauxaniidae
Meiosimyza mihalyii (Papp, 1973) (Cole and Godfrey 2004)
Lonchaeidae
Dasiops hennigi Morge, 1959 (Cole 1988a)
Muscidae
Hydrotaea aenescens (Wiedemann, 1830) (Pont, Lole and Cole 2007)
Lispe longicollis Meigen, 1826 (Pont and Cole 2008)
Lispe melaleuca Loew, 1847 (Pont and Cole 2008)
Mycetophilidae
Trichonta fusca Landrock, 1918 (Cole and Chandler 1979)
Rhagionidae
Chrysopilus erythrophthalmus Loew, 1840 (Cole 1981c)
Sciaridae
Scythropochroa quercicola (Winnertz, 1869): a male reared from a rotting log by J. Cole, found in Brampton Wood, Huntingdonshire, 3 June 1975 (Freeman 1990)
Corynoptera polliciformis Freeman, 1990: a male from Bedford Purlieus, Northamptonshire, 23 June 1985 (Freeman 1990: now synonymised with *Pseudolycoriella paludum* (Frey, 1948) by Menzel and Mohrig 2000).
Sciomyzidae
Antichaeta obliviosa Enderlein, 1939 (Cole 1988a, 1988e)
Pherbellia goberti (Pandellé, 1902) [added as *Pherbellia stylifera* Rozkošný] (Cole 2003b)
Sphaeroceridae
Opacifrons maculifrons (Becker, 1907) (Cole 2010, 2011b)
Strongylophthalmyiidae
Strongylophthalmyia ustulata (Zetterstedt, 1847) (Cole 1981b; 1?sex, suction trap (M. Service), Monks Wood NNR, Huntingdonshire, 3 June 1972).
Tethinidae
Pelomyia occidentalis Williston, 1893 (Irwin, Cole and Ely 2001)

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Cole, J. 2009. Diptera of Huntingdonshire 28. *Annual Report of the Huntingdonshire Fauna and Flora Society* **61,** 29-33. [Cylindrotomidae, Keroplatidae, Mycetophilidae, Cecidomyiidae, Hybotidae, Platypezidae, Syrphidae, Pipunculidae, Agromyzidae, Heleomyzidae, Drosophilidae, Scathophagidae, Anthomyiidae, Fanniidae, Muscidae, Tachinidae]

Cole, J. 2010. Diptera of Huntingdonshire 29. *Annual Report of the Huntingdonshire Fauna and Flora Society* **62,** 36-37. [Mycetophilidae, Scatopsidae, Empididae, Syrphidae, Milichiidae, Sphaeroceridae (including *Opacifrons maculifrons* (Becker) new to Britain)]

Cole, J. 2011a. Diptera of Huntingdonshire 30. *Annual Report of the Huntingdonshire Fauna and Flora Society* **63,** 27-32. [Tipulidae, Mycetophilidae, Pipunculidae, Tephritidae, Agromyzidae, Ephydridae, Bolitophilidae, Ditomyiidae, Keroplatidae]

Cole, J.H. 2011b. (1) *Opacifrons maculifrons* (Becker, 1907) new to Britain; (2) Some scarce flies from an oak sap run at Brampton Wood (TL1870), Cambridgeshire. Dipterists Day Exhibits 2009 and 2010 – compiled by Editor from exhibitors' notes. *Dipterists Digest* (*Second Series*) **18,** 99-102.

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Cole, J. 2013. Diptera of Huntingdonshire 32. *Annual Report of the Huntingdonshire Fauna and Flora Society* **65,** 31-33. [Tipulidae, Limoniidae, Bolitophilidae, Mycetophilidae, Sciaridae, Dolichopodidae, Syrphidae, Sepsidae, Agromyzidae, Ephydridae]

Cole, J. 2014. Diptera of Huntingdonshire 33. *Annual Report of the Huntingdonshire Fauna and Flora Society* **66,** 38-40. [Cecidomyiidae, Phoridae, Agromyzidae, Hybotidae, Tephritidae, Milichiidae, Chloropidae, Muscidae]

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Cole, J. 2016. Diptera of Huntingdonshire 35. *Annual Report of the Huntingdonshire Fauna and Flora Society* **68,** 41-42. [Mycetophilidae, Tephritidae, Ephydridae, Anthomyiidae, Muscidae, Sarcophagidae, Tachinidae]

Cole, J. 2017. Diptera of Huntingdonshire 36. *Annual Report of the Huntingdonshire Fauna and Flora Society* **69,** 22-23. [Trichoceridae, Dixidae, Syrphidae, Agromyzidae, Ephydridae, Anthomyiidae, Muscidae]

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Dipterists Digest 2023 **30,** 120-126

DEL SMITH 1948-2021

Dereck Arthur Smith, universally known as Del, died on Monday 2 August 2021 at his home, Milltown of Dunnideer, near Insch, Aberdeenshire, at the age of 73. Del was a remarkable man of many talents, coupled with great energy and integrity. He is greatly missed by his family and friends in and beyond Essex, where he worked, engaged in local politics, recorded many families of flies, and enthusiastically participated in the activities of the Essex Field Club.

Del was born in The Whittington Hospital, Islington on Monday 12 July 1948 to Arthur, who worked at Ford's Dagenham factory, and his wife Margaret (known as Betty) (née Matz). He was the eldest of four, with a younger brother Ray and then later two sisters Sharon and Tracy. The family moved from Islington to a two-bedroom flat in Harold Hill in 1951 when Del was two, and he remained in Harold Hill until retirement in 2006, when he moved to Aberdeenshire.

Dagnam Park was the gateway to the natural world for Del from a very young age. It was close to where they lived in the Brosely Road flats, and escape to the Park was the first choice of Del and his schoolmates to congregate and make mischief. A large population of three-spined sticklebacks lived in Green Pond, where the boys fished for them from a fallen trunk on the bank. Del established a captive group in the bathroom at home, until they were ejected by his mother as being incompatible with the needs of the rest of the family. Finding birds' nests was a favourite pastime in spring along hedges in the Park, while autumn was the season for collecting conkers. In these different ways the children of a new council housing estate pursued activities known to country children for generations before them. This was only possible because they could access nearby Dagnam Park, the remnants of a large country estate previously belonging to the Neave family. Later on Del researched the history of the Park in detail and chaired The Friends of Dagnam Park, who as a group aim to document the history and natural history of the Park and sustain it for future generations to enjoy (Friends of Dagnam Park 2022).

After leaving school in February 1964 Del's first job was as a shipping clerk at Greatermans Associates in Ropemaker Street, Moorgate, in the City. Even in these scruffy surroundings wildlife persisted, and soon Del spotted a pair of blackbirds carrying nest material onto the gantry of the fire escape. When this activity stopped he reckoned the nest was finished and should contain eggs. He hatched a plan to see the nest with its eggs, which involved an exit to the fire escape via a window above the middle cubicle of the male toilets. All went well at first – the office deserted at lunchtime, a successful exit, three beautiful eggs viewed. Returning was more difficult, the cubicle now being occupied by his boss reading *The Times*! A waiting game ensued, until he heard the toilet flush and the door bang. He quietly peered through the window, climbed back in and crept back to his desk "as flushed as the toilet".

Del then worked as a labourer on a local farm, which backed on to Dagnam Park. After flirting with mid-1960s lifestyles in his tearaway teenage years, when he had winter factory jobs and went gallivanting around in summer, he took various office jobs, before working for the GLC in the Harold Hill depot as a labourer. He began training to be a carpenter in 1973, following in the footsteps of his boss at the time and taking advantage of a Government training scheme to learn the skills of his trade, then remained as a carpenter until retirement.

Del met Gaynor in autumn 1969 at the Albemarle Youth Club, and the following year, in March 1970, they were married at Brentwood Registry Office. Del and Gaynor had three children, a girl Cher Rosa, and two boys Che and Keir. Their forenames reflect Del's lifelong socialist philosophy and beliefs, which he later put into practice so effectively in local politics. His interests in wildlife, local history and furthering the wellbeing of local residents came together in a powerful combination to create his strong personal agenda for Harold Hill. This agenda underpinned his efforts to protect and improve all aspects of the local environment, and his approach chimed well with many people, earning their support when Del entered the fray and began lobbying in earnest.

Del became a committed and enthusiastic community activist for his home area of Harold Hill, campaigning on many local issues, and this led to his standing successfully as a Labour Councillor candidate in 1986 for Hilldene Ward (Ainsworth 2021). He continued his characteristic approach of actively representing his constituents' interests, combined with advancing a local environmental agenda to sustain the quality of life for residents by enhancing green spaces (notably Dagnam Park) for wildlife and amenity. Del gained respect by working hard as a Councillor; his accessibility and readiness to help anybody, no matter what their circumstances, gave him an outstanding reputation and high profile locally. He did not stand in 1990, but was selected for Gooshays Ward in a 1991 by-election, being returned then and again in 1994, before leaving the Labour Party and not standing against his former Labour colleagues in 1998. Del formed a cross-party 'Rainbow Alliance' when serving as Mayor of Havering from 1997 to 1998, leading a successful coalition administration (Patterson 2021).

Cricket entered Del's life early when he was about ten and attending Dycorts Junior School in Harold Hill. Partly inspired by his cigarette card with a portrait of Don Bradman, he took the chance of entering his school cricket trials only to fall short and be designated scorer for the team. Notwithstanding this unpromising start, Del eventually found his cricketing home with the Havering and Brentwood Labour Party Cricket Club or HABLPCC. Here the relaxed attitude as to who could join the club more than made up for his school disappointment, and he enjoyed many matches playing for them over the years. In turn his son Che joined the club, followed in due course by Che's son Jude, thereby creating a family dynasty of cricketers. On Thursday 14 July 2022 a well-attended memorial match was held in Del's honour in glorious weather, an event which is planned to become an annual occasion to remember him. Cricket is a game of long-standing traditions, and one suspects that Del would be both amused and delighted to be honoured in this way. For his family and friends this memorial, through this most social of sports, is a fitting tribute to Del's campaigning and selfless hard work for the community in Harold Hill.

From a young age Del had a general interest in wildlife, particularly birds, then extending to plants and followed by moths in the late 1960s and early 1970s. His interest in Diptera came about in the early 1970s via an unexpected and unusual route. One day he noticed a fly inside their flat and Del decided to identify the insect. This proved to be a much harder task than he had anticipated, and it was only after an accumulated 24 hours of work that he was able to convince himself that it was *Fannia canicularis* (Linnaeus), the lesser house fly, and not the house fly *Musca domestica* Linnaeus that he had expected.

From that moment onwards Del was hooked, and he bought entomological books and equipment to enable him to become, with many hours of concentrated work, a very competent all-round dipterist. He found flies to be the most fascinating insects and had the attitude that if people would only look closely, anybody could have the same depth of interest that he had acquired. In an email to John Murray on 31 May 2015, Del remarked "Given free rein all men would collect flies", a sentiment that rings true to anybody who has been lucky enough to discover the secret world of flies and then embarked upon a life-long quest to reveal their mysteries.

In 1976 Del joined the Essex Field Club, the county natural history society; this enabled him to develop contacts and friendships with many other local naturalists in the years ahead. He also became Essex Diptera Recorder in 1976, when he took over at the invitation of Ron Payne (who at the time felt he was "getting on a bit" – happily Ron lived on until 2010!), remaining in this role until 2020/2021. In addition Del served as Membership Secretary from 2002 until the end of 2020, as Vice-President five times and as President in 2006/2007 at the time he moved to Scotland.

His Essex Field Club President's Page (Smith 2007) gives some fascinating background to his years as Diptera County Recorder and the importance of the Essex Field Club to his life as a naturalist. As mentioned above, while growing up his favourite local place to explore was Dagnam Park, where he spent many happy hours; as a dipterist he went on to compile an extensive site list of more than a thousand species, including many rarities. On the website devoted to Dagnam Park (Friends of Dagnam Park 2022) there is an article by Del on some of the insects found in the Park, illustrated with photographs by Don Tait (Smith 2020). Del went on to survey more parks in Essex, together with a wide range of different habitats at other sites. He also identified much Diptera material collected by other entomologists in Essex. He had a long collaboration with Peter Harvey recording flies, including major joint surveys of Chafford Hundred and West Thurrock Marshes in 2005 (Harvey 2021).

After he moved to Aberdeenshire Del published four extensive papers summarising records of Essex Diptera in the *Essex Naturalist* (Smith 2008b, 2009, 2010, 2016). There have been relatively few recorders of flies in Essex recently, with the majority of records being by Del and the other stalwart of Diptera recording in Essex, Peter Harvey. The popular hoverflies and Larger Brachycera, with more active recorders, were not included in these four papers.

Each paper contained an Introduction to the families covered, with background and brief history of recording in Vice-counties 18 and 19, followed by an extensive summary table listing Essex species under family headings. Five columns indicated saproxylic species (from Alexander 2002), number of hectads in Essex, number of records in Essex, and the last date recorded in vice-county 18 (South Essex) and vice-county 19 (North Essex). The total species numbers he summarised in the four papers were as follows.

Nematocera	British species	c.2,645	Essex species	700+
Acalyptratae	British species	c.1,540	Essex species	800+
Calyptratae	British species	c.1,024	Essex species	460
Empidoidea	British species	695	Essex species	354
Total	British species	c.5,904	Essex species	2314+

These totals reveal an impressive coverage for the county across a wide range of flies and are a testament to the diligence shown by Del, strongly supported by Peter Harvey, in their widespread recording over many years. Each paper also included a hectad coverage map, acknowledgements, and a list of references. These major papers are a tribute to Del's hard work and enthusiasm for recording Essex Diptera down the years, and will be extensively referred to in future.

Del was keenly interested in many Diptera families, but within this vast assemblage there were some groups he found particularly stimulating. The genus *Platypalpus* within the Hybotidae was one such – the delights of finding (and the challenges of identifying) these small predaceous flies ran deep. The consequences of his detailed attention to the genus are evident, resulting in the long list of species he compiled for Essex (52 out of 90 British species; Smith 2016) and his success in adding *Platypalpus bilobatus* Weber, his first species new to the British list (Smith 1990a). Acalyptratae families were also keenly appreciated by him, with many tiny, similar species requiring due care and patience to collect and identify, but in truth Del excelled as an all-round dipterist who was never happier than when sorting and identifying large samples of assorted flies. He added nine species to the British List, mostly in conjunction with other collectors who passed material to him for identification. Del bequeathed his Diptera collection to the Essex Field Club; it is housed at Wat Tyler Country Park, Pitsea (Harvey 2021) along with his insect books and equipment.

In 2006 Del and Gaynor moved to a cottage, Milltown of Dunnideer, in Aberdeenshire, a very different environment from the familiar terrain of South Essex. The cottage had belonged to Gaynor's parents and had been a favourite location for family holidays for many years. With his building experience and carpentry skills Del improved the property, including converting the bothy to make space for guests. The garden gave them opportunities for encouraging wildlife, with Gaynor planting a diverse hedge as well as keeping Buff Orpington chickens and growing vegetables for home consumption. Del and Gaynor enjoyed radio drama in the evenings, while his eclectic study soundtrack, chosen from his large music collection, ranged from Doo Wop, the Blues, some 1960's bands, Cajun, a bit of Blue Grass, through to classical composers such as Vaughan Williams and Shostakovich.

After moving to Scotland, Del continued his involvement with the Essex Field Club as Membership Secretary and kept in touch with Essex friends, as well as maintaining his interests in Diptera by identifying material from surveys in Essex and elsewhere. He also collected locally in Aberdeenshire, particularly in their large garden, where he deployed a Malaise trap from time to time. The garden is situated in a lowland arable landscape at 150m altitude, with nearby hills rising to 250-300m under less intensive management. Del and Gaynor enjoyed their years in Scotland, notwithstanding the challenges of long, cold winters in an isolated location. During a lengthy battle with cancer, Del received exemplary care at home from local NHS services, who supported the family throughout this difficult time.

Del made many significant contributions as a person who cared deeply about the environment and the needs of other people, putting his beliefs into action at every opportunity. He showed great commitment to all the campaigns and good causes he espoused throughout his life, giving his time freely in evenings to help local people solve their problems. This determination was tempered by a disarming dry sense of humour and an inherent calmness that defused tensions and helped to win over others to his point of view. He was an exceptional Diptera county recorder who, with Peter Harvey and others, showed that Essex has a rich fauna that is now well-documented and ripe for further investigation. He fully lived up to the idiom of 'a man of many parts', combining a true generosity of spirit with an inquiring mind: he is much missed.

Ian F.G. McLean

Diptera species added to the British List by D.A. Smith

This list includes those species added by Del in conjunction with co-authors who collected material identified by him.

Chloropidae
Homalura tarsata Meigen (Ismay and Smith 2014)

Fanniidae
Fannia pruinosa (Meigen) (Smith and Ekins 2017)

Heleomyzidae
Prosopantrum flavifrons (Tonnoir & Malloch) (Ismay and Smith 1994)

Hybotidae
Platypalpus bilobatus Weber (Smith 1990a.)

Phoridae
Phalacrotophora harveyi Disney (Disney and Smith 2016)

Sphaeroceridae
Rachispoda duplex Roháček (Smith and Harvey 2016)
Telomerina eburnea Roháček (Smith and Harvey 2006)

Syrphidae
Neoascia interrupta (Meigen) (Falk, Smith and Stubbs 1981)

Tachinidae
Clytiomya continua (Panzer) (Plant and Smith 1997)

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