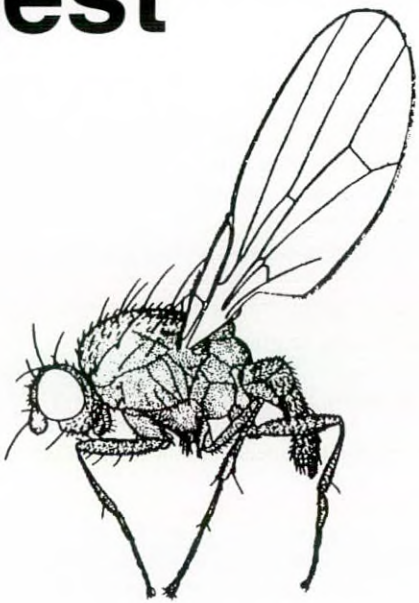
Dipterists Digest

2017 Vol. 24 No. 1

Cover illustration: *Rhamphomyia marginata* (Fabricius) (Empididae), female at Wakerley Great Wood, Northamptonshire, on 16 May 2017 (photo: Frank Porch) [see note by Colin Plant on pp 77-78].

Dipterists Digest



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Dipterists Digest

Dipterists Digest is the journal of the **Dipterists Forum**. It is intended for amateur, semi-professional and professional field dipterists with interests in British and European flies. All notes and papers submitted to Dipterists Digest are refereed. Articles and notes for publication should be sent to the Editor at the above address.

The scope of **Dipterists Digest** is:

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

Articles must not have been accepted for publication elsewhere and should be written in clear and concise English. **Contributions should preferably be supplied either as E-mail attachments or on CD in Word or compatible formats**.

Articles should be supplied in A5 format with text in 9-point and Times New Roman font, title 12 point and author's name 10.5 point, with 1.27cm (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 considered. Figures and photographs should be supplied separately as jpeg files to fit in the above page format, or as hard copy. All jpegs should be supplied at 300 dpi.

Style and format should follow articles published in the most recent issue. A short Summary (in the form of an Abstract) should be included at the beginning of each article. References to journals should give the title of the journal in full. Scientific names should be italicised. Authors of scientific names should be given in full and nomenclature should follow the most recent checklist, unless reflecting subsequent changes. Descriptions of new species should include a statement of the museum or institution in which type material is being deposited.

Authors will be provided with twenty separates of papers of two or more pages in length, and a pdf of their contribution if requested.

Enquiries about subscriptions and information about the Dipterists Forum should be addressed to the Membership Secretary, John Showers, 103 Desborough Road, Rothwell, Kettering, Northamptonshire NN14 6JQ, showersjohn@gmail.com

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Alexander Cuthbertson (1901 – 1942): from Scotland to Rhodesia, a dipterist's journey

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Summary
A biographical account is given of the dipterist Alexander Cuthbertson, who was born in Scotland where his interest in Diptera began and there he concentrated on craneflies (Tipuloidea) and their ecology. He later lived and worked in the former Rhodesia (now Zimbabwe) in southern Africa, where he was employed as an economic entomologist. Accounts are provided of his early years, development of his interest in Diptera, and the impact he had on dipterology in the region. Although he died at an early age his contributions were, nevertheless, substantial.

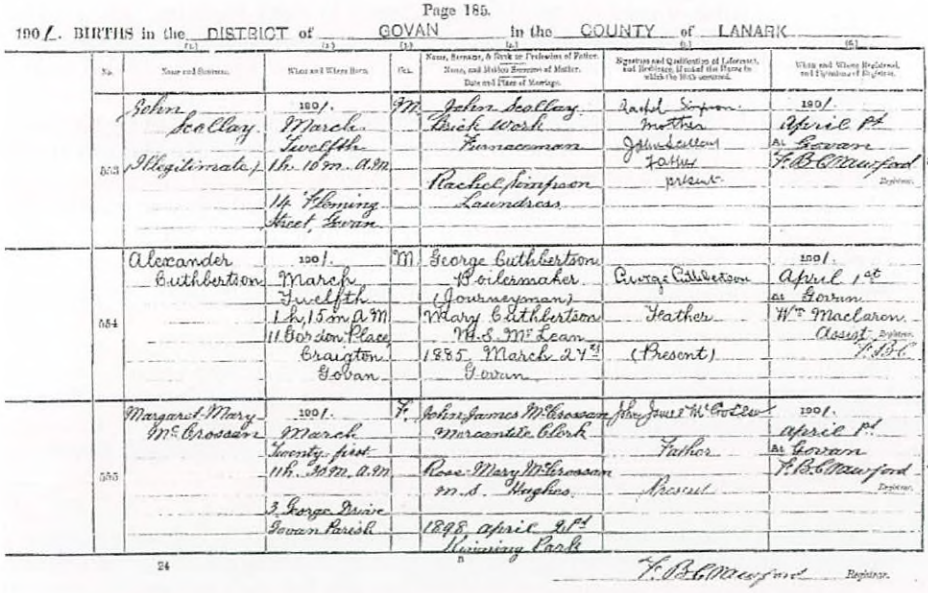
Introduction
Alexander Cuthbertson (Fig. 1) came from a working-class background in the Clyde shipbuilding industry and presents an example of how a highly intelligent and diligent boy went to college and developed a career in his chosen profession. He had natural talent which, combined with a sympathetic upbringing, resulted in his success as a professional entomologist. His development and career as a dipterist, beginning in Scotland and completed in Africa, is described. An assessment of his impact on the subject is attempted from a consideration of his collecting activities and publications and their use by others. His achievements developed from a deep interest and love for the natural world and retain a strong legacy. This is evidenced by his publications and the insect collections he made. The esteem of colleagues past and present is reflected in many species given his name, and modern studies still utilise the products of his work.

Early years
Alexander Cuthbertson was born on 12 March 1901, in Govan, Glasgow, the sixth of nine children, six boys and three girls. His parents were George Cuthbertson, a journeyman boilermaker and his wife Mary (née McLean) (Fig. 2). The family then lived at 11 Gordon Place, Craigton, Govan. While Alexander was still a boy they moved to Hazelbank, Yoker, further down the River Clyde. Some time later his father, knowing his son's interest in the natural world, brought home several woodwasps from a ship-building yard in Irvine, Ayrshire; they had emerged from timber of Scandinavian origin. This resulted in his son's first publication, a short note on the subject (Cuthbertson 1921a; see Appendix 1 for his Scottish publication record). Alexander Cuthbertson lived at the house in Yoker at least until 1925, using this address in correspondence, various membership lists and in articles that he authored.

He attended The High School, Clydebank from 1915 to 1921, and copies of testimonials from there are filed in the archives of Charles Paul Alexander (1889-1981), the prolific American specialist in craneflies (Smithsonian Institution Archives, see Acknowledgements for details; hereinafter referred to as Alexander Papers). These are unequivocal in their praise of his performance. The Rector (the title for a Headmaster in Scottish schools) stated he was "an earnest student with a decided genius for biological sciences" and the Principal Teacher of Science was effusive in his praise: "[Cuthbertson] differed from most pupils in his powers of observation and in his exact methods of recording [and] the accuracy of his deductions ... at the examination he

was specially commended for his great knowledge of natural history obtained from direct observation. This from the H[is] M[ajesty's] I[nspector of] S[chools] is the highest praise a student can get".

Fig. 1. Alexander Cuthbertson (1901-1942), dated 1932. Photo courtesy of the Smithsonian Institute, Washington, DC.



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1901. BIRTHS in the DISTRICT of GOVAN in the COUNTY of LANARK

No.	Name and Surname.	When and Where Born.	Sex.	Name, Surname, & Rank or Profession of Father. Name, and Maiden Surname of Mother. Date and Place of Marriage.	Signature and Qualification of Informant, and Residence, if other than the House in which the Birth occurred.	When and Where Registered, and Signature of Registrar.
553	John Scallay.	1901. March Twelfth. 1h. 10m. a.m. 14 Fleming Street, Govan.	M.	John Scallay. Brick Work Furnaceman. Rachel Simpson Laundress.	Rachel Simpson. Mother. John Scallay. Father. present.	1901. April 8th. At Govan. F. B. C. Munford Registrar. B.
554	Alexander Cuthbertson	1901. March Twelfth. 1h. 15m. a.m. 11 Gordon Place, Craigton, Govan.	M.	George Cuthbertson. Boilermaker. (Journeyman) Mary C. Cuthbertson. M.S. Mc Lean. 1885 March 24th Govan.	George Cuthbertson. Father. (Present)	1901. April 10th. At Govan. Wm. Maclaren. Assist. Registrar. F. B. C. 13.
555	Margaret Mary Mc Crossan	1901. March Twenty first. 11h. 30m. a.m. 3 George Drive Govan Parish	F.	John James Mc Crossan. Mercantile Clerk. Rose Mary Mc Crossan. m.s. Hughes. 1898 April 21st Kinning Park	John James Mc Crossan. Father. Present.	1901. April 8th. At Govan. F. B. C. Munford Registrar. L.

F. B. C. Munford Registrar.

Fig. 2. Copy of Alexander Cuthbertson's birth certificate.

Cuthbertson's interest in natural history as a young man began with bird watching (MacDonald 1919; Cuthbertson 1922a, b; Munro 1942). His paper on black-headed gulls (Cuthbertson 1922a) gave a historical overview of their various colonies in the area using literature sources, and incorporating his own field data for several seasons from at least 1914 (when aged 13) to give details of numbers of breeding pairs. He commented on the lack of any useful quantitative observations from earlier dates. The breeding success, or rather lack of it, and constant relocation by the birds to different nesting sites in successive seasons was linked directly to egg collecting (for use as food). The account was written up when he was aged 21 and is a succinct factual account that ended on a personal note in the last paragraph: "If my remarks have shown the need of adequate protection of this economically important Gull [enabling] ornithologists to take a more comprehensive view of the distribution of the species ... my object will have been achieved". This article supports the opinions expressed on his abilities in his school reports. Cuthbertson was to recall later (Alexander Papers, 21 April 1932) that encouragement from Alexander Morrison Stewart (1861–1948) of Paisley, Renfrewshire had led to his interest in birds being replaced by insects. Stewart was a well-regarded local naturalist who had a special interest in insects and donated his collections to Paisley Museum. He was keen to popularise natural history through the Paisley Naturalists Society's lecture programmes and local publications (Moore 2015; in press).

On 17 November 1920, Cuthbertson wrote to Charles Joseph Gahan (1862-1939), Keeper of Entomology at the British Museum (Natural History) [now the Natural History Museum, London]. It is worth quoting extensively from this letter as it explains the early origins of his ambition and provides some detail to support his later recollections:

> "Dear Sir, Some of my naturalist friends advised me to get the series of Pamphlets on Economic Ornithology and Entomology ... as I am a young enthusiast in both these

sciences. [...] I intend entering the 'Varsity in April to study Medicine, but my great ambition is to become an Economic Entomologist – to get to work and do some really good work investigating injurious insects, diseases, etc. But how shall I go about it? Do I require to take a degree B.Sc., and special classes in Botany, Chemistry, Physiology and Entomology? I would be delighted if you can help me in this thing. Prof Lefroy says that the need for young naturalists, who can become trained Entomologists, is urgent, and more than Empire-wide. Is it a sufficiently well paid profession? I am aged 19 and wish to get to work at once ... I am a keen young naturalist who wishes to know how to set about my life-work. At present I am taking classes in Highers [leaving certificates Scots Educ. Department] ... I have studied fairly well by myself Zoology and at school Botany. But I have my birds and my butterflies, and it is in the study of these I delight devoting all my leisure moments ..."

The reference to Harold Maxwell Lefroy (1877-1925) is interesting. Lefroy, the first Imperial Entomologist, based in India from 1903-1910, came back to Britain to become the first Professor of Entomology at Imperial College London. There, his teaching and philosophy emphasised his mission to train economic entomologists for the practical needs they would face in the field, usually in a tropical situation. That a Glaswegian schoolboy was aware of this and was being inspired by the concept says something about both parties. There is no record of any reply to Cuthbertson's plea to Gahan for career advice. His actual progress is described below.

The exact date that Cuthbertson joined the Glasgow Natural History Society is unrecorded, but, on 25 October 1921, he became its Honorary Secretary, and held the post until 1926 (Fig. 3). Despite involvement with the Society's activities he never published formally in its journal. One account of local birds was recorded later in some detail in the delayed proceedings of an indoor meeting, having been read in 1921 (Cuthbertson 1930). Perhaps because of his career plan in entomology, he chose to publish in less parochial journals.

Developing interests in Diptera

In 1922 Cuthbertson was appointed as assistant forester at Glasgow Corporation's Ardgoil Estate. He was to recall later that, in the Loch Goil area, he could "search for larvae on the banks of hill burns and in the soil of pine woods. J.R. Malloch a dipterologist of repute in America and Prof C.P.A[lexander] supplied a great deal of literature on the biology of the Tips" (Alexander Papers, 21 April 1932). These two correspondents were ideal sources for him. Alexander (1919, 1920) had just produced his first great work on tipulid biology, the published results of his PhD thesis. The seminal work on higher classification of Diptera by John Russell Malloch (1875-1963), using larval characters had also just appeared (Malloch 1917), just four years after Malloch had emigrated to America from Scotland. These works described their field methodology, and they generously sent him copies. Cuthbertson would have known of the success of Malloch who, without the same advantages of encouragement at home or schooling that Cuthbertson had enjoyed, had emigrated from the Glasgow area to North America. There he had become a professional entomologist, making a profound impact on the world stage (Hancock 1998; [2017]). In fact, from other correspondence it is evident that Cuthbertson knew the family personally (see below).

Among his contacts at this time Percy Hall Grimshaw (1869-1939), who was responsible for the Diptera collections at the Royal Scottish Museum, and James Ritchie (1882-1958), professor of natural history at the University of Edinburgh, were credited by Cuthbertson with their advice to him to concentrate on flies. Selection of the Tipulidae (sensu lato) was his own idea for "special study as several species were pests of considerable importance to local agriculture" (Alexander Papers, 21 April 1932). He developed a relationship with a number of

other biologists, to whom he appealed for advice; these included Dr Robert Stewart McDougall (1862-1947), a forestry specialist at the University of Edinburgh, and Mr J. Rennie of the North of Scotland Agricultural College at Aberdeen, who both also had an interest in craneflies.

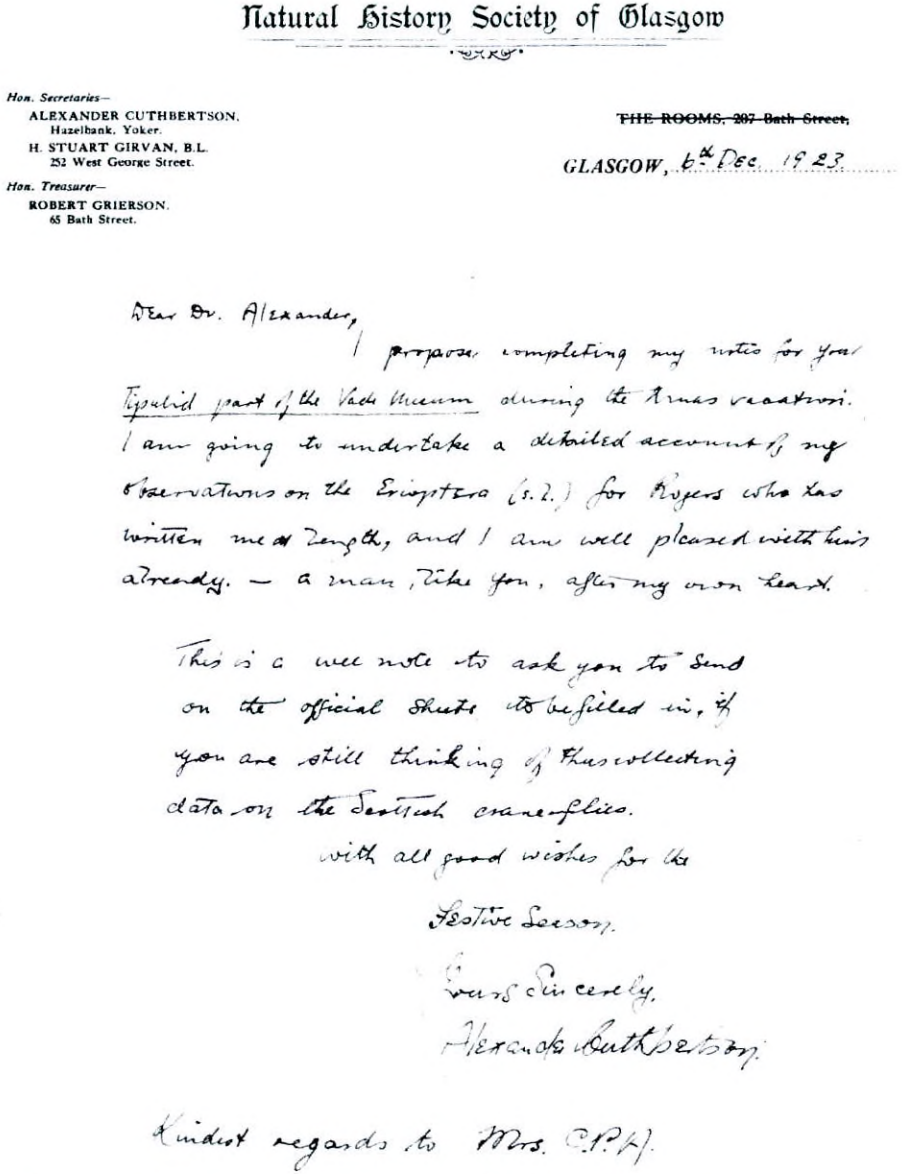
Horace Francis Barnes (1902-1960) became a correspondent in connection with craneflies, which he was then studying in Wales. Cuthbertson wrote to Alexander on 10 August 1924: "Barnes has taken up the ecology of our group and seems to be doing well ... his new species *Gonomyia bispinosa* was changed owing to one of yours being so named in Acad. Nat. Sci Phil. Proc.". The new name *G. conoviensis* Barnes, 1924, was substituted for the preoccupied *bispinosa* of Barnes, 1923. Clearly Cuthbertson was reading the *Entomologists monthly Magazine* where Barnes published some of his results. On 28 March 1925, Cuthbertson told Alexander that "my friend Barnes, in Wales, has published a paper on the ecological distribution (so-called) of the adult flies but has added very little to what we already know ... without reference to the larval stages and natural enemies & associates is of little scientific value". This paper, based on rainfall and altitude (Barnes 1925) and published in an academic journal by an entomologist working in an agricultural laboratory, failed to impress the young Cuthbertson. Barnes later became an authority on Cecidomyiidae (gall midges) and, from 1927 until his death in 1960, he worked at the Rothamsted Experimental Station; from 1946 to 1956 he authored seven volumes of the *Gall midges of economic importance*.

Another contact was John Samuel Dunkerly (1881-1931), who was then at the University of Glasgow, later moving to the University of Manchester. He was a parasitologist, to whom Cuthbertson sent *Tipula* larvae that had died during rearing; they proved to have been parasitised by a variety of Protozoa – "a flagellate *Polymastix*, several large gregarines and others yet unnamed" (Alexander Papers, 7 July 1923).

There were several collector naturalists in the Glasgow area who had already made contributions to the local cranefly species list. The Glasgow area had been the focus for tipulid recording from the turn of the previous century (e.g. Ord 1900; see also Stubbs 1992: 10; Hancock 2014). Cuthbertson gleaned information from their collections and was particularly impressed with that of James Joseph Francis Xavier King (1855-1933), from which Frederick Wallace Edwards (1888-1940) also derived data on several species new to Britain. However, Cuthbertson's general opinion of this coterie of collectors as a source of useful ecological information was minimal "owing to their being only interested in the manner (like postage stamp collectors) elementary, and unscientific, little valuable data or even imaginal [i.e. adult] habitats could be obtained ... they seem to have the old-woman-like jealousy for one who has entered their particular line of effort in 'collecting bugs!' with some success – no thanks to them" (Alexander Papers, 14 September 1925).

By this stage, Cuthbertson had developed a clear idea for his own work, probably inspired by reading the works of Alexander (1919, 1920), which contained his methodology for rearing larvae. Anything other than an investigation that included larval stages and their preferred habitats, together with behavioural observations in the field, was not only of no interest to him but was actively criticised by him. He was even critical of Malloch: following his comments on Barnes (see above) he ended this letter "intensified field work is essential for success in study of an [sic] group. Mr J. Malloch of Biological Survey has this failing if I may say so, but it is professional not personal" (Alexander Papers, 28 March 1925). When he wrote this Cuthbertson clearly had no idea of the terms of Malloch's employment, which was partly at least to advise farmers in Illinois on to how combat armyworm depredations and other insect pests on the plains. Elements of biological control were also investigated by Malloch, using his skill as a field naturalist (Hancock [2017]). These were the very activities that Cuthbertson himself aspired to as a potential career. Some youthful inexperience is evident. In his extensive correspondence with Alexander, he made no comment on him having abandoned his earlier studies on juvenile

stages in favour mainly of describing new species. Possibly he came to appreciate that knowledge of biology and ecology inform taxonomy and systematics.



Natural History Society of Glasgow

Hon. Secretaries—
ALEXANDER CUTHBERTSON,
Hazelbank, Yoker.
H. STUART GIRVAN, B.L.
252 West George Street.

Hon. Treasurer—
ROBERT GRIERSON,
65 Bath Street.

~~THE ROOMS, 207 Bath Street,~~

GLASGOW, 6th Dec. 1923

Dear Dr. Alexander,

I propose completing my notes for your Tipulid part of the Vade Mecum during the Xmas vacation. I am going to undertake a detailed account of my observations on the Eriopterа (s.l.) for Rogers who has written me at length, and I am well pleased with his already. — a man, like you, after my own heart.

This is a wee note to ask you to send on the official sheets to be filled in, if you are still thinking of thus collecting data on the Scottish craneflies.

with all good wishes for the Festive Season.

Yours Sincerely,
Alexander Cuthbertson.

Kindest regards to Mrs. C.P.A.

Fig. 3. Letter to C.P. Alexander, 1923, using Natural History Society of Glasgow headed notepaper.

In 1923, Cuthbertson became a member of the Royal Scottish Arboricultural Society, evidently resulting from his employment as a forester. One of his earlier published notes (Cuthbertson 1923a) arose from an excursion by that society to Perthshire: this demonstrated his ability to identify beetles and an awareness of relevant literature. He was one of three recipients to receive a bursary to attend that meeting. Despite this apparent progress, it seems that he abandoned any idea of a working specifically in forestry when, in the autumn of 1922, he enrolled as a student at the West of Scotland Agricultural College, which was then in Glasgow at 6 Blythswood Square. This college was established there in 1899 and after 1927 moved to Auchincruive, Ayrshire, becoming one of the Scottish Agricultural Colleges (Martin 1994). The University of Glasgow awarded undergraduate and postgraduate degrees to these colleges (Moss *et al.* 2001). Cuthbertson's work was now focussed on fields, crops and animal stock rather than on forests and timber.

Cuthbertson's published work on craneflies (Appendix 1) began with a short note (Cuthbertson 1923b), but this included observations on ecology and swarming behaviour; he acknowledged Edwards for help with identification. The proceedings of the Glasgow Natural History Society show that he read accounts, or exhibited specimens at meetings, that demonstrated his interest in the juvenile stages. The aquatic larva of *Dicranota guerini* Zetterstedt from West Kilbride, Ayrshire, and those of *Ptychoptera paludosa* Meigen from Westerton Garden Suburb, Glasgow, were shown at meetings in 1923 and 1924. A report on a note he had read at a meeting on 30 October 1923 mentioned eleven additions to the local list of craneflies of which six are based on Edwards (1921) and the other five must have been identified by Cuthbertson, using Edwards' paper with its keys and figures. On 29 December 1926, Cuthbertson read a paper concerning 175 species of Tipulidae that had been recorded from the Clyde area and said that "he had seen five others in local collections. *Adelphomyia* [now *Paradelphomyia*] *nielseni* (Kuntze) from Dunbartonshire, new to Britain, and *Ormosia uncinata* (de Meijere) [i.e. *O. hederae* (Curtis)] were exhibited". The text for this paper was based on his published article (Cuthbertson 1926d). From this, it is evident that he had been keeping local cranefly records from literature and fieldwork in a numbered list. As new species were added they were simply given a consecutive number and were derived from his own collecting, from the British Museum collection, the J.J.F.X. King collection in Glasgow (later acquired as a bequest by the University of Glasgow) or the Royal Scottish Museum, Edinburgh. The fate of Cuthbertson's own collection from this period is unknown, as is its extent or volume. Correspondence with Alexander indicates that they exchanged specimens of adults, and he also exchanged specimens with James Speed Rogers (1891-1955) in Gainesville, Florida. From the context of the letters these latter at least were probably entirely larvae. When Alexander began to concentrate on adult taxonomy he sent his entire collection of juvenile stages to Rogers.

Cuthbertson recalled that "the summer vacations of 1923-25 were spent on farms in Ayrshire and the Isle of Bute and every occasion was taken of continuing the study of craneflies in the field in spare time" (Alexander Papers, 21 April 1932). His observations resulted in a series of papers (Cuthbertson 1923b; 1926a-h; 1927a-c; 1929a-c), mostly written before he left Scotland although many did not appear until afterwards. It may be noted that some of these have titles that use a numbered sequence that is apparently incomplete. This anomaly could be explained by their appearance in different journals, the editors of which might not have accepted such numbering when they had not been involved with any other part(s) of the sequence. In addition, delays between submission and printing would have meant their appearing out of order. It later appears (Alexander papers, letter 3 February 1930) that some of these papers were written in, or at least sent from, Rhodesia. He also worried that these papers were being ignored: "I sent one on Mating and Oviposition Habits to the EMM about a year ago, but it seems to have gone astray. Out here in African isolation one feels so 'out of it' that I am beginning to despair of competing

in the entomological arena. I feel I do not matter anymore in European entomology!" In fact, this paper was published in June 1929 (Cuthbertson 1929a), so his isolation and the vagaries of the postal system are to blame, not his performance.

Cuthbertson was scheduled to broadcast a talk on BBC radio entitled "Wild birds and insect pests" in February 1926 (Anonymous 1926) and also produced a popularised account of craneflies (Cuthbertson 1925). He obtained his C.D.A. (College Diploma of Agriculture) in 1925 and, as a testimonial from the Head of the College shows, his performance as a student was of remarkable quality (Fig. 4).

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE.

6 BLYTHSWOOD SQUARE, GLASGOW.

21st. October, 1925.

MR. ALEXANDER CUTHBERTSON was a Student during the Winter Session 1923-1924 in my Lecture and Laboratory Classes in Agricultural Zoology (including Entomology). He obtained a First Class Certificate and a College Prize at the close of the Session and subsequently received the highest marks in this subject at the College Diploma Examination.

I have long known Mr. Cuthbertson as a keen and intelligent Field Naturalist and as an energetic and capable Secretary of the Glasgow Natural History Society. I have watched his progress as an entomologist and I consider that his work, in particular on the biomonics of Diptera, shows exceptional promise. He has already contributed a considerable bulk of material, derived from original observation in this branch, to various Scientific Journals and to the proceedings - eventually for publication - of the Glasgow Natural History Society.

In this work he has taken a line of his own and has shown himself capable of independent investigation of merit.

I have always found Mr. Cuthbertson exemplary in conduct, pleasing in personality, and entirely trustworthy.

(Signed) L.A.L.KING, M.A., Cantab.
Professor of Zoology.

Fig. 4. Copy of Cuthbertson's testimonial from Professor L.A.L. King.

In his earliest letters to Alexander, Cuthbertson exhibited a rather school-boyish phraseology. The earliest letter is undated but addressed from Lochgoilhead, so was written some time in 1922:

> "Dear Sir, I thank you very much for your work [Alexander 1920] ... some day I may send you some of my stuff on the Tipulidae; but at present I am sticking at it like a hatter and hope to do some really good work ... [I] find most of we economic students are working in quite different lines. My methods are crude comparatively. What is your general procedure? In concluding this short note may I congratulate you highly upon your work. It makes me almost think nous autres Écossais are not the only good entomologists in this happy little world of ours!"

Alexander was, nevertheless, always supportive and polite, usually confining himself to specific entomological issues. Only in one exchange during their initial sequence of correspondence do views of a personal element occur. This was in relation to the Mallochs. Alexander started work at the Illinois Natural History Survey in 1919, where Malloch had obtained a post in 1913 and remained until 1921, when he went to Washington DC. In 1919, at the end of the First World War, Malloch's family left Scotland to join him. By the time Alexander left Illinois for a post at Amherst College, Massachusetts, where he spent the rest of his academic career, there had been an overlap with Malloch of over three years.

The second letter from Cuthbertson to Alexander, addressed to Amherst and dated 7 July 1923, begins: "It is quite a long time since I heard from the Mallochs ... I wish to keep in touch with my entomological friends for they are so few that t'would be a pity not to report my progress from time to time in which case you would probably think I had been allowing girls or something to hinder my tipulid study." Alexander's reply of 19 July 1923, contains a small paragraph: "I have not heard from the Mallochs since I left Illinois. You know that Mr Malloch is in Washington. Bessie is still with the Natural History Survey. She is an interesting girl".

Elizabeth "Bessie" Graham Malloch (1902-1976) was the eldest of the Malloch daughters. On 10 August 1923, Cuthbertson inserted a postscript in another letter to Alexander: "Have not heard from Betty for months. I am just thinking that maybe it is my turn to write! These girls. But my motto so far, Garde la femme. But this not Dipterology. Cheerio". On 27 August 1923 Alexander replied: "Your motto 'Garde la femme' is a good one when not carried too far. You want to be sure you get the right girl when you finally settle down. Bessie is a nice girl but I hardly think you would have found her the one". To this 'avuncular' response, Cuthbertson replied on 13 September 1923: "I assure you I will not go too far with my eschewing of girls. I want to be an ordinary mortal in my pleasure moments". Cuthbertson's relationship with Bessie is unknown but they may have met through some natural history related event(s) in the Glasgow area. When the Mallochs emigrated Bessie would have been aged 17 and Cuthbertson a year older. The final statement on her comes from Alexander on 24 September 1923: "You may be interested to know she is now Mrs Alfred Pixler, Urbana, Ill. I have heard she and Alfred were hitched up on Sept 1st. I know the boy real well, supposed to be hired by a garage, but I am afraid he is not over ambitious ... I can say privately that Bessie was not the girl for you".

African journey

Many Scots emigrated in the 1920s in search of a better life overseas (Harper 1998). Cuthbertson himself was quite explicit: "Like all young Scotsmen ... I longed for the Colonies, and on May 28, 1926 sailed for Africa, arriving on the 21st June." This statement is contained in a letter in the Alexander Papers, dated 21 April 1932. This was an autobiographical account by Cuthbertson, which he had written in considerable detail in response to a request on 11 November 1931 by Alexander, who said: "Before I forget it, I have an especial favor to ask. Some day when I am

about ready to pass off the picture, as re. Tipulidae, I am hoping and planning to publish a 'History of the Development of Dipterology, with special reference to the Tipulidae". I believe that such a work, based on Osten Sacken's 'Record of my lifework in Entomology' published in about 1903, near the end of O.S's life, would be of great value and interest to all future students of the Order. What I would like now is a rather detailed statement of your life ... I have a lot of personal data from Edwards, Rogers, and many others who have been the great pioneer workers on the Tipulidae. You have carved yourself an enviable place in the galaxy."

This account did not get into print, although Alexander did publish a eulogy to Osten Sacken concerning his role as the earliest contributor to the higher classification of the Tipulidae (Alexander 1969; *vide* also Osten Sacken 1903). Nevertheless, the Alexander Papers preserve all the raw material for his plan, in considerable detail that he had received from a large number of entomologists. It also explains why Cuthbertson sent copies of his testimonials from school and college and an up-to-date photograph (see Figs 1 and 4 above), this being the level of detail that Alexander desired.

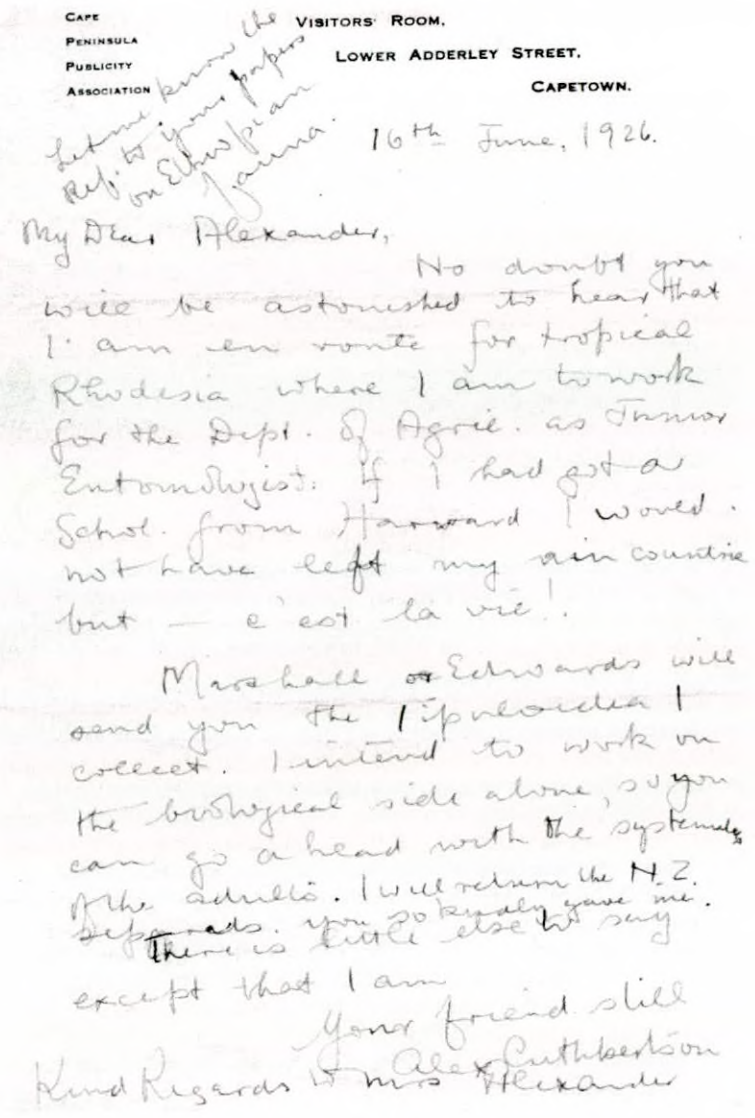
It is also tempting to conjecture that Cuthbertson regarded Malloch as a model entomologist who had made the transition from amateur to professional by emigrating, and this gave additional impetus to his plan to leave Scotland. Also, his intention to follow Lefroy's advice on the need for economic entomologists on a world scale, referred to above, was surely not forgotten. Cuthbertson had been considering getting a Ph.D. position in North America but, on 16 June 1926, he wrote: "My Dear Alexander, No doubt you will be astonished to hear that I am en route for tropical Rhodesia where I am to work for the Dept of Agriculture as Junior Entomologist" (Fig. 5). By 9 August 1926 he reported:

> "... settling in here. My chief, R.W. Jack [Rupert Wellstood Jack, 1882-1970] is a patient quiet man who lets me pretty well alone in my methods of study. My major studies are to be on Citrus pests, also revising the collections, and generally understanding each of the other entomologists. They are 1. J.K. Chorley engaged on tsetse fly problems, 2. Iogaer [sic] Roberts on cotton & tobacco. The chief has done some work on Tenebrionids and other groups and in his own 'economic' way is a good entomologist. I was disappointed in the collections of Diptera here. Only the culicids have been studied. So, I have a clear field once I get material together. I intend to work solely on the biology & ecology or bionomics of Tips & leave the systematics to you & Edwards for they could not be in better hands".

No record has been located of the recruitment process leading to his appointment. One of his earliest letters to Alexander, on 30 January 1927, describes his situation and includes a declaration of intent that outlined his plan for the future. After giving an account of the small number of craneflies in both the Agricultural Station collection and the Bulawayo Museum (that amounted to about a dozen species), he said he had managed to collect 22 species from marginal stream vegetation and some forest habitat. All of these he was going to send to Alexander for determination. He continues:

> "Despite many discouragements as lack of opportunity to do collecting at favourable localities I am going on with the work of finding the habitats of the Tips, of locating their larvae and of finding out the factors which influence this distribution (moisture ← rainfall → humidity is a chief one). I have taken a number at lights including *Libnotes*. A very fortunate circumstance is the very kindly interest which my chief has evinced in a recent scheme of mine which briefly is : - in conjunction with the other officers of the Dept, in particular the botanist Fred Eyles, I have begun an 'ecological' study of an undisturbed

area in the suburb of Hillside (nr Salisbury) which includes a river, with char. river bank vegetation, a true sedge marsh, a heath, a stretch of Savanna Bush-veld, and a rocky kopje. I am doing the insect part. Thus far among the Tips I have taken in addition to *Conosia irrorata* (marsh is the habitat) and several undescribed species which I took this weekend in assoc. with a remarkable culicid."


CAPE PENINSULA PUBLICITY ASSOCIATION
VISITORS' ROOM,
LOWER ADDERLEY STREET.
CAPETOWN.

16th June, 1926.

My Dear Alexander,

No doubt you will be astonished to hear that I am en route for tropical Rhodesia where I am to work for the Dept. of Agric. as Junior Entomologist. If I had got a School from Harward I would not have left my own countrie but — c'est la vie!

Marshall or Edwards will send you the Tipulaeidae I collect. I intend to work on the biological side alone, so you can go ahead with the systematics of the adults. I will return the N.Z. Tipulaeidae as you so kindly gave me. There is little else to say except that I am

Your friend still
Alex Cuthbertson

Kind Regards to Mrs Alexander

Fig. 5. Letter to C.P. Alexander, 1926, written as Cuthbertson arrived in Cape Town.

There is a certain irony in his attribution of rainfall and humidity to cranefly abundance; he may have forgotten his youthful criticism of Barnes (1925) for publishing a paper on that subject (see above). On 6 July 1927, in the next declaration, just over a year since he arrived, he writes to Alexander, after an exchange of more formal letters on sending specimens for naming:

> "I am still collecting all the material from the natural piece of veldt, and expect to get all the material dispatched to the various specialists before long – the tipulids will certainly find their way to you. I'm sending the *Styringomyia* to Edwards as he has asked for them .... If possible I want to get ahead with some systematic work – and at J.R. Malloch's suggestion I have selected for study Tachinidae. Munro and others are going to help me with material tho' it may be years before I get anything of moment accomplished. Still, there is nothing like getting ahead – standing still is a wearysome proceeding. Bezzi is dead, Villeneuve hors de combat, and the few New World men Curran, Tothill, Allen, etc, have their hands full with work already on the Neotropical fauna."

On 14 November 1927, he was able to elaborate a little on how some progress was being made:

> "Thus far I have been confined in my post as J. Entomologist to economic studies, and as a concession to my enthusiasm promises of help in systematic work in local tachinids but Curran seems to have been before me in the field and doing well, so I am sending my material to him from time to time. The latest news is that I am to proceed to the tsetse belt and study parasites & predators of puparia of Muscids & Sarcophagids, incl the tsetse *Glossina morsitans* West. This at least is slightly of more importance than touring the colony instructing settlers how to bait for Tobacco pests and fumigate bedbugs!"

Cuthbertson's work address in Southern Rhodesia was 'The Agriculture Laboratories, P.O. Box 387, Salisbury', as later recorded in the list of members of the Entomological Society of Southern Africa: his interests were listed as "Economic; biological control" (Pietermaritzburg 1939: 157). This is borne out by his work on the screw-worm fly (*Chrysomyia bezziana*), a pest of cattle in Southern Rhodesia (Cuthbertson 1933; 1934b, c; Lawrence and Cuthbertson 1934) (Fig. 6).

He applied his expertise as a field naturalist beyond his immediate official tasks. He was the first to record the roosting behaviour of the flies *Curtonotum quinquevittatum* Curran, 1933 and *C. cuthbertsoni* Duda, 1935 (Curtonotidae) in the burrows made by aardvark (*Orycteropus afer*) and warthog (*Phacochoerus aethiopicus*) (Cuthbertson 1936; Kirk-Spriggs 2012: 254) and observed the swarming in enormous numbers of pentatomid stink-bugs (Cuthbertson 1934a), known locally as Harugwa. Despite their odour, Harugwa were eagerly devoured by Bikita natives in southern Rhodesia (Bodenheimer 1951).

His earlier duties involved working with the major pests of citrus, maize, cotton and tobacco but he then began to take a special interest in flies of medical and veterinary importance, house flies, tsetse and agents of myiasis. "In November 1930, I accompanied a party from the Rhodesia Museum to Chirinda Forest, made famous by Marshall (now Sir Guy) and Swinnerton [sic = Swynnerton] (now in Tanganyika). After having been in Rhodesia five years, I went home in August to Scotland" (Alexander Papers: this refers to a five months visit in 1931-2, see below). Guy Anstruther Knox Marshall (1871-1959), an authority on weevils, had introduced Charles Francis Massy Swynnerton (1877-1938) to that area in 1900 – he remained there until leaving for Tanganyika in 1919, and while there he formed large collections of insects and other natural history specimens; he was also involved in tsetse fly research before and after leaving Rhodesia.

Cuthbertson's publications produced while in Rhodesia are listed in Appendix 2.

April, 1934 Bulletin No. 917

(*Reprinted from "Rhodesia Agricultural Journal."*)

ISSUED BY AUTHORITY OF

The Minister of Agriculture

The Life History of the Screw-Worm Fly.

By ALEXANDER CUTHBERTSON,
Entomologist.

SALISBURY:
PRINTED BY THE ART PRINTING WORKS, LTD.

Fig. 6. Cover of leaflet on the screw worm, 1934.

Collecting and collections

Some of Cuthbertson's insect specimens are in the Iziko SA Museum (Cape Town) but most of the results of his work as a curator and prolific field worker in southern Africa from 1926 to 1942 can be seen in the Plant Protection Research Institute, Harare, Zimbabwe (Kirk-Spriggs 2011). According to a list provided by the Institute, Cuthbertson's name is on labels of at least 2000 flies of more than 500 species spread over 15 families. The greatest numbers are in the Tipulidae (sensu lato), Asilidae, Syrphidae, Muscidae, Sarcophagidae, Calliphoridae and Tachinidae.

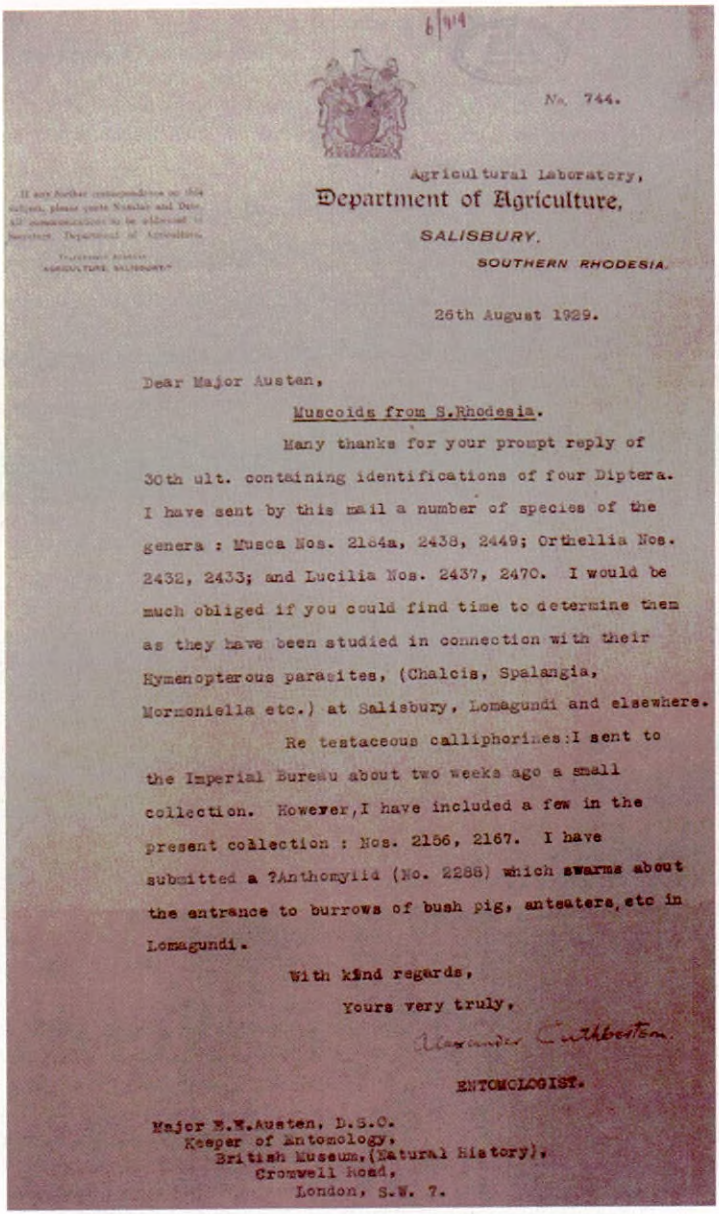
Cuthbertson sent out many samples from official activities with requests that named examples should be returned to Salisbury but with the offer that duplicates could be kept. His

correspondence in the Alexander Papers is characterised by two strikingly different styles. Pages of handwritten accounts of his work (with some personal chat and notes on collecting) are often signed off with notification that he was about to send specimens for identification. Then follows within a day or two a brief letter, typed on headed laboratory notepaper, itemising insects sent as a batch with their accession number sequences. A typical handwritten letter contained details of collecting trips and of the craneflies that have been obtained, followed by some personal anecdotes and greetings to Alexander and his wife Mabel, whom Cuthbertson usually refers to as Mrs CPA. On 3 February 1930, he had just returned from "Tsetse fly country working on the general bionomics, and parasites. I did a little on the trypanosome infections of the insects and of the buck & antelopes. I also did a little topographical surveying as the country is little mapped. I enclose a photo of me in case you want to see what sort of fellow you have been writing to since 1922!" (Fig. 7). On the reverse of this photograph he has written "Alec Cuthbertson Entomologist on Tsetse investigations, S Rhodesia, tries his hand at a plane-table survey. Chanka Camp, Lomagundi – but even amidst the wonders of sights and sounds on the veldt I think on the Tips of the Clyde."

Fig. 7. Cuthbertson in the bush using a plane table for surveying, 1930. Photograph courtesy of the Smithsonian, Washington, DC.

He also sent flies and a few specimens from other insect orders to London, either to the Imperial Bureau of Entomology or to the British Museum (Natural History), for identification and some as donations. Small batches were addressed to Major Ernest Edward Austen (1867-1938), formerly responsible for the museum's Diptera collections but by then Keeper of Entomology. Letters are preserved that accompanied at least six of these batches of specimens between 1929 and 1931 (NHM Entomology accession/acquisition record, DF314/1-8). One reply copy letter from Austen is tinged with a faint air of irritability: single specimens of just one sex and rubbed hairs make things rather difficult and he is a very busy man. Another reply by Austen is more cordial because Cuthbertson has added more information on the habits of the muscids,

calliphorids and tachinids, which he observed or reared as predators or parasitoids of potential value as biological control agents, to explain why he would like to know their identity. Both he and Austen were interested in these same kinds of fly (Fig. 8).



6/9/29

No. 744.

Agricultural Laboratory,
Department of Agriculture,
SALISBURY,
SOUTHERN RHODESIA.

26th August 1929.

Dear Major Austen,

Muscoids from S.Rhodesia.

Many thanks for your prompt reply of 30th ult. containing identifications of four Diptera. I have sent by this mail a number of species of the genera : Musca Nos. 2184a, 2438, 2449; Orthellia Nos. 2432, 2433; and Lucilia Nos. 2437, 2470. I would be much obliged if you could find time to determine them as they have been studied in connection with their Hymenopterous parasites, (Chalcis, Spalangia, Mormoniella etc.) at Salisbury, Lomagundi and elsewhere.

Re testaceous calliphorines:I sent to the Imperial Bureau about two weeks ago a small collection. However,I have included a few in the present collection : Nos. 2156, 2167. I have subcitted a ?Anthomyiid (No. 2288) which swarms about the entrance to burrows of bush pig, anteatera, etc in Lomagundi.

With kind regards,

Yours very truly,

Alexander Cuthbertson.

ENTOMOLOGIST.

Major E.E.Austen, D.S.O.
Keeper of Entomology,
British Museum,(Natural History),
Cromwell Road,
London, S.W. 7.

Fig. 8. Letter from Cuthbertson to E.E. Austen, 1929

A few tabanids, asilids and bombyliids were also included in material sent to Austen, but his main correspondent concerning robberflies was Erich Otto Engel (1866-1944), a German specialist in the family Asilidae, who was responsible for the Diptera collections in Munich (at the Zoologische Staatssammlung München), which explains why some of the specimens from Cuthbertson's endeavours will be in that museum. Engel included Cuthbertson as co-author in several of the papers in recognition of his role as collector (Engel and Cuthbertson 1934; 1937; 1938; 1939). In addition to Tipulidae sent to Alexander and Edwards, Cuthbertson also sent material to a wide range of experts, mainly in Washington DC.

Collecting was clearly a passion with Cuthbertson. The kind of rest cure that was prescribed for him was to go to the forest. He wrote to Alexander:

> "I have not been at all well recently – gastric 'flu. – and I have been urged by my chief, R.W. Jack, to go away to the Vumba for a week or so. Arnold is coming with me and therefore you should expect a nice lot of forest Limonias – Geranomyias etc. – in envelopes soon. But I urge you not to delay about the final publishing of your report for the B.M. DO IT NOW. What the enemy would like to achieve is the suspension of all scientific work ... Van Emden has wisely put out his parts of the Muscidae without delaying for new material to turn up as there is no end to the numbers of "new species". In the course of the years after your pioneer report on the African Tipulidae has been used other entomologists will arise and fill in the gaps in our data and so science will advance. If you delay much longer the report will be like that of Hesse on Bombyliidae, Pt 1 which has 1053 pages and weighs half a ton. Regarding type material, share all the Rhodesian species with, firstly, the B.M., secondly the National Museum, Bulawayo and thirdly the Dept of Agriculture, Salisbury." (Alexander Papers, 17 October 1940)

Albert John Hesse (1895-1987) was based at the South African Museum from where he produced the monumental work on bee-flies (Hesse 1938), as well as a number of shorter papers; clearly there are rather a lot of bee-flies south of the Sahara. He later described *Anthrax cuthbertsoni* Hesse, 1956 from Cuthbertson specimens. George Arnold (1881-1962), who was to join Cuthbertson on his collecting trip, was a hymenopterist, who had been curator at the national collections in Bulawayo since 1911; he was also editor of the publications produced by the museum. Cuthbertson told Alexander on more than one occasion that if he could send or keep sending manuscripts they would appear promptly, channelled through Arnold and there would be no page charges. However, Alexander ignored Cuthbertson's plea for action on what would seem to refer to the East African Ruwenzori Expedition reports, of which the Muscidae parts to which he refers had just appeared (van Emden 1939-1940). Between 1912 and 1976 Alexander published dozens of papers on the African fauna (e.g. Alexander 1956b) including two monographic treatments, the Ruwenzori (Alexander 1956a) and for South Africa (Alexander 1964). He was not to be deflected from his trajectory by Cuthbertson's youthful tendency to demand instant action.

Walter Scott Patton (1876-1960), professor of entomology at Liverpool University, records receiving large collections (including larvae) from Cuthbertson (Patton 1936). Cuthbertson told Alexander in May 1929 that Patton was receiving his muscids and other flies of medical importance, apart from *Morellia* and some related genera which he sent to Charles Howard Curran (1894-1972), a Canadian dipterist who from 1928 worked at the American Museum of Natural History in New York. Malloch was sent acalyptrates. Cuthbertson was aware of problems with identification of Muscidae partly, at least, due to disagreement between the various specialists. As discussed by Thompson and Pont (1993), Patton's work brought him into conflict with Malloch regarding the systematics of the group; Patton "could not reach any accord with Malloch

and the two remained irreconcilable". What is interesting to note is how this controversy affected people like Cuthbertson who were working remotely in the field, trying to understand the faunas that were important locally while isolated from the experts and their facilities. He refers to these problems on more than one occasion while writing to Alexander, as on 26 August 1929: "I am still working on the habits, etc., of the *Musca*, *Orthellia*, *Stomoxys*, *Lyperosia* groups and the blowflies *Lucilia*, *Chrysomyia*, etc, but it is slow work. After three years of collecting I have got about 1/10 of them named, mostly doubtfully. I have had more luck with the Hymenopterous parasites owing to the work of Australian entomologists ... the Imperial Bureau cannot keep pace with the demand for names." On 13 December 1931 (Alexander Papers) he shows that he is clearly aware that the problem is not just one of resources. After some chat about Tipulidae and the positive outcome of their cooperation that also involved Edwards:

> "This is more than I can say about past students of the Muscidae and Calliphoridae – even concerning quite common & widely distributed species which one studies in connection with myiasis, transmission of micro-organisms, etc, there is great confusion – chaos everywhere in the systematics due to early meagre descriptions, loss of types, carelessness of early (& several modern) students. Indeed, I will probably spend five years trying to get names for the species studied in the course of five years' field work. Disagreement as to identity of common species of Austen & Patton, Bezzi & Patton, Malloch & Austen, Malloch & Curran, etc. The medical entomologists haven't yet come out of the controversy with credit ..."

A number of smaller collections made by Cuthbertson of various Afrotropical insect orders, mainly of agricultural or medically important groups, were sent as donations to other British institutions. These included the Edinburgh School of Agriculture and museums in Leeds and Paisley. Of these only a small number of tsetse flies can be found in Paisley; the insect collections in the Edinburgh School of Agriculture were disposed of some years ago, and it has not been possible to confirm the continued existence of any of Cuthbertson's specimens in Leeds. There are some in the Hunterian (Glasgow University), which correspond to several accessions totalling a few hundred specimens, many of which are Coleoptera and Heteroptera (Fig. 9).

There is an accompanying letter addressed to Professor John Graham Kerr (1869-1957), professor of zoology at Glasgow University, in which Cuthbertson describes "on one of my trips to the 'Brachystegia-Berlinia' bush near Salisbury I took some remarkable coccids identified by our office as *Aspidoproctus maximus*" (a giant scale insect of the family Monophlebidae, Coccoidea, a group that damage food crops). Cuthbertson also stated his intention to respond to Kerr's request for more insects of value for teaching and various flies and beetles, mainly of economic importance. Kerr had an interest in mimicry and a marginal note by him indicates that he also expressed interest in receiving specimens showing protective resemblance as well as termites, termitophilous species and insects eaten by Africans. Cuthbertson also referred to an intention to send similar insects to Professor Leonard Augustus Lucas King (1879-1950), professor of zoology at the West of Scotland Agricultural College, his alma mater, who had written the testimonial for him in 1925 (Fig. 4).

Cuthbertson described his developing research into parasitoids of flies, and field trips into the bush which he clearly found exciting. On one of the earliest trips he experienced the 'thrill' of being bitten for the first time by a tsetse, *Glossina morsitans* (Westwood), an event on which his colleague Chorley commented: "the anticipated glory of working on tsetse would soon wear off" but Cuthbertson went on to say "but after all there is no reason why one should not try to be enthusiastic for as long a time as possible" (letter, Cuthbertson to Kerr, 16 December 1927; The Hunterian/EntomCollnsFile/Cuthbertson). Some of the various donations to Glasgow were

mailed in wooden insect store boxes (Fig. 10) although he did return to Scotland for several months from August 1931 to January 1932, and so may have carried African specimens with him. There was another visit in 1936 when he went to his old home address in Yoker, Glasgow, where Cuthbertson family members still lived.

Fig. 9. Cetoniine beetle and a horsefly, sent as *Tabanus africanus* (now in genus *Ancala*), collected by Cuthbertson and donated to the Hunterian Museum, University of Glasgow.

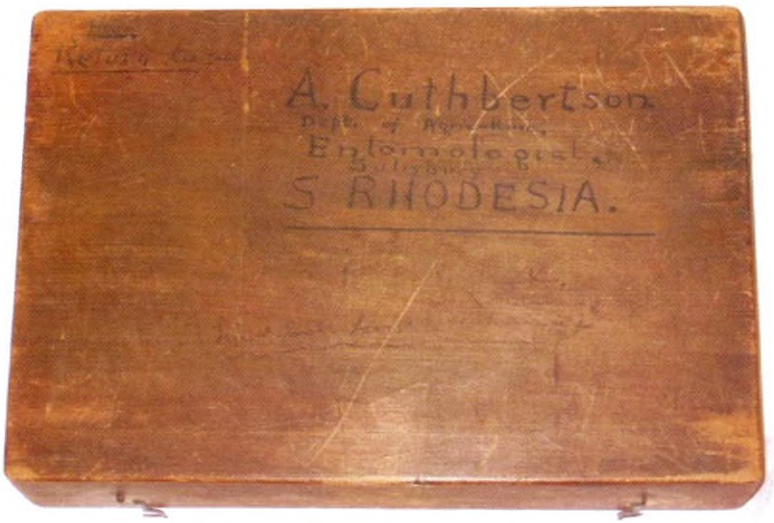


Fig. 10. Insect store box sent from Africa to Glasgow by Cuthbertson.

Entomological impact

Cuthbertson's early work in Scotland is outlined above. The bulk of his papers published from 1926 to 1929 are striking for their focus on aspects of cranefly behaviour and ecology, while most contemporary works were taxonomic or faunistic. The content is usually explicit in the titles with discussions of subjects like swarming, larval habitats, spider enemies, food resource for trout, seasonality, etc. Even those which appear essentially faunistic include details on behaviour or habitat that make interesting reading.

The value of his work is evident in some recent overviews. His contribution to forensic entomology, for example, is highlighted by Williams and Villet (2006). They cite his published work with useful illustrations on Calliphoridae, particularly *Chrysomyia* species, which proved valuable for identifying the species. They also remark on his extensive correspondence network that included Patton, Curran, Hesse, Malloch and Arnold as well as Daphne Aubertin (1902-1970) who worked on Calliphoridae at the British Museum, alongside Austen. Pearson (1967) summarised the history of economic entomology in Africa:

> "The first embryo departments of agriculture were started, and the first entomologists appointed to them, in most of the British dependent territories in tropical Africa between 1908 and 1911. The 1914-18 war interfered seriously with research and development generally, but the period between the middle 1920's and the second world war was one of great activity. During this time the pest fauna of tropical African agriculture was largely recognised and identified, and the life-histories of most of the species and the bionomics of many of them were worked out. This was a remarkable achievement when one considers that in few of the territories concerned, some of them six or seven times the size of England and Wales, would there be more than a couple of agricultural entomologists, who would be responsible not only for advising the administration on insect matters, but also for inspecting plant importations, identifying specimens sent in by agricultural officers and local planters, and organising control measures in all entomological emergencies ... The efforts of departmental entomologists ... were usually prevented by routine or emergency duties from making comprehensive long-term investigations of specific problems."

This description of the work and duties of a colonial entomologist would have been instantly recognisable to Cuthbertson. However, he did manage to publish, and contribute to the work of others on selected groups, and the esteem in which Cuthbertson has been held by the entomological community is reflected in the number of insect taxa named for him; all but two of them are Diptera. These number 43 taxa in 15 different families (see Appendix 3). Most of the insects, 34 out of 45, were named by taxonomists from material sent directly to them by Cuthbertson and appeared in papers published during or soon after his life-time. The remainder have been described since, the most recent in 2004 (Londt 2004).

It is also worth noting that he did not describe any new species himself; the few that carry his name derive from his co-authorship as the collector (Engel and Cuthbertson 1934, 1937, 1938, 1939; see Appendix 4). Alpha taxonomy was of less interest to him than observing behaviour in the field and collecting and rearing larvae and their parasitoids. He illustrated some of his own papers, for example the figures of the larva and pupa of the therevid *Psilocephala africana* Wiedemann in Engel and Cuthbertson (1938), and the immature stages of the skin maggot fly, or tumbu (*Cordylobia anthropophaga* (Blanchard)), first published in the Rhodesian Agricultural Journal (Cuthbertson 1942), and then as an information leaflet (Fig. 11). He acknowledges his wife's contribution as an artist and her monogram appears on the two plates in Cuthbertson (1938b), showing her skills as an illustrator (Fig. 12).

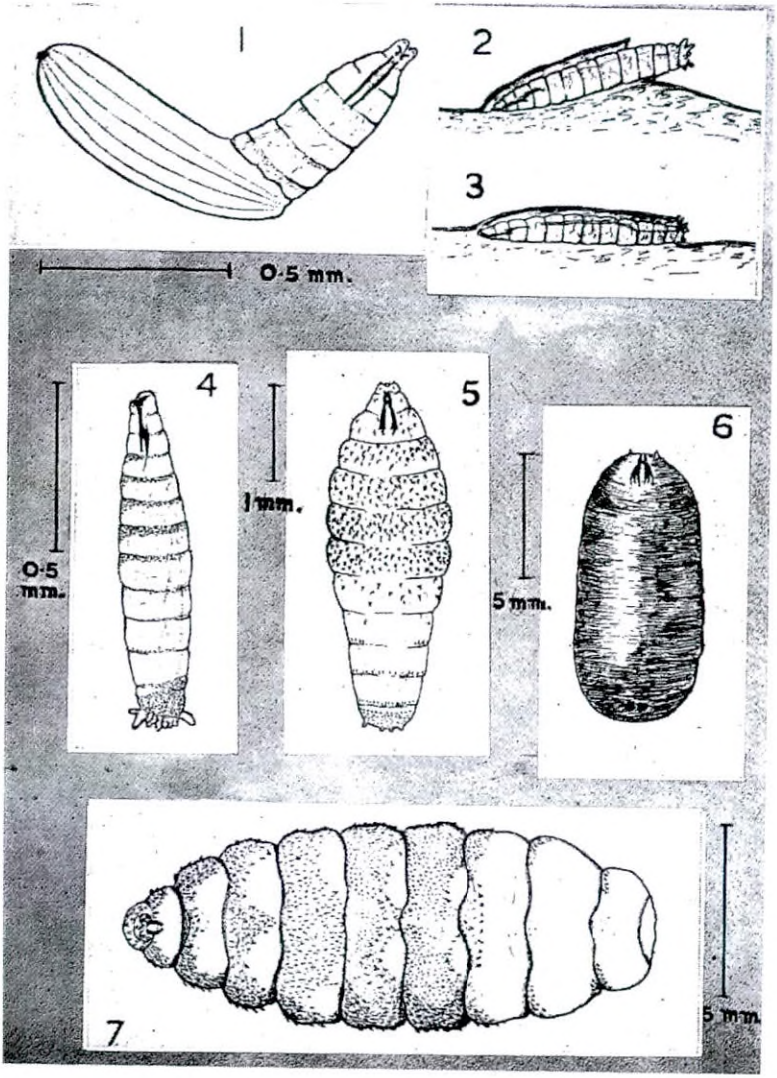


PLATE 1: (All figures highly magnified).

Fig. 1. Maggot hatching from egg.
Figs. 2 and 3. Maggot penetrating skin.
Fig. 4. Immature maggot (soon after hatching).
Fig. 5. Immature maggot (after first moult).
Fig. 6 Pupa (or *puparium*) (life size 4/10th inch).
Fig. 7. Mature maggot (life size ½ inch).

Fig. 11. Plate from information leaflet on the skin maggot fly *Cordylobia anthropophaga* (Blanchard) drawn by Cuthbertson (1942).

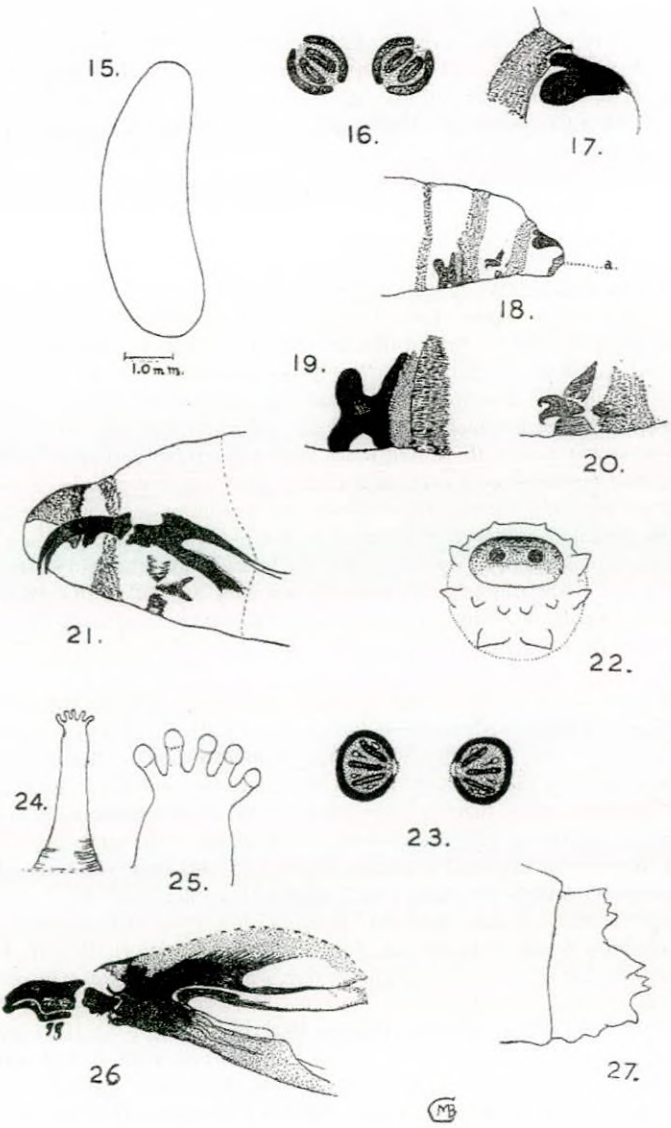


Fig.12. ***Calliphora flavicauda*** **Malloch, 1925 larval characters: Plate 2 from Cuthbertson (1938b), drawn by Margaret Beth Cuthbertson.**

He was elected a Fellow of the Royal Entomological Society of London in 1933, a member of Council of the Rhodesia Scientific Association and a founder member, becoming Vice-President in 1941, of the Entomological Society of Southern Africa (Pietermaritzburg 1939; Munro 1942; Mansell 1993).

Married life and untimely death

In 1934 he married Margaret Beth Niven (b. 1912), a librarian of Bulawayo: "... a charming old friend of mine, Margaret Niven, and for the first time for many a long year since leaving my native land, I am happy, contented and loving. 'Tis lyrical but true ... so, Doc, you can expect great things from Alex Cuthbertson before many years have passed ... [she] is, by the way, a trained librarian assistant, a clever lassie and a Scots Colonial!" (Alexander Papers, 8 January 1935).

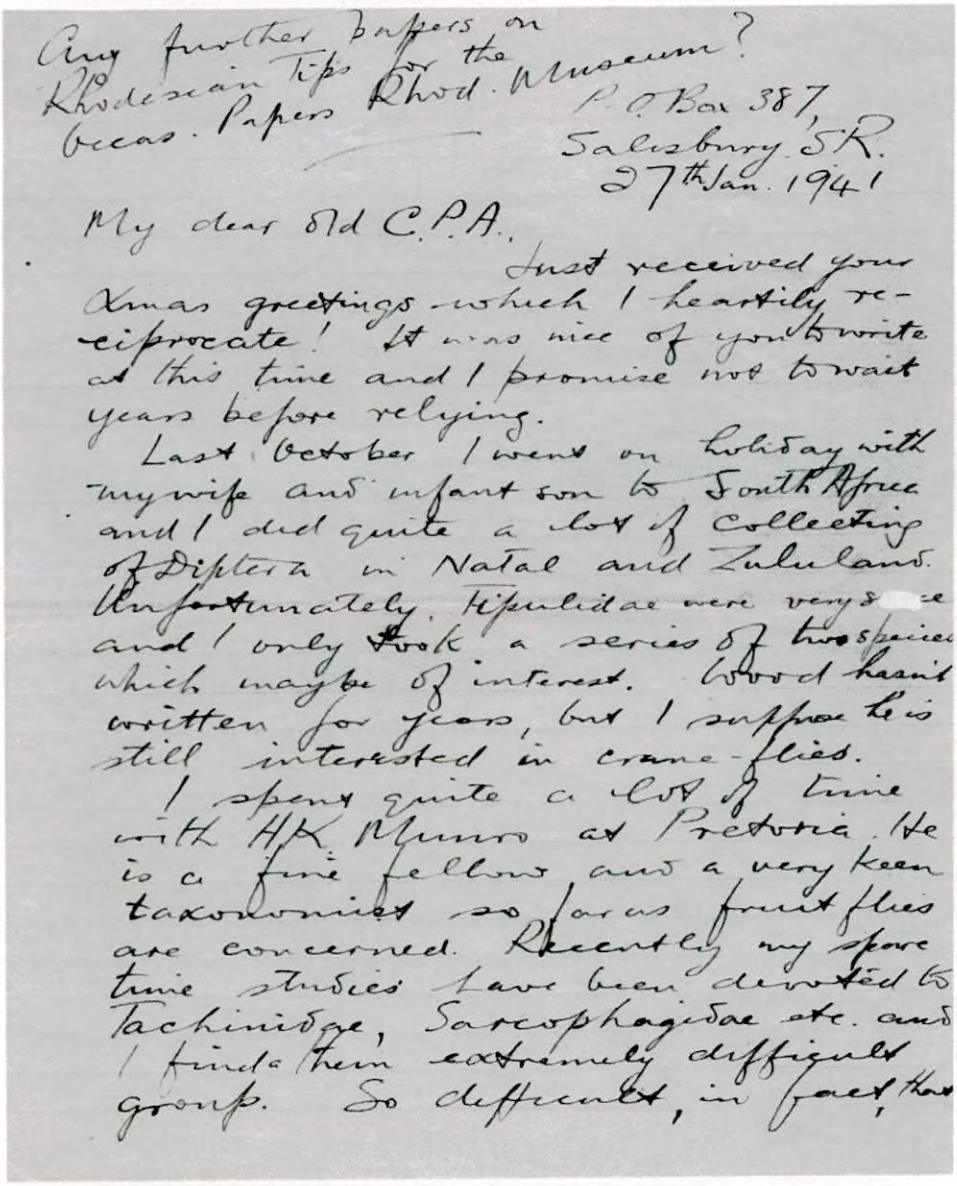
His wife often accompanied him on collecting trips. In her letter to Alexander of 8 March 1943, informing him of her husband's death she says:

> "I keep remembering our collecting trips and all the little incidents thereof. While we were in the Union we stayed for a fortnight at a seaside resort near Durban. The winds were so fierce off the sea that at that time of year it became necessary to go fairly far inland to discover any Diptera at all. We walked about four miles inland on one occasion and were repaid with the capture of a small female fly (I don't know the name) of which there was only one specimen in the Pretoria collection and none anywhere else. Every day after that we trekked those four miles inland to another particular locality and after a week we had captured two females and a male. Alec [sic] was greatly elated. We returned to Johannesburg and shortly after were on our way home with our wee adopted baby – who almost made Alex forget how proud he was of his four flies. About a week after our arrival home in Salisbury, Alex came into the house with a cheerful smile, not altogether without irony. 'About how many miles do you think we walked in search of those small flies?' he asked me and before I could answer he chuckled and said 'There are dozens of them on our sweet potato patch!'."

The first news that they had adopted a baby boy, Dugald, sometime between July and October 1940, was in a letter to Alexander dated 17 January 1941 (Fig. 13) in which Cuthbertson also reiterated his continuing difficulty with putting names to species: "Recently my spare time studies have been devoted to Tachinidae, Sarcophagidae, etc, and I find them [an] extremely difficult group. So difficult, in fact, that sometimes I've cursed them roundly and left off until further sendings of specimens sent me to study them anew!" Margaret and Dugald also had tipulids named for them (*Dicranomyia bethae* Alexander, 1945 and *Helius dugaldi* Alexander, 1945), an additional homage to his "long-time friend" (Alexander 1945: 95).

Alexander Cuthbertson died, aged only 41, on 15 July 1942: "of a nervous collapse in his laboratory in Salisbury, Southern Rhodesia while on duty during World War II. It was said that the military training he received the previous day was too intensive" (Evenhuis 2010: 7). Cuthbertson was company quartermaster sergeant to the First Battalion of the Rhodesian Regiment. Brief obituary notices appeared (Munro 1942; Townsend 1942; [Buxton] 1943). More detail is given in the letter (8 March 1943) from his widow to Alexander. She wrote in response to a Christmas card received from Amherst which made her realise the news had not reached there. Her husband had been under some strain, suffered from duodenal ulcers and had felt unwell on and off for almost a decade. After four days of an intensive five-day training manoeuvre he was sent home by the camp doctor as suffering from severe mental and physical breakdown. Despite her attempts to prevent him he insisted that he needed to go to his office the following day as there was much work to be done. "He seemed perturbed at the thought of remaining at home, so I had perforce to let him go to work." In addition to his full-time job he edited the Rhodesia Agricultural Journal and spent all his spare time studying insects. She received a visit at midday from Chorley to say that her husband had been missed from his desk at about 10.00am and found dead in a lavatory. A few days earlier the family had celebrated their adopted son's

birthday. The funeral was conducted with full military honours by his regiment (Alexander Papers).



Any further papers on Rhodesian Tips for the Occas. Papers Rhod. Museum?

P.O. Box 387,
Salisbury. S.R.
27th Jan. 1941

My dear Old C.P.A.,

Just received your Xmas greetings which I heartily reciprocate! It was nice of you to write at this time and I promise not to wait years before relying.

Last October I went on holiday with my wife and infant son to South Africa and I did quite a lot of collecting of Diptera in Natal and Zululand. Unfortunately, Tipulidae were very s[illegible]e and I only took a series of two species which maybe of interest. Wood hasn't written for years, but I suppose he is still interested in crane-flies.

I spent quite a lot of time with H.K. Munro at Pretoria. He is a fine fellow and a very keen taxonomist so far as fruit flies are concerned. Recently my spare time studies have been devoted to Tachinidae, Sarcophagidae etc. and I find them extremely difficult group. So difficult, in fact, that

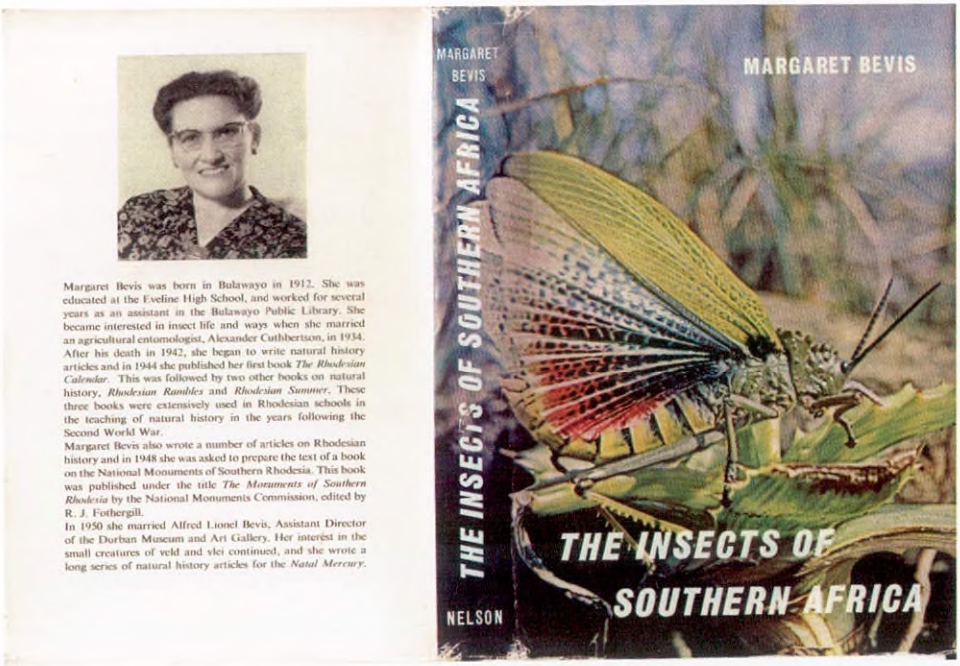
Fig. 13. Letter to C.P. Alexander, 1941.

Margaret Beth Cuthbertson – subsequent life and remarriage

In the years following her husband's death Margaret wrote on Rhodesian natural history (Cuthbertson, M.B. 1944, 1946, 1949a). The last of these works (1949a), a soft-covered book, was a compilation of articles she had previously published, with her own illustrations, in the *Bulawayo Chronicle*, *Sunday Mail* and *Young Rhodesia*. She contributed to the Rhodesia Scientific Association on her own professional subject of the importance of libraries (Cuthbertson, M.B. 1949b).

Fig.14. Margaret Bevis with son Dugald and husband Lionel, at their home in Durban, 1954. Photograph courtesy of the Smithsonian, Washington, DC.

Margaret remarried in 1950, to Alfred Lionel Bevis (1897-1984), Assistant Director of the Durban Museum and Art Gallery (Fig. 14). Bevis was also an entomologist and a long-standing friend of Cuthbertson, with whom he had been on collecting trips. Margaret and Lionel corresponded for a number of years before deciding to marry and she moved to Durban. She maintained an interest in birds (Cuthbertson, M.B. 1952) and as Bevis (1964) wrote an introduction to the study of entomology (Fig. 15).



Margaret Bevis was born in Bulawayo in 1912. She was educated at the Eveline High School, and worked for several years as an assistant in the Bulawayo Public Library. She became interested in insect life and ways when she married an agricultural entomologist, Alexander Cuthbertson, in 1934. After his death in 1942, she began to write natural history articles and in 1944 she published her first book *The Rhodesian Calendar*. This was followed by two other books on natural history, *Rhodesian Rambles* and *Rhodesian Summer*. These three books were extensively used in Rhodesian schools in the teaching of natural history in the years following the Second World War.

Margaret Bevis also wrote a number of articles on Rhodesian history and in 1948 she was asked to prepare the text of a book on the National Monuments of Southern Rhodesia. This book was published under the title *The Monuments of Southern Rhodesia* by the National Monuments Commission, edited by R. J. Fothergill.

In 1950 she married Alfred Lionel Bevis, Assistant Director of the Durban Museum and Art Gallery. Her interest in the small creatures of veld and vlei continued, and she wrote a long series of natural history articles for the *Natal Mercury*.

Fig.15. Margaret Bevis (formerly Cuthbertson): book jacket cover of 1964.

Acknowledgements

We are most grateful to Tad Bennicoff of the Smithsonian Institution Archives, Washington, DC, for making available copies of the Charles P. Alexander Papers which are housed in Record Unit 7298: Charles P. Alexander Papers, circa 1870-1979, Box 60, Folder: Cuthbertson, Alexander; Biographical information and photographs and Box 13, Folder: Cuthbertson, Alexander correspondence. The photographs in Figs 1, 7 and 14 are reproduced by permission of Smithsonian Institution Archives Images SIA2017-020131a, SIA2017-020132 and SIA2017-020133. We are grateful to a number of curatorial, library and archives staff of the Natural History Museum (London) for help with access and information. The correspondence relating to Cuthbertson is part of the Entomology Accession/Acquisition records (DF314/1-8). Val McAtear (Librarian, The Royal Entomological Society of London) is thanked for information on Cuthbertson's Fellowship dates. Several correspondents supplied useful information: David Happold (in Australia), Jason G.H. Londt (in South Africa). Rebecca Machin, Leeds City Museum and Nicola McIntyre, Paisley Museum helped in the search for specimens.

We thank Ashley Kirk-Spriggs (National Museum, Bloemfontein, South Africa) and curators at the Plant Protection Research Institute, Harare, Zimbabwe, for data on Cuthbertson's African material.

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Appendix 3. LIST OF TAXA NAMED FOR ALEXANDER CUTHBERTSON

These names are mainly taken from Crosskey (1980).

COLLEMBOLA
PARONELLIDAE
Cyphoderus cuthbertsoni Womersley, 1929

DIPTERA
TIPULIDAE
Achyrolimonia cuthbertsoni Alexander, 1934
Toxorhina cuthbertsoni Alexander, 1937
Dolichopeza cuthbertsoniana Alexander, 1945
Nephrotoma cuthbertsoni Alexander, 1956
STRATIOMYIDAE
Odontomyia cuthbertsoni Lindner, 1937
ASILIDAE
Alcimus cuthbertsoni Hobby, 1934
Neolophonotus cuthbertsoni (Curran, 1934)
Gonioscelis cuthbertsoni Londt, 2004
Scylaticus cuthbertsoni Londt, 1992
BOMBYLIIDAE
Anthrax cuthbertsoni Hesse, 1956
Paratoxophora cuthbertsoni Engel, 1936
EMPIDAE
Empis cuthbertsoni Smith, 1971
DOLICHOPODIDAE
Sciapus cuthbertsoni Parent, 1937
SYRPHIDAE
Allobaccha cuthbertsoni Curran, 1938
Merodon cuthbertsoni Curran, 1939
Rhingia cuthbertsoni Curran, 1939
TEPHRITIDAE
Pardalaspis cuthbertsoni Munro, 1936
LAUXANIIDAE
Cestrotus cuthbertsoni Curran, 1938
Homoneura cuthbertsoni Curran, 1938
CURTONOTIDAE
Curtonotum cuthbertsoni Duda, 1935
DROSOPHILIDAE
Leucophenga cuthbertsoni Malloch, 1929

MUSCIDAE

Coenosia cuthbertsoni Curran, 1935
Dichaetomya cuthbertsoni Emden, 1942
Helina cuthbertsoni Curran, 1934 [now synonymised with *Hebecnema semiflava* Stein]
Musca domestica cuthbertsoni Patton, 1936 [now synonymised with *M. domestica calleva* Walker, 1849]
Myospila cuthbertsoni Snyder, 1940
Phaonia cuthbertsoni Curran, 1938

CALLIPHORIDAE

Bengalia cuthbertsoni Zumpt, 1956
Isomyia cuthbertsoni Curran, 1938
Ochromelinda cuthbertsoni Villeneuve, 1939

SARCOPHAGIDAE

Phallosarcophaga cuthbertsoni Zumpt, 1972
Phumosia cuthbertsoni Zumpt, 1953
Scotathyrsia cuthbertsoni Rohdendorf, 1963 (now synonymised with *Sarcophaga samia* Curran, 1934)
Senotainia cuthbertsoni Zumpt, 1952
Miltogramma cuthbertsoni Curran, 1936

TACHINIDAE

Actia cuthbertsoni Curran, 1933
Dexilla cuthbertsoni Currran, 1941
Dolichotachina cuthbertsoni Rohdendorf, 1935
Hyalomya cuthbertsoni Curran, 1936 [now synonymised with *Alophora nasalis* Bezzi]
Linnaemya cuthbertsoni Curran, 1934 [now synonymised with *L. caffra* Villeneuve]
Pales cuthbertsoni Curran, 1940
Platyschineria cuthbertsoni Villeneuve, 1942
Siphona cuthbertsoni Curran, 1941

COLEOPTERA

CURCULIONIDAE

Analeurops cuthbertsoni Marshall, 1937

Appendix 4. SPECIES DESCRIBED BY CUTHBERTSON

RHAGIONIDAE

Lampromyia flavida Engel & Cuthbertson, 1937

ASILIDAE

Heteropogon gracilis Engel & Cuthbertson, 1937
Lasiocnemis fascipennis Engel & Cuthbertson, 1939
Microstylum ustulatum Engel & Cuthbertson, 1938 would appear to be a valid description of a new species and they are credited with authorship in Crosskey (1980). However, Engel had sent the text of the description to Bertram Maurice Hobby (1905-1983), but delayed publication. Hobby used the description verbatim in a publication a few years earlier, and so by the rules of nomenclature it is he who unwittingly should be credited with authorship (Hobby 1935).
Oligopogon nigripennis Engel & Cuthbertson, 1937
Proagonistes igniferus Engel & Cuthbertson, 1937
Scylaticus quadrifasciatus Engel & Cuthbertson, 1934

***Norrbomia hispanica* (Duda) and *Paralimosina fucata* (Rondani) (Diptera, Sphaeroceridae) in the New Forest** – In recent years I have found *Norrbomia hispanica* (Duda) on two separate occasions in the New Forest, Hampshire, a single female being collected in both instances. The first encounter was on 27 July 2013 in Denny Bog (SU347053) and the second at Shatterford Bottom (SU346062) on 16 July 2016. *Norrbomia hispanica* was first discovered in this country at Sea Palling, Norfolk on 8 August 1906 by J.E. Collin. Colonel J.W. Yerbury noted in his diary that on this date, whilst staying at Mundesley, Norfolk, he was visited by G.H. Verrall and they motored to Palling-on-Sea (Chandler, P.J. 2015. John Henry Wood and Colonel John William Yerbury – their different lives as dipterists. *Dipterists Digest* (*Second Series*) **21 Supplement** (2014), 1-118). Collin was presumably there as Verrall's driver and all three would have been present during the initial discovery of six males and six females. It may be significant that Yerbury mentioned finding the horse bot-fly *Gasterophilus intestinalis* (De Geer) (as *equi*) at Bacton during his stay at Mundesley as adults of *N. hispanica* have been recorded on horse dung (Skidmore, P. 2010. Dung. pp 157-165. **In** Chandler, P.J. (Ed.) *A Dipterist's Handbook*. Second edition). Horses frequent both sites where *N. hispanica* has been found in the New Forest and it seems likely that it will be found to be far more widespread within the National Park than the two adjacent areas where it has so far been recorded.

Since its original discovery in 1906 there appears to have been only one further record of *N. hispanica* at Burnham Beeches NNR, Buckinghamshire on 3 July 1995 by J.W. Ismay (Falk, S.J., Ismay, J.W. and Chandler, P.J. 2016. *A Provisional Assessment of the Status of Acalyptratae flies in the UK. Natural England Commissioned Reports.* Number **217**).

On 16 July 2016 I swept a male *Paralimosina fucata* (Rondani) in Denny Wood, New Forest, Hampshire (SU334069). This was first discovered as a British species by J.E. Collin at Barton Mills, Suffolk on 8 June 1931. The only more recent records in this country of which I am aware were obtained in 2012 in traps baited with deer dung in the Forest of Dean by B. Atkinson, as part of a PhD carried out at the University of Bristol. This material, from both English and Welsh parts of the Forest, was identified by John Deeming and is in the National Museum of Wales, Cardiff. The data are as follows: **Gloucestershire:** Little Kensley Inclosure, 11.vii.2012, 1♂; Highmeadow Wood, 17.vii.2012, 1♂; New Fancy View, 13.vii.2012, 1♀; near Parkend, between Farmer's Green and Highland, 18.vii.2012, 1♂, 1♀; **Monmouthshire:** Highmeadow Wood, 17.vii.2012, 2♂; Staunton, 17.vii.2012, 5♂, 1♀; Kymin, 17.vii.2012, 3♀.

According to B.R. Pitkin (1988. Lesser Dung Flies. Diptera, Sphaeroceridae. *Handbooks for the Identification of British Insects* **10**(5e), 1-175) *P. fucata* is a woodland species, usually found on dung, but also on fungi, forest litter and carrion.

I am grateful to Paul Gatt for alerting me to the Forest of Dean records of *P. fucata*, to John Deeming for providing the data and Jane Memmott, who supervised the PhD study, for permission to include details of these specimens here.

The finding in the New Forest of two rarely recorded species of Sphaeroceridae suggests that with its herds of large herbivores ranging over a variety of habitats, more interesting discoveries amongst the family in the Forest are likely – **IVAN PERRY**, 27 Mill Road, Lode, Cambridge CB25 9EN

Dipterists Digest 2017 **24,** 33-36

Pipunculus lichtwardti Kozánek (Diptera, Pipunculidae) new to Britain

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Summary
The discovery in 1993 of a single female example of *Pipunculus lichtwardti* Kozánek, 1981 from South Yorkshire is reported and its identification is discussed.

Introduction

With almost 100 species in the British and Irish fauna, the Pipunculidae are a relatively small family, and tend to be elusive and occurring at low density so are not often found in any numbers. As parasitoids of Auchenorrhynchan Hemiptera and, in the case of *Nephrocerus*, *Tipula* (Diptera, Tipulidae), they are likely to be useful indicators of the quality of habitats. Their identification has been fraught with difficulty for many decades, and only recently with the detailed studies of the male genitalia are some of the complexities being resolved. Despite many advances in the taxonomy of Pipunculidae, the genus *Pipunculus* still remains problematical due to the relatively undifferentiated male genitalia and variation in the ovipositor shape. Kehlmaier (2008) improved understanding of this genus considerably although some species-complexes are still very difficult to identify.

In 2016, Derek Whiteley sent me a batch of about 160 pinned specimens collected over the last 35 years for checking and identification. Amongst the 36 species in this collection was one female specimen that clearly did not fit any species I had seen before. This proved to be *Pipunculus lichtwardti* Kozánek, a species new to Britain.

Identification

Using Kehlmaier (2008) the species ran easily to couplet 21 and reference to the illustrations of the ovipositor (figs 55–56), although not fitting exactly with the British specimen (Fig. 1), was within the normal variation seen in pipunculid ovipositors.

The specimen had originally been identified as *Pipunculus lenis* Kuznetzov (as *P. thomsoni* auct. nec Becker) and although the ovipositor is quite different, it will run to this species in Coe (1966). Of the species on the British list, the ovipositor of *P. lichtwardti* is closest to *P. elegans* Egger so it is possible that specimens of *P. lichtwardti* might be found in collections standing over this name as well as both *P. lenis* and *P. tenuirostris* Kozánek.

The female of *P. lichtwardti* is readily distinguished from female *P. elegans* in having the mesonotum brown-dusted right up to the scutellum (undusted in rear half apart from a narrow band next to the scutellum in *P. elegans*); tibia and tarsi largely yellow with just a shade on middle of each tibia ventrally and apical tarsal segments darkened (tibia black in apical two-thirds and tarsi almost entirely black in *P. elegans*); tergites more sparsely pubescent with tergites 1-4 brown-dusted dorsally with distinct apico-lateral triangles of grey dusting, tergites 5-6 lacking the brown discal dusting so contrasting with T4 (tergites more densely pubescent, only tergite one with grey dusting on disc, tergites 2-6 shining on disc, lateral grey-dusted triangles smaller, not visible in dorsal view in *P. elegans*).

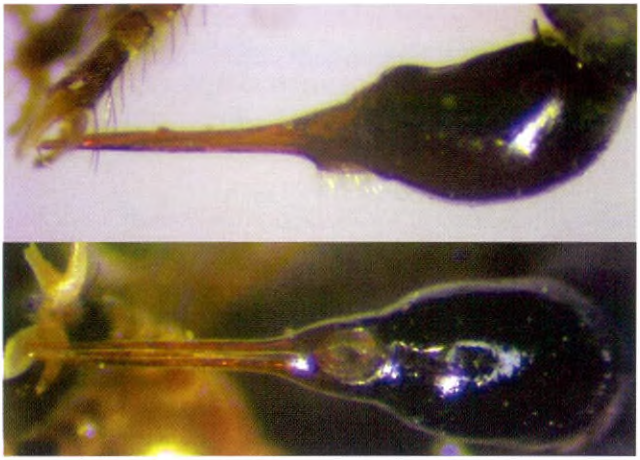

Fig. 1. *Pipunculus lichtwardti* ovipositor: lateral (above), dorsal (below) views.

Apart from the shape of the ovipositor, female *P. lichtwardti* is much closer to female *P. lenis*. Both have largely yellow tibiae and tarsi and entirely brown-dusted mesonotum; abdominal dusting is similar and there may be some overlap. Female *P. lichtwardti* has claws and pulvilli on all tarsi, especially the front, significantly longer than the apical tarsal segment (equal to or only slightly longer than distitarsus in *P. lenis*); tergites 1-4 brown-dusted dorsally with distinct apico-lateral triangles of grey dusting, tergites 5-6 lacking the brown discal dusting so contrasting with T4 (Fig. 2) (T1 grey-dusted, T2 brown-dusted on disc, usually only on basal third, but variable, lateral grey triangles smaller, hardly visible in dorsal view, T3-6 shining, some with T3 narrowly brown-dusted basally in *P. lenis*); pterostigma conspicuously long in the British specimen, approximately equal to the next (fourth) costal sector (Fig. 3) (pterostigma short, about two-thirds length of next (fourth) costal sector in *P. lenis*, this ratio varies from 0.6–1.1 but in all specimens examined pterostigma never as elongate as in the British *P. lichtwardti*).

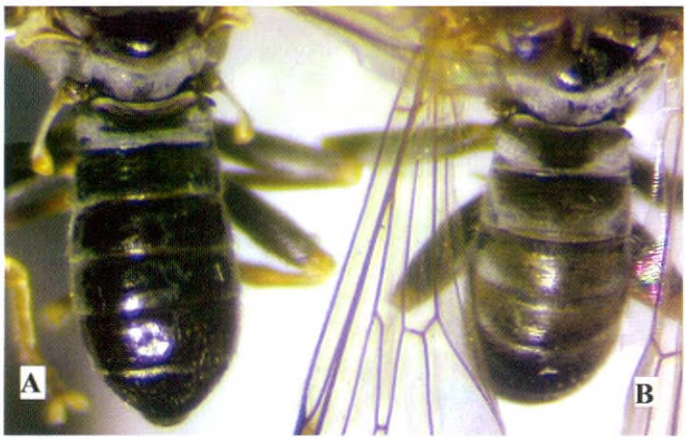

Fig. 2. Dorsal view of abdomens showing dusting of tergites; A. *P. lenis*, B. *P. lichtwardti*.

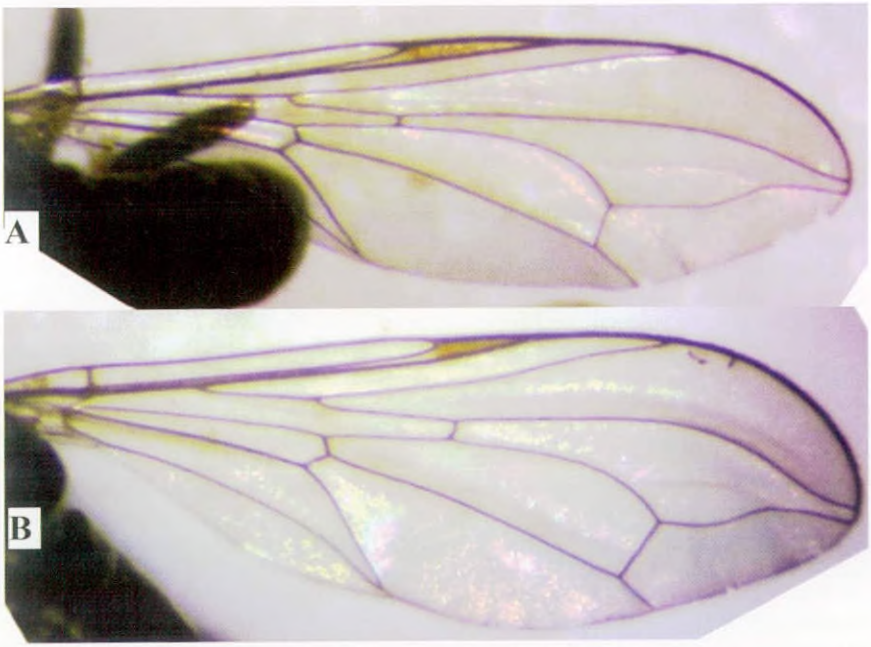

Fig. 3. Wings of A. *P. lichtwardti* and B. *P. lenis*.

Identification of male *P. lichtwardti* will be much more problematical and it is likely that any male specimens from Britain will be identified as *P. lenis* or *P. tenuirostris*. No male specimen was available to me so the following is based on the key and descriptions provided by Kehlmaier (2008). Male *P. lichtwardti* differs from *P. lenis* mainly in the nature of the phallus with all three ejaculatory ducts equally sclerotised in the distal half (view ventrally and laterally, the latter against a white background) (in *P. lenis/tenuirostris* the middle ejaculatory duct is distinctly more weakly sclerotised or membranous in its distal half). Reliance on this feature alone will necessitate the dissection of all male *P. lenis/tenuirostris*, and even having done so this character is not readily appreciated.

The discovery of male *P. lichtwardti* in Britain will almost certainly have to be through associated females unless some characters indicative of male *P. lichtwardti* as opposed to *P. lenis/tenuirostris* can be discovered. Wing length of the single male *P. lichtwardti* studied by Kehlmaier was 4.8mm, smaller than the lower limit for *P lenis* at 5.0–6.1mm, but given that there is a large overlap in wing length for females (5.6–6.0mm *lichtwardti*; 5.0–5.9mm *lenis*) this is probably also the case for males. Wing length of male *P. tenuirostris* is 3.8–5.1mm so many male *P. lichtwardti* may well key to *P. tenuirostris* if not dissected.

Specimens showing the following characters might be worth dissecting. In *P. lichtwardti* the upper posterior hair fringe of hind femur has multiple rows in the basal half, its longest hairs conspicuously curved in distal half and as long as the femur is high at its base. Although no direct comparison with *P. lenis* was possible, this feature also appears to be present in the female *P. lichtwardti* available to me. In *P. lenis*, the upper posterior hair fringe also seems to be multi-serial at the base, but is nonetheless rather sparse, not forming the tuft of hairs visible in the female *P. lichtwardti*. Eyes of *P. lichtwardti* meet for slightly more than length of frons (18 facets): meeting for slightly less than length of frons (14–18 facets in *lenis*), (12–14 facets in *tenuirostris*).

Surstyli of *P. lichtwardti* viewed dorsally have a straight inner margin and inward bent tip (see figs 30-31, Kehlmaier 2008) whereas surstyli of *P. lenis* have the inner margins angled on the inner side about one third distance from tip (figs 22-23, Kehlmaier 2008), but note surstyli of *P. tenuirostris* are variable and may look very like *P. lichtwardti*.

Biology

Nothing is known of the life history of *P. lichtwardti* but it is presumably a parasitoid of Cicadellidae leafhoppers. On the continent it has been collected in deciduous forest including plantations and a study in the Białowieza Forest, Poland found an apparent association with *Picea abies* (Norway spruce) (Kehlmaier and Floren 2009).

The Woodhouse Washlands specimen was swept from open lowland grazing marsh, so quite different to all continental specimens. A large spring-fed basin lies alongside the River Rother, giving rise to permanent wet pasture plant communities. Washlands also experience occasional flooding during times of exceptional rainfall.

Associated species in the same sample formed an interesting wetland community of flies: the soldierflies (Stratiomyidae) *Vanoyia tenuicornis* (Macquart), *Oxycera rara* (Scopoli), *Oxycera trilineata* (Linnaeus) and *Nemotelus nigrinus* Fallén; the wetland hoverflies (Syrphidae) *Chrysogaster cemiteriorum* (Linnaeus), *Lejogaster metallina* (Fabricius) and the snail-killing flies (Sciomyzidae) *Tetanocera punctifrons* Rondani, *Tetanocera robusta* Loew and *Sepedon sphegea* (Fabricius). The scarce dolichopodid *Nematoproctus distendens* (Meigen) was also found at the same time and place.

Distribution and Status in Britain

On the continent this species is little recorded with records from Slovakia, Hungary and Finland (Kehlmaier 2008), and Białowieza Forest, Poland (Kehlmaier and Floren 2009). Fauna Europaea (http://www.fauna-eu.org/) also gives Latvia but not Finland. With only six specimens collected previously (4♀, 2♂) it is either a very rare species or much overlooked and misidentified.

The single British specimen is from **South Yorkshire**, Woodhouse Washlands (SK434853), 23 July 1993, leg. Derek Whiteley.

Acknowledgements

I would like to thank Derek Whiteley for making all his specimens available to me as part of my continuing study of the family in Britain and for providing details of the collecting locality of *P. lichtwardtii*. I am also very grateful to Christian Kehlmaier for confirming the identity of the British *Pipunculus lichtwardti* specimen from photographs.

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Kehlmaier, C. and Floren, A. 2009. Pipunculidae (Diptera) collected by canopy-fogging in the Białowieza Forest (Poland) including first host records and larval descriptions of two Palaearctic *Nephrocerus* Zetterstedt. *Studia Dipteralogica* **16,** 169-181.

Palloptera laetabilis Loew (Diptera, Pallopteridae) re-found in Britain and new to Scotland, and other scarce flies from east Scotland in 2015 – In 2015, between 29 July and 6 August, I was subcontracted (in my Buglife Entomologist role) by Caledonian Conservation Ltd to survey Diptera at a series of Scottish sites for Scottish Natural Heritage as part of their ongoing Sites of Special Scientific Interest (SSSI) site condition monitoring programme. Whilst much of Scotland was being drenched, we enjoyed mostly dry and sunny weather at such classic sites as Morrich More (NH826845), Ross & Cromarty, Culbin Sands (NH960622) and Findhorn Bay (NJ033642), Moray, plus two ancient broad-leaved woods, Methven Wood (NO052266), Perthshire and Den of Airlie (NO292522), Angus. The last site, visited on 6 August, was the only one affected by poor weather. Heavy overnight rain and a very damp misty morning made sweeping of this steep-sided oak wood challenging. But by lunchtime, the weather had turned sunny and small patches of flowering *Angelica* and sunlit foliage allowed some recording of insects and a list of 107 Diptera species was made.

Sweeping of these *Angelica* flowerheads produced a female *Palloptera* that was clearly not one of the common species and was soon recognised as *P. laetabilis* Loew, 1873, which has unique wing markings within the British fauna (see Fig. 1). This is a remarkable find, apparently the first in Britain since 1907 and the first ever in Scotland. Only four earlier sites are given in Falk, S.J., Ismay, J.W. and Chandler, P.J. 2016. A provisional assessment of the status of Acalyptratae flies in the UK. *Natural England Commissioned Reports.* Number **217**: Wormsley Park, Oxfordshire (1907); Stoke Wood (1905) and Shobdon Marsh (1904), Herefordshire; and a record from Cambridgeshire (1905), suggested there to be from Grantchester, but actually found by Francis Jenkinson in his garden in Cambridge on 25 June 1905 (Perry, I. 2007. Francis John Henry Jenkinson, his life and legacy. *Dipterists Digest* (*Second Series*) **14,** 49-73).

Fig. 1. Female of _Palloptera laetabilis_ Loew from Den of Airlie, 6 August 2015.

Falk *et al.* (*op. cit.*) graded it as Data Deficient, and given the relatively poor level of recording of the many similar woods in this part of Scotland, this seems appropriate.

Further flies from the project with current or proposed conservation statuses included:

Bellardia pubicornis (Zetterstedt, 1838) (Calliphoridae) – Morrich More dunes, 31 July and 2 August
Botanophila sonchi (Hardy, 1872) (Anthomyiidae) – Culbin Sands (the Bar), 4 August
Calliphora loewi Enderlein, 1903 (Calliphoridae) – Methven Wood, 29 July
Chamaemyia fasciata (Loew, 1858) (Chamaemyiidae) – Morrich More (dunes), 31 July
Coenosia karli Pont, 2001 (Muscidae) – Morrich More, 1 and 2 August; Culbin Sands (the Bar and saltmarsh areas), 3 and 4 August
Coenosia minutalis (Zetterstedt, 1860) (Muscidae) – Culbin Sands (saltmarsh), 3 August
Helina intermedia (Villeneuve, 1899) (Muscidae) – Morrich More (dunes), 31 July and 2 August
Helina protuberans (Zetterstedt, 1845) (Muscidae) – Morrich More (dunes), 31 July
Limnospila albifrons (Zetterstedt, 1849) (Muscidae) – Morrich More (saltmarsh), 2 August; Culbin Sands (the Bar), 4 August; Findhorn Bay, 5 August
Lispocephala rubricornis (Zetterstedt, 1849) (Muscidae) – Morrich More (saltmarsh), 2 August; Culbin Sands, 3 August
Lispocephala verna (Fabricius, 1794) (Muscidae) – Findhorn Bay, 5 August
Muscidideicus praetextatus (Haliday, 1855) (Dolichopodidae) – Morrich More, 1 August; Findhorn Bay, 5 August
Mydaea deserta (Zetterstedt, 1845) (Muscidae) – Methven Wood 30 July; Den of Airlie, 6 August
Sapromyza opaca Becker, 1895 (Lauxaniidae) – Culbin Sands (the Bar), 4 August
Spilogona baltica (Ringdahl, 1918) (Muscidae) – Morrich More (dunes), 31 July and 1 August
Spilogona biseriata (Stein, 1916) (Muscidae) – Morrich More (saltmarsh), 2 August; Culbin Sands (dunes), 3 August
Spilogona trianguligera (Zetterstedt, 1838) (Muscidae) – Morrich More (saltmarsh), 2 August; Culbin Sands (the Bar and saltmarsh areas), 3 and 4 August
Spilogona veterrima (Zetterstedt, 1845) (Muscidae) – Morrich More (saltmarsh), 2 August
Tetanocera phyllophora Melander, 1920 (Sciomyzidae) – Methven Wood, 29 July
Tetanops myopinus Fallén, 1820 (Ulidiidae) – Morrich More (dunes), 1 August; Culbin Sands (dunes), 3 August
Thricops sudeticus (Schnabl, 1888) (Muscidae) – Methven Wood, 29 July
Tipula laetabilis Zetterstedt, 1838 (Tipulidae) – Methven Wood, 29 July; Den of Airlie, 6 August
Tipula nodicornis Meigen, 1818 (Tipulidae) – Culbin Sands (dunes), 3 August
Villeneuvia aestuum (Villeneuve, 1902) (Muscidae) – Morrich More (dunes and saltmarsh), 1 and 2 August (saltmarsh)

All records (flies and other invertebrate groups) from the project are published at full resolution on the NBN Atlas, and Scottish Natural Heritage will publish a report in the near future: Cathrine, C., Norris, G., Falk, S., Gleed-Owen, C., Currie, N. and Gillen, C. (in press.). Site Condition Monitoring of invertebrate assemblage features at six designated sites in Scotland 2015–16. *Scottish Natural Heritage Commissioned Report.*

I would like to thank Scottish Natural Heritage for commissioning the survey, plus Caledonian Conservation Ltd and Buglife – The Invertebrate Conservation Trust for facilitating my input – **STEVEN FALK,** 10 Fishponds Road, Kenilworth CV8 1EX; steven@sdfalk.wanadoo.co.uk

Dipterists Digest 2017 **24,** 39-41

Rheosmittia languida (Brundin) (Diptera, Chironomidae) new to Britain

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Summary
The occurrence of *Rheosmittia languida* (Brundin, 1956) in Scotland is reported, with details as to its identification in the British fauna.

Introduction

On 18 August 1983, the characteristic chironomid pupal exuviae known as *Rheosmittia* species B (Cranston and Sæther 1986, Langton 1991, Langton and Visser 2003) was collected in the River Dee at Dinnet, Scotland (NO462982). This pupal exuviae has been attributed to *Rheosmittia languida* (Brundin) (Brundin 1956, Caldwell 1996, Makarchenko and Makarchenko in Makarchenko *et al.* 2006). In material kindly donated by Vit Syrovátka, collected from the outflow of Lake Sylstjønna (63°1'50.66''N, 12°8'3.76''E), 6km NE of Nedalshytta cottage, in the mountains to the east of Trondheim, central Norway, was a pharate adult male that confirms the association between *Rheosmittia* species B and *R. languida*.

Rheosmittia languida (Brundin, 1956)

Identification

The pupal exuviae run to *Rheosmittia* species B in Langton (1991) and Langton and Visser (2003). The adult keys to *Rheosmittia* in Langton and Pinder (2007), with only the species *R. spinicornis* (Brundin) previously recorded for Britain and Ireland. The hypopygia of these two species are very similar (cf. Fig. 1 with fig. 190A for *R. spinicornis* in Langton and Pinder 2007, Vol. 2). They may be distinguished as follows (translated from Caspers and Reiss 1989: 144):

1. Mesonotum with distinct scutal tubercle well-developed. Antenna with 11 flagellomeres ..... ***R. spinicornis*** (Brundin)
- Scutal tubercle absent. Antenna with 13 flagellomeres. AR 0.3. Antepronotum distinct, its lobes meeting dorso-medially. Gonocoxite inner lobe with short, broadly rounded medial projection ..... ***R. languida*** (Brundin)

The pharate adult male from which Fig. 1a was drawn has the gonocoxites rotated such that the inner lobes are dorsomedial in position and pushed into the coxites. In fully eclosed individuals the lobe projects inwards as depicted in Fig. 1b.

Distribution

SCOTLAND, Aberdeenshire, R. Dee at Dinnet; a wide, fast flowing salmon river. New record for the British Isles. Previously, the species was recorded from eight western Palaearctic countries and from the East Palaearctic (Ashe and O'Connor 2012, Sæther and Spies 2013).

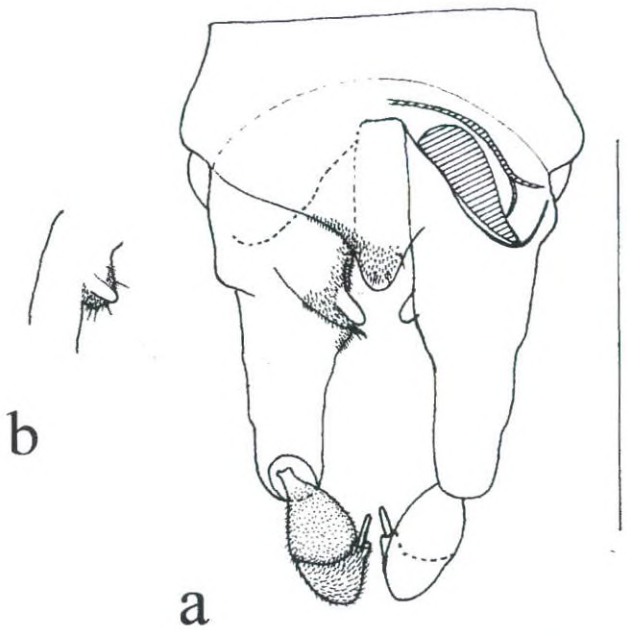

Fig. 1. ***Rheosmittia languida*** **male genitalia: a, hypopygium of pharate adult, dorsal/external view at left, ventral/internal at right (scale line = 0.1mm); b, gonocoxite lobe on eclosed specimen (redrawn from Brundin 1956).**

Acknowledgements

I am indebted to Vit Syrovátka for the donation of collections made in central Norway, in which the pharate adult male *R. languida* occurred.

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***Palloptera scutellata* (Macquart) (Diptera, Pallopteridae) in Dumfriesshire, Scotland –** Adults of this attractive grey and orange fly were first captured in Scotland in 2014 (Bland, K.P. and Horsfield, D. 2016. Distribution and biology of *Palloptera scutellata* (Macquart) (Diptera, Pallopteridae) in south-east Scotland. *Dipterists Digest* (*Second Series*) **23,** 51-53). A year later, females were swept near Alloa, Clackmannanshire by David Horsfield (Bland and Horsfield 2016 *ibid*), and at this locality larvae and puparia were found in hollowed stem bases of soft or common rush, *Juncus effusus* (Juncaceae) (Rotheray, G.E. and Hewitt, S. 2015. Development site, feeding mode and early stages of *Palloptera scutellata* (Macquart) (Diptera, Pallopteridae). *Dipterists Digest* (*Second Series*) **22,** 157-170). The discovery of early stages confirmed opinions that soft rush was the foodplant (Stubbs, A.E. 1969. Observations on *Palloptera scutellata* Mcq. in Berkshire and Surrey and a discussion on the larval habits of Pallopteridae (Dipt.). *Entomologist's monthly Magazine* **104,** 157-160; Chandler, P.J. 1991. Attraction of *Palloptera usta* Meigen (Diptera: Pallopteridae) to recently cut conifer wood and other notes on Pallopteridae. *British Journal of Entomology and Natural History* **4,** 85-87).

Larvae and puparia of *P. scutellata* are readily distinguished from other pallopterans and from other Diptera larvae found in *J. effusus* stem bases such as the psilid *Loxocera aristata* Panzer (Diptera, Psilidae) (Brindle, A. 1965. Taxonomic notes on the larvae of British Diptera. No. 22 – Psilidae. *The Entomologist* **98,** 169-173), by the presence of a dorsal ridge on the posterior spiracular plate and by a comb-shaped arrangement of spiracular openings on the anterior spiracles, both features illustrated by Rotheray and Hewitt (2015 *ibid*). Knowledge of the foodplant and larval/puparial identifying features means that it becomes possible to use these stages to record *P. scutellata.* Based on them, Bland and Horsfield (2016 *ibid*) recorded *P. scutellata* from nearly 50 Scottish localities during the winter of 2015/16. They also discovered that the occurrence of the early stages of *P. scutellata* in *J. effusus* did not match the full habitat range of *J. effusus.* Even at localities where the foodplant was abundant, such as open fields, moors and heaths, *P. scutellata* early stages were only found in damp hollows and ditches in sheltered locations (Bland and Horsfield 2016 *ibid*). Based on these data, the fieldcraft needed to find *P. scutellata* larvae and puparia can be stated to include: from autumn to early spring, search *J. effusus* stem bases in damp, sheltered places for larvae (at first) and puparia (later) which even if empty remain in the hollowed stems of the foodplant until at least early spring.

Based on this prescription and in less than an hour of searching, puparia of *P. scutellata* were found at three localities near Gatehouse of Fleet, Dumfriesshire in September 2016, thereby extending the known distribution of this species to south-west Scotland. Details of the captures are as follows: Dumfriesshire, Gatehouse of Fleet: 2 puparia plus reared males and 6 empty puparia from the bases of three *J. effusus* stems taken from a single tussock growing with other tussocks in a damp, grassy hollow semi-shaded by *Alnus* and *Ulmus* trees backed by a water-filled ditch and about 6 metres from the river Fleet, Port McAdam, NX59265553, 2.ix.2016; 4 puparia plus reared males and 3 empty puparia from two *J. effusus* stems taken from a tussock growing in short grass and shaded by surrounding bracken, *Pteridium*, Boreland Hills, NX58775665, 11.ix.2016; 2 empty puparia from a single *J. effusus* stem growing in a damp hollow containing 50+ tussocks surrounded by bracken and partially shaded by shrubs, Boreland Hills, NX58785671, 16.ix.2016.

Even allowing for a life cycle and habits that make adult *P. scutellata* less than straightforward to record (Rotheray and Hewitt 2015 *ibid*), it is striking that it was only found in Scotland as late as 2014 and furthermore, that it only took Bland and Horsfield (2016 *ibid*) a few months to record it from 50 localities from Forfar in the north to Peebleshire in the south. These data suggest that *P. scutellata* is a species long established, but under-recorded in Scotland. The records presented here support these ideas. They also support the appropriateness of recording *P. scutellata* via early stages, as appears to be the case for other *Palloptera* species (Rotheray, G.E, 2014. Development sites, feeding modes and early stages of seven European *Palloptera* species (Diptera, Pallopteridae). *Zootaxa* **3900,** 50-76). It also demonstrates the importance of developing fieldcraft that makes the recording of early stages reliable and consistent (Rotheray, G.E. 2016. Fieldcraft and closing the knowledge gap between immature and adult stages of Diptera Cyclorrhapha. *Dipterists Digest* (*Second Series*) **23,** 85-96) – **GRAHAM E. ROTHERAY**, 16 Bracken Wood, Gatehouse of Fleet, Dumfriesshire, DG7 2FA.

Lonchoptera scutellata Stein (Diptera, Lonchopteridae) newly found in Scotland

– Two female specimens of *Lonchoptera scutellata* Stein, 1890 were taken by sweeping the rank vegetation at the edge of the lowland mire of Bemersyde Moss, Berwickshire (NT6134, V.C. 81) on 2 February 2017. A further four specimens (2♂, 2♀) were taken at the same place a week later (9.ii 2017). The vegetation at the site consisted primarily of the dried standing stems of *Typha* and *Phalaris* with their associated ground litter on the wet ground between the open water and a narrow unkempt hedge. The unusual date is probably less significant than the habitat, as flies of the commonest species of Lonchopteridae, *Lonchoptera lutea* Panzer, 1809, can be found in any month of the year. The importance of the marshy habitat is further shown by a visit to the *Phragmites* reed-beds near Errol, Tay Estuary (NO2622, V.C. 89) on 14 February 2017, where another female of *L. scutellata* was taken.

No published records of this species are listed in the Scottish Insect Records Index in the National Museums of Scotland, nor are there any Scottish specimens in their collections, thus these records appear to be the first for Scotland. Previously it has been recorded as far north as North Yorkshire (NBN Atlas). On even a cursory examination of the species, the intensely black scutellum contrasting with the pale orange body colour is plainly visible. I am very grateful to my colleague David Horsfield for confirming my identification of the specimens – **KEITH P. BLAND**, 35 Charterhall Road, Edinburgh EH9 3HS

Dipterists Digest 2017 **24,** 43-47

New records of flies (Diptera) from Lundy Island

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Summary
An account is given of a visit to Lundy Island by the author and his parents in April 2015. Thirteen species of Diptera have been identified from catches made on this visit, of which 6 species appear to be new records for Lundy Island.

Aims and methods

The aim of this project was to add to the known diversity of flies on Lundy. I visited Lundy from 28 April to 2 May 2015 with my parents. Beccy MacDonald (island warden) kindly gave me permission to collect and remove flies from the island. Due to bad weather conditions, I could only collect on 30 April. It is always very windy on Lundy, which makes it difficult to use a net. I took samples of flies by sweeping low over the ground with a sweep net, similar to a butterfly net.

Lundy Island and its habitats

Lundy Island is a windy, beautiful and remote island situated in the mouth of the Bristol Channel. It is highly protected because of its astounding wildlife and its high diversity of plants. It is a SAC (Special Area of Conservation), a SSSI (Site of Special Scientific Interest) and within a Marine Conservation Zone known as the Lundy heritage coast. The island is three miles long and half a mile wide.

I collected Diptera in the following four habitats:

(1) (SS137450) (Fig. 1). A marshy area including a pond, providing habitat for aquatic species. Most importantly, the whole area is sheltered from the wind.

(2) (SS138451) (Fig. 2). A small patch of stunted willows (*Salix*), a little to the north-east of the previous habitat. It is also sheltered from the wind by the cliffs. Some dung, probably of horse or donkey, was present.

(3) (SS139448) (Fig. 3). Woodland, with towering oaks (*Quercus*) and a mixed undergrowth with a lot of bluebells (*Hyacinthoides non-scripta*). A small stream cuts through the woods, making the habitat an excellent breeding place for Lower Diptera; this stream is behind my father's head in the photograph.

(4) (SS145437) (Fig. 4). A rocky seashore. Unfortunately this area was visited at high tide; consequently, I only caught two flies of the same species. The day I was leaving, at low tide, I saw a bibionid in this area.

Fig. 1. The marshy area and pond.

Fig. 2. The willow (*Salix*) scrub.

Fig. 3. The woodland with oaks.

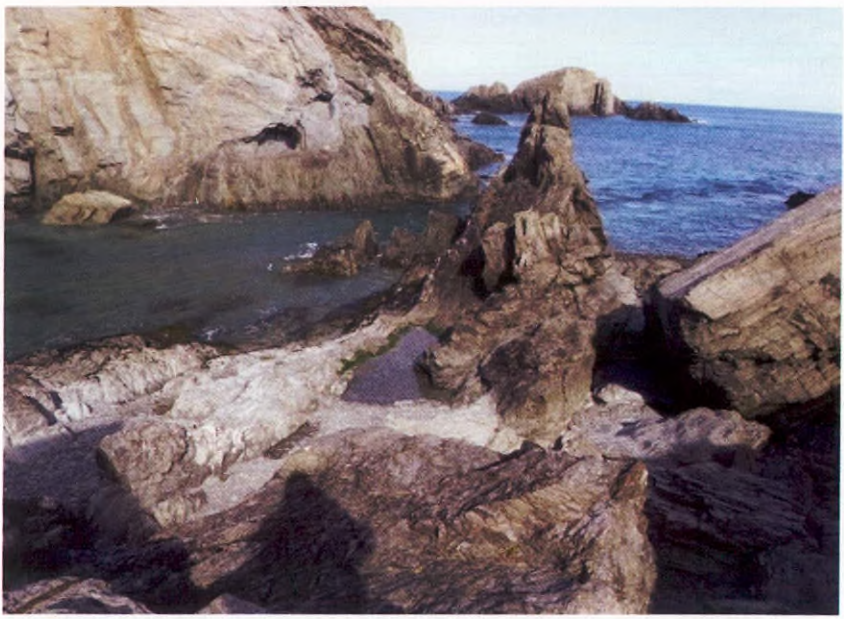

Fig. 4. The rocky seashore.

Identification

I caught 24 specimens of Diptera that were identified at least to family level, using the keys by Bächli *et al.* (2004), Drake (2010), d'Assis-Fonseca (1968, 1978), Edwards (1938), Freeman and Lane (1985) and Stubbs and Falk (2002). These included 13 families, of which 16 specimens were identified to species level. There were of 13 species, of which I believe that 6 species are recorded for the first time from Lundy. These are:

Bibio lanigerus Meigen (Bibionidae)
Syntormon pallipes (Fabricius) (Dolichopodidae)
Philygria picta (Fallén) (Ephydridae)
Canace nasica (Haliday) (Canacidae)
Drosophila subobscura Collin (Drosophilidae)
Scathophaga furcata (Say) (Scathophagidae)

Some of the species recorded occur in many different habitats, but 5 species are associated with specific habitats. These are *Syntormon pallipes* and *Philygria picta*, which are primarily found on water margins, the canacid *Canace nasica* which is specific to coastal habitats, with the larvae feeding on algae (here it was found on bladder wrack), and the scathophagids, which are associated with dung (John Ismay *pers. comm.*). Table 1 gives the data for all specimens recorded. Specimens will be deposited in the Oxford University Museum of Natural History and in the author's own collection.

Table 1. List of flies collected on Lundy Island on 30 April 2015, including location and habitat.

Family	Species	Sub Site	Habitat
Anthomyiidae	Indet. females	Site 3	Cliffs with woodland
Bibionidae	*Bibio lanigerus*	Site 1	Boggy disused quarry
Canacidae	*Canace nasica*	Site 4	Warm rocks by shore
Chloropidae	*Oscinella frit*	Site 3	Cliffs with woodland
Dolichopodidae	*Syntormon pallipes*	Site 3	Cliffs with woodland
Dolichopodidae	*Syntormon pallipes*	Site 1	Boggy disused quarry
Drosophilidae	*Drosophila subobscura* ♀	Site 3	Cliffs with woodland
Drosophilidae	*Scaptomyza pallida*	Site 1	Boggy disused quarry
Ephydridae	*Hydrellia* species indet ♀	Site 3	Cliffs with woodland
Ephydridae	*Philygria picta*	Site 3	Cliffs with woodland
Muscidae	*Schoenomyza litorella*	Site 1	Boggy disused quarry
Pediciidae	*Tricyphona immaculata*	Site 3	Cliffs with woodland
Scathophagidae	*Scathophaga stercoraria*	Site 3	Cliffs with woodland
Scathophagidae	*Scathophaga furcata* ♂/♀	Site 3	Cliffs with woodland
Sphaeroceridae	*Spelobia clunipes*	Site 3	Cliffs with woodland
Syrphidae	*Platycheirus clypeatus*	Site 1	Boggy disused quarry

The most comprehensive published list of Diptera from Lundy that I was able to locate was by Lane (1977). I also compared my results with the lists of Diptera in Davis and Jones (2008-2013) and Parsons (1983-1997). I also checked the records for Lundy Island on the NBN Atlas (accessed 19 April 2017). According to these lists, six of the 13 species recorded appear to

be new to Lundy Island. There is another previously unpublished record from Lundy for one of these species *Syntormon pallipes*, which was found by Roger Key in 1994 (grid reference given as SS1344, precise date unknown: Martin Drake *pers. comm.*). All of the species found are common on the mainland.

The collecting was done early in the year during adverse weather conditions. It is evident that there are many further species of Diptera to be found on Lundy. To conclude, I had a great holiday on this remote island, with my fascinating world of Diptera.

Acknowledgements

I would like to thank: Michael Williams for his support in making the first contact possible and Alan Rowland, for all the additional and extremely interesting information on previous records; Beccy MacDonald, for making it all happen by granting me permission to collect and remove the flies; Martin Drake for the earlier record of *S. pallipes*. I am tremendously thankful to John and Barbara Ismay for sharing their precious expert knowledge of taxonomy, their detailed discussions and great help in preparing and identifying the various flies and their valuable advice with this report.

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Ocytata pallipes (Fallén) (Diptera, Tachinidae) new to Ireland – *Ocytata pallipes* (Fallén, 1820) is recorded as new to Ireland based on two records, one of which dates from a specimen collected in 1978 which was overlooked in the compilation of the Irish checklist.

A survey of Pollnaknockaun Wood Nature Reserve in Co. Galway by Buglife during 2016 produced two *O. pallipes* females from a Malaise trap located at M73927 01281, which was set on 17 July 2016 and emptied on 13 August 2016. These females were identified by Andrew Grayson from material in spirit which was forwarded by Adam Mantell. They will be preserved as dry-pinned specimens, and deposited with the National Museum of Ireland in Dublin. The

Malaise trap was erected close to a 'T' junction of two woodland rides (A. Mantell *pers. comm.*). Pollnaknockaun Wood Nature Reserve is a statutory nature reserve and Special Area of Conservation, which is managed by the National Parks and Wildlife Service. The site protects areas of oak woodland that are part of what was, until 1940, one of the largest areas of natural oak woodland in Ireland (B. Nelson *pers. comm.*).

After the identification of *O. pallipes* from Pollnaknockaun Wood NR, an earlier Irish record came to light, the basic details of which were found in the database of the Tachinid Recording Scheme. This record relates to a specimen of *O. pallipes* which was found at Loughlinstown Common (Irish Grid Reference O2423) in Co. Dublin on 18 July 1978 by Michael de Courcy Williams, and identified by Peter Chandler. It is contained in the collections of the Ulster Museum, Belfast, Northern Ireland. Loughlinstown Common was just around the corner from the former home of Michael de Courcy Williams, and was described by Michael (*pers. comm.*) as 'a rather interesting site' which is 'now much built over by housing and roads'.

This note could not have been satisfactorily completed without the assistance of Brian Nelson, Peter Chandler, Michael de Courcy Williams, Chris Raper and Matt Smith regarding the Loughlinstown Common specimen; and Adam Mantell and Suzanne Burgess of Buglife regarding the Pollnaknockaun Wood Nature Reserve specimens. The work at Pollnaknockaun Wood NR was done under contract to the National Parks and Wildlife Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin – **ANDREW GRAYSON,** 'Scardale', High Lane, Beadlam, Nawton, York, YO62 7SX; andrewgrayson1962@live.co.uk

***Opacifrons maculifrons* (Becker) and *Pseudocollinella jorlii* (Carles-Tolra) (Diptera, Sphaeroceridae) in Cornwall** – On 4 September 2016, I swept a female of *Opacifrons maculifrons* (Becker) at Holywell, Cornwall (SW766590), the silvery patches on the frons being very noticeable. The habitat consists of a small stream running into the sea, at the top of a sheltered sandy cove above the high water mark. A further visit two days later failed to find any further specimens. *Opacifrons maculifrons* was discovered in this country by J.H. Cole at Grafham Water, Cambridgeshire on 8 October 2009, when about 20 specimens were swept from the margins of the lake (2011. Dipterists Day Exhibits in 2009. *Dipterists Digest* (*Second Series*) **18,** 99). The discovery of a series of *O. maculifrons* was significant as this very widespread species is normally collected as a single individual or as a few specimens (J. Roháček *pers. comm.*). There do not appear to have been any subsequent records (J.H. Cole *pers. comm.*).

Later on the same day, I visited the next bay along at Porth Joke (SW772605), where the habitat was very similar to that at Holywell and there I found a female *Pseudocollinella jorlii* (Carles-Tolra). This species was known in Britain from a single female collected around the Kenfig Pool, Kenfig NNR, Glamorgan on 10 July 1995 by Paul Gatt (2001. *Pseudocollinella jorlii* (Carles-Tolra) (Diptera: Sphaeroceridae) new to Britain and new records of Sphaeroceridae from Kenfig National Nature Reserve, Glamorgan. *British Journal of Entomology and Natural History* **13,** 197-201). It is very similar to the common *P. humida* (Haliday) and for that reason may have been overlooked in the past. However, it may turn out to be restricted to western coastal areas in this country as it is unknown elsewhere in northern Europe and most records are from countries bordering the Mediterranean (Marshall, S.A., Roháček, J., Dong, H. and Buck, M. 2011. The state of Sphaeroceridae (Diptera: Acalyptratae): a world catalog update covering the years 2000-2010. *Acta Entomologica Musei Nationalis Pragae* **51**(1), 217-298) – **IVAN PERRY**, 27 Mill Road, Lode, Cambridge CB25 9EN

Dipterists Digest 2017 **24,** 49-51

Cerodontha (*Poemyza*) *unisetiorbita* Zlobin (Diptera, Agromyzidae), an adventive species new to the British Isles

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Summary
Cerodontha (*Poemyza*) *unisetiorbita* Zlobin, 1993 (Agromyzidae) is recorded as an adventive species new to the British Isles. Three specimens were reared from mines in leaves of the bamboo *Phyllostachys aureosulcata* McClure f. *spectabilis*, found at a Garden Centre in Cornwall in December 2014.

Introduction

Whilst looking at various bamboo plants at a Garden Centre at Carkeel, near Saltash, Cornwall (V.C. 2) on 20 December 2014, I noticed one that had several mined leaves. Most of the mines were old and rather brown but a few were fresher and pale green (Fig. 1). Further visits were made on 23 and 29 December when more fresh mines were found. Although this bamboo plant, growing in a large plant pot, was next to several other bamboo plants, some of which were growing in the ground, mines were only found on this one plant, *Phyllostachys aureosulcata* McClure f. *spectabilis* according to a label attached to it. There was nothing on the label to indicate the plant's origin.

Fig. 1. ***Cerodontha* (*Poemyza*) *unisetiorbita*: mine in leaf of *Phyllostachys aureosulcata* f. *spectabilis*.**

Several leaves were collected. Three adults, 1♂ and 2♀, emerged between 29 January and 12 February 2015 (Figs 2-3). All three were sent to Miloš Černý (Czech Republic), who kindly dissected the male and identified the material as *Cerodontha* (*Poemyza*) *unisetiorbita* Zlobin, 1993, a species not previously recorded from the British Isles.

Figs 2-3. *Cerodontha* (*Poemyza*) *unisetiorbita*: 2, lateral view of male; 3, dorsal view of female.

Observations

The larvae of Agromyzidae are well known as leaf-miners and those of the subgenus *Poemyza* Hendel, 1931, mine leaves of grasses (Poaceae), but only three species in that subgenus are known from bamboo (subfamily Bambusoideae) (Černý and Roháček 2015). Of these three, *Cerodontha* (*Poemyza*) *unisetiorbita* is the only species known from Europe. It was described by Zlobin (1993) from adults collected in Japan. It appears, however, that the first description and illustration of the mine was provided by Süss (2001), who recorded it as new to Europe when adults were reared from mines in leaves of *Phyllostachys mitis* (Lour.) A. & C. Riv. in Italy in 2000 and 2001. It was found at three localities in that country; one was in the wild near Arizzano, another was in a private garden in Milano and the third was in the Liguria region. The next European country where it was noted was Switzerland, when mines were recorded on a *Phyllostachys* species and a *Fargesia* species (also in Bambusoideae) in a bamboo garden near Zürich in August 2013. Then the species was reared in August 2014 from mines found in leaves of *Phyllostachys nuda* McClure earlier that month at the Zlín-Lešná Zoological garden in the Czech Republic. In October of that year puparia were found in leaves of *Phyllostachys atrovaginata* C.S. Chao & H.Y. Chou, *P. parvifolia* C.D. Chu & H.Y. Chou and *P. aureosulcata* McClure in a bamboo garden in Hannover, Germany from which adults were reared. These records, with more details, were given by Černý and Roháček (2015). I am not aware of any subsequent European records until the discovery of mines at Carkeel on 20 December 2014.

The tenanted mines found in December 2014 were pale green and comparatively broad, on the upper surface of the leaves, with only one larva in each mine. The larvae (undescribed) pupated within the mines and the puparia were reddish brown and slightly shiny (Fig. 4).

I also reared one specimen each of two species of hymenopterous parasitoids.

Hymenopterous parasitoids reared from *Cerodontha unisetiorbita*

Pediobius metallicus (Nees, 1834) (Chalcidoidea, Eulophidae: Entedoninae), 1♀. This is a very common and widespread parasitoid, attacking especially a broad range of leaf-mining Agromyzidae. It has also apparently been reared from leaf-mining microlepidoptera, though not commonly.

Colastes braconius Haliday, 1833 (Ichneumonoidea, Braconidae: Exothecinae), 1♀. This is a very common parasitoid of a wide range of leaf-miners on low plants as well as trees, especially Lepidoptera, Diptera and Coleoptera (much less frequently of Hymenoptera).

Fig. 4. ***Cerodontha* (*Poemyza*) *unisetiorbita*: puparium.**

Acknowledgements

I am extremely grateful to Rob Edmunds for initially suggesting that the mines that I found might be those of *Cerodontha* (*Poemyza*) *unisetiorbita*, for him then putting me in touch with Miloš Černý and to the latter for examining my material and dissecting the male to confirm identification. I thank Mark R. Shaw and Richard R. Askew respectively for determining the *Colastes braconius* and *Pediobius metallicus*. My thanks are also due to Stella Beavan for enhancing my images.

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Corrections and changes to the Diptera Checklist (37) – Editor

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

Changes are listed under families; names new to the British Isles list are in bold type. The notes below refer to addition of 7 species, resulting in a new total of **7148** 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 intended to update this regularly following the appearance of each issue of *Dipterists Digest*.

Mycetophilidae. The following genus (subfamily Mycetophilinae, tribe Mycetophilini) and species are added in the present issue:
MACROBRACHIUS Dziedzicki, 1889
Macrobrachius ***kowarzii*** Dziedzicki, 1889

Chironomidae. The following species is added in the present issue:
Rheosmittia ***languida*** (Brundin, 1956 – *Parakiefferiella*)

Hybotidae. The subgenus ELAPHROPEZA was raised to generic rank from a subgenus of *Drapetis* by I.V. SHAMSHEV and P. GROOTAERT (2007. Revision of the genus *Elaphropeza* Macquart (Diptera: Hybotidae) from the Oriental Region, with a special attention to the fauna of Singapore. *Zootaxa* **1488,** 1-164).

The following species is added in the present issue:
Platypalpus ***maculimanus*** Zetterstedt, 1842

Phoridae. The following species was added by R.H.L. DISNEY and N.J. RIDDIFORD (2017. Scuttle flies (Diptera: Phoridae) from Fair Isle, including a first record for the British Isles and mainland Shetland. *Entomologist's monthly Magazine* **153,** 21-24):
Megaselia ***teneripes*** Schmitz, 1957

Pipunculidae. The following species is added in the present issue:
Pipunculus ***lichtwardti*** Kozánek, 1981

Muscidae. The following species are added in the present issue:
Atherigona ***orientalis*** Schiner, 1868
Phaonia ***aeneiventris*** (Zetterstedt, 1845 – *Aricia*)

Changes to the Irish Diptera List (24) – Editor

This section appears as necessary to keep up to date the initial update of the Irish list in Vol. **10,** 135-146 and the latest checklist of Irish Diptera (Chandler *et al.* 2008). Species are listed under families, but with references listed separately (unless within the present issue). The addition cited here brings the total Irish list to 3408.

Tachinidae
Ocytata pallipes (Fallén, 1820) (added by Grayson in the present issue)

Dipterists Digest 2017 **24,** 53-60

Melanostoma scalare (Meigen) larvae (Diptera, Syrphidae) feed on Diptera larvae in leaf litter

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Summary

In winter 2016, *Melanostoma scalare* (Meigen) larvae (Diptera, Syrphidae) were found in woodland leaf litter and, in culture, were observed catching and feeding on co-occurring larvae of Lonchopteridae, Lauxaniidae and Limoniidae (Diptera). Tactile contact with prey elicited capture behaviour. This involved turning prey upside down and piercing the underside with the head skeleton. Initially prey fluids were imbibed with little movement of the head skeleton followed by head skeleton lunging when food was imbibed only during retraction or backwards movement. These data support the idea that *Melanostoma* larvae are facultative aphid predators and they help to resolve the enigma of high adult abundance versus the scarcity of larval records from aphid colonies.

Introduction

Syrphines (Diptera, Syrphidae) are well known predators of soft-bodied Hemiptera, such as Aphididae (Verrall 1901, Smith 1989). Yet an unresolved issue is what resources are used by larvae of some of the most widespread and abundant species, such as *Melanostoma mellinum* (Linnaeus) and *M. scalare* (Meigen) (Rotheray and Gilbert 2011). Despite numerous studies assessing syrphines at aphid colonies, a discrepancy exists between high adult abundance of these *Melanostoma* species and the paucity of larval records. For instance, in Britain Rojo *et al.* (2003) recorded only 9 and 5 prey species for *M. mellinum* and *M. scalare* respectively. This contrasts with prey records of two other widespread and abundant syrphines, *Episyrphus balteatus* (De Geer) and *Syrphus ribesii* (Linnaeus), with 27 and 29 prey species respectively (Rojo *et al.* 2003).

Rotheray and Gilbert (2011) discussed these missing data and considered that either *Melanostoma* species use hemipteran prey that are under-sampled, such as root aphids, or that they feed on other types of prey altogether, such as those occurring in soil and leaf litter. Apparently, *M. scalare* has not been recorded from root aphids, but Dunn (1960) and Dransfield (1975) quoted in Rojo *et al.* (2003), report *M. mellinum* at colonies of these aphids.

In the winter of 2016, we found *M. scalare* larvae in woodland leaf litter and observed them feeding on co-occurring Diptera larvae. In this paper we describe these observations. We also use films of prey handling to analyse the feeding mechanisms used by *M. scalare* larvae, i.e. determining how food is transferred from the prey into the alimentary canal of the predator. Attempts to understand larval feeding mechanisms and the roles of the various trophic features are not often made (Roberts 1971, Rotheray and Lyszkowski 2015). This is understandable given that feeding involves small components that move too fast to resolve (Tinkeu and Hance 1998). Combining morphological analysis with films played at slow speed overcomes many of these difficulties (Rotheray and Lyszkowski 2015, Rotheray and Wilkinson 2015).

Methods and Materials

About 12 polythene bags of moist leaf litter were collected from three locations in Angus, Scotland: Marchbank near Hillside (NO686623) on 18.xii.2016; Montrose Basin (NO704656) on 29.xii.2016, and Dun House near Montrose (NO665604) on 30.xii.2016. Bags were hand searched for larvae at home. Actively feeding *M. scalare* larvae were found. They were

recognisable by their respiratory structures, pea-green colour with pale fat deposits overlying parts of the gut and measuring approximately 7mm in length (Rotheray 1993).

Each larva was reared individually in a Petri dish with leaf litter and stored in cool, dark conditions outdoors. Each Petri dish was provided with Diptera larvae that co-occurred in the leaf litter: *Lonchoptera* sp. (Lonchopteridae), *Meiosimyza* sp. (Lauxaniidae) and chioneine limoniids (Limoniidae, Chioneinae). Dishes were sprayed periodically with water to prevent the leaves drying out and to maintain feeding substrates for potential prey species. The *M. scalare* larvae pupated in early spring. Stubbs and Falk (2002) was used to identify the single adult that emerged and voucher specimens are retained by the first author.

To monitor feeding, larvae of *M. scalare* and one or more of the following possible prey were placed together on moist leaf litter in Petri dishes: *Lonchoptera*, *Meiosimyza* and chioneine limoniids. Observations were made using a stereomicroscope. Films were made using a Canon EOS 1100D camera fitted to a Brunel BMSZ trinocular stereomicroscope via a T2 ring and 35mm SLR camera attachment. The Canon EOS Utility software was used to transfer live images from the camera to a desktop computer, and the remote shooting facility was used for shutter release. Films were examined in real time, slow and fast time, reverse time and freeze-frame using Microsoft Movie Maker12 on a desktop computer and iMovie10 on an Apple Workbook Pro computer.

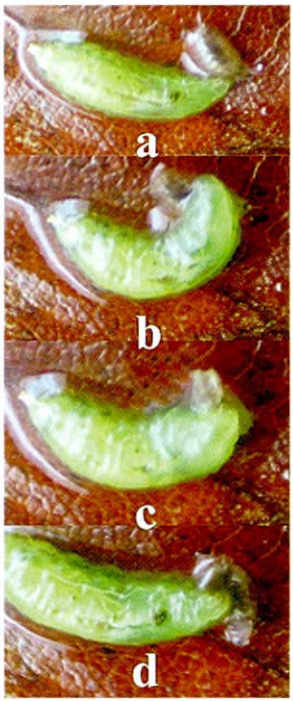

Fig. 1. A third stage *Melanostoma scalare* larva (Syrphidae) catching and piercing a *Lonchoptera* larva (Lonchopteridae): stills from a film, a to d took 16 seconds, a, contact with the prey; b, draping thorax over the prey; c, lifting and turning over the prey; d, piercing the prey.

Results

Rearing results

Four *Melanostoma* larvae were found in the 12 bags of leaf litter, at least one from each of the three sites. No aphids were present. Two larvae were in the second stage as indicated by their separated posterior breathing tubes and two larvae were in the third stage, being larger and having fused posterior breathing tubes. All four larvae formed puparia but only one adult emerged and was identified as a female of *M. scalare*. One puparium was parasitised by an unidentified hymenopteran (Hymenoptera).

Prey capture

All the *M. scalare* larvae were observed attacking and feeding on *Meiosimyza* (n = 10) and *Lonchoptera* (n = 8) larvae and one attacked and consumed a chioneine larva. Films showed that tactile contact between *M. scalare* and *Lonchoptera* or *Meiosimyza* larvae elicited prey capture behaviour i.e. attempts to pierce the prey. Tactile contact was made either by the predator touching the prey during locomotion or the other way round in which case the predator responded by raising and turning the head towards the source of the contact and touched the prey.

Initial attempts at apparent piercing involved the apex of the head stabbing the dorsal and lateral prey margins (Fig. 1a). In one sequence, a *M. scalare* larva stabbed a *Meiosimyza* larva 25 times in 30 seconds but without success. In another sequence, piercing a *Lonchoptera* larva was achieved when the predator draped the thorax over the prey body and lifted it up and over and stabbed the ventral surface (Figs 1b-d). Turning prey upside down depended on the front end of the predator being at a sufficiently sharp angle relative to the longitudinal axis of the prey to drape itself over it and grip the prey body (Fig. 1b). In one sequence, a predatory larva pursued a *Meiosimyza* larva for about 40 seconds, but due to the rapid movement of the latter, the predator was unable to orientate itself at a sufficient angle to drape the thorax over it. Furthermore, when it did manage this manoeuvre, the prey turned itself back over and escaped.

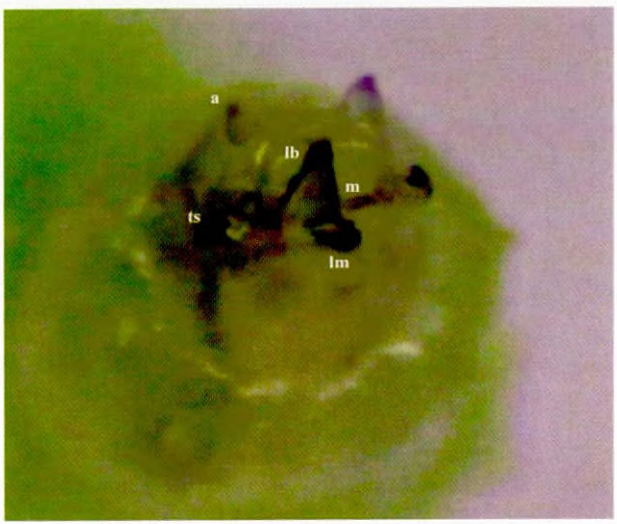

Fig. 2. Open mouth of a third stage *Melanostoma scalare* larva (Syrphidae), still from a film, dorsal margin uppermost: a = antennomaxillary complex; lb = labrum; lm = labium; m = apex of mandible; ts = triangular sclerite.

Feeding mechanisms

After prey were pierced, the head of the predator remained inserted and stationary within the prey. The head skeleton was also stationary except for slight inward movements of the dorsal cornua. In the film sequence between a third stage *M. scalare* larva and a *Lonchoptera* larva in Fig. 1 these inward movements lasted 12 seconds and took place at a rate of about 1 per 0.56 seconds. After this, the head skeleton started retracting and protracting or lunging back and forth. Based on five films of lunging in 4 larvae, the mean lunging rate recorded was 0.87 lunges per second, range 0.85-1, n = 111 lunges.

The mouthparts of a *M. scalare* larva are an upper lip or labrum and underneath a lower lip or labium (Fig. 2). The sclerotised sections of the labrum and labium that project at the front of the head are pairs of black rods that originate on the basal sclerite and approximate and meet at their apices (Fig. 2). The mandibles are embedded within the sides of the head and on the outer side of the mandible apex, but not part of it, are a pair of triangular-shaped sclerites attached to the cuticle (Fig. 2).

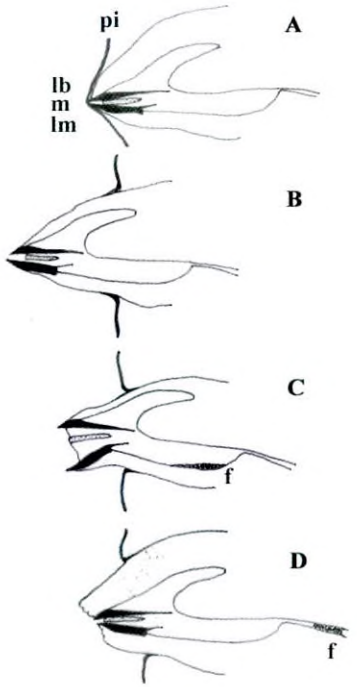

Fig 3. Model of piercing larval prey and imbibing fluids and tissues in a third stage *Melanostoma scalare* larva: A, stabbing the prey; B, prey pierced and head skeleton protracts inside; C, head skeleton retracts, pivots and labium moves down, which opens the mouth and food is sucked into the head skeleton; D, the head skeleton fully retracted starts to protract and simultaneously food passes out of the head skeleton into the main sections of the alimentary canal. f = food; pi = prey cuticle; lb = labrum; lm = labium; m = mandible.

Films revealed that feeding consists of a staged series of events (Fig. 3). Following the prey being pierced (Fig. 3a), the head being inserted into the prey (Fig. 3b) and a short period of inward movement of the dorsal cornua, the head skeleton starts lunging. A lunge begins with the head skeleton protracting into the prey. The limit of protraction is either the integument of the prey or the full extent the head skeleton is able to protract. When one or other of these limits are reached, the head skeleton starts to retract. As it does so, it pivots upwards slightly and at the same time the labium moves down from its basal articulation point with the head skeleton (Fig. 3c). These movements open the mouth and as retraction continues, food is sucked in and begins to accumulate at the back of the head skeleton (Fig. 3c). Towards the limit of retraction, the labium moves up against the labrum and the head skeleton pivots in the other direction which closes the mouth. The head skeleton then starts to protract and begin a new lunge. Simultaneously, food passes from the head skeleton into the main sections of the alimentary canal (Fig. 3d). During lunging, direction changes inside the prey are frequent. For instance, in one 71 second sequence of a *M. scalare* larva lunging inside a *Lonchoptera* larva, lunging changed direction 17 times or about once every 4-5 seconds.

Discussion

We record here *M. scalare* larvae (Diptera, Syrphidae) capturing, feeding and developing on larvae of other Diptera families, such as Lauxaniidae, Lonchopteridae and Limoniidae, that co-occurred in woodland leaf litter. Although predation of these prey was observed in culture, the behaviour recorded leaves little doubt that it occurs naturally. In common with the majority of north temperate syrphines, records also exist of *M. scalare* larvae developing successfully on aphids (Rojo *et al.* 2003). As proposed by Chandler (1968a, b) *Melanostoma* and certain *Platycheirus* species are facultative aphid predators. Unlike Chandler (1968a, b), who proposed that plant tissue provides an alternative food source, we found that in *M. scalare* it was co-occurring Diptera larvae. These results corroborate those of Zafar in Gilbert *et al.* (1994) who tested the possibility of syrphine larvae feeding on plant tissue and did not record it. Our observations also help resolve the difficulty discussed by Rotheray and Gilbert (2011) of what resources are used by *Melanostoma* larvae and possibly, other common syrphine species sharing high levels of adult abundance and few larval records, such as *Platycheirus albimanus* (Fabricius) and *P. clypeatus* (Meigen). Females of these species oviposit low on herb layer plants (Chandler 1968a, b). We suggest that larvae search these plants for aphids and also for root aphids and a wider range of prey at the soil surface and leaf litter. Data helping to verify and improve understanding of this search strategy will come from examination of leaf litter and root and ground level aphid colonies during spring and summer generations.

In common with Diptera larvae in general, feeding behaviour is probably elicited by gustatory stimuli obtained when food is touched by the maxillary sense organs (Oppliger *et al.* 2000). In Syrphidae, the maxillary sense organs are each approximated with an antenna at the apex of a pair of fleshy projections dorsal to the mouth (Fig. 2) (Bhatia 1939, Rotheray and Gilbert 1999). In *M. scalare* prey capture behaviour is elicited by aphids and other Diptera larvae and although the gustatory cues involved are unknown, they differ presumably between these two types of prey. Prey handling behaviour is certainly different. Aphids are relatively small and are captured with sticky saliva and the triangular sclerites gripping the prey (Fig. 2). They are held for feeding within an inverted pseudocephalon and anterior prothorax (Rotheray and Lyszkowski 2015). None of these mechanisms is used to capture and feed on other Diptera larvae. To handle these prey, the prothorax is draped across the prey which enables it to be lifted and turned over to expose the underside. The head skeleton stabs the underside and the approximated and tapered sclerotised apices of the labrum and labium pierce the prey. We did not observe prey being pierced in any other way, despite the upperside being repeatedly stabbed. Perhaps the cuticle or

integument on the underside is thinner or not as tight as the upperside and therefore is more vulnerable to piercing. It may also prevent prey from escaping. Turning prey over is also a feature of two other syrphines that are obligatory predators of lepidopteran and coleopteran larvae, *Xanthandrus comtus* (Harris) and *Parasyrphus nigritarsis* (Zetterstedt) respectively (Rotheray 1993, 1997). Turning prey over is not, however, a general feature of predatory cyclorrhaphan larvae. It does not occur, for instance, in the predatory muscids, *Phaonia gobertii* (Mik) and *Phaonia subventa* (Harris) (Diptera, Muscidae) (Rotheray and Wilkinson 2015).

Following piercing, the slight inward movements of the dorsal cornua show that the pump in the head skeleton is sucking up prey fluids. This is similar to the early stages of prey feeding in *P. gobertii* and *P. subventa* (Rotheray and Wilkinson 2015). At first, pressure inside the prey is likely to be high and sufficient for pumping alone to imbibe prey fluids. Lunging with the head skeleton occurs when prey has deflated and pressure has dropped. During lunging, food is sucked up when the head skeleton retracts back into the thorax. Simultaneous with retraction two movements open the mouth. A head skeleton pivot which lifts the labrum and downward movement of the labium. Unlike the labium, the labrum is fixed to the head skeleton and has no independent movement. The head skeleton pivot is due to muscles that originate on the thoracic walls and insert on the head skeleton (Hartley 1961). Labial movement is due to muscles that originate on the head skeleton and insert on the labium (Hartley 1963, Roberts 1970). Films show that these movements are reminiscent of a bird opening its beak. Opposing muscles return the labium to a resting position, while natural elasticity appears to return the labium.

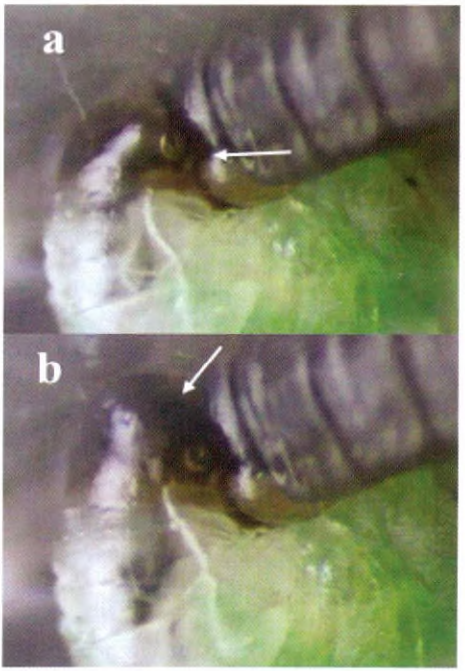

Fig. 4. A third stage *M. scalare* larva (Syrphidae) lunging inside a chioneine larva (Diptera, Limoniidae, Chioneinae): stills from a film, arrows indicate prey fluids coming from the wound. a, fluids begin to leak; b, 2 seconds later, a fluid mass emerges.

Unlike many saprophagous cyclorrhaphan larvae (Diptera, Cyclorrhapha), food does not accumulate in the head skeleton over several lunges, but with each lunge it passes directly through to the main sections of the alimentary canal. This is probably related to the absence of a filtering and food concentrating mechanism in the head skeleton, the cibarial ridges. Cibarial ridges occur frequently in saprophagous, but not predatory larvae (Dowding 1967). The frequent changes of direction that occur during lunging directs pumping to different places in the prey and ensures efficient extraction of food.

Our observations of *M. scalare* larvae confirm the relative loss of functionality in syrphine mandibles. Unlike the mandibles of most other cyclorrhaphan larvae, those of syrphines are immobile and embedded in the side margins of the head skeleton (Rotheray and Lyszkowski 2015). Their role is probably to strengthen the side margins, particularly to prevent them collapsing when the mouth opens and food is sucked in (Fig. 3c).

Finally, feeding on other larvae is probably a secondary acquisition in *M. scalare* larvae. This is suggested by the inadequate seal made between the predator and the prey meaning that larvae are not adapted to prevent loss of food from wounds as much as when feeding on aphids. When feeding on aphids, an almost perfect seal is made via sticky saliva and pulling the prey into the inverted apex of the pseudocephalon and prothorax, but when feeding on larvae prey fluids may leak from the wound (Fig. 4). In muscid larvae an effective seal is made by the almost perfect cylindrical shape of the thorax and coating of spicules which engage the prey cuticle evenly (Rotheray and Wilkinson 2015). No such morphology exists in *M. scalare* larvae.

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Dilophus bispinosus Lundström (Diptera, Bibionidae) and its enigmatic British distribution

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Summary
A review of all known British records of *Dilophus bispinosus* Lundström, 1913 is presented, together with the generally scant associated habitat data. Common factors are discussed and a tentative hypothesis developed for the species habitat associations. The species, however, remains an enigma. The female is very distinctive in the field but the species is known from just twelve specimens over a period in excess of 100 years – intriguingly, none from the same locality twice. Some patterns in habitat association are detectable although these appear to vary geographically within its British distribution: broad-leaved trees; woodland, woodland edge or wood pasture; large open-grown veteran trees; dry, freely-draining soils, but possibly including river alluvium; relatively mild microclimate; mosaics of vegetation types, including sheltered flower-rich meadow.

Introduction

The females of *Dilophus bispinosus* Lundström, 1913 are very distinctive, with ochre-coloured bodies and yellow legs, whereas the males are black and superficially very similar in appearance to those of *D. febrilis* (Linnaeus, 1758) (Freeman and Lane 1985). It seems quite feasible that male *D. bispinosus* could be overlooked amongst the much commoner *D. febrilis*. Most other native bibionids are also black-bodied, although the notum and abdomen of female *Bibio hortulanus* (Linnaeus) are orange red. *Dilophus bispinosus* was first found in Britain in 1903 and the total number of specimens reported has reached twelve, all single records from sites where the species has apparently not been seen subsequently – including well-worked sites where the species had not been reported previously. Working on the basis that a record is never just a record, but an opportunity to further our understanding of the species' biology and ecology, a review of the documentation has been attempted and a working hypothesis has been developed.

East Anglia 1906 – 1917

The species was first found in Britain in August 1903, when Claude Morley found one at Sheringham in East Norfolk (V.C. 27, TG14). The specimen was passed to Edmund Bloomfield with other unidentified Diptera, and identified for him by J.E. Collin (Bloomfield 1904; Morley and Atmore 1915). The latter publication includes a second record, another female beaten from hazel in Wangford Wood near Southwold on 13 September 1912. Morley (1947) later wrote that he took another on bracken in Staverton Thicks (TM3550) on 20 August 1917. He noted that Edwards in 1925 knew two indigenous specimens, taken at Boyton (TM3747) and Tangham Forest (TM3548) on 27-29 August 1907. These sites are all in East Suffolk (V.C. 25) and – like Sheringham – close to the coast. It is interesting to note that Morley (1947) was unable to provide any additional records over nearly 30 years, since 1917. None has been forthcoming since, so the species is possibly now extinct locally. The coastal distribution might suggest a phase of immigration across the North Sea, except that the species is not known from the Netherlands or Belgium (see later).

No habitat information was provided but Staverton Thicks is part of the historic parkland of Staverton and an SSSI for its large assemblage of ancient oak trees and the associated saproxylic invertebrate fauna. No 'Wangford Wood' is shown on modern OS mapping but Reydon Wood (TL4779) is close to Wangford and is a Suffolk Wildlife Trust Nature Reserve –

this is assumed to be the wood meant (P. Vincent *pers. comm.*). This ancient woodland site has recently been restored from conifer afforestation and the ash and hornbeam coppice stools have survived but the oak standards were cleared when it was converted to plantation forestry. It is also feasible that Morley meant what is now known as Wangford Common Covert, on the edge of Henham Park. Tangham Forest and Boyton are immediately south of Staverton Thicks, and are now within Rendlesham Forest – any habitat of interest is assumed to have been swept away by the Forestry Commission plantings. Sheringham is well-known for its stands of old oak. In conclusion, these sites appear to all be in or close to oak woodland or old oak wood pasture.

Hertfordshire (1932) and Berkshire (1944)

Freeman and Lane (1985) were only able to examine specimens from Berkshire, Hertfordshire and Suffolk in their handbook for the identification of Bibionidae. They stated that their keys were based almost entirely on the collections of the British Museum (Natural History), but acknowledge the loan of rare species from the J.E. Collin Collection in the Hope Department, Oxford University Museum of Natural History. The Berkshire specimen of *D. bispinosus* is noted as extracted from a swift's crop and stored in the Hope Department. Enquiries at the Natural History Museum in London found that only a single specimen was present in the collections (E. McAlister and D. Sivell *pers. comm.*). This relates to the Hertfordshire (V.C. 20) record: C.B. Williams took a specimen in a light trap at Harpenden, Hertfordshire (TL1314), 22.ix.1932. Williams had joined the staff at Rothamsted Experimental Station in that year and it seems likely that the record relates to Rothamsted rather than the nearby town of Harpenden. His interest was in insect migration and light-trapping was an important part of his studies. The Experimental Station is based on Rothamsted Manor (TL1213), a 16th century estate, and is set in an agricultural landscape with hedgerows, although there is also some ornamental parkland. It seems likely that the Suffolk specimen examined by Freeman and Lane (1985) originated from the Morley Collection, although this is mainly housed in Ipswich Museum (H. Mendel *pers. comm.*).

The Berkshire specimen was found in the crop of a swift and the specimen label indicates that this swift was found at Radley, near Oxford, in July 1944 by R. Vaughan (Zoe Simmons *pers. comm*). Richard Vaughan was involved in swift research with David Lack of the Edward Grey Institute (Lack and Owen 1955). Food balls brought by parent birds to their young were analysed, the birds having been netted for ringing purposes. A single specimen was found amongst twelve meals collected and analysed. L.W. Grensted identified the Diptera from the crop contents and just one *D. bispinosus* was present amongst 988 Diptera – 209 *Dilophus febrilis* were present in just one crop but bibionids were otherwise little represented in the diet of the swifts. Swifts typically feed 20-100 feet above the ground, and may circle up to several hundred feet (Lack and Owen 1955). They feed close to their colonies. Radley village and Park are situated along the flood-plain of the River Thames, around SU5298. Almost all of the swift meals collected indicated that the birds had been hunting over low-lying agricultural country, especially at Radley where the large proportion of grain aphids suggests feeding over fields.

Both of these records arise from typical low-lying, pre-war, agricultural landscapes, in contrast with the woodland and wood-pasture/parkland sites close to the East Anglian coast. With decades of intensive, industrialised agriculture, it is now difficult to comprehend the habitat quality provided by pre-war farmland.

21st century – Forth, Surrey, Bristol

Remarkably, the next series of specimens arose 75 years later and from three new areas: the Firth of Forth in Scotland, the North Downs of Surrey and most recently the Avon Gorge, Bristol.

In Scotland, the late Bob Saville took one female by sweep-netting through ground layer vegetation in a small area of fairly open deciduous woodland at Newbattle Woods (NT328663),

near Dalkeith, Midlothian (V.C. 83), 22.viii.2000 (Saville 2002). This site lies along the valley of the River South Esk, close to Dalkeith Oakwood SSSI – the site of a former royal hunting park – and presumably on sandstone geology or alluvial soils. Graham Rotheray took another single female on the other side of the Firth of Forth, at Falkland Palace in Fife (V.C. 85, NO2507), 23.viii.2012 (Skartveit *et al.* 2013). The actual site is called Orchard Meadow according to the NBN Atlas; this is actually an ancient orchard with a wildflower meadow (National Trust for Scotland website). Falkland Palace stands at the base of the northern slopes of East Lomond, in The Lomond Hills Regional Park; Craigmead Meadows SSSI on the south-west side of the hill is an area of calcareous meadow. Intriguingly there is also a former royal hunting park here. What are the chances of these two records coinciding with two of Scotland's very few royal hunting parks?

The Surrey (V.C. 17) records coincide approximately in time with the Scottish finds. Roger Hawkins (2005) exhibited one from Nonsuch Park, Cheam (TQ2363), 1.ix.2004. This is a former deer park, with undisturbed clay soils but over Chalk, with chalk pits. He comments (*in litt.*) that he beat a single female from *Sorbus vilmorinii*, an ornamental rowan which was planted about 3-5 years previously in an area of mown lawns and scattered trees sheltered on three sides by woodland. Ivan Perry (2010) later exhibited one from Denbies (TQ15), 22.viii.2009, a female amongst numerous *D. febrilis* swept from flowers of wild parsnip *Pastinaca sativa*. This site is a south-facing hillside of chalk grassland in the North Downs.

The most recent record is my own (Alexander 2017) from Leigh Woods NNR, Bristol (V.C. 6; ST5673), a female taken in a flight interception trap set in the top of a hollow ancient oak pollard above a large accumulation of compacted wood mould, operated from 27 June to 12 September 2016, coll. KNAA, det. PJC. Bristol has been a notably well-recorded area for Diptera, by H.L.F. Audcent and others, but this appears to be the first record locally and from western Britain as a whole. No other bibionids were taken in the ten traps operated across the site.

European situation

With the British records providing such limited clues as to its ecology, a search was made over the Internet to see what colleagues were finding elsewhere within its European range. *Dilophus bispinosus* has been described as having a sub-Mediterranean distribution (Haenni *et al.* 2005). It is widely distributed in Southern and Central Europe, and the Middle East, but it appears to be rare in most of the countries where it has been reported (Skartveit and Kaplan 1996). The first Slovakian record originated from a surprisingly high altitude (900 m) but from a warm open habitat (beech forest margin) on the south-eastern margin of a limestone rocky formation (Pol'udnica Res.) (Mantic *et al.* 2015). This is a comparable situation to the Leigh Woods record, being in a generally damper part of Britain but with a relatively warm microclimate due to the limestone gorge situation. Also, interestingly the species is associated in Israel with oak forest and appears to be relatively numerous in this situation (Skartveik and Kaplan 1996).

Biology and phenology

The larvae of Bibionidae feed on roots and decaying organic matter in damp soil and the adults play a part in fertilisation of fruit tree blossom (Freeman and Lane, 1985). Bibionids have been reared from rot-hole material in veteran trees on occasion (A. Godfrey *pers. comm.*).

Adults of *D. bispinosus* are said to be on the wing during August – September (Freeman and Lane 1985), although the British records actually suggest a more restricted flight period. The recent records cover only a ten-day period – August 22 (2), 23 (1), September 1 (1); while the old records cover a wider period, from 27 August to 22 September. This suggests that the flight period is from late August to late September, a period of perhaps just 30 days. Continental records, however, cover a much broader range of dates including a surprising 23 June in Romania

(Pârvu 2005) and a more typical 12 October in Spain (diptera.info, consulted 7.i.17). Such variation may reflect emergence in response to a seasonal environmental variable (R.P. Lane *pers. comm.*).

Habitat associations

Table 1 attempts to bring together information on the common factors apparent from the records, to help develop an appreciation of the types of place where the species has been found.

Table 1. Habitat information available for British records of *Dilophus bispinosus*.

Site	Landscape situation	Gross habitat type	Immediate vegetation information
Sheringham	East Anglian coastal		
Wangford Wood	East Anglian coastal	Woodland or woodland edge	Off hazel
Staverton Thicks	East Anglian coastal	Wood pasture	On bracken
Boyton	East Anglian coastal	? woodland	
Tangham Forest	East Anglian coastal	? woodland	
Harpenden	Inland agriculture	Agricultural fields	
Radley	Inland agriculture	Agricultural fields	
Nonsuch Park	North Downs	Wood pasture	Off *Sorbus vilmorinii* in sheltered open area
Denbies	North Downs	Chalk downland	Wild parsnip flowers; chalk grassland
Newbattle Woods	River valley, south side of Firth of Forth	Woodland edge	Ground layer vegetation
Falkland Palace	North side of Firth of Forth	Traditional orchard	Wildflower meadow
Leigh Woods	Avon Gorge, near Bristol Channel	Former wood pasture	Ancient oak pollards

One thing appears clear, that for each grouping of records there are common threads. The East Anglian records suggest coastal woodland and wood pastures, the Thames Basin records are in typical low-lying agricultural landscapes, the Scottish records are from either side of the Firth of Forth. This may suggest that the specific habitat requirements may be met in a variety of different ways according to local conditions and microclimate.

Conclusions

The ecology of this species is proving impossible to tie down, with none of the reported sites known to generate more than a single specimen. Also, the earlier records are clustered in counties which have generated no further records. The most recent records are from very different areas, with two Scottish records belying the suggestion for a sub-Mediterranean distribution – albeit in

relatively mild situations close to a major sea inlet. While this might suggest a highly mobile species, colonising new areas and then dying out soon after, this scenario is inconsistent with its general rarity across its European range. It has to be assumed that these represent very isolated and small populations, but with no real evidence for established populations. Could it be a species which occurs as very small populations in very localised situations, which results in it being overlooked? It may be that climate change is resulting in conditions under which the species has again become detectable – it is said to be a warmth-loving species. Or could the records be the result of casual introductions with imported produce, the populations never establishing locally?

The species appears to be associated with undisturbed soils (with little or no history of gross disturbance, physically and chemically), over free-draining substrata (e.g. limestone or sandstone, but possibly also river alluvium), with a relatively warm and dry microclimate. The local vegetation is characterised by the presence of trees (oak, beech, fruit), either as large old open-grown individuals in wood-pasture situations (Leigh Woods and Staverton Thicks) or traditional orchard (Falkland Palace), or wood-edge (Newbattle Woods and possibly Denbies and Wangford). Some but not all sites are along river valleys, where topography creates the desired microclimate. The Hertfordshire and Berkshire records both appear to be from conventional agricultural landscapes, albeit before modern intensification.

With just five modern records the species would have to be assessed as Nationally Rare in Britain. A lack of understanding of its ecology means that a IUCN Red List assessment cannot be made as no obvious or justifiable threats can be suggested. Cultivation would presumably disrupt or destroy the larval soil habitat. Trees may be important as a source of nectar and/or pollen for female flies – although only the Denbies specimen has been taken at blossom; felling might be potentially damaging. Could the larvae be in wood-mould in tree cavities rather than soil? Could soil carbon or soil biodiversity be important factors? Leigh Woods is a NNR, part of the Avon Gorge SSSI, and under active conservation management. Denbies Hillside is a SSSI, also under active conservation management. Orchard Meadow at Falkland Palace is NTS property. However, with such very incomplete knowledge of the precise habitat requirements, actions which might be considered good conservation practice generally might actually be damaging for this species – and vice versa.

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Dipterists Digest 2017 **24**, 67-70

Trichomyia minima Withers (Diptera, Psychodidae) and other notable Diptera from the Tyntesfield Estate, North Somerset

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Summary
A commissioned study of the saproxylic invertebrates of the National Trust's Tyntesfield Estate was carried out during the 2016 field season. A programme of flight interception trapping yielded material of 248 species of Diptera from nine traps placed by carefully targeted saproxylic habitat, in or on nine veteran broad-leaved trees. Of these flies, 99 species appear to be primarily saproxylic. These include 17 species currently or provisionally assessed as Nationally Scarce, as well as two species only recently recognised as occurring in Britain. Of greatest interest is the discovery of a single specimen of *Trichomyia minima* Withers, the third known to science.

Introduction

Tyntesfield is presented by the National Trust as a Victorian country house and estate, but the house was actually preceded by a Tudor hunting lodge and the surrounding landscape remains relatively rich in veteran trees. The land was owned by the Tynte family, who lived at Halswell House, near Bridgwater, and had a hunting lodge here, implying that the area was unenclosed and uncultivated, wild country during the Tudor period at least. One can envisage the Tudor hunting grounds as open wood pasture along the steep slopes, unsuitable for cultivation by the available technology, but excellent for the pleasures of the hunt. There was also a medieval deer park site either close by or partly coincident. The oldest trees are almost certainly the larger oaks – predating the present house by two centuries at least – but the area also has much mature beech, an old avenue of common lime leading up to the house, and the occasional large old ash trees. The estate lies on the eastern edge of Wraxall Civil Parish in North Somerset (V.C. 6) centred on ST47/57. The whole ridge remains heavily tree-covered, with parkland and woodlands.

The survey

The author was commissioned to carry out an investigation of the saproxylic invertebrate interest associated with selected veteran trees across the estate during the 2016 field season. The basic technique employed was to be trapping and the four-bottle type flight interception trap was chosen as the most targeted approach currently available (Alexander *et al.* 2016). The first visit began with a tour of the estate's veteran trees led by the local National Trust ranger team. Ten trees (see Table 1) were identified for trapping on the basis of the presence of accessible decaying wood, rot-holes and/or bracket fungi.

Traps 1 to 7 were placed within the 1km OS grid square ST5071, while traps 8 to 10 were within ST4971. The traps were first set up on 16 May 2016 and finally emptied on 31 October 2016; intermediate visits were made on 13 and 20 July and 28 September, providing samples for each of the three date periods. The traps were therefore operated for 5½ months across – more or less – the full field season.

Table 1. Description and location of the visible saproxylic habitats of the trees selected for trapping at Tyntesfield [gbh = girth at breast height, i.e. 1.5 metres from the ground].

Tree & location	Position of trap
Lime Avenue	
1. Common lime of 4.98m gbh, with *Polyporus squamosus* fungus high in crown	Above a large cavity in the NE side, with white rot exposed, where a large limb had ripped out in the recent past
Hay Field	
2. Collapsed oak estimated 3.5m gbh	Low down in shattered base, some white-rot exposed as well as much freshly split un-decayed heartwood
Rock Field	
3. Large parkland oak with very hollow trunk 5.09m gbh	Hung inside the top of the hollow trunk
Sawmill Combe	
4. Large veteran open-grown oak recently opened up from secondary and plantation woodland 4.9m gbh	Hung on side of trunk opposite a small cavity with fresh brown-rot wood mould
Car park area	
5. Hollow ash tree with upper trunk largely gone 2.69m gbh	Hung inside top of hollow trunk
Farm Plantation	
6. Standing dead beech with top snapped and gone	Hung in top of decay-filled cavity
7. Standing live beech with *Ganoderma australe* and *Ustulina* fungi	Hung alongside trunk
Battleaxes Field	
8. Mature oak on upper edge of pasture 3.14m gbh	Hung by a cavity at 3m height with brown-rot
Wraxall Woods – Rectory Cottage	
9. Woodland beech c3.5m gbh; east side lost leaving a basal ring of solid wood and wet wood mould within	Hung over the wood mould
10. Woodland beech 2.70m gbh; top collapsed; *Ganoderma australe* bracket fungi	Hung under white-rot of hanging top. **NB this trap disappeared before the first collection and was not replaced.**

Results

A final total of 248 species of Diptera were identified from the samples of which 99 appear to be primarily saproxylic. These include 17 currently Nationally Scarce or provisionally Nationally Scarce species (Falk 1991; Falk and Chandler 2005; Falk *et al.* 2016; Falk and Pont in press – calyptrates; Boardman in prep. – craneflies), and two species only recently recognised as occurring in Britain – see Table 2. *Keroplatus testaceus* and some of the mycetophilids, including the *Mycomya* and *Sceptonia* species, may no longer merit their status as Nationally Scarce (Peter Chandler *pers. comm.*). Of greatest interest is the discovery of a single specimen of *Trichomyia minima* Withers, the third known to science.

Table 2. Diptera species of particular interest taken in the flight interception traps.

Family and species	Status	1	2	3	4	5	6	7	8	9
Tipulidae										
Ctenophora pectinicornis (Linnaeus)	NS	f								
Limoniidae										
Rhipidia uniseriata Schiner	NS	m								
Keroplatidae										
Keroplatus testaceus Dalman	NS						m			
Mycetophilidae										
Brachypeza armata Winnertz	NS						f			
Docosia flavicoxa Strobl	NS							2m1f		
Exechia dizona Edwards	NS		m							
Mycetophila stylatiformis Landrock	Not assessed							3m1f		
Mycomya parva (Dziedzicki)	NS							m		
Neoempheria bimaculata (von Roser)	NS							m		
Sceptonia flavipuncta Edwards	NS							m		
Psychodidae										
Trichomyia minima Withers	Not assessed					m				
Rhagionidae										
Chrysopilus laetus Zetterstedt	NS							f		f
Stratiomyidae										
Eupachygaster tarsalis (Zetterstedt)	NS	f								
Clusiidae										
Clusia tigrina (Fallén)	pNS									f
Chloropidae										
Lasiambia brevibucca (Duda)	pNS				m					
Fanniidae										
Fannia aequilineata Ringdahl	pNS									f
Muscidae										
Helina abdominalis (Zetterstedt)	pNS									m
Phaonia cincta (Zetterstedt)	pNS								2m	
Phaonia pratensis (Robineau-Desvoidy)	pNS								2f	
Total of species of particular interest		**3**	**1**	**0**	**1**	**1**	**2**	**6**	**2**	**4**

***Trichomyia minima* Withers**

Withers (2004) described this moth fly as a species new to science based on a male and a female taken by John Ismay in two Malaise traps sited in the vicinity of ancient beech trees at Burnham Beeches (SU98) in Buckinghamshire, 5-31.viii.1996. Several decayed trees with rot holes were available in close proximity in both cases. No further examples have been reported since the original description of this species (Phil Withers and Gunnar Kvifte *pers. comm.*), until now. A single male was taken in a trap hung inside a large girth hollow ash tree. The trap had been placed here in May 2016 and was emptied on 19 July, 28 September and finally dismantled on 30 October. The male was taken during the July to September trapping period. Three males and six females of the widespread *T. urbica* Haliday were taken in the same trapping period. Two males of another psychodid *Telmatoscopus advenus* (Eaton) had been taken by the same trap in the first trapping period. This trap proved to be one of the two least productive of the nine for Diptera, with only the *T. minima* being of any particular note – only the third known specimen globally. In this particular study, species-richness does not equate with the tree producing the most interesting species.

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Macrobrachius kowarzii Dziedzicki (Diptera, Mycetophilidae) new to Britain, and other notable Diptera from Ashenbank Wood, West Kent

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Summary
A commissioned study of the saproxylic invertebrates of the Woodland Trust's Ashenbank Wood was carried out during the 2016 field season. Conventional hand-search and netting techniques, supported by a programme of flight interception trapping, yielded material of 195 species of Diptera. Seven traps were placed by carefully targeted saproxylic habitat, in or on veteran broad-leaved trees. Of these flies, 82 species appear to be primarily saproxylic. The catches include one species which has provisionally Vulnerable status (a milichiid *Madiza britannica*), and 19 species with current or proposed Nationally Scarce or provisionally Nationally Scarce status. The Diptera also include two species only recently recognised as present in Britain and one not previously known to occur in Britain at all (the fungus gnat *Macrobrachius kowarzii* Dziedzicki, 1889), although these are mostly likely to be recent colonists responding to climate change.

Introduction

Ashenbank Wood (TQ6769) was formerly part of the very extensive Cobham Hall Estate. The first edition large-scale OS map shows the area as extensive woodland along the south side and with a series of hedged enclosures with frequent hedgerow trees around a building named as The Mount (an Elizabethan manor). The enclosures on the west side of The Mount are shown as rough ground. The Mount and its immediate grounds are currently in private ownership. Across the public road along the east side of the wood is Cobham Hall, surrounded by parkland, with the National Trust's Cobham Woods and Rochester & Cobham Park Golf Club beyond. Immediately to the north is the high-speed rail link between London and the Channel Tunnel, the A2 dual carriageway, with Shorne Woods Country Park beyond. This complex of sites is rich in veteran trees from former wood pasture land-use systems. The land surrounding The Mount had been subject to a period of landscape gardening in the 18th century, including Repton-style planting of sweet chestnut trees to frame views. The older sweet chestnut trees date from this period (C. Steward *pers. comm.*).

Ashenbank Wood is currently predominantly scattered trees of around 200 years age in a matrix of younger secondary woodland. There are a few older trees – up to 350 years old. Mature and veteran sweet chestnut predominate, with small numbers – localised – of oak, hornbeam, and a very few ash, sycamore and field maple. Old hawthorns and elders are an especially valuable feature for invertebrates, providing nectar and pollen. Many of the older trees have open-grown form, with good lateral branch development or traces of former laterals, now lost. Dead lateral branches are an important habitat for invertebrates as are the rot-holes which form in their trunk stubs after the branches are lost. Some of the older sweet chestnut are multi-stemmed but this presumably has arisen from regrowth following felling or damage rather than former coppice. These valuable veteran trees are currently engulfed within secondary sycamore development, although work is in progress to free the veteran trees from this competition. The young sycamore growth is increasing shade levels across the wood and suppressing saproxylic activity. A light grazing regime using cattle has been restored to much of the area in order to help to maintain the open mosaic structure.

Ashenbank Wood forms part of the Shorne and Ashenbank Woods SSSI, designated in 1968 for its diverse invertebrate fauna, especially Coleoptera (Beetles), Hemiptera (true bugs) and Odonata (dragonflies). Another section of the complex has been designated as the Cobham Woods SSSI, also in 1968, but for woodland and parkland, and an outstanding assemblage of plants. The citation acknowledges that the latter site was well-known in the past for its beetles and bugs, but notes a lack of recent information. An invertebrate survey of Cobham and Ashenbank Woods in 1998 (Kirby 1998) addressed this lack of recent knowledge and found the area to still be rich in Nationally Rare and Nationally Scarce beetles and bugs as well as Diptera (true flies), Hymenoptera (bees and ants), and spiders.

The construction of the Channel Tunnel Rail Link to London cut through the northern edge of Ashenbank Wood (Tither 1999) and, as part of the mitigation, a dozen large trees which were removed from its path were strapped to stout live trees nearby. That author described this work as the largest re-erection scheme to be carried out (in Britain). Standing dead wood is amongst the rarest of habitats due to human concerns about safety and tidiness. The re-erection was part funded by the Cobham Ashenbank Management Scheme (CAMS) as was the Kirby invertebrate survey in 1998.

The survey

The author was commissioned to carry out an investigation of the current saproxylic invertebrate interest during the 2016 field season, to assess whether the current management has been beneficial and to make recommendations for improvements. The basic techniques employed were hand-searching and netting, supported by trapping – the four-bottle type flight interception trap was chosen as the most targeted approach currently available (Alexander *et al.* 2016). The first visit began with a tour of the estate's veteran trees led by the local Woodland Trust officer. Seven trees (see Table 1) were identified for trapping on the basis of the presence of accessible decaying wood, rot-holes and/or bracket fungi. Two of the re-erected trunks were amongst the trees selected.

Table 1. Description and location of the visible saproxylic habitats of the trees selected for trapping at Ashenbank Wood [gbh = girth at breast height, i.e. 1.5 metres from the ground].

Tree & location	Position of trap
Area open to cattle grazing	
1. Large open-grown hornbeam in temporary grazing exclosure; bracket fungus *Ganoderma australe* fruiting at base TQ67541/69052	In front of large cavity giving access to humid wood mould within; west side of tree
2. Standing dead oak in open strip by overhead telephone cable TQ67559/69413	Hung on sunny south side of trunk against extensive exposed decayed sapwood
3. Large hollow ash >5m girth with white-rotted interior TQ67858/69467	Hung at head height inside the hollow trunk
4. Re-erected sycamore trunk attached to mature oak; bark lost and advanced white-rot TQ67863/69179 Tag 6107	Hung against re-erected trunk
5. Re-erected oak trunk attached to mature oak; bark partially lost TQ67485/69540 Tag 6109	Hung against re-erected trunk

Tree & location	Position of trap
Grazing exclosure	
6. Large veteran oak, 3.49m gbh TQ674/694 – further detail not recorded	In front of medium-sized cavity/rot-hole at 1.5m above ground
7. Large veteran sweet chestnut, 5-6m gbh TQ675/694 – further detail not recorded	On collapsed dead branch, propped against trunk; trap at about 1.5m above ground

The traps were first set up on 19 May 2016 and finally emptied on 2 November 2016; intermediate visits were made on 28 June and 13 September, providing samples for each of the three date periods. The traps were therefore operated for 5½ months across – more or less – the full field season.

Results

A final total of 195 species of Diptera was identified from the samples of which 82 appear to be primarily saproxylic. These include one species which is currently assessed as provisionally Vulnerable (the milichiid *Madiza britannica*) and 19 Nationally Scarce (NS), provisionally NS, or Notable species (Falk 1991; Falk and Chandler, 2005; Falk *et al.* 2016; Falk and Pont in press – calyptrates; Boardman in prep. – craneflies), as well as two species only recently recognised as occurring in Britain and a third actually new to Britain – see Table 2.

Table 2. Diptera species of particular interest taken in the flight interception traps.

Family & species	Status	1	2	3	4	5	6	7
Limoniidae								
Atypophthalmus inustus (Meigen)	NS							3m
Rhipidia uniseriata Schiner	NS			4f				
Mycetophilidae								
Allodia silvatica (Landrock)	NS							5m
Brachypeza armata Winnertz	NS							1m 3f
Macrobrachius kowarzii Dziedzicki	Not assessed						1m	6m
Mycetophila caudata Staeger	NS						1f	
M. lastovkai Caspers	NS							2m
M. lubomirskii Dziedzicki	NS							1m
M. stylatiformis (Landrock)	Not assessed						1m 3f	170m 63f
M. sublunata Zaitzev	Not assessed							4m
Sceptonia flavipuncta Edwards	NS						1m	
Sciophila interrupta (Winnertz)	NS				1m			
Trichonta fragilis Gagné	NS							1m
Psychodidae								
Saraiella consigliana (Sara)	Not assessed					1m		
Rhagionidae								
Chrysopilus laetus Zetterstedt	NS	1m						
Scenopinidae								
Scenopinus niger (De Geer)	NS			1m				

Family & species	Status	1	2	3	4	5	6	7
Hybotidae								
Oedalea apicalis Loew	NS	1f						
Sciomyzidae								
Pherbellia annulipes (Zetterstedt)	N	1m						
Milichiidae								
Madiza britannica Hennig	pVU			1f				
Chloropidae								
Lasiambia brevibucca (Duda)	pNS						1f	
Heleomyzidae								
Oecothea praecox Loew	pNS		1m					
Fanniidae								
Fannia aequilineata Ringdahl	pNS	2f						
Fannia clara Collin	pNS							1f
Muscidae								
Mydaea maculiventris (Zetterstedt)	pNS						1f	

Amongst the Diptera found, *Madiza britannica* has recently been provisionally assessed as Vulnerable in Britain and *Lasiambia brevibucca* as Nationally Scarce (Falk *et al.* 2016). Both are very typical of veteran trees (Alexander and Perry 2013, Alexander 2014). *Madiza britannica* appears to be a new record for SE England, the nearest other record coming from Cambridgeshire. Kirby (1998) also found *Oedalea apicalis* and *Pherbellia annulipes* in Ashenbank Wood, as well as *Chrysopilus laetus* in the neighbouring Cobham Woods, 23.vii.1998; this was the only previous Kent record of this species, although there are a number of recent records from adjacent counties (Surrey, Middlesex, Essex). *Scenopinus niger, Allodia silvatica, Brachypeza armata, Mycetophila caudata* and *Sciophila interrupta* are all new species for Kent. All are known from adjacent counties and probably indicate under-recording in Kent, except for *M. caudata* which has recently spread over SE England. Some of the other species of fungus gnats, including *M. lastovkai, M. stylatiformis* and *M. sublunata,* were first recorded from Kent on the 2016 Dipterists Forum summer field meeting based at Canterbury. For *Mydaea maculiventris* this is the second Kentish record, although the source of the Tunbridge Wells record (cited in the draft calyptrate review) is uncertain (Laurence Clemons and Adrian Pont *pers. comm.*). *Saraiella consigliana* has only once been found previously in Kent, from the nearby Shorne Woods Country Park (TQ677704), a male in a similar flight trap operated by the author between 13 and 27.ix.2011; there are relatively few records nationally.

The exciting discovery is the fungus gnat *Macrobrachius kowarzii* Dziedzicki as this species has not previously been found in Britain. Six males were trapped on the large old sweet chestnut and a seventh on the veteran oak in the ungrazed exclosure, all in the final trapping period, from 13 September until 2 November; 92 of the 99 fungus gnats recorded came from these two traps. The reason this particular area has been fenced out is due to the presence of a deep pool – situated between the two trapped trees – and the perceived risk of the cattle becoming trapped in the water. The exclosure is about 100m across and has ground cover comprising of bare leaf litter or dense bramble, except in the immediate vicinity of the pond which has dense ground vegetation of wetland plants. It seems probable that the proximity of this pond increases the humidity in the vicinity, making it more attractive to Diptera – 14 of the species listed in Table

2 were taken in this exclosure, compared with 9 within the much larger main grazed wood pasture. The intention appears to be to leave this exclosure as minimum-intervention.

Two other species of fungus gnat only recently found in Britain, *Mycetophila stylatiformis* and *M. sublunata* were also only found in the exclosure. The former was recently added to the British list from Windsor Forest, Berkshire and the Warburg Reserve, Oxfordshire (Chandler 2015), and was also found on the Tyntesfield Estate in Somerset during 2016 (Alexander 2017). The latter was first recorded in Britain in 2011 (Chandler 2011b) but is now known to be widespread though scarce in the south (Peter Chandler *pers. comm.*). It seems likely that all three represent an expansion into Britain from across the English Channel and that all three will become much commoner and more widespread in due course. The *Sceptonia* and *Trichonta* both probably no longer merit their status as Nationally Scarce (Peter Chandler *pers. comm.*). The total number of fungus gnats found in the single field season – 99 species – is very notable.

***Macrobrachius kowarzii* Dziedzicki, 1889 new to Britain**

The genus *Macrobrachius* Dziedzicki, 1889 includes only a single European species, so is also a new addition to the British fauna. It is closest to the genus *Phronia* Winnertz, which includes 34 British species. The wing venation is similar, but distinct in having a very short posterior fork, about a quarter the length of the median fork, and the costa is strikingly extended halfway from R_5 to M_1, while in *Phronia* it reaches at most a third of the distance between these veins and the posterior fork is longer. The male tergite 7 is well-developed, while it is reduced and contracted within tergite 6 in *Phronia* as in most Mycetophilinae, but the genitalia are small and simple in structure.

Macrobrachius kowarzii is a small yellow and brown gnat (wing length of the Ashenbank males 2.1-2.5mm). The thorax is yellowish on most of the pleura and sides of the mesonotum which is darker brown dorsally, and the scutellum, laterotergite and mediotergite are brown. The abdomen is dark brown except for yellow lateral patches on tergites 1-4, which are broader basally on 2-4 and reduced to a basal triangle on 4. The legs are yellow except for the hind femur which is brown on the apical two fifths. Dziedzicki (1889), when describing *M. kowarzii*, indicated that both sexes had distinct wing markings, but Chandler (2008) noted that all the males he had seen have the wing practically clear, while the six Italian females then examined had distinct wing markings, which he figured to show the pattern. These markings comprise an apical shade including the tips of the radial veins and extending to M_1, an elongate median spot over the base of the median fork, and a longitudinal shade on the stem of the posterior fork. A female recorded from Spain by Chandler (2011) had similar markings, while the British males recorded here have the wings unmarked, so it is concluded that there is usually a sexual difference in this character. Kjærandsen (2015) includes habitus photographs of the male and of diagnostic characters including the genitalia, taken of a Swedish specimen.

The biology is currently unknown but is probably similar to that of *Phronia*, where most known associations are with encrusting fungi on decaying wood. This species is widespread in Europe but everywhere uncommon. In addition to the records cited in Fauna Europaea (Chandler 2004) from Austria, Belarus, the Czech Republic, France, Germany, Hungary, Lithuania, Poland, Romania and Switzerland, and the recent finds in Italy and Spain mentioned above, it has been recorded from Slovakia (Ševčík 2004, Ševčík 2009, Ševčík and Kurina 2011) and Russian Karelia (Jakovlev *et al.* 2014), and was also reported to occur in Norway and Sweden by Kjærandsen (2015). It is unclear whether this recent increase in national records indicates a spread or merely reflects earlier under-recording.

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***Rhamphomyia marginata* (Fabricius) (Diptera, Empididae) discovered in northern Hertfordshire –** I was most surprised to discover a single female of *Rhamphomyia marginata* (Fabricius, 1787) (Fig. 1) amongst the catch in an 8-watt actinic light trap opened after the night of 5 – 6 May 2017 in Scales Park, Hertfordshire (V.C. 20; TL4133). The site is a moderate-sized (approximately 1500 x 1200 metres) neglected conifer plantation (primarily Corsican Pine *Pinus nigra*) planted approximately sixty years ago, although other species of conifer are present, including *Pinus sylvestris*, *Picea abies* and *Larix decidua.* Around 45 mostly more or less square or rectangular blocks of woodland are defined by rides; many of these have a concrete substrate beneath the superficial vegetation, reflecting the war-time use of the site as an RAF bomb storage area. Deciduous trees of a significant variety form broad edge zones to the coniferous blocks and most of the main rides are maintained open. A lesser number of rides follow the same format, but are narrower and not always based on a man-made substrate. The woodland is now managed with minimal interference with a main aim of improving its value to wildlife – especially birds, of which a number of locally important species are represented. It may be of importance to note that the woodland is isolated in the "arable desert" of northern Hertfordshire/north-west Essex/southern Cambridgeshire.

The origin of this species as a member of the British fauna is unclear. It was added to the British list by P.J. Chandler (1973. *Rhamphomyia (Pararhamphomyia) marginata* Fabricius (Dipt., Empididae), a remarkable addition to the British list. *Proceedings of the British entomological and Natural History Society* **6**(3), 73-76) from woodland in East Kent (V.C. 15) and there are no British records prior to 1971. Based on records listed by L. Clemons (1999. Notes and observations on *Rhamphomyia marginata* (Fabricius) (Diptera, Empididae) in East Kent. *Bulletin of the Kent Field Club* **44,** 89-93) and on those held in the national recording scheme, currently maintained by my brother, Adrian R. Plant, the fly expanded into a wider area of East Kent in the late 1990s and into the early part of the present millennium, but it remains more or less confined to that area, with only four reports, all of singletons, elsewhere.

There are reports from West Kent (V.C. 16) at Chattenden in 2004 and 2007, and single reports from South Essex (V.C. 18) near Basildon in 2015 (perhaps not overly surprising as this is just across the River Thames from Kentish localities) and from the New Forest in South

Hampshire (V.C. 11) in 2009. Thus, the present record represents only the fourth outside East Kent. With these outlying records in mind it is of interest that *Rhamphomyia marginata* appears to be at least partially nocturnal in habit. All of the non-Kentish reports, including the present one, herald from lepidopterists' light traps and are a significant distance from the "home range" of the species. This might indicate a species that is prone to random dispersal – and if not from Kent to northern Hertfordshire then why not the rather shorter distance from Europe to East Kent?

Fig. 1. Female of *Rhamphomyia marginata* (Fabricius) from Scales Park, Hertfordshire.

One wonders how many other examples may have been ignored by trap operators? Interested dipterists might do well to ask their local moth recorders to save their trap debris.

The species has extended its range further as on 16 May 2017 a female was photographed by Frank Porch on low vegetation at about 12:23pm at Wakerley Great Wood (SP96119849), Northamptonshire and the photograph [see front cover] was posted on Flickr.

My thanks to Peter Chandler for helpful comments on the status of the fly and significance of the record, and for passing to me a copy of the records held by Laurence Clemons, to Laurence and David Gardner for information on those in West Kent, to Roger Morris for alerting me to Frank Porch's record, and to Frank for further details of that record. I should also thank my brother, Adrian Plant, for a copy of the records held in the national database and for several helpful comments – **COLIN W. PLANT**, 14 West Road, Bishops Stortford, Hertfordshire, CM23 3QP; cpauk1@ntlworld.com

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The relative importance of wet woodland and wet grassland for Diptera conservation: a case study from Devon, England

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Summary

The nature conservation importance of the Diptera (true fly) fauna of adjacent wet woodland and semi–natural wet grassland habitats within a Culm site in north Devon (south-west England) was compared by counting the number of threatened or scarce species recorded. A total of 845 species was identified. These include 67 species believed to be either threatened or near threatened with extinction in Britain, or nationally rare or nationally scarce. Of these 13 are considered likely to be wet woodland specialists but just two wet grassland specialists. 25 of the 67 species have larvae associated with decaying wood, a frequent feature of the wet woodland. It is concluded that wet woodland is worthy of conservation effort alongside wet grassland, and that where the two habitats occur together they should be managed in a complementary, not exclusive, manner. Some species require the presence of both habitats, and others are likely to be specialists of the boundary between the two habitats.

Information is given on other threatened or scarce Diptera (a further 11 species) and on threatened or scarce Lepidoptera (butterflies and moths) and Coleoptera (beetles) recorded on similar sites in north Devon. As with Diptera, the majority of threatened or scarce Coleoptera are associated with wet woodland rather than wet grassland; the converse is true for Lepidoptera.

The most species-rich families were Mycetophilidae (fungus gnats), Syrphidae (hoverflies), Muscidae, Dolichopodidae and Limoniidae (craneflies).

Introduction

Scattered across a large swathe of northern Devon in south-west England, within an area known as the Culm, lie numerous wet woodlands and semi-natural wet grasslands, often side by side in a habitat mosaic. Similar wet woodland – wet grassland habitat mosaics are frequent across western Britain, with local names like Rhôs pasture or Culm grassland (e.g. Gardiner 2009), and where not divided into compartments by fences have similarities to wood meadow or wood pasture (Peterken 2017). The purpose of this paper is to compare the importance of these two habitats for invertebrates through focussing on their fly (Diptera) fauna, and to promote more holistic management of sites which contain both.

The Culm is named after the underlying geology: an area of sedimentary slates, shales and sandstones of the Carboniferous Period termed the Culm Measures. This area broadly occupies the ground between the uplands of Exmoor, Dartmoor and Bodmin Moor, extending eastwards from Devon into Somerset and westwards into Cornwall. The soil is predominantly heavy clay, which drains poorly, and this together with a high rainfall provides ample opportunities for wet woodland and wet grassland plant communities to develop.

Over the last three decades the Devon Wildlife Trust and Natural England (and their predecessor bodies) have spearheaded a sustained and successful campaign to conserve Culm grasslands (e.g. Wolton 1993, Burgess and Bulman 2007, Burgess 2010). The focus of this effort has been on the grassland element, typically a mixture of fen meadow and rush pasture. By

comparison little attention has been paid to associated wet woodlands and indeed these tend to be regarded as recent or invasive and of little conservation merit. This reflects poor understanding of their wildlife value: knowledge of their invertebrate fauna is particularly lacking. As a consequence, substantial areas of wet woodland have been removed to expand the area of grassland without much thought being given as to what might be being lost.

That the open grasslands have been seen as the priority is understandable: they are very vulnerable to agricultural destruction, they can have stunning displays of orchids and other flowers, and they are the habitat of an attractive and threatened butterfly, the marsh fritillary *Euphydryas aurinia* (Rottemburg, 1775), along with several other charismatic species. By contrast, the associated willow and alder woodlands are more robust, tend to be visually dull and have few if any charismatic species – only a bird, the willow tit *Poecile montana* (Conrad von Baldenstein, 1827), comes close to qualifying on this account.

Furthermore, one of the main grassland plant communities present within Culm grassland, '*Molinia* meadows on calcareous, peaty or clayey–silt laden soils (*Molinion caeruleae*)' is recognised as being a priority for conservation measures at a European level through its inclusion on Annex 1 of the Habitats Directive (European Union's 1992 Council Directive 92/43/EEC). Only wet woodlands growing on alluvial soils are afforded similar status, soils that are not characteristic of the Culm. Both the wet grassland (i.e. purple moor grass and rush pastures) and wet woodland were, however, recognised as priority habitats for conservation action within the 1995 UK Biodiversity Action Plan. Consequently, both habitat types are currently recognised as being of principal importance for the purpose of conserving biodiversity under Section 2(4) of the Nature Conservation (Scotland) Act 2004, Section 41 (England) of the Natural Environment and Rural Communities Act 2006, and Section 7 of the Environment (Wales) Act 2016.

Wet woodlands are widely recognised among entomologists to possess a rich Diptera fauna. Nevertheless, published studies on this fauna in Britain are virtually non-existent – those that exist are reviewed in Drake (2011). Drake (2011) sampled the Diptera of a wet woodland, also in Devon but 80 km to the east. 486 species were recorded. Information is provided on the most frequently encountered species, on the most species-rich families, on seasonal variation in numbers and on scarce and rare species. Further information is presented in the same paper on the Diptera of three wet woodland Sites of Special Scientific Interest in neighbouring Dorset on similar Cretaceous geology. Wheeler *et al.* (1999) reviewed the biodiversity value of wet woodland in comparison to open herbaceous wetlands. They focussed on the effects of natural succession on plant communities, and were able to provide scant information on the comparative value of the two habitat types for invertebrates.

The study reported here is designed not to describe the Diptera fauna of a wet woodland but rather to compare and contrast this fauna with that of an adjacent semi-natural wet grassland, to help establish their relative nature conservation value. A survey of the invertebrates of Clayhidon Turbary Nature Reserve, a site in east Devon which contains wet heath, mire and boggy woodland, noted that although the heath and mire have been regarded as the key features of the reserve for nature conservation, the boggy woodland and wooded boundary banks support the more interesting invertebrate fauna (Alexander 2015). This paradox is common on nature conservation sites. The information presented in this paper will, it is hoped, assist site managers to adopt a more balanced approach to the conservation of wet grassland – wet woodland habitat mosaics, both on the Culm and elsewhere.

Methods

Study site

The study site, Scadsbury Moor, forms part of Locks Park Farm, near Hatherleigh in Devon (SS518014, V.C. 4, North Devon). The Moor, in effect a single 7.23 ha land parcel, occupies the

south-facing slope of a shallow valley. It is roughly rectangular, measuring 470m by 155m, the long axis running east-west. Within it lies a long irregular central clearing of semi-natural wet grassland, 3.43 ha in size. Native broad-leaved woodland, predominantly wet, completely encircles this clearing and makes up the remainder of the Moor. Aerial photographs taken between 1946 and 1949 show this woodland occupying a very similar area to that of the current day, so it is at least 70 years old. A small stream forms the lower, southern, boundary, running through the woodland. On the other side of this stream, in separate ownership, lies further woodland, including about 3 ha of very wet woodland, occupying the north-facing slope of the valley. Beyond this is Rutleigh Wood (c. 15 ha), an ancient oak woodland running down to the River Lew (English Nature 1994). A much smaller (0.89 ha) block of ancient (as assessed by its ground flora) woodland borders the Moor on its northern side – otherwise this side is largely bordered by agriculturally improved, species-poor, pasture. Thus the immediate landscape is an intimate mix of wet grassland and wet woodland, together with drier woodland and improved pasture, a common situation both on the Culm and further afield.

Scadsbury Moor has no statutory conservation designation. It is, however, recognised as a County Wildlife Site by a partnership of conservation organisations led by Devon County Council and the Devon Wildlife Trust. As such, it is one of about 2,200 sites recognised to be of county importance for nature conservation (Devon Biological Records Centre web site).

Fig. 1. Scadsbury Moor showing the semi-natural wet grassland (NVC M24c) surrounded by woodland, June 2015. The flowers are heath spotted orchids *Dactylorhiza maculata* and meadow thistle *Cirsium dissectum*.

The wet grassland within Scadsbury Moor largely conforms to National Vegetation Classification (NVC) (Rodwell 1991b) *Molinia caerulea – Cirsium dissectum* fen meadow, *Juncus acutiforus – Erica tetralix* sub-community (M24c). The sward has abundant *Molinia caerulea* together with a range of short sedges (*Carex* species) and numerous herbs of which *Cirsium dissectum*, *Dactylorhiza maculata*, *Lotus pedunculatus*, *Pedicularis sylvatica*, *Potentilla erecta* and *Succisa pratensis* are among the most conspicuous. Occasional patches of *Juncus effusus/acutiflorus – Galium palustre* rush pasture *Juncus acutiflorus* sub–community (M23a) occur – these contain herbs such as *Cirsium palustre* and *Angelica sylvestris*.

Fig. 2. Malaise trap set in wet woodland (NVC W7b) at Scadsbury Moor, June 2016. A decumbent willow *Salix cinerea* stem with rot holes lies immediately behind the trap and alder *Alnus glutinosa* carr in the background. The ground flora is dominated by remote sedge *Carex remota*.

The wet woodland conforms to NVC *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* woodland, *Carex remota – Cirsium palustre* sub-community (W7b) (Rodwell 1991a). The canopy is dominated either by *Alnus glutinosa* or by *Salix cinerea*, and the ground flora by *Carex remota* together with *Galium palustre* and *Ranunculus repens*. *Callitriche stagnalis*, *Molinia caerulea*, *Ranunculus flammula* and *Rumex acetosa* are locally frequent. Bare mud, in places too soft and deep to walk safely through in the winter, is frequent.

Adjacent drier woodland conforms to NVC *Quercus robur – Pteridium aquilinum – Rubus fruticosus* woodland, typical sub community (W10a) (Rodwell 1991a). Most of this is long-established secondary woodland with the canopy layer dominated by *Quercus robur* with some *Fraxinus excelsior* and *Betula pubescens*, a shrub layer dominated by *Corylus avellana* with occasional *Ilex aquifolium*, and a sparse herb layer with frequent *Ficaria verna*, *Rubus fruticosus* agg. and *Hedera helix*. The small block of ancient woodland is of the same NVC community but the ground flora is richer and dominated by *Hyacinthoides non–scripta*, and species such as *Veronica montana*, *Lonicera periclymenum*, *Sanicula europaea* and *Conopodium majus* are much more frequent.

Soils throughout the site are mineral, derived from clay, with no peat deposits. Water originates from springs and seepages, not from fluvial flooding. The pH varies widely. Within the wet woodland, pH readings of 7.2 were recorded while some wet grassland measurements were as low as 4.5. It is presumed that this variability reflects both differences in the underlying geology and the modifying influences of the plant communities themselves. No evidence of

nutrient enrichment due to fertiliser run–off from improved pastures above was noted – *Urtica dioica* was, for example, rare.

During the course of the study (2014 – 2016), the site was grazed for a few weeks in July and August by about 30 young dairy cattle. These were not constrained within the grassland but could roam freely through the surrounding woodland. When first put into the site each year the cattle preferentially grazed the woodland, showing a strong preference for *Carex remota*. This resulted in heavy poaching damage to parts of the wet woodland, although each year winter rain restored a smooth surface. Only after they had consumed the majority of the sparse sedges and grasses within the woodland, along with bramble leaves, did the cattle focus on the grassland itself. They were retained on site until they had eaten the sward down to an average (but uneven) height of about 10 cm over most of the open grassland. Before the study began, under the previous owners, in most years the land was mown and baled in August, grazing being limited to that carried out by wild red deer *Cervus elaphus* Linnaeus.

Apart from allowing cattle access, the woodlands have received no management for several decades, other than the ill-advised removal of some fringing willow (*Salix* species) scrub under an agri-environment scheme. As a result decaying wood, both fallen and standing, is common in both wet and drier stands.

Sampling

Diptera were recorded by running Malaise traps over three years (Table 1), supplemented by sweep netting. The sweep-netting was carried out periodically, particularly over the open grassland, but not in a systematic or standardised way. No Malaise traps were set in the middle of the open grassland on the assumption that grassland specialists would be caught either in the trap placed for two years on the boundary between grassland and woodland, or through sweep netting. An insecticide–impregnated card extracted from a commercially available clothes moth killer cassette was used in the collecting bottle of the Malaise traps, so specimens were dry when examined.

Table 1. Details of Malaise trap placement and location. The traps were set between late March/early April and late November/early December each year. The traps were emptied every one, two or three days. Each year there were three to five periods of between 3 and 11 days during which the traps were not set – the total number of missed days is given in the final column.

Placement of individual traps	Grid reference	Years	Comments	Duration trap not set
Boundary between open grassland and wet woodland	SS52010152	2014 & 2015	Not under tree canopy and south-facing so in full sunlight.	2014 – 39 days 2015 – 27 days
Within wet woodland 5m from grassland	SS5175014	2015	Over rotting alder stump.	27 days
Within wet woodland 25 m from grassland	SS51700145	2016	Close to fallen willow stem with rot holes (Fig. 2).	19 days

Species-rich families from which few if any species were identified were Agromyzidae, Cecidomyiidae, Ceratopogonidae, Chironomidae, Chloropidae, Phoridae and Psychodidae. Chironomids, phorids and psychodids were often numerous in trap samples. It is probable that

some Dixidae, Ephydridae, Sphaeroceridae and Trichoceridae were overlooked. Fungus gnats were identified by PJC, craneflies by AES, and the remaining Diptera by RJW with assistance from CMD and other specialists as listed in the acknowledgments. Coleoptera were identified by Martin Luff.

Numbers of individuals were not recorded on a systematic basis other than for fungus gnats (Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae) in the Malaise trap set well within wet woodland in 2016, and hoverflies (Syrphidae) in the trap set on the boundary between woodland and grassland in 2014 and 2015 and that set well within wet woodland in 2016. Fungus gnat samples were lumped into two batches of 1 April – 1 July and 12 July – 24 November, while for syrphids the number of males and females of each species were recorded each time a trap was emptied.

Assessing nature conservation value and species status

To compare the nature conservation importance of each habitat a simple approach was taken: the number of threatened or nationally scarce species specific to each habitat was counted and compared. This required that the status of all species recorded should be known, alongside information on the habitat preferences of those considered scarce or threatened.

Assessment of the status of British Diptera species is, as with most invertebrates, currently imperfect and in a state of flux. Nevertheless, Government conservation agencies have published a number of status reviews and others are in preparation. Those that have been published this century are for: Nematocera and Aschiza excluding craneflies (Tipuloidea) (Falk and Chandler 2005); Empidoidea (Falk and Crossley 2005); Syrphidae (Ball and Morris 2014); and Acalyptratae excluding Conopidae, Sciomyzidae and Tephritidae (Falk *et al.* 2016). Reviews in an advanced stage of preparation are Calyptratae (Falk and Pont in press), Larger Brachycera (Drake in prep.), fungus gnats (Mycetophilidae and allies) (Chandler in prep.), Platypezidae (Chandler in prep.) and Dolichopodidae (Drake in prep.). Work is currently underway on craneflies (Boardman in prep.). All this unpublished information was available to the authors of this paper. An earlier review (Falk 1991) covered a range of larger Brachycera families, together with craneflies, conopids, sciomyzids and tephritids. Information from this publication has not been used here, because it pre-dates the use of IUCN criteria (see below) and because much of the information it contains is now considered out of date.

Modern species status reviews use different methods to assess (a) the risk of a species becoming extinct in Britain and (b) their rarity. Both these methods are difficult to apply to most Diptera species. Risk of extinction is determined using IUCN Red List categories and criteria to assess threat status (IUCN 2012), with species being classified as Extinct, Critically Endangered, Endangered, Vulnerable or Near Threatened. Rarity on the other hand is based solely on the number of hectads (10 km x 10 km grid squares) occupied by a species, Nationally Rare species occurring in 15 or fewer hectads and Nationally Scarce ones in between 16 and 100 hectads. Where the distribution data available are poor, some rarely recorded species are classified under the IUCN system as Data Deficient. Since the expectation is that such species will be found to merit being placed in a threatened or Near Threatened category, Data Deficient species are considered threatened or scarce for the purpose of this study.

Where status information from unpublished reviews or published reviews that do not fully follow the IUCN criteria has been used, statuses are marked as provisional (p) in this paper. Most species fall into this category.

The use of the best available status reviews to compare the nature conservation value of wet grassland and wet woodland is considered by the authors to be valid despite these imperfections since they apply equally to both habitat types. It is not the specific species that are compared, rather the relative numbers of threatened or scarce species in each habitat.

Information on the habitat preferences of those species identified as threatened or scarce was taken from the various status reviews referred to above or from other works (e.g. Chandler 2010, Stubbs and Drake 2014, Stubbs and Falk 2002). Each threatened or scarce species was placed in one of the four habitat categories: wet woodland only, herbaceous wetlands only (treeless wet grassland, fen or mire), wet habitats generally, and not restricted to wet habitats.

Results

A total of 845 Diptera species were recorded from the study site. 633 species were recorded at the Malaise trap location on the boundary between wet grassland and wet woodland, and 503 species where the traps were set within wet woodland. Nearly all species were caught in the Malaise traps, with few additional species being found through sweep-netting, although precise numbers in this respect were not recorded. The hoverfly *Microdon myrmicae* Schönrogge *et al.*, 2002 is an example of a species caught only by sweep-netting.

The numbers of threatened or scarce species believed to be specialists of wet woodland, open wetlands (including wet grassland) or wetlands in general, together with those species not considered to be wetland specialists are presented in Table 2. Details of the species concerned are presented in Appendix 1. Five or more individuals of 19 of the 67 species were recorded. One species, the fungus gnat *Epicypta fumigata* (Dziedzicki, 1923), added to the British list by Chandler (2014), is not currently known from any other site in the British Isles.

Table 2. Numbers of threatened (Endangered or Vulnerable), Near Threatened, Nationally Scarce or Data Deficient species recorded in each habitat type.

Habitat associations	Number of species
Wet woodland specialists	13
Open (treeless) wetland specialists	2
Other wet habitat (with or without trees) specialists	9
Not restricted to wet habitats	43
Total	**67**

The substrates occupied by the larvae of many species are unknown. However, 25 (37%) of the 67 species are known to have larvae associated with decaying wood, although not necessarily exclusively – some, for example, occur on terrestrial fungi as well as lignicolous fungi. Five species (7%) are known to have larvae associated with wet soil (e.g. mud).

The most species-rich families are given in Table 3.

Table 3. Families from which ten or more species were recorded.

Family	Number of species
Mycetophilidae	204
Syrphidae	69
Muscidae	64
Dolichopodidae	58
Limoniidae	53
Anthomyiidae	28

Empididae	26
Tachinidae	25
Sciaridae	24
Tipulidae	20
Keroplatidae	19
Lauxaniidae	17
Sarcophagidae	16
Hybotidae	15
Heleomyzidae	14
Sciomyzidae	11
Fanniidae	10

1,200 fungus gnats of 144 species were caught in the Malaise trap set well within wet woodland in 2016. The great majority of these belonged to Mycetophilidae (1,141 individuals of 129 species), the others being Bolitophilidae (34 individuals, 2 species), Diadocidiidae (5 individuals, 2 species), Ditomyiidae (7 individuals, 2 species) and Keroplatidae (13 individuals, 9 species). A total of 1,775 hoverflies (Syrphidae) were caught in the Malaise traps set either on the woodland–grassland boundary or well inside the wet woodland (Table 4).

Table 4. Influence of Malaise trap placement on numbers of individuals and species of Syrphidae caught.

Malaise trap placement	Number of trap years	Number of species caught	Number of individuals caught in each trap year
Well (25m) within wet woodland	1	33	280 in 2016
Boundary between open wet grassland and wet woodland	2	64	748 in 2014 747 in 2015

Other threatened or scarce insects associated with wetland habitats on the Culm

Elsewhere on the Culm, within wet woodland or herbaceous (treeless) wet habitats, 11 scarce or threatened Diptera not encountered at Scadsbury Moor are known to occur, as given in Appendix 2. Three of the 11 species are primarily associated with herbaceous wetland and six with wet woodland: the preferred habitat of the remaining three is uncertain although all are wetland species. It is probable that with further sampling several of these species would be found at Scadsbury Moor: *Cheilosia nebulosa* and *Chyliza vittata* have been recorded within the same farm, and *Egle parvaeformis* and *Helina vicina* within a few kilometres.

The only other insect order which is well-recorded within the wet woodland or wet grasslands of the Culm is Lepidoptera. Threatened and scarce Lepidoptera species associated with either wet woodland or wet grassland on the Culm are listed in Appendix 3. Seven are primarily associated with open wet grassland and four with wet woodland (including scattered willow bushes).

128 species of beetle (Coleoptera) were recorded from Scadsbury Moor, mainly in the Malaise traps. These included six Nationally Rare or Nationally Scarce species. Of these three have larvae which develop on willows (among other trees in the case of *Epuraea distincta*) and are therefore linked to wet woodland, and one (*Larinus carliniae*) is associated with thistles in

wet grassland as listed in Appendix 4. The other two, *Leptura aurulenta* Fabricius, 1792 and *Melasis buprestoides* (Linnaeus, 1761), are associated with dead or decaying wood, a feature of woodlands generally.

Discussion

The presence of 13 (in some cases provisionally) Vulnerable, Near Threatened, Data Deficient or Nationally Scarce Diptera species strongly associated with the wet woodland at Scadsbury Moor, compared to just two such species strongly associated with open wet habitats, demonstrates that the wet woodlands found on the Culm Measures are worthy of conservation alongside the area's characteristic semi-natural grasslands (purple moor grass and rush pastures).

This principle is confirmed by the review of threatened and scarce Diptera not recorded from Scadsbury Moor but known from other wetland sites on the Culm Measures, and from the threatened and scarce Coleoptera recorded at Scadsbury Moor. However, for threatened and scarce Lepidoptera treeless wet grassland appears more important than wet woodland. Nevertheless, a detailed survey of four Culm sites found that only 19% of the 193 species of Macrolepidoptera recorded have larvae which prefer to feed on grasses and herbs typical of the open grassland as opposed to 47% on plants typical of associated scrub and woodland (Wolton 2000). As with this paper, Wolton (2000) recommended that site management should aim to conserve not just the open sward but also associated woodland, scrub and hedges.

Some species may obtain vital resources from both wet grassland and wet woodland (Wheeler *et al.* 1999) and close proximity of these habitats is important for them. Others may be specialists of the boundary between woodland and grassland. Examples include species with larvae that require shaded mud or damp rotting wood yet have adults that feed on nectar or pollen. Several muscids and syrphids are likely to fall into this category. In this context it is noteworthy that a significantly higher number of the syrphids caught in the wet woodland were female than were those caught at the woodland/grassland boundary (RJW, unpublished data). For some species, notably *Eristalis pertinax* (Scopoli, 1763) and *E. nemorum* (Linnaeus, 1758), only females were caught in the wet woodland. Presumably this is because the wet mud in the woodland provided suitable oviposition sites and so was attractive to females – the males on the other hand preferred to stay near flowers or sunny spots in the open grassland so they had better access to both food and mates.

The importance for nature conservation of sites on the Culm Measures in Devon in which semi-natural wet grassland and wet woodland occur together is confirmed by the high number (67) of species found at Scadsbury Moor that are (in some cases provisionally) considered Endangered, Vulnerable, Near Threatened, Data Deficient or Nationally Scarce in Britain, and by the high proportion (7.9%) of all species recorded which fall into one or other of these status categories. A similar total number of species (830) from the same range of families was recorded from a hedge on the same farm, 800m to the north of Scadsbury Moor, where a Malaise trap was run for two years. Here, however, just 26 (3.1%) of species had a threatened or scarce status (numbers updated to reflect current understanding), even though the hedge was close to a range of other habitats including a pond, a wooded stream and drier oak woodland (Wolton *et al.* 2014).

Of the 15 threatened and scarce species believed to be wet grassland or wet woodland specialists found at Scadsbury Moor, only two were recorded from the hedge study referred to above (Wolton *et al.* 2014). These two species were both fungus gnats – *Mycetophila strigatoides* and *Trichonta pulchra*. Likewise only two of the 15 species, *Fannia speciosa* and *Trichonta pulchra*, were caught in a Malaise trap set between April and November 2016 in more freely draining woodland by the River Lew, 500m south from Scadsbury Moor (RJW, unpublished data). These figures support the contention that most if not all of the 15 species really are

specialists of wet woodland or wet grassland so it is valid to use them in assessing the comparative conservation value of the two habitat types.

Many of the threatened or scarce species found at Scadsbury which are not considered likely to be restricted to wet woodland or open wet habitats are, even so, likely to have larvae which develop in the wet woodland. This is especially true for those 21 such species known to have larvae associated with decaying wood: such wood was frequent in the wet woodland and two of the three trap locations were close to rotting wood. On the other hand, from what is known of their ecology, few of the species not specifically assigned to either herbaceous (treeless) habitats or wet woodland are in reality likely to be dependent on the herbaceous habitats: possible examples are *Conisternum decipiens* and the tachinids.

Just five of the threatened and scarce species found are known to have larvae which are dependent on wet soil such as mud. However, the true number if likely to be greater: the biology of many of the species remains unknown. Further research is required here.

The most species-rich families recorded at Scadsbury Moor are broadly similar to those recorded in a Malaise trap run between April and December 2005 in a wet woodland (Burridge Common) in east Devon (Drake 2011). Mycetophilidae topped the rankings, and Muscidae and Dolichopodidae came third and fourth respectively, at both sites. However, Syrphidae species were more numerous at Scadsbury than at Burridge, being ranked second at the former site and sixth at the latter. Limoniidae ranked second at Burridge but only fifth at Scadsbury even though more species were caught at Scadsbury. Other notable differences were higher rankings for Tachinidae, Sciaridae, Keroplatidae and Sarcophagidae at Scadsbury, and for Hybotidae at Burridge. These differences may be explained by the Scadsbury study sampling wet grassland and drier woodland as well as wet woodland, with differences in ground flora and vegetation structure probably contributing. The wet woodland at Burridge supported the same National Vegetation Classification community as Scadbsury but a different sub–community (W7a) reflecting more base-rich soil. Also, the Burridge woodland had a more closed canopy with less exposed mud, not being cattle grazed. Anthomyiidae, a family for which species were not identified at Burridge, was highly ranked at Scadsbury, coming sixth.

Conclusions

The results provide evidence that within the semi-natural wet grassland – wet woodland habitat mosaics typical of the Culm, the wet woodland is of conservation merit alongside the wet grassland (purple moor grass and rush pastures). Wet grassland and wet woodland should be managed to complement one another, not regarded as conflicting features. This principle is likely to apply to similar wet grassland – wet woodland habitat mosaics wherever they occur throughout the British Isles.

The results also confirm the high value of wet woodlands for Diptera, especially for fungus gnats, craneflies, muscids and dolichopodids. The high numbers of threatened and scarce species associated with decaying wood confirms that, as in all woodland, the retention of such wood is important.

An unresolved issue is whether cattle grazing is detrimental or beneficial to the Diptera fauna of wet woodlands. Should fences be erected along woodland – grassland boundaries? Further research is needed to answer this question.

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Appendix 1.

Threatened and scarce species recorded at Scadsbury Moor. *5 or more individuals recorded. ¤Larvae known to be associated with decaying wood. §Larvae known to be associated with wet soil (e.g. mud).

Species likely to be restricted to wet woodland within the Culm.

Family	Species	Status p – provisional
Fanniidae	¤*Fannia speciosa* (Villeneuve, 1898)	pNationally Scarce
Lauxaniidae	*Homoneura interstincta* (Fallén, 1820)	pData Deficient
Limoniidae	§*Gonomyia abscondita* Lackschewitz, 1935	pNationally Scarce
Limoniidae	§*Thaumastoptera calceata* Mik, 1866	pNationally Scarce

Muscidae	**Helina abdominalis* (Zetterstedt, 1846)	pNationally Scarce
Muscidae	*Phaonia magnicornis* (Zetterstedt, 1845)	pNationally Scarce
Mycetophilidae	*Allodia neglecta* Edwards, 1925	Nationally Scarce
Mycetophilidae	*Exechiopsis membranacea* (Lundström, 1912)	Nationally Scarce
Mycetophilidae	¤*Grzegorzekia collaris* (Meigen, 1818)	Nationally Scarce
Mycetophilidae	¤*Mycetophila strigatoides* (Landrock, 1927)	Nationally Scarce
Mycetophilidae	*¤*Neoempheria winnertzi* Edwards, 1913	Vulnerable
Mycetophilidae	*Rymosia britteni* Edwards, 1925	Nationally Scarce
Mycetophilidae	*Trichonta pulchra* Gagné, 1981	Nationally Scarce

Species likely to be restricted to herbaceous wetland (treeless wet grassland, fen or mire) within the Culm.

Family	Species	Status p – provisional
Anthomyiidae	*Zaphne inuncta* (Zetterstedt, [1838])	pNationally Scarce
Sarcophagidae	**Sarcophaga sinuata* Meigen, 1826	pNationally Scarce

Species likely to be restricted to wetland, whether wooded or open, within the Culm.

Family	Species	Status p – provisional
Dolichopodidae	*§*Gymnopternus angustifrons* (Staeger, 1842)	pNationally Scarce
Dolichopodidae	**Rhaphium fascipes* (Meigen, 1824)	pNationally Rare
Dolichopodidae	*Syntormon macula* Parent, 1927	pNationally Scarce
Mycetophilidae	*Allodia angulata* (Lundström, 1913)	Nationally Scarce
Mycetophilidae	**Exechia dizona* Edwards, 1924	Data Deficient
Mycetophilidae	¤*Phronia egregia* Dziedzicki, 1889	Nationally Scarce
Scathophagidae	*Conisternum decipiens* (Haliday in Curtis, 1832)	pNationally Scarce
Tephritidae	*Cryptaciura rotundiventris* (Fallén, 1814)	pNationally Scarce
Tipulidae	§*Nephrotoma dorsalis* (Fabricius, 1782)	pNationally Scarce

Species not, or probably not, restricted to wetland habitats within the Culm.

Family	Species	Status p – provisional
Clusiidae	*¤*Clusia tigrina* (Fallén, 1820)	pNationally Scarce
Dolichopodidae	**Hercostomus nigrilamellatus* (Macquart, 1827)	pNationally Scarce

Dolichopodidae	¤*Systenus scholtzii* (Loew, 1850)	pNationally Scarce
Drosophilidae	*Amiota basdeni* d'Assis–Fonseca, 1965	pData Deficient
Drosophilidae	¤*Stegana nigrithorax* Strobl, 1898	pNationally Scarce
Fanniidae	¤*Fannia gotlandica* Ringdahl, 1926	pNationally Scarce
Keroplatidae	*Monocentrota favonii* Chandler, 1987	Vulnerable
Lauxaniidae	**Homoneura notata* (Fallén, 1820)	pNationally Scarce
Lauxaniidae	*Pseudolyciella pallidiventris* (Fallén, 1820)	pData Deficient
Lauxaniidae	*Sapromyza albiceps* Fallén, 1820	pNationally Scarce
Limoniidae	¤*Rhipidia uniseriata* Schiner, 1864	pNationally Scarce
Lonchaeidae	¤*Lonchaea bukowskii* Czerny, 1934	pData Deficient
Lonchaeidae	¤*Lonchaea corusca* Czerny, 1934	pNationally Scarce
Megamerinidae	*¤*Megamerina dolium* (Fabricius, 1805)	pNationally Scarce
Muscidae	**Coenosia pudorosa* Collin, 1953	pNear Threatened
Muscidae	**Lispocephala pallipalpis* (Zetterstedt, 1845)	pNationally Scarce
Muscidae	**Mydaea anicula* (Zetterstedt, 1860)	pNationally Scarce
Muscidae	¤*Phaonia cincta* (Zetterstedt, 1846)	pNationally Scarce
Muscidae	*¤*Phaonia mystica* (Meigen, 1826)	pNationally Scarce
Muscidae	**Phaonia villana* Robineau–Desvoidy, 1830	pNationally Scarce
Mycetophilidae	¤*Acnemia amoena* Winnertz, 1863	pNear Threatened
Mycetophilidae	¤*Brachypeza armata* Winnertz, 1863	Nationally Scarce
Mycetophilidae	¤*Ectrepesthoneura colyeri* Chandler, 1980	Nationally Scarce
Mycetophilidae	**Epicypta fumigata* (Dziedzicki, 1923)	pData Deficient
Mycetophilidae	*¤*Leia bilineata* (Winnertz, 1863)	Nationally Scarce
Mycetophilidae	¤*Manota unifurcata* Lundström, 1913	Near Threatened
Mycetophilidae	*Mycetophila caudata* Staeger, 1840	Nationally Scarce
Mycetophilidae	*Mycetophila lastovkai* Caspers, 1984	Nationally Scarce
Mycetophilidae	¤*Mycomya pectinifera* Edwards, 1924	Nationally Scarce
Mycetophilidae	¤*Neoempheria bimaculata* (von Roser, 1840)	Near Threatened
Mycetophilidae	*Zygomyia matilei* Caspers, 1980	pData Deficient
Periscelididae	¤*Periscelis annulata* (Fallén, 1813)	pNationally Scarce
Sarcophagidae	¤*Macronychia striginervis* (Zetterstedt, [1838])	pNationally Scarce
Sarcophagidae	*Sarcophaga subulata* Pandellé, 1896	pNationally Scarce
Syrphidae	¤*Ferdinandea ruficornis* (Fabricius, 1775)	Nationally Scarce

Syrphidae	¤*Xylota xanthocnema* Collin, 1939	Nationally Scarce
Tabanidae	*§*Tabanus maculicornis* Zetterstedt, 1842	pNationally Scarce
Tachinidae	*Actia lamia* (Meigen, 1838)	pNationally Scarce
Tachinidae	*Drino lota* (Meigen, 1824)	pNationally Scarce
Tachinidae	**Eloceria delecta* (Meigen, 1824)	pNationally Scarce
Tachinidae	*Lophosia fasciata* Meigen, 1824	pNationally Scarce
Tephritidae	*Chetostoma curvinerve* Rondani, 1856	pNationally Scarce
Tipulidae	*Tipula luridorostris* Schummel, 1833	pEndangered

Appendix 2.

Scarce or threatened Diptera known from wetlands on the Culm which were not recorded at Scadsbury Moor (Devon Biological Records Centre, Drake 1990, National Biodiversity Network, Wolton 2015, RJW pers. obs.).

Family	Species	Status p – provisional	Wetland habitat type
Limoniidae	*Idioptera pulchella* (Meigen, 1830)	pNationally Scarce	Uncertain
Limoniidae	*Pilaria scutellata* (Staeger, 1840)	pNationally Scarce	Uncertain
Syrphidae	*Melanostoma dubium* (Zetterstedt, 1837)	Nationally Scarce	Herbaceous (treeless) wetland
Syrphidae	*Sphaerophoria potentillae* Claussen, 1984	Vulnerable	Herbaceous (treeless) wetland
Syrphidae	*Cheilosia carbonaria* Egger, 1860	Nationally Scarce	Wet woodland
Syrphidae	*Cheilosia nebulosa* Verrall, 1871	Nationally Scarce	Uncertain
Lauxaniidae	*Sapromyza quadricincta* Becker, 1895	pNationally Scarce	Wet woodland
Tephritidae	*Urophora spoliata* (Haliday, 1838)	pNear Threatened	Herbaceous (treeless) wetland
Psilidae	*Chyliza vittata* Meigen	pNationally Scarce	Wet woodland
Anthomyiidae	*Egle parvaeformis* Schnabl, 1911	pNationally Scarce	Wet woodland
Muscidae	*Helina vicina* (Czerny, 1900)	pNationally Scarce	Wet woodland

Appendix 3.

Scarce or threatened Lepidoptera known from wetlands on the Culm (Barry Henwood pers. obs., RJW pers. obs., Wolton 2000, Wolton *et al.* 2007). Habitats given are those used on the

Culm. Statuses are from Davis (2012) (Microlepidoptera), Fox *et al.* (2010) (butterflies) and Waring and Townsend (2003) (Macrolepidoptera).

Family	Species	Status p – provisional	Wetland habitat type
Micropterigidae	*Micropterix mansuetella* (Zeller, 1844)	Nationally Scarce	Herbaceous (treeless) wetland
Adelidae	*Nemophora minimella* ([Denis & Schiffermüller], 1775)	Nationally Scarce	Herbaceous (treeless) wetland
Pterophoridae	*Platyptilia isodactylus* (Zeller, 1852)	Nationally Scarce	Herbaceous (treeless) wetland
Pieridae	*Leptidea sinapis* (Linnaeus, 1758)	Endangered	Wet woodland
Nymphalidae	*Euphydryas aurinia* (Rottemburg, 1775)	Vulnerable	Herbaceous (treeless) wetland
Crambidae	*Anania stachydalis* (Zincken, 1821)	Nationally Scarce	Wet woodland
Crambidae	*Crambus uliginosellus* Zeller, 1850	Nationally Scarce	Herbaceous (treeless) wetland
Sphingidae	*Hemaris tityus* (Linnaeus, 1758)	Nationally Scarce	Herbaceous (treeless) wetland
Geometridae	*Cyclophora pendularia* (Clerck, 1759)	Red Data Book	Wet woodland
Geometridae	*Lampropteryx otregiata* (Metcalfe, 1917)	pNationally Scarce	Wet woodland
Geometridae	*Chlorissa viridata* (Linnaeus, 1758)	pNationally Rare	Herbaceous (treeless) wetland
Noctuidae	*Mythimna turca* (Linnaeus, 1761)	pNationally Scarce	Wetlands generally

Appendix 4.

Scarce or threatened Coleoptera known from wetlands recorded at Scadsbury Moor (Luff and Wolton 2016). Statuses are from Hyman (1992, 1994).

Family	Species	Status p – provisional	Habitat
Curculionidae	*Acalyptus carpini* (Fabricius, 1792)	pNationally Scarce	Wet woodland
Curculionidae	*Ellescus bipunctatus* (Linnaeus, 1758)	pNationally Scarce	Wet woodland
Curculionidae	*Larinus carliniae* (Olivier, 1807)	pNationally Scarce	Herbaceous (treeless) wetland
Nitidulidae	*Epuraea distincta* (Grimmer, 1841)	pNationally Rare	Wet woodland

Dipterists Digest 2017 **24**, 95-97

Platypalpus maculimanus Zetterstedt (Diptera, Hybotidae) new to Britain from exposed riverine sediments

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Summary

The hybotid *Platypalpus maculimanus* Zetterstedt, 1842 is recorded as a species new to the British Isles based on material obtained from exposed riverine sediments (ERS) on the King Water river in north Cumbria. The conservation value of flood deposited sand on riverbanks is discussed.

Introduction

In 2015 I operated a limited number of soil emergence traps set on exposed riverine sediments (ERS) on the King Water (NY525635), a tributary of the River Irthing in north Cumbria (Hewitt 2016). In 2016 I extended this study and installed 10 standard soil emergence traps with a footprint of 60cm by 60cm, set on different ERS substrate types. A valance around the base of each trap was buried in the substrate, ensuring that all insects emerging from the soil surface within the trap were retained. At the apex of each trap, a collecting bottle containing 95% ethanol was used to preserve emergent individuals. The traps were operated from 2 May to 3 October and serviced on a roughly fortnightly basis. Two traps were installed on loose, vegetated, flood-deposited sand on the riverbank at separate locations. Specimens of *Platypalpus maculimanus* Zetterstedt, 1842 were found in three samples from one of these traps. The sample for 12 June – 7 July contained 10 specimens (4 males and 6 females), the sample for 7-18 July contained 5 specimens (2 males and 3 females) and a final single female was in the sample for 18-26 July. Females of *P. maculimanus* and *P. articulatus* Macquart, 1827 are indistinguishable, so the identifications of females reported here are based on the association with males of *P. maculimanus*.

Distribution and ecology

Platypalpus maculimanus is probably widely distributed from southern Scandinavia to the Mediterranean according to Grootaert and Chvála (1992), who reported it from Norway, Denmark, Finland, Belgium and Greece. The species is further recorded from Germany and Switzerland (Fauna Europaea 2017). There is no habitat information reported for this species, although material I collected in Norway in 2015 was also from vegetated, exposed riverine sediments. However, given the widespread distribution of the species there is little evidence that this fly has a particularly high fidelity to ERS.

Identification

Platypalpus maculimanus belongs in the *P. pallidiventris* – *P. cursitans* group of Chvála (1989), which has a black thorax, one pair of vertical bristles, mesonotum dusted, a single humeral bristle present and mid femora with posteroventral bristles. Allen (1986) compared *P. articulatoides* (Frey, 1918) with *P. articulatus* Macquart and *P. maculimanus* (Zetterstedt), the latter species

having not then been recorded in Britain although considered likely to occur here. *Platypalpus ochrocera* can be considered as a member of this group of similar species, particularly with regard to the females (Hewitt *op. cit.*). *Platypalpus articulatoides* and *P. ochrocera*, with their yellow palpi and posterior four coxae, are readily distinguishable from *P. articulatus* and *P. maculimanus*, in which these structures are black-brown. *Platypalpus maculimanus* was flagged by Plant (2012) as a potential British species and it was also included in the update to Plant's key (Hewitt *op. cit.*). Grootaert and Chvála (1992) report some variation in the coloration of the front tarsi, from completely brown to sharply annulated black in different populations. The Cumbrian specimens have sharply blackish annulated front tarsi, as do specimens that I have from Norway. The males generally having rather sharper and more contrasting annulations than do the females.

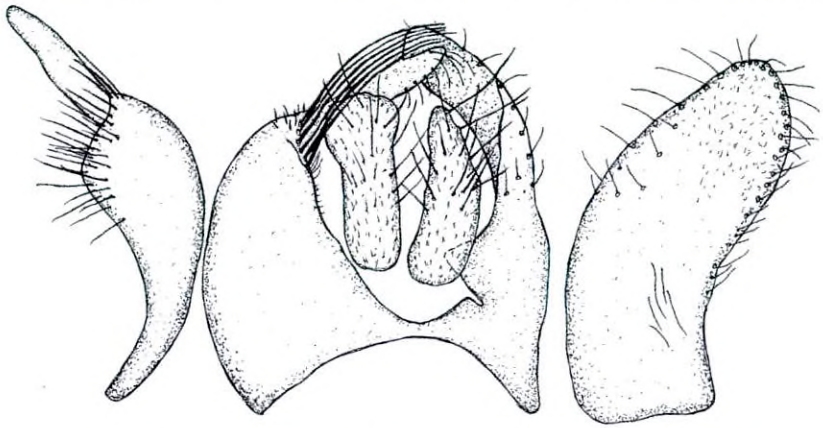

Fig. 1. Male genitalia of *Platypalpus maculimanus* Zetterstedt 1842 (adapted from Grootaert and Chvála 1992) – left to right: right periandrial lamella, periandrum with cerci, left periandrial lamella.

Discussion

Platypalpus maculimanus adds to a growing list of rare and scarce flies recorded on sandy riverbanks. There is a fairly extensive recent literature on the important arthropod fauna of ERS in Britain, particularly for beetles (see Bates *et al.* 2009). However, the Diptera of ERS have received rather less attention and the conservation value of the specific micro-habitat of flood-deposited sand on riverbanks has not been widely reported. The exception is the UK BAP stiletto-fly *Cliorismia rustica* (Panzer) (Therevidae), which is known to show a high fidelity to this substrate type, at least in northern Britain (Skidmore 2001, Drake 2004, Hewitt 2008, Stubbs and Drake 2014). In the present study of ERS Diptera, the two traps situated on this discrete type of ERS deposit between them yielded a number of nationally rare or scarce species, several of which (given in **bold type**) are suggested to show a high fidelity to ERS: ***Nephrotoma lunulicornis*** (Schummel) (Tipulidae); ***Arctoconopa melampodia*** (Loew), *Cheilotrichia imbuta* (Meigen) and *Molophilus niger* Goeghebuer (Limoniidae); *Chrysopilus erythrophthalmus* Loew (Rhagionidae); ***Hilara albiventris*** von Roser, *H. apta* Collin and ***H. biseta*** Collin (Empididae); *Platypalpus articulatoides* (Frey), ***P. melancholicus*** (Collin), *P. niger* (Meigen), ***P. ochrocera*** Collin, ***P. subtilis*** (Collin), *Symballophthalmus fuscitarsis* (Zetterstedt), ***S. pictipes*** (Becker), ***Tachydromia costalis*** (von Roser) and ***T. woodi*** (Collin) (Hybotidae); ***Dolichopus longicornis*** Stannius (Dolichopodidae),

Fig. 2. Stacked photographic image of male genitalia of *Platypalpus maculimanus* cleared in 10% potassium hydroxide solution. King Water, Cumbria, 12 June – 7 July 2016.

Acknowledgements

I am grateful to Major P.D. Johnson of Castlesteads Estate for permission to undertake this study on his land.

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Callicera rufa Schummel (Diptera, Syrphidae) at Dersingham Bog NNR, Norfolk – The European stronghold for the Nationally Scarce hoverfly *Callicera rufa* Schummel (Diptera, Syrphidae) is the central Scottish Highlands (MacGowan, I. and Rotheray, G.E. 2006. *Callicera rufa* Schummel (Diptera, Syrphidae) status and trends: an update. *Dipterists Digest* (*Second Series*) **13**(2006), 113-118). The Malloch Society has been instrumental in monitoring and conserving this Scottish population. In 2011, *Callicera rufa* was discovered at two sites in Shropshire, both associated with Scots Pine stands on hilltops. These sites have been monitored continuously since 2011 by Nigel Jones, who was the first to suggest that "hill-topping" may be used by this species as a mating strategy (Jones, N. 2016. *Callicera rufa* in Shropshire – update. Hoverfly Newsletter No **60,** 9. *Bulletin of the Dipterists Forum* **81**).

Here we report a new discovery of two adults (1 male, 1 female) at Dersingham Bog NNR and further sightings of at least three individuals there two weeks later. A project has been developed in collaboration with Natural England to promote the growth of a population of *Callicera rufa* by creating artificial rot-holes and is described here. There are only two previous records of *Callicera rufa* in East Anglia, both very recent (Roger Morris *pers comm* to MW): a garden in Dersingham village on 5.vi.2015, and at Holme Dunes NNR on 13.vii.2014, being 1.5 km and 16 km, respectively, from the occurrence at Dersingham Bog NNR reported here.

During one of his regular Diptera recording visits to Dersingham Bog (10.v.2017), MW was checking out a stand of Scots pine *Pinus sylvestris* in the hope of encountering "hill-topping" *Callicera rufa*. This stand of pines is located at the eastern end of the NNR on the northern side of a Cretaceous greensand escarpment (the so-called "Wolferton sea-cliff") at Frizzell's Heath. An area of about two hectares was clear-felled in 2012 to develop a heathland mosaic. The escarpment is ~15 m above the level of the bog (Fig. 1).

Fig. 1. The Frizzell's Heath escarpment clear-fell at Dersingham Bog NNR looking NE. _Callicera rufa_ was observed in the line of Scots pines on top of the terrace, left of centre.

The weather was warm, sunny, with minimal cloud cover (1/8) and a light southerly breeze (< 10 mph). At 12.45 hrs, after only twenty minutes of scanning the pines, MW netted a male *Callicera rufa* basking in full sunshine on a lone pine (TF 67794 29207) at a height of about 2 metres (Fig. 2), which was then released. About five minutes later, a female appeared on the same tree in almost the same position as where the male was found, and remained basking for several minutes (Fig. 3). The identifications of these two specimens as *Callicera rufa* were confirmed by Roger Morris and Joan Childs from photographs MW submitted to UK Hoverflies Facebook (https://www.facebook.com/groups/609272232450940/).

Fig. 2. *Callicera rufa* **male, caught at Dersingham Bog on 10 May 2017.**

Fig. 3. *Callicera rufa* **female, at Dersingham Bog on 10 May 2017.**

It was decided by the authors to monitor the pines at Frizzell's Heath for *Callicera rufa* in the following weeks and to create artificial rot-holes by chain-sawing suitable pine stumps (MacGowan, I. and Rotheray, G.E. 2006. *ibid*; Morris, R. 2015. Creating artificial rot holes for *Callicera rufa*. Hoverfly Newsletter No **58,** 9-10. *Bulletin of the Dipterists Forum* **79**). A second visit to Frizzell's Heath on 27.v.2017 (warm, sunny, 3/8 cloud cover, light westerly breeze <10 mph) resulted in a further seven sightings between 11.35 hrs and 13.10 hrs of at least three *Callicera rufa* individuals on three different trees, including the original pine, extending along ~50 metres of the treeline. The ease with which the specimens were found on two occasions 17 days apart, their occurrence as a group and the nearby 2015 record from Dersingham village (1.5 km away) suggest a community of *Callicera rufa* at Dersingham Bog NNR that has been overlooked in the past or has recently colonised the area.

Thirteen artificial rot-holes in Scots Pine stumps were created on 4.vi.2017. Seven rot-holes were made on the northern (sunnier) treeline at 10-25 m from the trees where *Callicera rufa* was recorded. Another six rot-holes were prepared on the southern edge of the clear-felled area bordering a wood of predominantly Scots Pine, 70-110 m across the clear-fell from the three pines where *Callicera rufa* was recorded. Using the same approach as that of MacGowan and Rotheray (2006. *ibid*), we shall search for larvae in the rot-holes during March/April, July/August and October/November each year, starting in October/November 2017 – **MARK WELCH,** 32 Tennyson Place, Ely, Cambridgeshire CB6 3WE **and ASH MURRAY,** Natural England, Smithy Workshops, Wolferton, Kings Lynn, Norfolk PE31 6HA

***Ctenophora ornata* Meigen (Diptera, Tipulidae) at Ockwells Park, Maidenhead, Berkshire** – On the evening of Monday 26 June 2017, a moth survey was being conducted at Ockwells Park, Maidenhead, on land recently acquired by the Royal Borough of Windsor and Maidenhead. The area consists mainly of grassland and is designated by the Environment Agency as 'Flood Zone 3', implying the threat of regular flooding. There are, additionally, two separate small tracts of woodland which are relicts of ancient woodland stretching from Windsor Forest in the south-east, and there is evidence of some coppicing until approximately forty years ago.

During the course of the evening, an insect was attracted to a moth trap supporting an MV lamp operated by Martin Finch at SU88027840. This trap was situated on the grassland, but within 100 metres of the woodland. The captor was unaware of the insect's identity which, after being photographed, was released off-site. Subsequent research has revealed that the insect was *Ctenophora ornata* Meigen.

The main centres of population for this rare cranefly in Britain are the New Forest, Hampshire and Windsor Forest and Great Park, Berkshire, but there appears to have been a recent increase in records from the vicinity of the latter area (Kramer, J. 2013. News of *Ctenophora ornata*. *Cranefly News* **26,** 2. **In** *Bulletin of the Dipterists Forum* No 76). The Ockwells Park site is about 6 km to the north-west of an extremity of Windsor Forest, and about 5 km to the north north-east of Jealott's Hill, where the insect was recorded by Ian Sims in 2013 (Sims, I. 2014. *Ctenophora ornata* Meigen (Diptera, Tipulidae) at Jealott's Hill, Berkshire. *Dipterists Digest* (*Second Series*) **21,** 77) – **LES J. FINCH,** 23 Hemsdale, Maidenhead, Berkshire, SL6 6SL

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Clitellaria ephippium (Fabricius) (Diptera, Stratiomyidae) and its disappearance from Britain

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Summary
The stratiomyid *Clitellaria ephippium* (Fabricius, 1775) was last seen in Britain 200 years ago. From consideration of what is known of its biology and habitat there is no obvious reason why it would have died out.

Fig. 1. *Clitellaria ephippium* (Fabricius), male (photo: M.C.D. Speight).

As an adult insect, *Clitellaria ephippium* (Fabricius, 1775) (Fig. 1) is a rather strangely proportioned, black and russet fly some 10-15mm long, to be found flitting (rather slowly!) ahead of you along a path in deciduous woodland, in dappled sunlight, settling now and again on pathside vegetation at around waist-height. It can also be encountered in more open conditions, but doesn't occur in coniferous forest. As a larva *Clitellaria* is a commensal of the largely arboreal ant *Lasius fuliginosus* (Latreille, 1798), which usually makes its carton nests below the ground surface, hidden among tree roots, nests which can persist for a considerable number of years. *Clitellaria* larvae live in the base of the ants' nest and take some four years to reach maturity. *Lasius fuliginosus* is particularly associated with the huge aphid, *Stomaphis quercus* (Linnaeus, 1758), which it farms. As its name implies *S. quercus* is found only on oaks of various species, both deciduous and evergreen. Not surprisingly, given its predilection for *Stomaphis*

quercus, *Lasius fuliginosus* is also well-recognised as an inhabitant of oak forest. However, *Lasius fuliginosus* nests can be located where there are no oak trees, or where there are no trees at all. A hundred years ago, Donisthorpe (1915) mentioned various situations in which *Lasius fuliginosus* nests had been found in Britain, encompassing old walls, earth banks, dune systems and different sorts of woodland.

Clitellaria is the only European representative of its subfamily Clitellariinae, and has only two European species, the other being *C. pontica* (Lindner, 1938), which is known only from Bulgaria, but the genus is more diverse in the eastern Palaearctic. Once upon a time, *Clitellaria ephippium* occurred in southern England but, according to Verrall (1909), who refers to it in his keys under the name *Ephippium thoracicum* Latreille, 1804, was by his time presumed extinct. There have been no more recent records and it is no longer included in keys to British stratiomyid genera (Stubbs and Drake 2014).

In continental Europe, Rozkošný (1983) showed that there are recent records from the Netherlands south to the Mediterranean and from western France to as far east as parts of European Russia. What happened in England? *Clitellaria* survived the major forest clearances and lingered in Coombe Wood, Surrey, until at least 1812, according to the information supplied by Verrall (1909). Baldock and Early (2015) reviewed the Surrey records of *Clitellaria*, including a photograph of a specimen in the Hope Department collections (Oxford University Museum of Natural History) labelled as originating in "Coombe Wood". What type of forest was Coombe Wood? Was it oak forest with large trees, or oak coppice (maintained historically to provide firewood) or some other type of forest? According to Jeremy Early (*pers. comm.*) the 2 ha fragment remaining today is oak with a hazel understorey. Baldock and Early (2015) say that the rest of it is now partly golf course and otherwise built over.

I have been able to find little published information on habitats in which *Clitellaria* occurs. Mason (1988) remarks that the species "è stata osservata più volte e ripetutamente catturata su fogliame di *Corylus avellana* L" [= was observed more times and repeatedly captured on the foliage of hazel]. I have come across it in:

- unimproved, calcareous, lightly grazed, dry grassland with thickets of *Cornus/Rosa* scrub
  (3 June 2010, Franklens, Haute-Savoie, France)
- ancient *Castanea sativa* firewood coppice with scattered oak coppice stools mixed in
  (3 June 2014, Maison Brulée, Dordogne, France)
- grassland beside old *Quercus robur* firewood coppice
  (15 May 2017, La Bûcherie, Dordogne, France)
- alluvial softwood gallery forest of *Salix alba*
  (27 June 1991, Décize, Nièvre, France)
- *Quercus/Fagus* forest and *Ostrya* scrub
  (1 July 1988, Fonte de Mareschiallo, env. Forli, Emilia-Romagna, Italy)
- *Rhamnus/Viburnum opulus/Populus tremula* scrub and montane (1200m alt.) grassland
  (22 June 1988, Monte d'Alpe, env. Bobbio, Emilia-Romagna, Italy)
- *Fraxinus/Quercus* forest
  (13 June 1987, Poscahalde, Liechtenstein)

These records show that *Clitellaria* is not found only in oak forest, and can indeed occur away from forest, like the ant with which its larvae are known to be associated. *Lasius fuliginosus* is still well distributed in Britain and, indeed, in Surrey (Pontin 2005), where *Clitellaria* was last seen in England. Of *Lasius fuliginosus*, Pontin (2005) says "All of Surrey, except the fully urbanised parts, is suitable for this species". So what did happen to *Clitellaria* in Britain, if its host ant and apparently appropriate habitat still occur? It has a striking appearance, is of

reasonable size and its behaviour makes it noticeable; to suggest it might still be present but simply has not been noticed for 200 years would not be very realistic! Even so it was refound in the Netherlands recently (Korf and Van der Leij 2000), after 100 years with no sightings and in Norway (Gammelmo and Lønnve 2006) after nearly 200 years with no sightings .....

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Megamerina dolium (Fabricius) (Diptera, Megamerinidae) new to Scotland

– While inspecting a fallen oak branch in the steep riverside woodland at Bemersyde Hill (NT5934), Berwickshire (V.C. 81) on 30 June 2016, two unusual dipteran puparia were found under loose bark by KPB and DH. Both were empty and only their posterior ends were intact. We have identified them as *Megamerina dolium* (Fabricius, 1805). Furthermore, GER caught a psilid-like male fly, which was flitting and running on a large, sunlit *Arctium* leaf (Asteraceae) in a grove of oak trees within mixed woodland on 12 July 2017 in Kirkcudbrightshire (V.C. 73) on the Almorness Peninsula, south of Palnackie (NX8352). In possessing the key recognition features of an unlengthened antenna, round head, narrow, black, shiny body and the thickened hind femora with two rows of spines on the underside the specimen was readily identified as *M. dolium* using the keys by Pjotr Oosterbroek (2006. The European Families of the Diptera, identification, diagnosis, biology. KNNV Publishing, Utrecht) and Darwyn Sumner (www.dipteristsforum.org.uk/documents/Diopsoidea.pdf.).

The elongate parallel-sided shape of the puparia was reminiscent of a *Loxocera* species (Psilidae); however, the characteristic posterior hooks were absent. The posterior seven abdominal segments were present in both specimens and the spiracular and anal plates and dorsal area of the last abdominal segment appeared to offer distinctive characters. These were initially matched against the text and drawings of those reproduced in P. Ferrar (1987. A Guide to the Breeding Habits and Immature Stages of Diptera Cyclorrhapha. *Entomonograph* **8** (1, 2), 1-907), where the best likeness was with *M. dolium*. A more detailed comparison was then made with the original drawings by W. Hennig (1943. Einiges über die Metamorphose von *Megamerina dolium* Fabr. (= *loxocerina* Fall.) (Diptera: Acalyptrata: Megamerinidae). *Arbeiten über Morphologische und Taxonomische Entomologie aus Berlin-Dahlem* **10,** 205-208) and with the drawings of the larva by N.P. Krivosheina and M.G. Krivosheina (1997. A contribution to the biology and morphology of the larvae of Megamerinidae (Diptera). *Studia dipterologica* **4**(1), 231-237). Matching characters included the prominent ribbing encircling the parallel-sided abdominal segments of the puparium; the ventral locomotory welts with 4-6 rows of spicules on all but the last abdominal segment; the oval posterior spiracular plates on short mountings with three sinuous spiracular slits and the angular ribbed border around the spiracular mountings; the small oval anal plate and the pattern of spicules around the anal plate extending around the plate and laterally at each end of the plate; and the two double rows of pits on the dorsal surface of the last abdominal segment. Smaller bands of locomotory spicules were observed dorsally on abdominal segments which are mentioned by Ferrar (1987. *op. cit.*). Finally, a detailed comparison was also made with a complete puparium collected under oak bark on 27.iv.1921 at Eversden Wood, Cambridge and from which an adult male of *M. dolium* subsequently emerged. This comparison showed that all three puparia were almost certainly of the same species.

In Britain *M. dolium* has been reared from beneath the bark of small-leaved lime (*Tilia cordata*) by Derek Lott (Falk, S.J., Ismay, J.W. and Chandler, P.J. 2016. A Provisional Assessment of the Status of Acalyptratae flies in the UK. Natural England Commissioned Reports, Number 217). The larva of *M. dolium* was found under bark of a fallen oak in Germany (Hennig 1943. *op. cit.*). Larvae are recorded from under bark of dead trunks of aspen, poplar, willow and oak by Krivosheina and Krivosheina (1997. *op. cit.*). Finally, J. Roháček (2016). Strongylophthalmyiidae, Tanypezidae and Megamerinidae (Diptera) in the Czech Republic and Slovakia: current state of knowledge. *Acta Musei Silesiae Scientiae Naturales* **65,** 1-13) records an association of adults with cut or fallen trunks of aspen.

The British distribution given by P.J. Chandler (1975. Notes on the British status of three unusual Acalypterate flies (Diptera). *Proceedings and Transactions of the British Entomological and Natural History Society* **8**(3), 66-72, and 1977. Supplementary notes on *Megamerina* (Diptera: Megamerinidae) and *Tanypeza* (Diptera: Tanypezidae). *Proceedings and Transactions of the British Entomological and Natural History Society* **10**(1/2), 26.) is of a species mostly found in old woodland and widespread in England as far north as Westmorland (V.C. 69). The NBN Atlas (accessed 3 July 2017) shows the species to be widespread in England as far north as the southern Lake District (SD38, V.C. 69), Silverdale (SD47, V.C. 60) and South Northumberland (V.C. 67). Our records of an adult male and two puparia appear to be the first for *M. dolium* in Scotland. Interestingly, the junior synonym *loxocerina* Fallén, 1820 for this species refers to the gross similarity of the adult fly with that of *Loxocera* species; it could equally have referred to similar resemblance of the puparia. We are grateful to the University Museum of Zoology, Cambridge, for access to the reared specimen of *M. dolium* – **KEITH P. BLAND** and **DAVID HORSFIELD,** National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA and **GRAHAM E. ROTHERAY,** 16 Bracken Wood, Gatehouse of Fleet, DG7 2FA

Dipterists Digest 2017 **24,** 105-108

A new oriental species of *Meoneura* Nitzsch (Diptera, Carnidae)

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Summary
Meoneura deemingi sp. nov is described from India.

Introduction

Knowledge concerning the diversity and distribution of Carnidae is only at a very first starting point. Brake (2011) listed 90 Carnidae species worldwide – to date there are 115 species published and several other undescribed species are known. Even in well-investigated regions like Central Europe, new species are recorded continuously. All in all, only 13 Carnidae are known from the Oriental Region (Brake 2011, with additions in Ozerov 2011, Papp 1913, Ozerov and Krivosheina 2014). Therefore it is not surprising that material I received recently from India belongs to an undescribed species. To add a further mosaic piece to the knowledge of these minute flies, this species is described here.

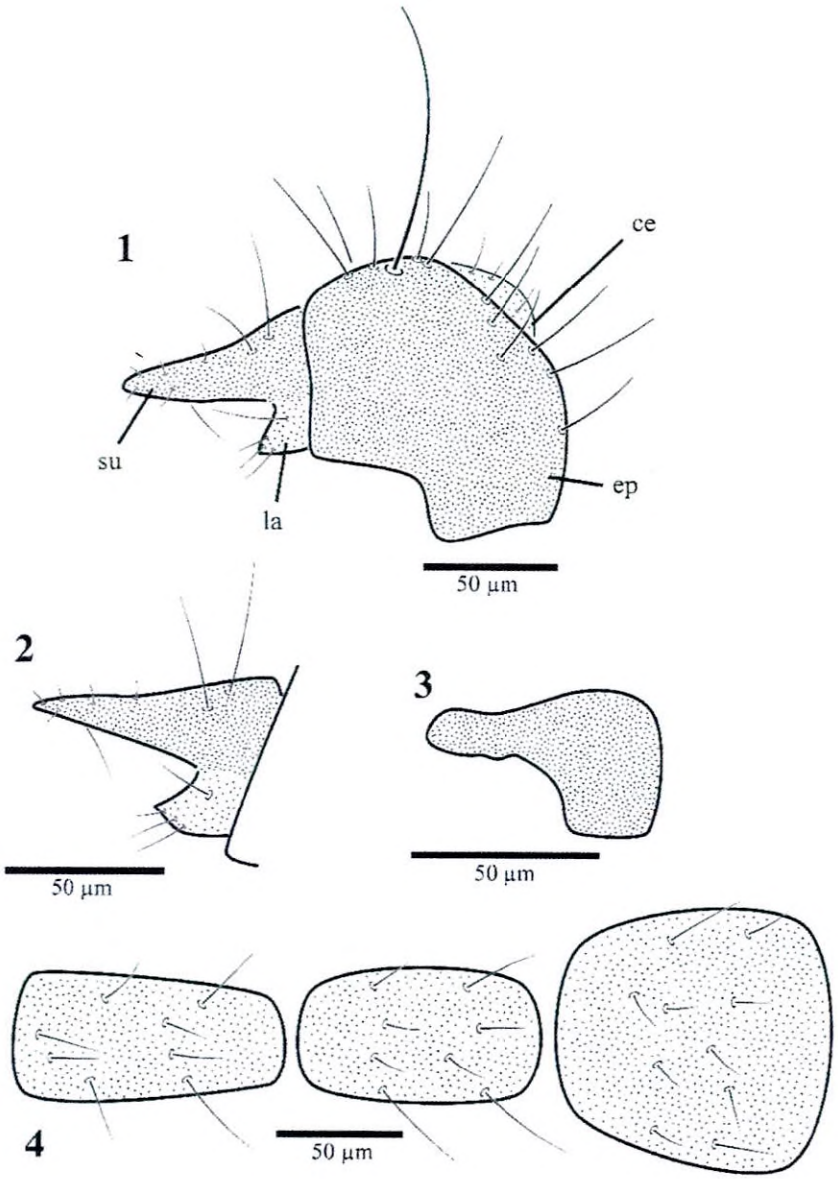
Materials and methods

The abdomen was dissected, macerated for about three hours in NaOH (aqueous) solution and stored in a microvial in glycerine together with the specimen on the insect pin. Because the specimens are very dry they have been softened before cutting the abdomen by putting them for three hours in an air-tight closed box with damp paper. The material is stored in the collection of the National Museum of Wales, Cardiff, United Kingdom (NMWC), with duplicates kept in the private collection of Jens-Hermann Stuke (PJHS). The terminology of the morphology is adopted from Cumming and Wood (2009) and Buck and Marshall (2007) and illustrated in Fig. 1. A separate sclerite ventrally beneath the protandrium (syntergosternite 6–8 sensu Wheeler 2010: 1102, fig. 5) is called tergite 7 (Buck and Marshall 2007: 14, fig. 16). The most anteroventral seta on the face is interpreted as the vibrissa, those above the vibrissa as supravibrissal setae and those posterior to the vibrissal seta on the gena as genal setae.

Results

Description of the new species

***Meoneura deemingi* sp. nov.** (Figs 1-4)
Holotype ♂: (1) "India: / Tamil Nadu, / Ooty Lake / 26.II.1984"; (2) "K. A. Spencer / Coll. NMW. / Z.1981-086."; (3) "Holotypus / *Meoneura deemingi* / spec. nov. ♂ / det. Stuke 2017".
The Holotype is deposited in the National Museum of Wales, Cardiff, United Kingdom (NMWC). The posterior part of the abdomen is dissected, macerated and stored in glycerine in a microvial pinned beneath the specimen. The remainder of the specimen is glued on paper and in good condition.
Paratypes: INDIA: 6♂ Tamil Nadu, Ooty, Botanical Garden, 27.ii.1984, leg. K.A. Spencer, coll NMWC & PJHS; 1♂ Tamil Nadu, Ooty Lake, 26.ii.1984, leg. K.A. Spencer, coll. PJHS; 1♂ Bangalore, University Agriculture Sciences Farm, 24.ii.1984, leg. K.A. Spencer, coll NMWC.



Figs 1-4. ***Meoneura deemingi*** **sp. nov. (drawn from holotype). 1, lateral view of epandrium and surstylus; 2, lateral view of surstylus; 3, lateral view of postgonite; 4, ventral view of sternite 3 (left) - sternite 5 (right). ce = cercus, ep = epandrium, la = lamella, su = surstylus.**

Description of holotype (male)

Body length about 1.5 mm. Wing length 1.4 mm. Head height 0.4 mm.

Head black, anterior part of the frons slightly lighter dark brown. Antenna black. Arista with minute pubescence. Eye without ommatrichia. Maximum eye length : maximum eye height = 0.9. Posteroventral margin of gena closest to eye margin : maximum eye height = 0.5. Frons with frontal triangle shining. Frontal triangle indistinct, reaching anteriorly about half distance from anterior ocellus to frontal margin. Face slightly microtomentose. Carina narrow. Postcranium slightly microtomentose. The haustellum of the holotype is wizened and therefore difficult to examine. Prementum longer and wider than labellum. Palpus brown, about as long as the haustellum. 1 pair of distinct ocellar setae. Supralunular setae cruciate. 4 fronto-orbital setae, anterior two mesoclinate, posterior two lateroclinate. 2 vertical setae. 2 small setae behind vertical setae. Postorbital setae cruciate. 1 strong vibrissal seta. 2 supravibrissal setae, the ventral one distinctly smaller. 3 strong genal setae.

Scutum subshining and covered with black setulae. Scutellum microtomentose and contrasting with scutum. Pleura subshining. Scutum with 3 distinct dorsocentral setae. 1 seta on postpronotum; 1 presutural seta; 2 notopleural setae; 1 supraalar seta; 1 postalar seta; 1 prescutellar seta; 1 apical and 1 lateral scutellar seta. 1 seta at posterior margin of anepisternum. Setae on katepisternum can not be recognised. Costa without obvious setae beyond radial vein R_1. Wing hyaline, veins light brown to whitish yellow. Radial vein R_{4+5} slightly curved to apex of wing. Knob of haltere whitish yellow, base of haltere dark brown. Legs black to brown. Fore femur with 2-3 outstanding posteroventral setae. Hind femur apically with 1 strong anteroventral seta. Coxa without obvious setae. Hind metatarsus ventrally with dense yellow golden hairs. Length mid metatarsus : length mid tibia = 0.5. Tergites without obvious depressions or tufts of setulae. Abdominal pleura with scattered setae on segments 4-5. Segments 1-5 narrow, width of tergite 3 : length of tergite 3 = 3.1. Tergites 3-4 each with a short lateral seta at the posterior margin only, tergite 5 with 4 pairs of conspicuously long setae at the posterior margin. Sternite 5 slightly trapezoid, about as long as broad, with few short setae only (Fig. 4). No midventral tergite 7 recognised. Protandrium distinct, about as long as epandrium and about 0.6 of length of tergite 5. Protandrium ventrally not fused. Epandrium with several distinct setae and one outstanding seta (Fig. 1). Maximum length dorsally in the middle of epandrium : maximum width of epandrium = 0.6. Cerci distinct, slightly projecting, and with a few setulae only. Subepandrial plate laterally with a few setulae. Hypoproct not projecting laterally. No tooth on subepandrial plate. Surstylus as in Figs 1-2: elongated, with a slightly broader base and pointed. Surstylus dorsobasally with two distinct setae, a few minute setulae apically and a medially directed long setae apically. Lamella as Figs 1-2: small, less than half the length of surstylus and less sclerotised. Lamella with several short hairs and one longer seta at its base. Surstylus and lamella broadly fused basally (Fig. 2). Postgonite as in Fig. 3: slightly sclerotised, with a broad base, elongated, rounded apically and not bent like a hook. Distiphallus inconspicuous, about as long as length of epandrium. Distiphallus with brown setulae, but no distinct sclerotisation could be found.

Variability

Almost all paratypes with dorsal seta on katepisternum. Palpus slightly shorter than haustellum. Frons completely black in one paratype.

Diagnosis

Meoneura deemingi sp. n. is easily recognised by the shape of the surstylus. It is most similar to *Meoneura orientalis* Papp, 2013 which is widespread within the Oriental Region; *M. deemingi* is easily distinguished from this species by the occurrence of 3 distinct dorsocentral setae (only 1 in

M. orientalis), the small lamella that is fused with the surstylus (separated in *M. orientalis*) and only 1 strong seta at the lamella (usually more than 1 strong seta in *M. orientalis*). There are a few similar species – all occurring in the Palaearctic Region – that share the character of a small lamella that is basally broadly fused with the surstylus: *Meoneura mongolica* Papp, 1967, *Meoneura acuticera* Gregor, 1973, and *Meoneura obtusangula* Carles-Tolrá, 2016. *Meoneura mongolica* has only 1 dorsocentral seta and is therefore easily ruled out; *M. obtusangula* has an apically rounded lamella that is not directed forward (Carles-Tolrá 2016: 54, figs 1-2) and the postgonite is apically bent like a hook (Carles-Tolrá 2016: 54, Fig 4); *M. acuticera* has a broader common base of surstylus and lamella (Gregor 1976: 139, Fig. 4) and there is dorsally one basal and one subapical setae on the surstylus.

Etymology

This species is dedicated to John Deeming (Cardiff), who brought the material of the new species to my attention and who has supported my work with Carnidae for several years. Additionally John Deeming is one of the pioneers of Carnidae research with 7 papers published since 1976 and four species described as new for science.

Distribution

To date *Meoneura deemingi* is only known from southern India.

Acknowledgements

I am grateful to John Deeming (Great Britain, Cardiff) who loaned the material. A first version of the manuscript was kindly checked by Irina Brake (Germany, Burgdorf).

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Dipterists Digest 2017 **24**, 109-110

Phaonia aeneiventris (Zetterstedt) (Diptera, Muscidae) new to Britain

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Summary
Phaonia aeneiventris (Zetterstedt, 1845) is reported as new to Britain, based on a male from Hampshire and a female from Oxford.

Introduction

In June 2001, John Ismay and Darren Mann of the Oxford University Museum of Natural History were surveying the insects of the Old Bus Station site on Oxford's Cowley Road, as part of an Ecological Impact Assessment. An unusual female of the genus *Phaonia* Robineau-Desvoidy, 1830 was collected, which was identified by ACP as probably *Phaonia aeneiventris* (Zetterstedt, 1845). Subsequent visits to the site, also with ACP, failed to produce any further specimens and so this female was put on one side. Since 2001, the Oxford site has been redeveloped for housing (Reliance Way), but a small area has been left intact and there is still some additional grassland habitat in adjacent areas, the old Cowley Marsh area, although there are no areas of wetland.

Recently, DJG collected a male *Phaonia* which he provisionally identified as *P. aeneiventris* from Gregor *et al.* (2016). This male was sent to ACP, who confirmed the identification, and this additional capture has made it possible to add this species to the British list. The specimen was swept from one of the drier parts of Greywell Fen, Hampshire, largely *Phragmites*-dominated with much encroaching sallow *Salix* scrub. It further differs from the other parts of Greywell Fen in being very flower-rich, with a particularly strong colony of *Lysimachia vulgaris*. The drier margins where the *Phragmites* bed thins out also has much *Senecio* which proved to be a very attractive resource for nectivorous insects.

Of the 175 species of insects (including 97 Diptera) recorded from four visits (about an hour of survey each visit), 19 have or recently had national conservation status, including 8 species of Diptera: *Dorylomorpha hungarica* (Aczél, 1939) and *D. infirmata* (Collin, 1937) (Pipunculidae); *Myopites inulaedyssentericae* Blot, 1827, *Acinia corniculata* (Zetterstedt, 1819) and *Campiglossa malaris* (Séguy, 1934) (Tephritidae); *Homoneura tesquae* (Becker, 1895) (Lauxaniidae); *Phaonia atriceps* (Loew, 1858) (Muscidae) and *Admontia blanda* (Fallén, 1820) (Tachinidae).

Phaonia aeneiventris (Zetterstedt, 1845)

Collection data for our two specimens are as follows:
HAMPSHIRE: V.C. 12, Greywell Fen, SU7251, 28.vi.2016 (D.J. Gibbs), 1♂, in the Natural History Museum, London.
OXFORDSHIRE: V.C. 23, Oxford, Cowley, overgrown playing field, SP5305, 22.vi.2001 (J. W. Ismay), 1♀, in the Oxford University Museum of Natural History, Oxford.

Phaonia aeneiventris is a medium-sized, dark species with the body and legs entirely black. Its most striking character is the presence of an additional short posterodorsal seta on the basal half

of the hind tibia, as in *P. pullata* (Czerny). In addition, it has a pubescent arista, 2 strong pairs of presutural acrostichals, 3 pairs of postsutural dorsocentrals, notopleuron bare apart from the two setae, prealar slightly shorter than 2nd notopleural, costal spine as long as crossvein r-m, both crossveins strongly clouded, halteres yellow, and sternite 1 bare.

It may be incorporated into the British key of d'Assis-Fonseca (1968) as follows:

Males

67 (88) Prealar about as long as, or longer than, 2nd notopleural, but if shorter then *either* scutellum with setulae on the margins below the level of the strong setae (*cincta*) *or* hind tibia with an additional short posterodorsal seta on basal half (*aeneiventris*).

68 (69) Arista pubescent, the longest hairs less than one-third width of postpedicel. Sternite 1 bare.

68a (68b) Haltere black. Wing strongly infuscated at base and on anterior half. Frons at narrowest point as wide as diameter of anterior ocellus ..... *pullata* (Czerny)

68b (68a) Haltere yellow. Wing not conspicuously infuscated, only the crossveins clouded. Frons at narrowest point as wide as width of postpedicel ..... *aeneiventris* (Zetterstedt)

69 (68) Arista plumose, the longest hairs equal to or longer than width of postpedicel, but if only half this width (*gobertii*) then sternite 1 with setulae.

Females

61 (80) Prealar as long as, or longer than, 2nd notopleural; when rather shorter then *either* scutellum with setulae on the margins below the level of the strong setae (*cincta* and some *gobertii*) *or* hind tibia with an additional short posterodorsal seta on basal half (*aeneiventris*).

62 (63) Arista pubescent, the longest hairs less than one-third width of postpedicel. Sternite 1 bare.

62a (62b) Haltere black. Wing strongly infuscated at base and on anterior half ..... *pullata* (Czerny)

62b (62a) Haltere yellow. Wing not conspicuously infuscated, only the crossveins clouded ..... *aeneiventris* (Zetterstedt)

62 (63) Arista plumose, the longest hairs equal to or longer than width of postpedicel, but if only half this width (*gobertii*) then sternite 1 with setulae.

General distribution: Palaearctic region, from Central and North Europe (Austria, Czech Republic, Denmark, Finland, France, Germany, Norway, Poland, Spain, Sweden, Switzerland), east to the Russian Far East.

Habitat: *Phaonia aeneiventris* favours wet or marshy habitats. ACP has collected it in Germany, at a flooded forest on the edge of the River Rhine, and in North Sweden in Abisko National Park, in wet birch forest and around open pools. Nothing is known of its life history.

Acknowledgements

We thank Darren Mann (Oxford University Museum of Natural History) for information about the Old Bus Station site in Oxford.

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Dipterists Digest 2017 **24,** 111-113

Atherigona orientalis Schiner (Diptera, Muscidae), newly recorded in Britain

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Summary
The subtropical muscid fly *Atherigona orientalis* Schiner, 1868 is recorded from Hackney Marsh in London as a probable recent introduction. Like the only other species of its genus recorded in Britain, *A. varia* (Meigen), it isn't known if there is an established population. A key is provided to separate these two species.

Introduction

On 14 July 2016 a small female muscid was taken from flowering hogweed (*Heracleum sphondylium*) growing along the woodland path beside the river Lea at Hackney Marsh (TQ370860) (Figs 1-2). Using photographs from the gallery on Diptera.info I was able to identify it as belonging to the genus *Atherigona* Rondani, 1856. Across the river at this location is the western corner of the 31 acre site of New Spitalfield Market, one of the largest horticultural wholesalers nationally.

Figs 1-2. *Atherigona orientalis* Schiner, female at hogweed *Heracleum sphondylium* flowers.

The specimen was sent for identification to Adrian Pont who determined it as *Atherigona orientalis* Schiner, 1868. An internet search revealed a range of informative material, but no reference to British records. An article issued as a PDF file (Hibbard and Overholt 2013.) reports that *A. orientalis* is a highly polyphagous pest species often known as the 'pepper fruit fly' or 'tomato fruit fly' after its major plant hosts. It is found in most tropical and subtropical regions, with frequent reports in more temperate areas during the 2000s. A study by the European and Mediterranean Plant Protection Organization (EPPO 2015) states that it is found in Cyprus, Spain (the Canary Islands) as well as in Israel. It is also known from Libya, Egypt, Iraq and Turkey (Adrian Pont *pers. comm.*).

A ready explanation of its presence on Hackney Marsh appears to be the proximity of the New Spitalfield Market, opened in 1991, with 115 trading units for wholesalers dealing in fruit,

vegetables and flowers, much of which is imported. An identification guide in Spanish (Cajamar Group 2015) points out that *A. orientalis* has recently been found in greenhouses on the Iberian peninsula. The guide demonstrates how to separate it from *Coenosia attenuata* Stein, 1903 (Muscidae) which is already well established in commercial greenhouses in Spain and which is widely used for the biocontrol of greenhouse pests such as white fly and leaf-miners. Britishtomatoes.co.uk/environment offers a possible clue to the timing of the find: "Most of our imported tomatoes come from Spain and the Canary Islands, traditionally through the winter, but with the season being increasingly extended through the rest of the year". Hackney Marsh is a well-visited site, and flowering hogweed along the southern and western edge of the Market has been regularly examined since at least 2011. If spring and summer deliveries of Spanish greenhouse tomatoes here is only a recent practice, it could explain why *A. orientalis* has not been found here before. In addition to damaged or rotting fruit it has been known to develop in dung, carrion and other insect oviposition sites (Hibbard and Overholt *op. cit.*), so the presence of possible breeding conditions in containers or other parts of the market during July cannot be ruled out.

Figs 3-4. *Atherigona orientalis* Schiner female, lateral and dorsal views.

Identification

The genus *Atherigona* has been recorded in Britain before. In June 1998 a single specimen of *A. varia* (Meigen, 1826) was found in Dorset (Pont and Grainger 2000). It has not been seen in Britain since and it is not known whether a breeding population had become established. *Atherigona varia* and *A. orientalis* (Figs 3-4) may be simply separated by the following key couplet:

1. Presutural acrostichal setulae in 4-5 rows at suture. Hind femur with a dorsal preapical seta in addition to the anterodorsal preapical. Basal lateral setula of scutellum half as long as the subbasal lateral seta. ♂: palpus elongate, with fine hairs along apical ventral part, without basal dorsal setae; fore femur with a shallow dorsal preapical excavation; abdomen without hypopygial prominence and trifoliate process. ♀: ovipositor without a pair of anterior platelets on tergite 8.

[Sg. *Acritochaeta* Grimshaw, 1901] ..... *orientalis* Schiner

- Presutural acrostichal setulae in 2-3 rows at suture. Hind femur without a dorsal preapical seta in addition to the anterodorsal preapical. Basal lateral setula of scutellum at most one-third as long as subbasal lateral seta. ♂: palpus short, clubbed, with fine hairs only at tip and with several stout black dorsal setulae at base; fore femur without a dorsal preapical excavation; abdomen with a "hypopygial prominence" on the dorsal surface of syntergite 6-8, and dorsal surface of epandrium with a long stalk bearing a trifoliate process. ♀: ovipositor with a pair of small platelets anterior to tergite 8.
  [Sg. *Atherigona* Rondani, 1856, s. str.] ..... *varia* (Meigen)

Further details of these structures, together with illustrations, can be found in Pont and Magpayo (1995).

Acknowledgements
I am very grateful to Adrian Pont for his help with identification, for drafting the key couplet and for placing the specimen in the British Diptera collection at the Natural History Museum, London.

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A record of the American black dump fly *Hydrotaea aenescens* (Wiedemann) in Scotland – A single male of *Hydrotaea aenescens* (Wiedemann, 1830) was taken in an ultra-violet electric fly-killer trap, which was in operation during September 2016 in the taxidermy laboratory at the National Museums Collection Centre, West Granton Road, Edinburgh (NT2276, V.C. 83). This species is easily recognised by its yellow palpi, while other *Hydrotaea* in Britain have black palpi. A male and female of the similar, but native and commoner species, *Hydrotaea ignava* (Harris) were taken in the traps in October 2016.

Hydrotaea aenescens has spread from the New World to Europe. A history of the occurrence of the species in Britain, Ireland and Europe is provided by A.C. Pont, M.J. Lole, H.N. Leblanc and J.H. Cole (2007. The American black dump fly *Hydrotaea aenescens* (Wiedemann, 1830) in Britain and Ireland. *Dipterists Digest* (*Second Series*) **14,** 23-29). The species was first recorded in Europe in 1964, and in England first came to the attention of A.C. Pont as adult flies

from Staines, Middlesex in 1979. The finding of adults at a number of sites from southern England to Lancashire between 2001 and 2006 suggests that by that time the species had become established widely in England. Adrian C. Pont (*pers. comm.*) informs me that he is not aware of any records in the British Isles since that 2007 paper. The present record appears to be the first record in Scotland. Previously the furthest north the species was known in Europe was from southern Norway, from specimens mostly taken at garbage dumps in Bergen and Stavanger (Rognes, K. 1982. Some interesting captures of Muscidae (Dipt.). *Fauna Norvegica* Ser. B **29,** 40-44). Recently it has been recorded much further north near Narjan-Mar in the far north of European Russia in the polar tundra at about 68°N, where adults were taken at a refuse pit (Vikhrew, N. 2008. New data on the distribution and biology of the invasive species *Hydrotaea aenescens* (Wiedemann, 1830) (Diptera, Muscidae). *ZooKeys* **4,** 47-53).

I am grateful to Georg Hantke of the National Museums Scotland for providing the trap catch and to Keith Bland for selecting specimens from the catch and making them available to me for identification – **DAVID HORSFIELD,** National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA

A second British record of *Scaptomyza adusta* (Loew) (Diptera, Drosophilidae) – This species was first found in Britain in a hothouse in Durham during 2005 and was subsequently reared from partly decayed inflorescences of the perennial *Costus arabicus* (Chandler, P.J., Ismay, J.W., Ismay, B. and Rotheray, G.E. 2008. *Scaptomyza adusta* (Loew, 1862) (Diptera, Drosophilidae) at the Durham University Botanic Garden. *Dipterists Digest* (*Second Series*) **15,** 5-12).

The British Myriapod and Isopod Group (BMIG) were holding their annual field meeting in Lancashire this year and kindly allowed me to join them on an arranged visit to Myerscough College, near Bilsborrow, Lancashire on 31 March 2017. Myerscough College is the largest national provider of specialist education and training for the land-based and sports industries (and was previously known as an agricultural college).

After visiting various Temperate Greenhouses and looking under many plant trays, floor mats and table mats, some of us went to the Tropical Greenhouse (SD497401). As several BMIG members began patiently sieving soil for sub-millimetre woodlice, I had a look around for any Diptera that there might be. Disappointingly there was nothing flying anywhere and examination of accessible glass panels failed to reveal any flies. Finally, though, I saw one individual sitting still on a leaf near to the path.

This was determined to be a female of *Scaptomyza adusta* (Loew, 1862), which is described as a Nearctic and Neotropical species that is established in the Mediterranean region and the Atlantic islands (Bächli, G., Vilela, C.R., Andersson Escher, S. and Saura, A. 2004. The Drosophilidae (Diptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*, Volume **39,** 362 pp). Unfortunately the manner of the find means that little was learnt about its natural history, or of any plant associations at this new site; perhaps a visit later in the year might reveal more. The fact that it has now been found in two hothouses suggests that it may be present in more of these specialised habitats in Britain.

My thanks to BMIG for allowing my participation, Myerscough for allowing recording and to Peter Chandler for checking the identification – **ROB ZLOCH,** 89 Coniston Road, Lancaster, LA1 3NW; robszsz@yahoo.co.uk

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