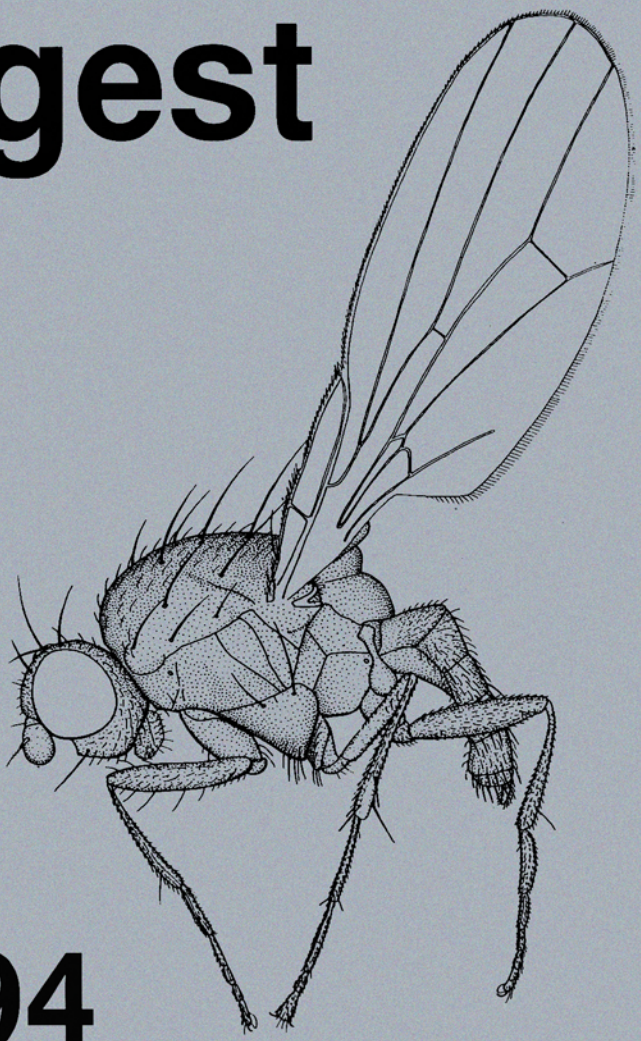
Dipterists Digest



1994
Vol. 1 No. 1

Dipterists Digest is a popular journal for amateur, semi-professional and professional field dipterists with interests in British and NW European flies. The scope of **Dipterists Digest** is:

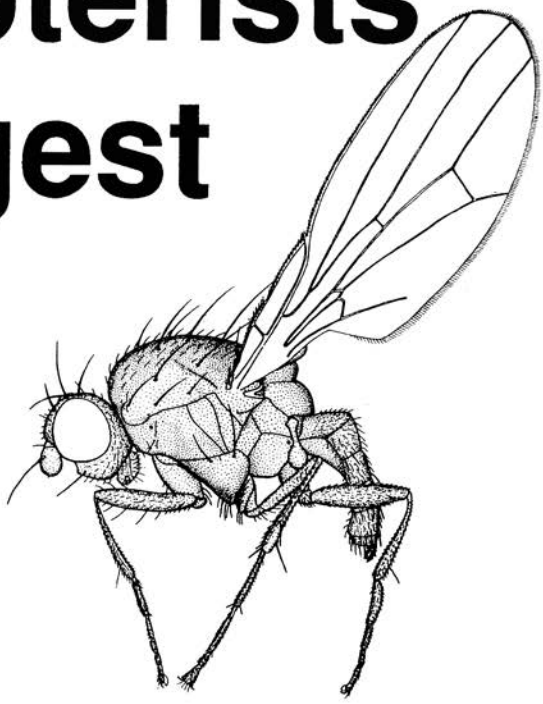
- the behaviour, ecology and natural history of flies
- new and improved techniques (e.g. collecting, rearing etc)
- the conservation of flies
- provisional and interim reports from the Diptera Recording Schemes, including preliminary maps
- records and assessments of rare and scarce species including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

Articles may be of any length up to 3,000 words and must not have been accepted for publication elsewhere. Items exceeding this length may be serialised or printed in full, depending on competition for space. Articles should be written in clear and concise English, preferably typed double spaced on one side of A4 paper. Style and format should follow articles published in this issue. References should be given in full according to the layout in this issue. Only scientific names should be underlined. Tables should be on separate sheets. Figures should be drawn in clear black ink, about twice their printed size and lettered clearly. Descriptions of new species should include a note of which museum or institution type material is being deposited.

Articles for publication should be sent to the Editor, Dr Graham E. Rotheray, Royal Museum of Scotland, Chambers Street, Edinburgh, Eh1 1JF, UK.

Enquiries about subscriptions, photographs and colour plates should be addressed to the Production Editor, Derek Whiteley, 17 Rustlings Road, Sheffield, S11 7AA, UK.

Dipterists Digest



Edited by Graham E. Rotheray

Vol. 1 No. 1

Second Series

1994

Published by Derek Whiteley
ISSN 0953-7260

Derek Whiteley
17 Rustlings Road
Sheffield
S11 7AA

Dipterists Digest (second series) Vol. 1, No. 1, August 1994

Contents

PROSOPANTRUM FLAVIFRONS (TONNOIR AND MALLOCH) (DIPTERA, HELEOMYZIDAE) NEW TO BRITAIN AND THE NORTHERN HEMISPHERE

JOHN ISMAY, 55 Lashford Lane, Dry Sandford, nr. Abingdon, Oxon OX13 6DZ
DEREK SMITH, 12 Tring Gardens, Harold Hill, Romford, Essex RM3 9EP

In late 1991 the authors examined a British "acalypterate" fly that could not be easily identified to family. The specimens were taken at Colne Point, North Essex, in pitfall traps by Mr. P. Harvey. The habitus (Fig. 1) of the specimens suggested Heleomyzidae and they agree well with Colyer and Hammond's (1951) diagnosis of the family except that there are no stronger setae among the costal setulae and the tip of the subcostal vein (Fig. 2) is very close to the point where the upper margin of r_1 meets the costa. While most Northern Hemisphere heleomyzids have these costal setae, they are absent in many Southern Hemisphere genera (McAlpine, 1985) and an attempt was therefore made to identify the specimens in Southern Hemisphere keys. In Harrison (1959) and Malloch (1933) the specimens were identified as *Prosopantrum flavifrons* (Tonnoir and Malloch, 1927), described from Christchurch, New Zealand. The species is thought to have been originally confined to South America but spread, possibly by human agency, to New Zealand (Edwards, in Malloch, 1933), South Africa (Cogan, 1971), Tasmania (McAlpine, 1985) and now Britain. This paper adds the species to the British fauna and considers the changes necessary in keys to families and heleomyzid genera to accomodate such an exotic introduction.

Material studied

All from Essex, Colne Point, pitfall traps, P. Harvey. 4 ♀ grid reference TM 1112, 21.iv.-xii.1990; 6 ♀ TM 107123, TM 095129, TM 093133, 21.iv-10.v.1991; 2 ♀ TM 1112, 29.viii-1.xi.1991.

Description

The following descriptions are taken from Malloch (1933) and Harrison (1959).

Genus *Prosopantrum* Enderlein, 1912

Anepimeron bare; middle and posterior tibiae without setae before middle; 1-2 fronto-orbital setae, anterior shorter and directed laterally; several pairs of acrostichal setae (Fig. 3) developed; middle tibia (Figs. 4,5) with strong setae on almost dorsal surface at about 2/3 length and 1 strong ventro-apical seta; costa without stronger setae beyond r_1; subcosta ending close to tip of r_1; a_1 + cua_2 ending abruptly about 2/3 distance to wing margin; 2 strong dorsal katepisternal setae; prosternum without setae; no strong seta at middle of gena.

Prosopantrum flavifrons

Thorax and abdomen black, pleura paler between sclerites, dusted grey; scutum with brown spots about bases of setae; head with black, grey-dusted occiput, ocellar tubercle and orbital

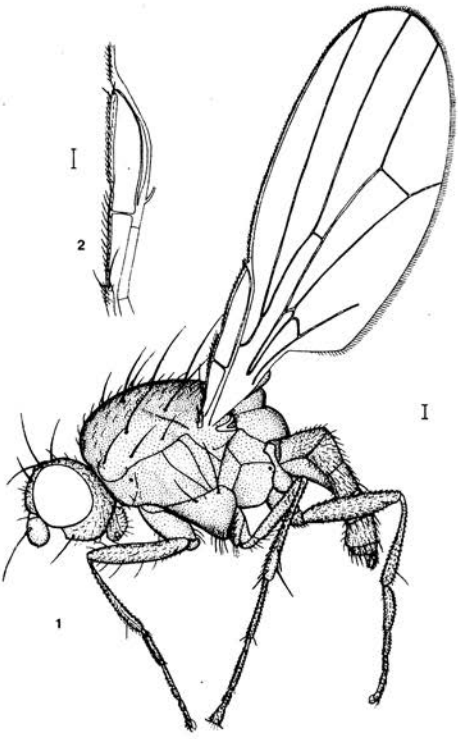


Fig. 1-2. *Prosopantrum flavifrons*. **1.** adult, lateral view; **2.** anterior basal part of wing, dorso-lateral view; scale lines 0.1mm.

plates, remainder yellow; antennae yellow, first flagellomere brown apically, arista brown. Legs yellow-brown; femora grey-brown, trochanters and apices of tarsi also darkened.

Three dorsocentral setae developed (Fig. 3), anterior at level of transverse suture, 1 postpronotal seta, 1+1 notopleural setae, anterior much stronger, 1 presutural supra-alar, 1 intra-alar, 1 postalar, very strong. Scutellum slightly flattened and bare of setulae, with 2 pairs of longer setae, basal pair shorter and convergent, apical pair longer and divergent. Anterior femur with strong posterio-dorsal and posterio-ventral rows of setae; middle femur with anterior setae on apical 1/4 and 1 posterior apical seta; posterior femur with 1 anterior seta at apical 3/4. Anterior tibia with dorsal preapical seta; middle tibia with complex chaetotaxy, stronger than on other tibiae, a strong and almost exactly dorsal seta at slightly more than 2/3 length, preapical seta slightly more anterior than usual, postero-dorsal at 7/8 length, 1 strong apical ventral seta, these 4 setae subequal in size; posterior tibia with dorsal preapical seta. Wing slightly yellow tinted with yellow veins. Costa with 2 longer setae at

base, the dorsal longer, costa narrowed beyond humeral crossvein, broken at apex of sc which is very close to r_1. Female postabdomen as Figs. 6,7. Length 3.0mm.

Identification to family

Colyer and Hammond (1951) is a widely used key to the families of British diptera. In the key to acalypterate families, *P. flavifrons* fails at couplet 19 since the British Heleomyzidae run to the first half of the couplet (costal break well separated from junction of costa and vein 1) whereas *P. flavifrons* runs to the second half of this couplet (costal break very close to the junction of costa and vein 1). It then runs to the end of the key (couplet 45) and the family Chyromyidae, since it has convergent postvertical setae and a scutellum which, though flattened, does not have projections. The key could be modified by replacing the family Chyromyidae with a further couplet 46:

46 Tibiae with well developed preapical dorsal setae . . . . . Heleomyzidae, part (*Prosopantrum*)

\- Tibiae without developed preapical dorsal setae . . . . . Chyromyidae

McAlpine (1985) is the most comprehensive recent work on the higher classification of the Heleomyzidae. Many of the characters used at family level by Northern Hemisphere revisers are shown to be variable and a broad definition of the family is presented, with 22 tribes not placed in subfamilies. *Prosopantrum* is placed in a tribe of its own, Cnemospathini Enderlein, 1938.

Identification to genus in Collin (1943)

In Collin's key to genera of Heleomyzidae, *P. flavifrons* runs to couplet 7(8) but does not agree with the description of *Borboropsis*. Since this work, *Oldenbergiella brumalis* Czerny 1924 has been recorded from Britain (Collin, 1951) and this also lacks strong costal setae. The simplest procedure is to replace couplet 7(8) with the following short key to all British Heleomyzidae without stronger costal setae:

1(2) Vein a1 + cu2 ending abruptly at about 2/3 distance to wing margin; middle tibia with strong seta on almost dorsal surface at about 2/3 length; acrostichal setae irregularly developed, longer than setulae on scutum . . . . . *Prosopantrum flavifrons* (Tonnoir and Malloch, 1927)

\- Vein a1 + cu2 continued to wing margin; middle tibia bare dorsally; no acrostichal setae developed **2**

2(1) Anepisternum with setae on posterior margin . . . . . *Borboropsis puberella* (Zetterstedt, 1838)

\- Anepisternum without setae . . . . . *Oldenbergiella brumalis* Czerny, 1924

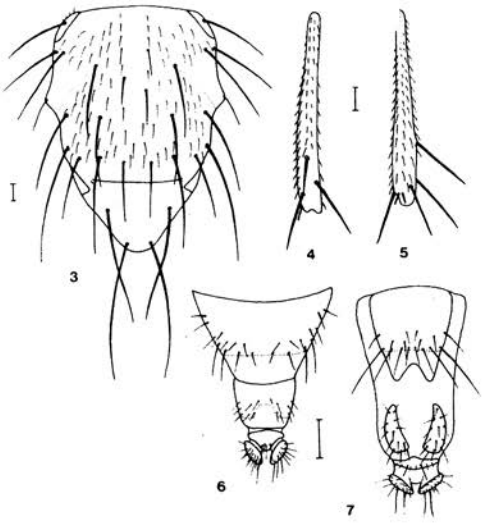


Fig. 3-7. *Prosopantrum flavifrons*. **3.** scutum and scutellum, dorsal view; **4.** middle tibia, lateral view; **5.** middle tibia, anterior view; **6.** female postabdomen, dorsal view; **7,** female postabdomen, ventral view; scale lines 0.1mm.

Biology and Ecology

The biology of the species is apparently unknown but Cogan (1971) notes an association with faecal matter and carrion, which agrees with other species in the family. There is no evidence that it is of medical or veterinary importance, but it may become one of the synanthropic diptera associated with dung or carrion or both.

The specimens reported here were collected by pitfall traps and total 12 females. Harrison (1959) reported only female specimens from New Zealand and Cogan (*op. cit.*) also from South Africa, noting that the species may be capable of reproducing parthenogenetically outside its natural range (South America). *Prosopantrum flavifrons* was originally described from New Zealand but was later found in South America, where both sexes occur (Malloch, 1933).There are other *Prosopantrum* species in South America (Gill,1968) and it most probably originated there, spreading to New Zealand, South Africa, Tasmania and Britain. The spread may well have been caused by human agency (Edwards in Malloch, 1933).

One of us (DAS) contacted Mr. Coupland of the Colne Harbour Authority and enquired about the possibility of the insect being introduced by shipping. Shipping from South Africa, Australia and South America (mainly fruit ships) often sheltered off the coast near Bradwell Power Station and was serviced by local vessels. Coal is imported from South Africa, but

usually *via* Rotterdam by way of coasters. The area thus has strong shipping connections with the Southern Hemisphere.

Acknowledgements

We are particularly grateful to Mr. P. Harvey for the opportunity to study this interesting material. Mr. Coupland, Colne Harbour Authority, kindly advised on shipping movements off the Essex coast. Mr. A.C. Pont commented on an early draft of this paper. Prof. D. Spencer-Smith, Hope Professor of Entomology and Dr. S.J. Simpson, Curator, provided research facilities for one of us (JWI) at the Hope Entomological Collections, University of Oxford.

References

Cogan, B.H. (1971) The Heleomyzidae of the Ethiopian region (Diptera). *Annals of the Natal Museum* **20(3)**: 627-696.

Collin, J.E. (1943) The British species of Heleomyzidae (Diptera). *Entomologist's mon. Magazine* **79**: 234-251.

Collin, J.E. (1951) British Heleomyzidae (Diptera); Additions and corrections. *Journal of the Society for British Entomology* **4**: 37-39.

Colyer, C.N. & Hammond, C.O. (1951) *Flies of the British Isles*. Warne, London.

Czerny, L. (1924) Monographie der Helomyziden (Dipteren). *Abhandlungen der Zoologisch Botanischen Gesellschaft in Wien* **15(1)**: 1-166.

Enderlein, G. (1912) Die Insekten des Antarkto-Archoplato-Gebietes (Feuerland, Falklands-Inseln, Süd-Georgien). *Kungliga Svenska vetenskapsademiens handlingar* **48(3)**: 1-170.

Enderlein, G. (1938) Die Dipterenfauna der Juan-Fernandez-Inseln und der Oster-Inseln. In Skottsberg (ed.): *The natural history of Juan Fernandez and Easter Island,* **3**: 643-680.

Gill, G.D. (1968) Family Heleomyzidae (Helomyzidae) including the Trixoscelididae (Trichoscelidae). *A catalogue of the Diptera of the Americas south of the United States* **85**: 1-13.

Harrison, R.A. (1959) Acalypterate Diptera of New Zealand. *New Zealand Department of Scientific and Industrial Research Bulletin* **128**: 1-382.

McAlpine, D.K. (1985) The Australian genera of Heleomyzidae (Diptera: Schizophora) and a reclassification of the family into tribes. *Records of the Australian Museum* **36**: 205-251.

Malloch, J.R. (1933) Acalyptrata. *Diptera of Patagonia and South Chile* **6(4)**: 177-391.

Tonnoir, A.L. & Malloch, J.R. (1927) New Zealand Muscidae Acalyptratae. Part 3 - Helomyzidae. *Records of the Canterbury Museum* **3**: 83-100.

Zetterstedt, J.W. (1938) *Insecta Lapponica* **3**: 486-867, Lipsiae.

CREATING BREEDING SITES FOR *CALLICERA RUFA* SCHUMMEL (DIPTERA, SYRPHIDAE) AND A FURTHER HOST TREE

IAIN MACGOWAN, Scottish Natural Heritage, South East Region, Battleby, Redgorton, Perth PH1 3EW

Callicera rufa is a rare hoverfly in Britain which is almost completely confined to remnants of ancient Caledonian pinewood in the Scottish Highlands. The larvae of this species develop in water filled rot holes in living Scots Pine trees (*Pinus sylvestris* L.). The species is dependant on old, relatively large well branched trees which are the most likely to contain rot holes (Rotheray and MacGowan, 1990). Some native pinewoods such as those in Strathspey and at Rannoch contain many suitable rot holes. In other pinewoods especially those which occur further west such as Glen Affric, Strathfarrar and Beinn Eighe, rot holes are rare and indeed apparently absent. This may be partly due to genetic differences in the pine stock or to previous forestry extraction. For example, after several days searching in the Beinn Eighe woodlands only two trees with good rot holes containing *C. rufa* were located. Not only are rot holes scarce in certain pinewoods, but there is a generation gap in many woods where past management has led to a present lack of trees in the younger age classes. This means that, in the future, suitable large trees capable of sustaining rot holes will probably be absent from many sites.

Artificial rot holes could be one means of overcoming these problems and help to ensure the continued survival of *C. rufa*.

During December 1989 an opportunity arose on the Beinn Eighe National Nature Reserve in Wester Ross to cut an artificial rot hole in the cleft of a twin trunked native pine. The age of the choosen tree was estimated at about 90 years and it was selected to be within 300m of the largest known rot hole containing *C. rufa* to maximise the potential for colonisation. The cleft was located some 60cm above ground level, this was enlarged into a hole with the use of a small chainsaw. A triangular shaped plug of wood was removed leaving a hole some 50cm deep and with an estimated volume of some 0.4 litres (Hole 1). It was hoped that, over the winter, the hole should fill with water and over a period of a few years it would gradually mature and become attractive to female *C. rufa* searching out an egg laying site.

Seven months later, in July 1990 I visited the rot hole and was astonished to find that the now water filled hole contained at least seven third instar *C. rufa* larvae. One of these was removed, and the identification was confirmed by G. Rotheray. At this same time I constructed a "roof" over the top of the hole. This consisted of a few larger twigs jammed in position horizontally across the mouth of the hole with moss and pine needle debris laid on top. This is similar to the situation which occurs in many natural rot holes (Rotheray & MacGowan, 1990). The roof may act to minimise evaporation in the summer months and to reduce freezing during the winter. The reduction of evaporation is especially important for a relatively small volumed rot hole such as this. Rot hole 1 was monitored intermittently and during 1991, larvae continued to be present but no puparia were found.

Encouraged by the success of the first artificial rot hole in attracting *C. rufa*, a further three

holes were made in March 1991. These were cut in a group of three trees each about 10m apart from the other in a roughly triangular pattern. This group of trees was approximately 600m from the nearest known natural rot hole containing *C. rufa*. The volume of the three holes was 1.0 litres (Hole 2), 0.9 litres (Hole 3) and 2.0 litres (Hole 4). The holes successfully retained water and were apparently suitable for occupation by June 1991. The site was monitored throughout the summer and a more detailed examination was made on 14.viii.1991. There was no sight of any *C. rufa* larvae although in the original rot hole in 1990 well grown larvae were visible by late July. To ascertain whether these rot holes were capable of supporting *C. rufa* I removed three larvae from the original natural rot hole and placed them in Hole 2. Two of the larvae were about 10mm long, the other was 6mm.

On 24.vii.92 I once more visited all the artificial rot holes. Hole 1 contained 7 puparia all lodged into the crevices in the bark just above the water level but still beneath the layer of pine needles forming a roof over the hole. One puparium was empty indicating the emergence of an adult. One puparium was removed and the adult female emerged a day later on 25.vii.92, almost exactly two years after larvae were first seen in this rot hole.

In hole 2 two puparia were found, these obviously corresponded to the two large larvae which were translocated into the hole in 1991. No evidence of any other larvae was found in this hole. Hole 3 contained several dead *Myathropa florea* larvae but no evidence of any *C. rufa* larvae. Rot hole 4 contained at least one *C. rufa* larvae thus confirming the natural spread of the species to this more distant group of rot holes. Several dead *Myathropa* larvae were also found in this hole.

In May 1993 a further visit was paid to all the four artificial rot holes and *C. rufa* larvae were recorded in each one, thus demonstrating clearly, that the technique had been successful. The rapid growth rate of *C. rufa* larvae in Hole 1 during summer 1990 and the emergence of adults two years later contrasts with the observations made by earlier workers. Coe (1941) kept larvae for five years without any sign of pupation. Rotheray and MacGowan (1990) reported that they had kept larvae which were about to enter their third winter. *C. rufa* larvae are probably filter feeders on the bacteria which occur within rot holes. It seems likely that in mature rot holes which have been utilised by succeeding generations of *C. rufa*, and which perhaps contain large numbers of larvae, low nutrient inputs and competition for food resources combine to cause low individual growth rates. The similar conditions probably occurred in laboratory situations where previous workers reported long larval periods. Under such conditions it may take the larvae a long time to finish growing; physiologically they may be adapted to cope with fluctuating food levels. One of the most obvious features of rot hole 1 was the resin and sap which issued from the newly cut surfaces. Above the water line this dried to a hard, crystalline solid but below the water line these substances were presumably dissolving into the rot hole water. This large input of nutrients probably encouraged a large bacterial population which in turn would lead to an increased food supply for the larvae. In three of the four rot holes dead slugs were also found in the rot hole water again presumably increasing nutrient input.

The success of habitat creation for the rot hole dwelling *C. rufa* larvae opens up new opportunities for conservation and biology. In the Highlands there are still some of the most important remnants of ancient coniferous forest in Europe. *C. rufa* is an important and

characteristic component of these woodlands. It is now possible to create artificial habitats for this species within native pine woods thus maintaining and encouraging the spread of this species. It also provides a mechanism whereby continuity of rot holes in the future can be assured through the creation of rot holes in younger trees.

The success of artificial rot hole creation also has consequences for other species in other types of woodland. The most obvious contenders are other *Callicera* species which are known to occur in Europe (Speight, 1991). There are also several other endangered hoverfly species such as *Brachypalpus laphriformis, Pocota personata*, and *Myolepta* spp. which could potentially benefit from such habitat creation techniques.

The creation of artificial rot holes could also prove to be a useful tool for future workers studying the dispersive abilities of ancient woodland Diptera and as an example to land managers of the relatively simple techniques which can be employed to encourage populations of rare saproxylic insects.

On 25 July 1992, as part of a continuing investigation of *C. rufa,* I examined a twin stemmed larch (*Larix decidua* Miller) growing by a roadside near Scotsburn, Easter Ross, Highland Region. A search revealed the presence of a water filled rot hole in the cleft between the trunks. The hole was too deep and narrow to allow a search for larvae to take place but 9 empty *C. rufa* puparia and one occupied puparium were discovered lodged into cracks in the bark just below the layer of vegetation and debris which formed the roof of the rot hole. The smell of water, resin and decaying needles in the rot hole seemed to be very similar to that experienced in pine rot holes. The occupied puparium was retained and a male *C. rufa* emerged on 8.8.92.

The Scotsburn area is dominated by Scots pine, both planted and self sown. *C. rufa* had been found previously in a mature Scots Pine only some 5 km from the larch site in 1989. Presumably *C. rufa* is dispersed throughout the area and could therefore colonise the larch tree on the edge of the woodland. The presence of the larch in this area may have been partly for ornamental purposes or self sown from a planted source. This record suggests that *C. rufa* could be associated with a range of conifers, rather than just *P. sylvestris*.

Acknowledgements

I wish to thank Tim Clifford for his practical assistance and Graham Rotheray for his comments on an earlier draft of this paper.

References

Coe, R.L. (1941) *Callicera rufa* Schummel (Diptera, Syrphidae); colour variation of abdominal hairs in the adult, with a note on longevity of the larvae. *Entomologist* **74**: 131-132.

Rotheray G.E. & MacGowan I. (1990) Re-evaluation of the status of *Callicera rufa* Schummel (Dipt., Syrphidae) in the British Isles. *Entomologist* **109**: 35-42..

Speight, M.C.D. (1991) *Callicera aenea, C. aurata, C. fagesii* and *C. macquarti* redefined, with a key to and notes on the European *Callicera* species. *Dipterists Digest* **10**: 1-25.

FOUR SPECIES OF *ANATELLA* WINNERTZ (DIPTERA, MYCETOPHILIDAE) NEW TO THE BRITISH ISLES

PETER CHANDLER, Weston Research Laboratories, Vanwall Road, Maidenhead, Berks SL6 4UF

Chandler (1977a) added three species and provided a tentative key to the British species of *Anatella*; in the same year Plassmann described several several new species from Europe and Chandler (1977b) indicated that the British species cited as *gibba* was correctly *pseudogibba* Plassmann.

Two more of Plassmann's species may now be recorded as British; both have already been recorded from Ireland by Chandler (1987). A third additional species, apparently undescribed, has been found in Welsh wetland material and a fourth recently described by Norbert Caspers can also be added. Both *alpina* Plassmann and *ankeli* Plassmann are rather dark species with small genitalia (figured by Plassmann, but in more detail by Caspers, 1984b) and may be confused with females on superficial examination. Both run in my key to couplet 6 but the antennal character used in this couplet to separate *pseudogibba* is unreliable as some other species running to here may have the flagellar segments as long as in *pseudogibba*. *A. ankeli* and *A. alpina* may be distinguished from all included species by the thoracic colouration which is deep black on the disc and broadly grey dusted on the humeral areas and more narrowly on the sides of the mesoscutum. The grey dusting is lighter and more strongly contrasting in *ankeli*, which also differs in the basal antennal segments being obscurely yellowish and the palpi yellow (both blackish in *alpina*).

The new species also runs to *pseudogibba* on the antennal character but otherwise more closely resembles *simpatica* Dziedzicki and *dampfi* Landrock, to which it is similar in genital structure. The outer (anterior) mid tibial spur is nearly as long as the inner spur in the specimens examined. *A. dampfi* remained little known in Britain until it was found at the same localities as the new species and at 51 other wetland sites (37 in Wales, 8 Norfolk, 2 Suffolk, 4 Oxon), during recent surveys by the former Nature Conservancy Council.

A. emergens Caspers is structurally very similar to *minuta* (Staeger), with which I have previously confused it, but has the mesoscutum more uniformly darkened, so might run to the *dampfi/flavomaculata* couplet; there the tibial spurs and coxal bristles agree with *flavomaculata* but the mid femoral fringe is very short as in *minuta*.

***Anatella alpina* Plasmann, 1977b**

This was described from the German Alps; it has since been recorded from other parts of Germany (Caspers, 1980, 1984a) and Austria (Caspers, 1984b). British records except the last cited are from near woodland streams, usually in gorges.

Material examined: 1 ♂, Devon: Ivybridge, 11.x.80; 1 ♂, Wicklow: Glendalough, 10.xi.86; 1 ♂, Perthshire: Pass of Killiecrankie, 1.ix.87; 1 ♂, Gwynedd (Caernarvon): Aber Valley, 7.vii.87, (Chandler); 2 ♂, Dyfed (Cardigan): Cors Caranod, 23.vii.87, *Equisetum* fen (P.

Holmes, D. Boyce & D. Reed).

***Anatella ankeli* Plassmann 1977a**

Also described from the German Alps, this has since been recorded from Austria (Caspers, 1984b) and France (Matile, 1980). Again, the British localities are mainly deep wooded gorges.

Material examined: 1 ♂, Ross: Scotsburn Gulley, 18.vi.76; 2 ♂, Wicklow: Glendalough, 10.xi.86; 1 ♂, Enniskerry, 10.xi.86, (Chandler); 1 ♂, Somerset: Cogley Wood, 19.x.86, (A.E. Stubbs).

***Anatella emergens* Caspers 1987**

This was based on a single male from Germany; the genitalia were figured and attention was drawn to the resemblance in their structure to *minuta* (Staeger). Some specimens were initially confused with *minuta* and the record of *minuta* from Ireland by Chandler (1987) refers to *emergens*. The British material is from woodland, scrub and fen sites, collected in iii and vi-x.

Material examined (13 ♂): Berks: Windsor Forest, 5.vi.89; Durham: Nesbitt Dene, 23.vii.90; Gwynedd (Caernarvon): Aber Valley, 7.vii.87; Mayo: Louisburgh, 14.vi.85; Perthshire: Black Wood of Rannoch, Dall Burn, 21.vi.92 (Chandler); Staffs: Sandwell Valley, 29.iii.89 (M.G. Bloxham); Norfolk: Woodbastwick, 5-19.viii.88; Thompson Common, 13-27.viii.88; Old Buckenham Fen, 28.vi-12.vii.88; Middle Harling, 28.vi-12.vii.88; Suffolk: Walberswick, 11-25.viii.88 (A. Foster & D. Proctor); Gwent: Magor Marsh, 12.x.88; Dyfed (Pembroke): Goodwick, 23.ix.87 (P. Holmes, D. Boyce & D. Reed).

***Anatella bremia* sp. n.**

Male. Body mainly dark greyish brown, darker on head and disc of thoracic dorsum and sides of tergites 1-4 obscurely yellowish, genitalia brownish yellow. Antennae grey brown with pedicel and base of first flagellar segment yellow. Palpi yellowish. Flagellar segments twice or more as long as broad. Halteres pale yellow. Legs brownish yellow. Fore metatarsus subequal to its tibia. Mid femur with a-v and p-v fringes short, the p-v fringe a little longer. Outer (anterior) mid tibial spur 0.8 x long to almost as long as inner (posterior) spur. Wings clear. Costa extending almost halfway from R5 to M1. Posterior fork beginning a little beyond base of median fork. Wing length 1.9-2.3mm. Genitalia Figs. 1-3. Female. Not recognised

Holotype male, Powys (Radnor), Colwyn Brook, 9.x.1987, water trap in *Molinia* bog (P. Holmes, D. Boyce & D. Reed, deposited in Natural History Museum, London) Paratypes: 5 ♂, same data as holotype; 1 ♂, Colwyn Brook, *Carex acutiformis* fen, 9.x.1989; 1 ♂, Powys (Radnor), Cors Goch, eroded peat hags, 4.vi.1989; 3 ♂, Powys (Radnor), Rhôs Goch, *Juncus* fen, 10.x.1989; 2 ♂, Powys (Radnor), Aberithon Turbary, 10.x.1989; 3 ♂, Powys (Radnor), Cwm Gwynllyn, lake fen, 9.x.1989; 1 ♂, West Glamorgan, Gors Llwyn

(Onllwyn), *Carex paniculata* tussocks, 6.x.1989; 2 ♂, Gwynedd (Caernarvon), Cors Gyfelog, floodplain fen, 26.vii.1988; 2 ♂, Gwynedd (Caernarvon), Cors Farlais, 6.x.1989; 1 ♂, Gwynedd (Caernarvon), Cwm Crafnant, *Carex rostrata*, 18.viii.1988; 1 ♂, Dyfed (Cardigan), Gwaun Garthenor, herb rich meadow, 2.x.1987; 2 ♂, Anglesey, Llyn Hafodol, 6.x.1988 (all P. Holmes, D. Boyce & D. Reed). Additional material: 77 males preserved (many more seen), mostly same data as above; also Anglesey, Cors Bodeilio, ex *Cladium mariscus*; Dyfed (Cardigan), Ynys Eidiol, Phragmites fen, 9.x.1989 (same collectors).

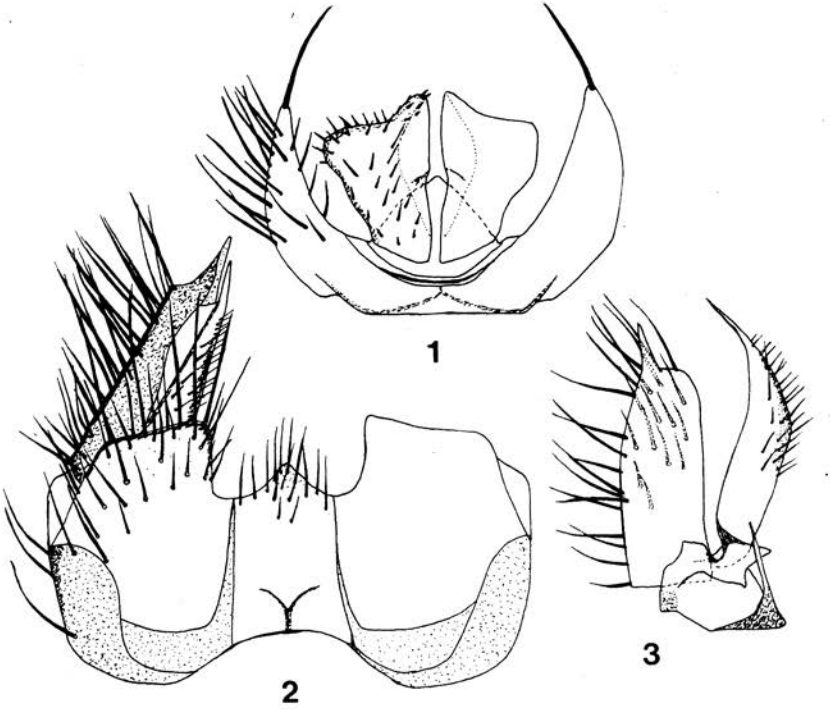


Fig. 1-3. Male genitalia of *Anatella bremia* **sp. n. 1.** tergite 9 and cerci; **2.** ventral view; **3.** internal view of right gonostylus.

Etymology: The specific name is that of a Roman fort in the upper part of the Teifi Valley where the first British specimen was collected, in 1987 at Gwaun Garthenor.

Acknowledgements

I wish to express my gratitude to all the collectors who have referred material to me. I am also grateful to the former Nature Conservancy Council for the opportunity to see the remarkable results of their wetland surveys.

References

Caspers, N. (1980) Die emergenz eines kleinen Waldbaches bei Bonn. *Decheniana Beihefte* (Bonn) **23**: 1-175.

Caspers, N. (1984a) Mycetophiliden-Fänge am Breitbach/Osthessen (Insecta, Diptera, Nematocera). *Bëitrage zur Naturkunde in Osthessen* **20**: 109-121.

Caspers, N. (1984b) Mycetophiliden aus Lunz, Niederösterreich (Diptera, Nematocera, Mycetophilidae). *Zeitschrift für Entomologie* **5(15)**: 173-205.

Caspers, N. (1987) Mycetophiliden-Fänge am Breitenbach/Osthessen (Bundesrepublik Deutschland) (Insecta, Diptera, Nematocera). 1. Nachtrag. *Nachrichtenblatt der Bayerisschen Entomologen* **36(4)**: 85-95.

Chandler, P.J. (1977a) Studies of some fungus gnats (Diptera: Mycetophilidae) including nine additions to the British list. *Systematic Entomology*. **2**: 67-93.

Chandler, P.J. (1977b) Some fungus gnats of the tribe Exechiini (Dipt., Mycetophilidae) new to the British Isles. *Proceedings British Entomological Natural History Society*. **10**: 71-85.

Chandler, P.J. (1987) New data on Irish fungus gnats (Diptera: Mycetophiloidea) including 51 species new to the Irish list. *Bulletin Irish Biogeographical Society*. **10**: 2-27.

Matile, L. (1980) Complément au Catalogue des Mycetophilidae de France (Dipt.). *Bull. Soc. ent. France* **85**: 93-102.Plassmann, E. (1977a) Neue Pilzmücken aus dem Allgäu (Diptera, Mycetophilidae. *Nachrichtenblatt der Bayerisschen Entomologen* **26**: 11-14.

Plassmann, E. (1977b) Drei weitere neue Mycetophilidenarten aus dem Allgäu (Diptera, Mycetophilidae). *Nachrichtenblatt der Bayerisschen Entomologen* **26**: 30-31.

SZABOIELLA HIBERNICA (TONNOIR), (PSYCHODIDAE) NEW TO SCOTLAND

JONATHON COLE, 2 Lenton Close, Brampton, Huntingdon, Cambs. PE18 8TR

During the Diptera Recording Scheme on the Isle of Skye in July 1991 I swept a male *Szaboiella hibernica* (Tonnoir) from a cliff seepage. There are very few records of this species and I believe this to be the first from Scotland. Withers (1989, Moth Flies, Diptera: Psychodidae. *Dipterists Digest*. **4**: 1-83) lists the counties from which it is known as Somerset, Yorkshire and Caernarvonshire, with Kerry and Waterford from Ireland. Withers (*op. cit.*) noted that he had only seen one recent specimen, but since then he (*pers. comm.*) found it in County Cork, Ireland, on splashed mossy rocks along a steep valley stream on limestone with overhanging bushes. This almost exactly describes the site in Cotterdale near Hawes, North Yorkshire, where I found the species first, on 4.v.1976, an earlier date than so far recorded.

The Skye site (NG/5915) at the base of a basalt sea cliff, again on mossy rocks in the splash zone, broadens the larval habitat to include water on other than calcareous rock.

NOTES ON SOME UNUSUAL DOLICHOPODIDAE AND EMPIDIDAE

PETER HODGE, 8 Harvard Road, Ringmer, Lewes, East Sussex BN8 5HJ

***Dolichopus cilifemoratus* Macquart**

During a survey of the Arun Valley wetlands in the summer of 1990 a colony of this scarce species was discovered in two adjacent dykes on the western side of the River Arun just south of Watersfield, West Sussex (TQ 021145). The first specimens were taken on 25.vii.1990 and the species was still present on 2.viii.1990. On the second date, *D. cilifemoratus* was quite plentiful and certainly the commonest *Dolichopus* species to be found.

On 19.vii.1992 during a survey of the wetland insects of Ingrebourne Marshes, South Essex (TQ 5383), another colony of *D. cilifemoratus* was discovered. The site consisted of a series of long-abandoned water meadows, some of which were very wet and shallowly flooded. *Dolichopus cilifemoratus* was confined to the wettest area not far from a small pond but was present in reasonable numbers.

***Dolichopus argyrotarsis* Wahlberg**

There are a number of records for this species in Britain but all appear to be concentrated in the north and west. Fonseca (1978) gives several Scottish localities and Kidd & Brindle (1959) record it from the Goyt Valley in Cheshire (H. Britten). There are also sites in the Monnow Valley on the border of Herefordshire and Monmouthshire.

On 31.v.1991 I swept a single male of *D. argyrotarsis* from the bank of the River Uck in Buxted Park, East Sussex (TQ 492230). This appears to be the first record for the south-eastern half of the British Isles.

***Chersodromia cursitans* (Zetterstedt)**

On 26.v.1990 a large expanse of fine sand in a disused gravel-pit at Dungeness, East Kent (TR 0719) was found to support a strong colony of this very local empid. The flies were running rapidly between clumps of low-growing vegetation in company with *Tachydromia terricola* Zetterstedt in equal abundance.

***Tachydromia terricola* Zetterstedt**

At the 1986 annual dipterist's meeting in London I exhibited a specimen of this species from the old racecourse at Lewes, East Sussex (TQ 390114), taken on 31.viii.1986. Although at the time I did not doubt the record, reference to my field notebook indicates that I had visited Rye Harbour, East Sussex (TQ931194) on the previous day. Bearing in mind that the species is very plentiful at Dungeness (see above) and that the species occuring there also tend to be present at Rye, I am inclined to think that a tube from Rye containing *T. terricola* was accidentally mixed with material collected at Lewes on the following day. Therefore although there is no doubt that the species occurs in East Sussex, the actual site cannot be

stated with confidence.

References

Fonseca, E.C. d'Assis (1978) Diptera Orthorrhapha Brachycera Dolichopodidae. *Handbooks for the Identification British Insects.* **9(5)**.

Kidd, L.N. & Brindle, A. (1959). *The Diptera of Lancashire and Cheshire; Part 1.* Lancashire and Cheshire Fauna Committee, 136pp.

MUSCINA PABULORUM FALLÉN (DIPTERA: MUSCIDAE) FOUND IN FAILED NEST OF THE HORNET *VESPA CRABRO* LINNAEUS (HYMENOPTERA: VESPIDAE)

A. J. PRINCE, 3 Verdun Terrace, Washford, Watchet, Somerset TA23 0PF

In early August 1990 I was shown a small failed hornet nest under rough rabbit-grazed turf in a lepidopterist friend's wild back garden. It consisted of a small hollow with a few cells and the remains of two or three (somewhat indiscernible) dead workers. I am interested in Aculeata and this was the only hornet nest attempt in earth I had seen. Mike Archer (*pers. comm.*) mentions that there have been several recordings of attempted *Vespa* earthnests, so far as we know all unsuccessful (their usual habitat is hollow wood), with the queen capable of moving on and forming a secondary nest in another position.

What then turned out to be a progressively interesting find was the presence of two dipterous (cyclorrhaphous) larvae in the detritus. They were 8mm long and had apparently eaten out the insides of the dead worker hornets; a smaller 3.3mm larva was still at work in one of the hornet heads (this larva did not survive, probably due to size at time of capture). Both large larvae began pupating on the day of capture and 13 days later emerged, at average temperature of 22°C (indoors), two *Muscina pabulorum* females, 8.5mm long.

All three native species of *Muscina* have been bred from nests of *Paravespula vulgaris* (Linnaeus) the common social wasp (Fonseca, 1968 Diptera: Muscidae. *Handbooks for the Identification British Insects.* **10**: 4b) and are therefore probably capable of breeding in all ground nesting vespinae nests.

THE IMPORTANCE OF THE EIGHTH ABDOMINAL STERNITE AS A MEANS OF DETERMINING FEMALE *PLATYPALPUS* MACQUART (DIPTERA, HYBOTIDAE)

TIM LAVERY, Country Watch, Farnes, Castlemaine, Co. Kerry, Ireland

The genus *Platypalpus* Macquart has received much attention in recent decades from a number of workers. The taxonomy of a great many palaearctic species has been revised by Collin (1961), Zusková (1966), Chvála (1970; 1975; 1989) and most recently Grootaert & Chvála (1992) who added some 23 species new to science and produced an excellent key to the European fauna (some 250 species). The structure of the male genitalia is used as an important taxonomic tool by these authors, and sibling species have been recognised initially by differences exhibited by these structures. The females of many species of *Platypalpus* are very similar and frequently cause some difficulty in identification. Using existing key works, some species are still not separable in the female sex, e.g. *P. minutus* (Meigen) and *P. australominutus* Grootaert. *Platypalpus* females stored in alcohol may be difficult to determine using available keys, since certain characters may be obscured, such as dusting of the mesonotum, abdomen and/or pleura; colour also frequently fades in alcohol stored specimens.

Examination of the eighth abdominal sternite

Over the past year, the author has examined approximately 20,000 *Platypalpus* specimens, from localities in France, Great Britain and Ireland. Faced with such a large amount of specimens, a great proportion of which were very similar females of various species, characters which could be used to facilitate determination of "wet" females were sought. Using the degree of sclerotisation of the eighth abdominal sternite, constant interspecific features were found, with very slight intraspecific variation.

All material was preserved in isopropyl alcohol, which has the effect of expanding the abdominal segments, thus allowing the terminal segments to be seen. Care should be taken to ensure that the entire sternite is visible; if not, it may be gently drawn out with fine-pointed forceps.

Examination of "dry-mounted" specimens is more difficult, as the terminal segments are usually partially hidden within the abdomen. One method of dealing with such material is immersion in a very weak solution (0.25-0.50%) of trisodium orthophosphate in water, followed by washing (Van Cleave & Ross, 1947). This should relax specimens sufficiently to enable the necessary segment to be examined. Specimens are then preserved in alcohol.

The value of this character in separating closely allied species can be seen in the examples of *P. pallidiventris* (Meigen) and *P. longiseta* (Zetterstedt) (Figs. 1 & 2); *P. annulatus* (Fallén) and *P. melancholicus* (Collin) (Figs. 3 & 4); *P. australominutus* Grootaert and *P. minutus* (Meigen) (Figs. 5 & 6). The unambiguous determination of female *Platypalpus*

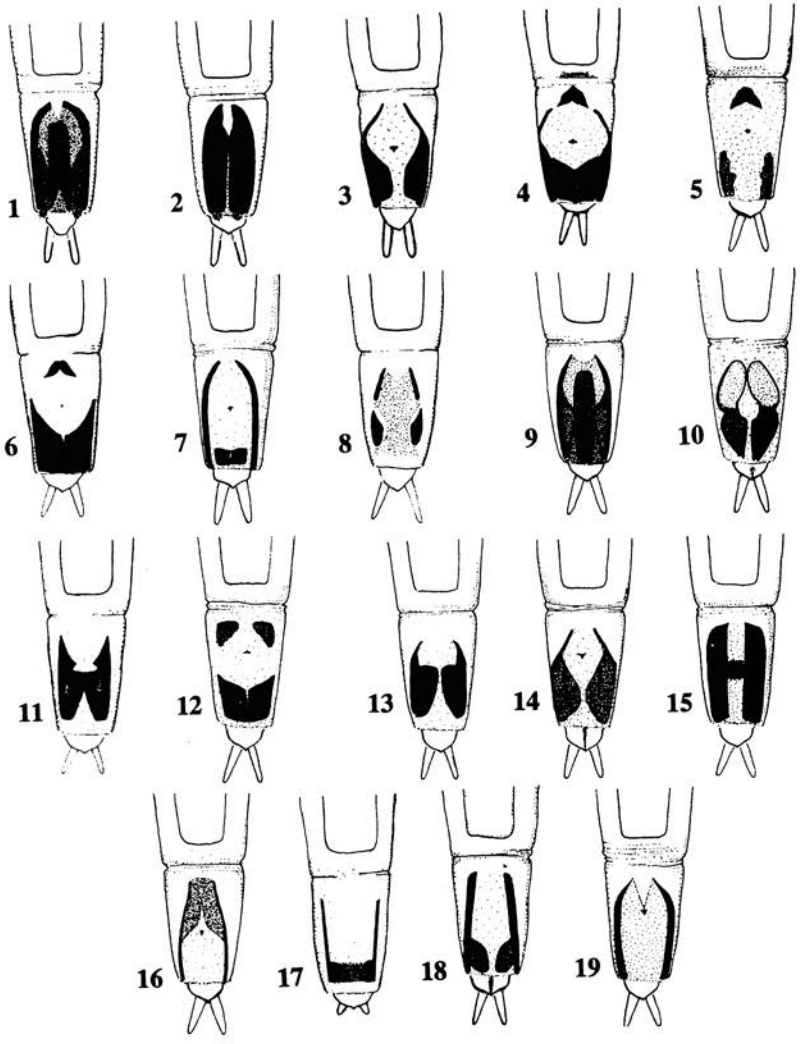


Fig. 1-19. Eighth abdominal sternite of female *Platypalpus*. **1**, *P. pallidiventris* (Meigen); **2**, *P. longiseta* (Zetterstedt); **3**, *P. annulatus* (Fallén); **4**, *P. melancholicus* (Collin); **5**, *P. australominutus* Grootaert; **6**, *P. minutus* (Meigen); **7**, *P. cursitans* (Fabricius); **8**, *P. candicans* Chvála; **9**, *P. verralli* (Collin); **10**, *P. caroli* Grootaert; **11**, *P. rapidoides* Chvála; **12**, *P. notatus* (Meigen); **13**, *P. longicornis* (Meigen); **14**, *P. agilis* (Meigen); **15**, *P. nigritarsis* (Fallén); **16**, *P. aristatus* (Collin); **17**, *P. pallipes* (Fallén); **18**, *P. laticinctus* Walker; **19**, *P. pseudofulvipes* (Frey).

using this character (see Figs. 1-19, all drawn to same scale) has apparently been overlooked until now, perhaps due to the prevalent practice of dry-pinning specimens. Further research by the author on other palaearctic species has shown marked differences between species, and little or no variation in the character (Lavery, *unpublished observations*).

In summary, the morphology of the eighth abdominal sternite is an important taxonomic tool in the identification of female *Platypalpus* and should in particular be utilised in any future revisionary work, and form part of the description of any new species. *Platypalpus* females must thus be preserved in alcohol to facilitate this.

Acknowledgements

The author sincerely thanks Dr. M. C. D. Speight (National Parks and Wildlife Service, Ireland) for the opportunity to examine the Hybotidae collected by him in France and Ireland, especially the large quantity of *Platypalpus* collected as part of the S.T.E.P Floodplains project, and also for much advice and encouragement. Sincere thanks is also expressed to Dr. P. Grootaert (Koninklijk Belgisch Instituut voor Natuurwetenschappen) for much helpful advice, comments and for kindly sending me a copy of his joint Monograph with Dr. M. Chvála on Mediterranean *Platypalpus*.

References

Chvála, M. (1970) Revision of Palaearctic species of the genus Tachydromia Meig. (= *Tachista* Loew) (Diptera, Empididae). *Acta Entomologica Musei Nationalis Pragaea* **38**: 431-540.

Chvála, M. (1975) The Tachydromiinae (Dipt. Empididae) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* **3**: 336.

Chvála, M. (1989) Monograph of northern and central European species of *Platypalpus* (Diptera, Hybotidae), with notes on their occurrence in Czechoslovakia. *Acta Universitatis Carolinae Biologica* **32**: 209-376.

Collin, J.E. (1961) British Flies - VI: Empididae. Cambridge University Press, 782pp.

Grootaert, P. & Chvála, M. (1992) Monograph of the genus *Platypalpus* (Diptera: Empidoidea, Hybotidae) of the Mediterranean region and the Canary Islands. *Acta Universitatis Carolinae Biologica* **36**: 3-226.

Van Cleave, H.J. & Ross, J.A. (1947) A method for reclaiming dried zoological specimens. *Science* **105 (2725)**: 318.

Zusková, L. (1966) Czechoslovak species of the genus *Platypalpus* Macquart (Diptera, Empididae). *Acta Faunistica Entomologica Musei Nationalis Pragae* **11**: 331-372.

TWO NEW PSYCHODID SPECIES OF THE *BERDENIELLA HOVASSEI* SPECIES GROUP (DIPTERA, PSYCHODIDAE) FROM ITALY

RÜDIGER WAGNER, Limnologische, Flußstation des Max-Planck-Instituts für Limnologie, Schlitz, Germany

The genus *Berdeniella* (Diptera, Psychodidae) was erected by Vaillant (1976) in his revision of the family. Larval stages of the entire genus are almost exclusively found in high densities in the moss carpets of streams in the mountainous and alpine areas of the western palaearctic region. Recently, the males of several new species and unknown larvae were described (Wagner, 1983). Furthermore it became evident that the species of the so-called *Berdeniella hovassei* group have an extremely interesting distribution pattern. This species group is characterised by a deep medial invagination of the sclerotised aedeagus hull. In several species there appear complex lateral structures of the hull.

Having had the pleasure to look through the collection of Professor F. Vaillant (Montbonnot, France), Professor Vaillant showed me an undescribed sister species of *B. zwicki* Wagner from central Italy. Recently, I received a collection of Psychodidae from southern Italy (collected by Dr. R. Gerecke, Zoologische Staatssammlung, Münich) that contained another two undescribed species of the *B. hovassei* group. These latter two species are described here, and are of great biogeographical interest, concerning the diversification of the species group in Italy.

Specimens were preserved in ethanol. Slides were prepared as follows: wings were dissected and put immediately into a mixture of acetic acid and clove oil. The remaining body was boiled in 10% KOH and transferred into acetic acid, clove oil/acetic acid and finally placed with the wings in pure clove oil. Head wings, thorax and genitalia were arranged under four coverslips on a slide in Canada balsam. Figures were made with a drawing mirror on a Leitz Dialux 20EB microscope.

***Berdeniella calabricana* n. sp. (Figs. 1-2)**

Material: holotype male, Italy, Calabria, Pellegrino, Saracena spring no. 1, Contr. Polinano, 750 m.a.s.l., 7 October 1990, leg. Gerecke (in coll. R. Wagner at the Limnologische Flußstation, Schlitz, Germany).

Description: Head with eye bridge consisting of 4 facet rows, distance between the eyes equal to 3 facet diameters. Interocular suture wide, U-shaped. Antenna with scape twice as wide and slightly longer than the subspherical pedicel. Flagellum with 14 segments shaped as usual for the genus. Antennal segments 6-12 with a pair of simple ascoids. Relative length of palpus segments: 30-44-50-75. Thorax without specific features. Wing length 3.0mm.

Genitalia with 9th tergite longer than wide, ventral bridge equally wide over its entire length, slightly narrower in the ventero-medial part. Phallapodeme thin in ventral view, flatspread in lateral view. Inner lamellae thin with a small distal incision. Aedeagus sheath basally as wide as long, hind margin W-shaped. Laterally there is a pair of almost straight, blade-

shaped structures, evolving from invaginations. The plate located dorsally of these structures is basally half as wide as the aedeagus sheath, distally only half as wide as in its basal part. Gonocoxite 2.5 times longer than its maximal width. Gonostyles slightly bent, swollen basally. Cercopodia elongate, slightly bent, with one big tenaculum and a pair of small spines at their tips. Subgenital plate with greatest width medially, distally with a blunt, setose, cylindrical projection.

Systematic position: the shape of the aedeagus places *B. calabricana* as a member of the *B. hovassei* species group. *Berdeniella zwicki* Wagner from the northernmost part of the Appenines in Liguria and the undescribed Vaillant species from central Italy are its closest relatives. Similarities with *B. brauxica* Vaillant from the SW Alps are less obvious. The shape of the aedeagus sheath with the lateral blade-like structures resembles *B. brauxica*, however, both blades are close together in *B. calabricana* but separate laterally in *B. brauxica*. Furthermore, there is no V-shaped medial incision of the aedeagal sheath in *B. brauxica*. The shape of the dorsal plate of the aedeagus with its distal decrease in width is similar to *B. zwicki*. However, the lateral appendages of both species differ significantly in shape.

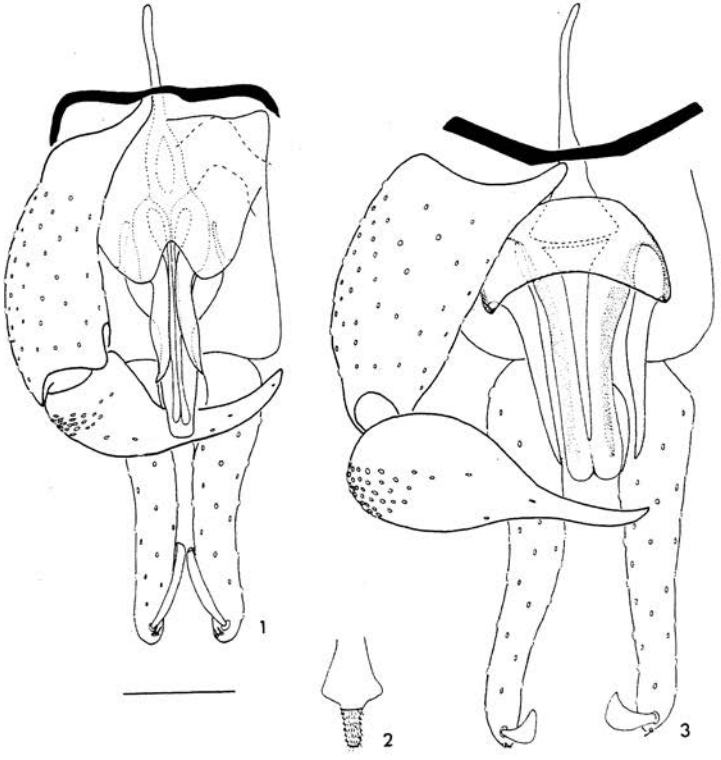


Fig. 1-3. *Berdeniella* genitalia. **1,** *B. calabricana*, ventral view; **2,** *B. calabricana*, 10th tergite; **3,** *B. gereckei*, ventral view. Scale line = 0.1mm.

***Berdeniella gereckei* n. sp.**

Material: holotype male, Italy, Calabria, Pollino, Morana Calabria, Sorgente Porcello, 575 m.a.s.l., 5 October 1990. leg. Gerecke (in coll. R. Wagner at the Limnologische Flußstation, Schlitz, Germany).

Description: Head with eye bridge of 3/4/4 rows of facets, distance between the eyes equal to 3 facet diameters. Interocular suture U-shaped. Antenna with scape twice as long as wide and 1.5 times longer than the spherical pedicel. Flagellum with 14 segments shaped as usual for the genus. Antennal segments 6-12 with a pair of simple ascoids. Relative length of palpus segments: 32-45-49-67. Thorax without specific features. Wing length 3.0mm.

Genitalia with 9th tergite quadrate, ventral bridge equally wide over its entire length. Phallapodeme thin in ventral view, flatspread in lateral view. A single thin inner lamella with a sharp tip. Aedeagus sheath basally, twice as wide as long with a shallow incision. Laterally there is a pair of straight, blade-shaped projections, evolving from invaginations. The plate located dorsally of these structures is basally half as wide as the aedeagus sheath. Gonocoxite twice as long as its basal width. Gonostyle almost straight, swollen in its basal 2/3, tip slightly bent, 2.5 times longer than its maximal width. Cercopodia elongate, slightly bent, with one big tenaculum and a single small spine at its base. Subgenital plate similar in shape to *B. brauxica*.

Systematic position: *Berdeniella gereckei* is a member of the *B. hovassei* species group. Its closest relative is *B. brauxica*. The shape of the aedeagus sheath with the lateral blade-like structures is very similar to that species, but the shape of the gonocoxites and gonostyles are different and the "inner lamellae" are paired in *B. brauxica*, but simple in the new species.

Discussion

The recent distribution pattern shows that the group must have had its origin on the Balkan peninsula. There, species with the most plesiomorphic features (deep medial invagination of the aedeagus hull) are found (*B. siveci* Wagner, *B. bistricana* (Krek)). The group then developed towards the Alps (*B. carinthiaca* Wagner), thereafter colonising the Alps (*B. helvetica* (Sarà)). The dististyles of these latter species are movable in the vertical plane. The closest relative of both, *B. hovassei* (Vaillant) is restricted to the Massif Central in France and must have developed before the Rhône valley was cut by the river. Apparently the *B. hovassei*-group has not reached the Pyrenees. *Berdeniella thomasi* Vaillant, previously considered to be a member of the *B. hovassei* species group belongs to the *B. freyi*-group, on the basis of its very elongate 9th tergite and the small size of the gonocoxite and styles.

The further diversification along the western margin of the Alps and into the Appenine peninsula is probably a result of glaciation. One pair of sister species is *B. ramosa* Vaillant from the NW Alps and *B. alemannica* Wagner from the Black Forest of Germany, both being very similar in the shape of the male genitalia. The *B. hovassei* group is unknown in the Vosges mountains of France.

In the streams in the SW Alps is found *B. brauxica*, and in the same habitats of the NW

Ligurian Appenines *B. zwicki* occurs. These two species differ in characters of the genitalia compared with those of *B. ramosa/alemannica*. The probability that further species of the *B. hovassei*-group might be found in Italy thus remains high.

Both new species described here, seemingly indicate that the ancestors of both invaded the Appenine peninsula from the north, diversifying into *B. brauxica*- and a *B. zwicki*-like type of genitalia. Further diversification may have taken place in the mountainous areas distributed along the Italian mainland, resulting in morphologically different taxa (evidenced by *B. zwicki*, *B. calabricana* and the undescribed species of Vaillant, and *B. brauxica*/*B. gereckei*). Most probably the species described thus far do not represent all the existing taxa of the *B. hovassei*-group in Italy. More may be found along the chains of mountains between the distribution areas of the known taxa.

References

Vaillant, F (1976) *Psychodidae-Psychodinae*. In: E. Lindner (ed.): *Die Fliegen der palärktischen Region 9d. Lieferung* **313**: 183-206.

Wagner, R. (1983) Zur Situation der Gattung *Berdeniella* Vaillant in Europa (Diptera, Psychodidae). *Mitteilungen der Münchener Entomologischen Gesellschaft* **72**: 159-186.

THE STATUS OF *CRYPTACIURA ROTUNDIVENTRIS* (FALLÉN, 1820) (DIPTERA: TEPHRITIDAE) IN SCOTLAND

KEITH BLAND, 35 Charterhall Road, Edinburgh EH9 3HS

A small greenish blotch mine on *Angelica sylvestris* (L.), reminiscent of the early mine of *Phytomyza angelicae* Kaltenbach, but without visible frass, was collected at the Lake of Menteith (NN 5800), West Perthshire (vice county 87) on 25.viii.1991. The mine continued to expand and in due course produced a tephritid puparium, which yielded on 9.vi.1992 a male of the rare *Cryptaciura rotundiventris* (Fallén).

There is confusion in the literature about the status of this species in Scotland. White (1988) mentions old Scottish records from Dumfries and Speyside. However no literature records from Dumfriesshire are listed in the Scottish Insect Records Index in the Royal Museum of Scotland, Edinburgh - the only old Scottish literature records are from Bonhill, Dumbartonshire (Malloch, 1909) and Polton, Midlothian (Carter, 1911). There is a record of the anthomyiid *Chiastochaeta rotundiventris* Hennig from Speyside (Collin, 1954) and this may have erroneously been ascribed to *Cryptaciura rotundiventris*.

Specimens in the collections of the Royal Museum of Scotland show the species to have occurred widely in southern Scotland. Interestingly, although Malloch (1909) only records collecting a single specimen from Bonhill in 1908, his collection contains specimens from each of the months April to August for 1909. Other specimens in the Royal Museum collections are from East Lothian (Pressmenan, by J.W.Bowhill in 1920), Midlothian (Ratho by H.A.Latham in 1935) and Renfrewshire (Kilbarchan by F.J.Ramsay in 1946). The

present record is thus the most northerly to date.

References

Carter, A.E.J. (1911) On some new and rare Scottish Diptera. *Annals of Scottish Natural History*. **1911:** 83-85.

Collin, J.E. (1954) The genus *Chiastochaeta* Pokorny (Diptera: Anthomyiidae) *Proceedings Royal Entomological Society (B)*. **23:** 95-102.

Malloch, J.R. (1909) Diptera in Dumbartonshire in 1908. *Entomologist's monthly Magazine*. **45**: 40-41.

White, I.M. (1988) Tephritid flies; Diptera: Tephritidae. *Handbook for the Identification British Insects*. **10(5a)**.

SPHEGINA (ASIOSPHEGINA) SIBIRICA STACKELBERG 1953 A NEW SPECIES AND SUB-GENUS OF HOVERFLY (DIPTERA, SYRPHIDAE) IN BRITAIN

ALAN STUBBS, 181 Broadway, Peterborough, PE1 4DS.

The possibility of extra *Sphegina* has been in mind for several years but hitherto only the standard three British species have been found. However, in 1991, a rather large specimen was caught that had a black face as in *S. verecunda* Collin but the abdomen was far too elongate, akin to *clunipes* (Fallén). This male specimen was identified as *Sphegina sibirica* Stackelberg, a species previously unknown in Britain.

On 6 July 1991 visits were made to eight localities, mainly by Loch Duich and Lochalsh (which are confluent) and north east of Kyle of Loch Alsh, prior to catching the ferry to joining the dipterists' field meeting on Skye that evening. Nearly all these sites were speculative to gain habitat and 10km square records. The locality that yielded the new hoverfly is at the tiny village of Dornie, at the west end of Loch Duich. The main road had recently been aligned over a new bridge across Loch Long but between the old main road and the high level road (an even earlier main road) there was a small gulley with a stream suitable for craneflies (NG/883263). The gulley was shaded by ash trees and the ground flora had plenty of ferns.

In Stubbs (1983) the new species will key out to *verecunda* because of the black face but reference to text Fig. 7 on page 189 reveals the latter species to be short bodied relative to the other members of the genus. *S. sibirica* has a black face (as in *verecunda*) but has a large shining black area on the lower part of the sides of the thorax (most of the sternopleuron). All other British species have the sides of the thorax completely dusted (strongly so when viewed obliquely from in front).

Identification was based upon a recent European review (Thompson & Torp, 1986) which includes fifteen species, with a key, description of species, illustrations of male genitalia and distribution maps. The British specimen accords with *sibirica*, including the genitalia. *S. sibirica* is the only European species to be placed in the sub-genus *Asiosphegina*. However, the recognition of the sub-genus is largely a matter of opinion since the above authors made this separation "even though this action may leave *Sphegina* proper as a paraphyletic group, because it is distinctive and therefore useful". In other words, the remaining species in the sub-genus *Sphegina* are a mixed bag containing several evolutionary lines that may in due course be split into sub-genera of equal rank to *Asiosphegina* if the genus is to be split at all. In their key the only unique character in *Asiosphegina* is the absence of a chitinised first sternite plate (Speight, 1988, incorrectly refers to the second sternite missing) but it is perhaps also worth noting the presence of a few distinct bristles on the styles of the male genitalia. The latter author mentions the considerable variability in colour from extensively orange to black (presumably referring to the colour of the abdomen). The British specimen has a entirely black body.

Sphegina sibirica has been one of the most likely extra species to occur in Britain. It is for instance known from Belgium and Norway (including the southernmost part). It is among the species reviewed by Speight (*op. cit.*) as one to look out for, commenting on its rapid

spread into adjacent areas of Europe (speaking of NW France). It is interesting that he speaks of an association with *Picea*, such conifers not being present at the Scottish locality, though conifer plantations occur in the district. If this were a recent arrival in Britain, it has done remarkably well to get to north-west Scotland (we have conifer colonists among the much more mobile aphid feeding genera).

There are a few more *Sphegina* to look for, of which *clavata* (Scopoli) is a strong candidate (as suggested by Speight, *op. cit.*). Rather than offer a key with four to six extra species it seems more useful to give check characters for the four known British species so that the familiar key can still be retained. The male genitalia provide good characters (see Thompson & Torp, *op. cit.*, who include lateral view with aedeagus; Coe (1953) illustrates the then British species). Ventral views of male genitalia for all species known from western and central Europe excluding Spain are given in Fig. 1.

Sphegina clunipes Face yellow. Humeri black. Hind coxa (at least beneath) and trochanter yellow. Male styles slender, abruptly narrowed beyond the base. (Despite the colour of the coxae being a key character, some British specimens have the hind coxae dark laterally but the trochanters are yellow. The hind coxae and trochanters are entirely dark in *cornifera* Becker and *latifrons* Becker, the male genitalia having exceptionally long surstyli).

Sphegina elegans (= kimakowiczi) Face yellow. Humeri yellow. Hind coxa and trochanter yellow. Male styles very short, with small inner tooth.

Sphegina sibirica Face dark. Sternopleuron shining. Sternite 1 absent. Hind tibia at least half yellow. Male styles with a few distinct strong bristles. (*montana* Becker has a dark face and shining sternopleuron, but the hind tibiae are mainly black.)

Sphegina verecunda Face dark. Sternopleuron dusted. Hind coxa partly pale (rather than entirely black). Basal antennal segments (ie 1 & 2) blackish. (*clavata* (Scopoli) is similar but has entirely pale orange antennae: *platychira* Szilady and *spheginea* (Zetterstedt) have entirely dark hind coxae.)

One may fairly conclude that black-faced specimens need particular care since there is still scope for finding at least one more species in Britain. Fortunately, such specimens are rare, so many past records of *verecunda* will have vouchers. There is less chance that more yellow-faced species occur but specimens with dark hind trochanters need looking for and the males should be very obvious with their very long externally visible surstyli to the genitalia. The above notes are indicative rather than definitive but act as a prompt to check more thoroughly. My thanks are passed to Dr Ian MacLean for his comments on a draft of this paper.

[Note added in proof] Since the submission of this paper, a new species has been discovered in France, *Sphegina varifascies* Kassebeer (Kassebeer, 1991). This species is very similar to *S. latifrons*. The European list also now includes *S. sublatifrons* Vujic (Vujic, 1990) which has been described from Yugoslavia.

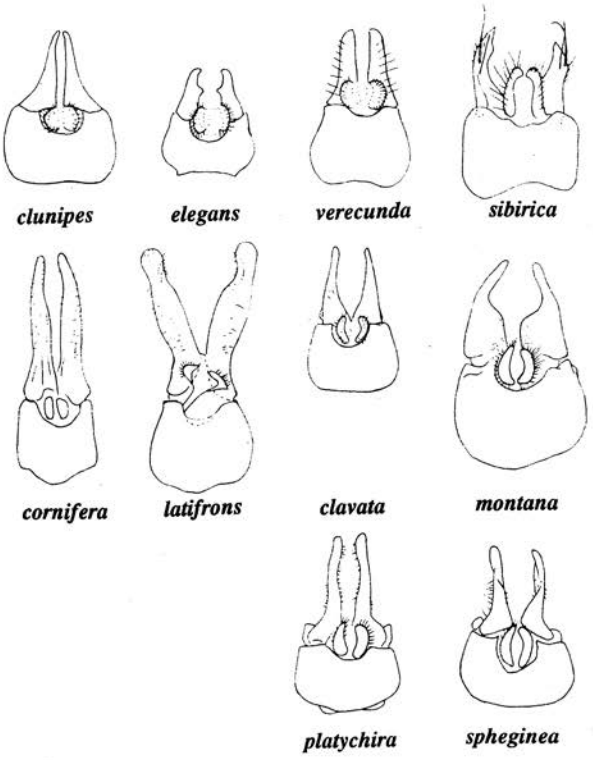


Fig. 1. *Sphegina* male genitalia in ventral view (re-drawn after Thompson and Torp (1986)), all species currently known from western and central Europe outside Spain/Spanish borders. Top row = British species. Left two columns = yellow-faced species. Right two columns = black-faced species.

References

Coe, R.L. (1953) Diptera. Family Syrphidae. *Handbooks for the Identification of British Insects*. **10(1)**: 1-98.

Kassebeer, C.F. (1991) Eine neue Art der Gattung *Sphegina* Meigen 1822 aus Europa (Diptera: Syrphidae). *Entomologische Zeitschrift* **101**: 441-446.

Speight, M.C.D. (1988) Syrphidae known from temperate Western Europe: potential additions to the fauna of Great Britain and Ireland and a provisional species list for N. France. *Dipterists Digest* **1**: 2-35.

Stubbs, A.E., (1983) *British Hoverflies*. British Entomological and Natural History Society, London, 253pp.

Thompson, F.C. & Torp, E., (1986) Synopsis of the European species of *Sphegina* Meigen (Diptera: Syrphidae). *Entomologica scandinavica*. **17**: 235-269.

Vujic, A. 1990. Genera *Neoascia* Williston 1822 (Diptera: Syrphidae) in Yugoslavia and description of species *Sphegina sublatifrons* sp. nova. *Bulletin Natural History Museum Belgrade Series B, Biological Science* **45**: 77-93.

A FURTHER RECORD OF *PARASYRPHUS NIGRITARSIS* (ZETTERSTEDT, 1843) (DIPTERA: SYRPHIDAE), WITH A REVIEW OF ITS KNOWN DISTRIBUTION IN BRITAIN

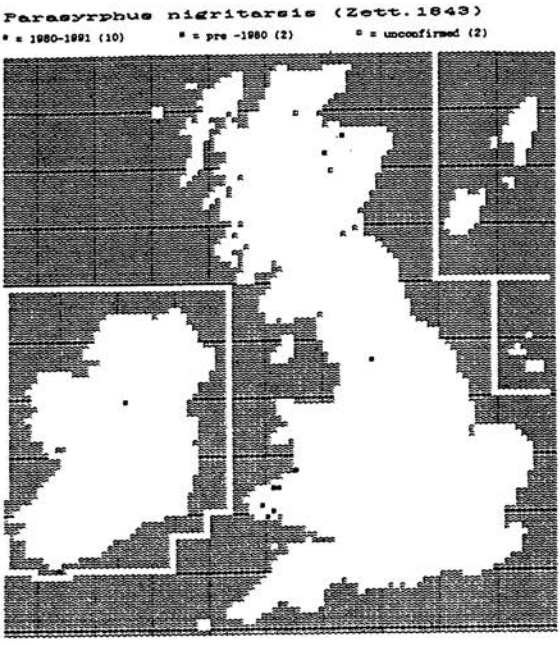
IAIN MACGOWAN, SNH, Redgorton, Battleby, Perth, PH1 3EW
KENNETH WATT, University of Aberdeen, Zoology Department, Tillydrone Avenue, Aberdeen AB9 2TN

On 2 June 1991 a *Parasyrphus*, which was basking on the leaves of a mature elm (*Ulmus glabra* Huds.) near Boat O'Brig, Grampian Region (NJ 3151), was caught by one of us (IM). Later examination of the specimen revealed that it was a female *Parasyrphus nigritarsis* (Zetterstedt). This species is classified in the Insect Red Data Book (Shirt, 1987) as Category 1 "Endangered" and is given a similar rating by Falk (1991). G. H. Verrall originally described specimens taken by himself on 20 June 1882 on Arran, Scotland and from Boxhill, Surrey in 1881 by Rev. H. S. Gorham (Verrall, 1883), as being *P. nigritarsis*, and although he does not mention it, they would therefore be the first British specimens of this species. However he later redescribed these specimens as being variations of *Metasyrphus* (= *Eupeodes*) *latifasciatus* (Macquart) (Verrall, 1901).

The first confirmed British specimens of *P. nigritarsis* were briefly described by J. E. Collin (1952) based on 2 female specimens taken by himself and C. J. Wainwright from Grantown-on Spey in Scotland on 20 June 1937. Collin's specimen is now held by the Hope Museum, Oxford, while Wainwright's specimen is in the Natural History Museum, London. Since then a female has been taken from Morrone Birkwood NNR, Grampian in the 1960's (Falk, *op. cit.*). More recently Steven Falk re-identified a female *Eupeodes latifasciatus* (Macquart) specimen which he had taken in 1983 at Malham Tarn, as *P. nigritarsis* (Falk, 1992), making this the first English record. The first Welsh specimen was taken on 25 May 1987 by Adrian Fowles at Rhyd-y-gwin, Llanfarian, where he found a male on a washing line in his back garden, which adjoins a woodland SSSI containing a small clump of *Salix cinerea* L. and two mature *Populus tremula* L. He again took males in May 1988 and 1989, on the same washing line, but was never able to observe them on the willow or aspen trees. Coker (*pers. comm.*) also reported taking this species in Wales from a further 7, mainly wet meadow, sites in 1988 & 1989. On 19 May 1990 Alan Stubbs took a female at Banc-y-mwldan, Cardiganshire from an area of unimproved pasture which is fringed by wet woodland of sallow carr, during a period when hoverflies were scarce due to dull weather conditions. It was the black front tibia that caused him to check the alula of a "*Syrphus*" looking specimen in the field (*pers. comm.*). This species has not yet been taken in Northern Ireland. However Speight (1986) reported it as new to Ireland when he took males at L. Linn, Co. Leitrim on 25 May 1985. The known distribution data for *P. nigritarsis* in the British Isles is summarised below.

The face of the female, from the Boat o'Brig locality, is entirely yellow, with only the mouth edge being black, as noted in Irish & English material, by Speight (1986) and Falk (1992). The antennal base is yellow, while the third antennal segment is mostly black. All the tarsi and leg bases are black. The basal end of the hind femora is less than a quarter black, compared with the male, which is two thirds black (Speight, 1991). Other useful characters

Parasyrphus nigritarsis (Zetterstedt,1843)



STATUS	British - RDB1
TOT.10Km.	10 + 2 unconfirmed
TOTAL RECORDS	Engl. 1 Irel. 2 Scot. 3 + 2 unconf. Wales 15
HABITAT	Usually near damp broad-leaved woodland e.g. willow & aspen
ECOLOGY	Larvae are reported as feeding on aphids & eggs and larvae of Chrysomelid beetles
FLIGHT PERIOD	30 Apr - 2 Jul Peak - Jun (S) - mid May (W)
ALTITUDE RANGE	sea level - 400m.
DISTRIBUTION	(E,I,S,W) Yorkshire Scottish Highlands lowland Wales

SCOTTISH RECORDS

NH 59 (57_99_) 45m. VC107 1979--1984 SHSD. Achany G. P.F.Entwistle woodland (birch, aspen), riverside
NJ 02 (0_2_) 200m. VC 95 1937.06.20 SHB&SD. Grantown-on-Spey J.E.Collin woodland? 1f
NJ 02 (0_2_) 200m. VC 95 1937.06.20 SHB&SD. Grantown-on-Spey C.J.Wainwright woodland? 1f
NJ 35 (31_51_) 60m. VC 95 1991.06.02 SGMD. Boat o'Brig I.MacGowan riverside, woodland (willow, alder), 1f
NO 19 (13_90_) 450m. VC 92 196_._._ SGK&DD. Morrone Birkwood NNR E.C.Pelham-Clinton woodland (birch) 1f

WELSH RECORDS

SM 91 (966164) ___m. VC 45 1988._._ WDPD. Scotchwell S&A.Coker
SM 91 (953166) ___m. VC 45 1989.05.16 WDPD. Haverfordwest, Old Mill S&A.Coker wet meadow
SM 91 (952165) ___m. VC 45 1990.04.30 WDPD. Haverfordwest, Old Mill S&A.Coker
SN 10 (145065) ___m. VC 45 1989.05.14 WDSPD. Pleasant Valley S&A.Coker wet meadow
SN 14 (195431) ___m. VC 45 1989.05.13 WDPD. Cilgerran Castle S&A.Coker wet meadow
SN 14 (154486) ___m. VC 45 1990.04.28 WDPD. Poppit Dunes S&A.Coker
SN 24 (200489) ___m. VC 46 1990.05.19 WDCerD. Banc-y-mwldan A.E.Stubbs carr (sallow), on willow 1f
SN 57 (584767) 60m. VC 46 1987.05.25 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SN 57 (584767) 60m. VC 46 1987.05.26 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow $ aspen) 1m
SN 57 (584767) 60m. VC 46 1988.05.11 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SN 57 (584767) 60m. VC 46 1988.05.14 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SN 57 (584767) 60m. VC 46 1988.05.16 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SN 57 (584767) 60m. VC 46 1989.05.22 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SN 57 (584767) 60m. VC 46 1989.05.24 WDCerD. Llanfarian A.P.Fowles garden, woodland (willow & aspen) 1m
SS 09 (063977) ___m. VC 45 1988._._ WDSPD. Manorbier Marsh S&A.Coker

ENGLISH RECORDS

SD 86 (88_67_) 400m. VC 64 1983.07.02 EYNCD. Malham Tarn S.J.Falk 1f

IRISH RECORDS

N 19 (10_91_) ___m. NV 3 1985.05.25 ICo.Le. L.Linn M.Speight lake-margin, fen carr (willow & aspen) mm
N 19 (10_91_) ___m. NV 3 1985.05.26 ICo.Le. L.Linn M.Speight lake-margin, fen carr (willow & aspen) mf

noted are - the eyes are sparsely covered in setae; the dust spots on the frons are large and meet at the mid line; and the scutellum contains a few black hair among the yellow ones. Collin (1952) does not mention seeing any black hairs on the female's scutellum. The rarity of this species is probably more apparent than real. Speight (1986) comments on the great similarity between *P. nigritarsis* and *Syrphus ribesii* (Linnaeus) in shape, colour and behaviour, which might account in part for it being an under-recorded species. Recently Speight (1991) accounts for the rarity of *P. nigritarsis* being due to the fact that the adults are not only to be found high in the tree canopy but descend to ground level only occasionally. This last suggestion has yet to be shown to be the case. Alan Stubbs (*pers.comm.*), on the other hand, suggests that this species may well have elusive habits, like feeding on aphid honeydew instead of visiting flowers, where it would be more easily observed. With so few records to go on it is difficult to give an accurate flight period. However in Wales where most records were collected it appears *P. nigritarsis* has a short flight period, which would also add to its apparent rarity.

According to Speight (1991), mature fen carr of willows (*Salix* sp.) and aspen (*Populus tremula*) at river or loch margins is the preferred habitat for this species. Coker & Alan Stubbs (*pers. comm.*) have also taken it a number of times about sallow in poor fen. Although aspen does not occur in such wet biotypes in Scotland this habitat description fits well with the Boat o'Brig locality, which adjoins the extensive areas of willow and alder (*Alnus glutinosa* (L.)), associated with the River Spey.

As with some other apparently rare species, it could be more profitable to search for the larvae of *P. nigritarsis* rather than the adults (Rotheray, 1990). On the continent the larvae of this species are recorded as feeding primarily upon the larvae of *Melasoma* sp. (Coleoptera: Chrysomelidae) (Schneider, 1953) as well as various other chrysomelid species of a number of genera. Younger larvae feed upon the larvae of *Galerucella* and *Leptinotarsa* (Chrysomelidae) species and on aphids of the genus *Rhopalosiphoninus* (Hemiptera: Aphididae). Observations on willows along the river Spey in this area have indicated that there are often large numbers of chrysomelids present. This, together with the relatively large resource of willows associated with the flood plain of the river, is perhaps the key feature in explaining the presence of *P. nigritarsis* in this area.

Acknowledgements

We would like to thank Graham Rotheray for confirming the identification of the specimen and for checking for other published records in the Scottish Insect Record Index (SIRI), held in the Royal Museum of Scotland, Edinburgh.

References

Collin, J. E. (1952) *Syrphus malinellus* sp.n. (Diptera: Syrphidae). *Proceedings Royal Entomological Society London (B)* **21:** 35-36.

Falk, S. J. (1991) A review of the scarce and threatened flies of Great Britain (Part 1) NCC Peterborough 194pp.

Falk, S. J. (1992) *Parasyrphus nigritarsis* (Zetterstedt) and some other scarce flies recorded from Malham Tarn, N.W.Yorkshire. *Dipterists Digest.* **11:** 40.

Rotheray, G.E. (1990) Larval and puparial records of some hoverflies associated with dead wood (Diptera, Syrphidae). *Dipterists Digest.* **7:** 1-7.
Schneider, F. (1953) *Syrphus nigritarsis* Zett., ein Ei- und Larvenrauber von *Melasoma* (Chrysom., Col.). *Tijdschrift over plantenziekten.* **59**: 192-194.
Shirt, D. B. (1987) *British Red Data Books 2 Insects.* NCC, Peterborough 402pp.
Speight, M. C. D. (1986) *Cheilosia nasutula, Neocnemodon vitripennis* and *Parasyrphus nigritarsis*: hoverflies (Diptera: Syrphidae) new to Ireland. *Irish Naturalists Journal.* **22**: 149-152.
Speight, D. B.(1991) A key to European *Parasyrphus* species (Syrphidae). *Dipterists Digest.* **8**: 3-5.
Verrall, G. H. (1883) Diptera in Arran. *Entomologist's monthly Magazine.* **19**: 222-226.
Verrall, G. H.(1901) *British Flies 8: Syrphidae etc.* London. Taylor & Francis, 691pp.

INFORMATION ON TYPES OF SYRPHIDAE

J. R. VOCKEROTH, Centre for Land and Biological Resources Research, Biological Resources Division, Central Experimental Farm, Ottawa, Ontario, K1A 0C6, Canada

In 1969 I visited museums in London, Oxford, Leiden, Amsterdam, Basel, Florence, Milan, Genoa, Turin, Paris, Frankfurt, Vienna, Prague, Moscow, St. Petersburg, Helsinki, Stockholm, Lund and Copenhagen to examine types of Syrphidae. These visits extended over four months. In 1974, I spent another two weeks in London, and in 1990 visited briefly museums in Brussels and Tervuren. Types in a number of North American museums have been examined over many years.

My first aim was to determine generic placements of the types, especially of those of Syrphinae; my second aim was to identify the type specimens by comparison with keys or other specimens or to make notes on the specimen that might allow this to be done later. Many of the new combinations and much of the new synonymy presented in the recent catalogues of the Diptera of the Neotropical, Oriental and Afrotropical Regions, published from 1975 to 1980, were based on these type examinations.

I did not have time to examine all types, especially in Vienna and in London. I concentrated on non-European species as European material (e.g., the types of Meigen and Zetterstedt) had often been restudied by others. A possible exception is the collection of Rondani. Horn and Kahle (1936) listed seven cities in which parts of Rondani's collection were deposited, but did not mention Florence. Just before my departure from Canada in 1969 D. M. Wood informed me that the main Rondani collection was in Muzeo Zoologico dell'Universita di Firenze, Florence, and that the other collections mentioned by Horn and Kahle contained in large part duplicate material. Study of the collection in Florence indicated this was undoubtedly correct. I think this may be partly the reason why the Rondani types, at least of Syrphidae, seem to have received less attention than those of many other workers.

The types of Fabricius in Universitetets Zoologische Museet, Copenhagen, should also be mentioned. Those which have always been in Copenhagen are all, or mostly, in good

condition. Those which were in the Fabrician collection in Kiel were badly damaged by Dermestidae; the remnants of these types were in Copenhagen when I visited in 1969, and I think were to remain there. Some types were completely destroyed; others were represented by fragments of various kinds. Zimsen (1964), in her catalogue of types of Fabricius, a number of times says "Kiel only the name label" when in fact a fragment remained. One example is the type of *Syrphus apiformis* Fabricius. Zimsen says "Kiel only the name label", but a piece of scutum with a recognizable and specifically distinct colour pattern was, in 1969, on the pin labelled as *apiformis*.

Notes on the types examined, and on non-type specimens of rare or unusual species, were written on cards ca. 3 inches by 5 inches. Over 1000 species were examined. The notes range from a statement that the type, or type material, of a species is in a particular museum, to descriptions (sometimes with freehand sketches of heads, abdomens, parts of terminalia, etc.) which may cover up to eight cards. Much of the information is unpublished and may be of use to taxonomists, particularly if a revision is being prepared. These cards are deposited in the Canadian National Collection of Insects (C.N.C.) and may be borrowed on application to the Curator of Diptera. Most of the notes were written in blue ink and photocopy poorly; the original cards will be loaned, as would specimens, and must be returned. The cards are filed alphabetically by species or varietal name; they should be asked for by name and not by geographic area (e.g. all species occurring in New Zealand). They may be requested for a genus (e.g. all types of *Syritta*) or other taxonomic group if clear catalogue references to all specific names are provided.

References

Horn, W. and I. Kahle. (1936) Über entomologische Sammlungen, Entomologen & Entomo-Museologie. Teil I-III. *Entomologische Beihefte* **3**: 161-296, pl. XVII-XXV1. Berlin-Dahlem.

Zimsen, E. (1964) *The type material of I. C. Fabricius. 1-508.* Munksgaard, Copenhagen.

CHYMOMYZA WIRTHI WHEELER 1954 (DROSOPHILIDAE) IN ESSEX; A SURPRISING ADDITION TO THE BRITISH LIST

DAVID GIBBS, 28 Blackamoor Lane, Maidenhead, Berks SK6 8RD

In 1988 I carried out an extensive survey of the invertebrates of the Essex saltmarshes. As part of this survey I visited Canvey Point at the eastern end of Canvey Island on 5.ix.1988. This proved to be a rather poor site for diptera, only 11 species being found on the marsh, most of them common and ubiquitous. However, a male drosophilid swept from the seaward edge of the marsh did not key out satisfactorily. I sent the specimen to Peter Chandler who identified it as *Chymomyza wirthi* Wheeler, a species not only new to Britain but also the Old World. He compared it with paratypes of *C. wirthi* which agreed structurally. The identification was also confirmed by Paul Beuk, who is preparing a Royal Entomological Society Handbook on the Drosophilidae.

In the key by Fonseca (1965) *C. wirthi* runs to couplet 48: *Chymomyza distincta* (Egger) and *Chymomyza fuscimana* Zetterstedt. The male specimen from Canvey Island differs from *fuscimana* in the following respects: lacks distinct darkening of the wings beyond R1 and below tip of R2+3; stronger costal fringe extending 2/3 of the way along costa between R2+3 and R4+5; inside face of front coxa bare (lacks long silky hairs); legs of male all yellow; front femora with an anteroventral row of about 8 slender bristly hairs whose length is greater than tibial width, and with a parallel row of shorter more ventral hairs; structure of genitalia (see Fig. 1a,b).

Fonseca (*op. cit.*) gives no description of *C. distincta* and I have not seen any specimens. However, Chandler (1978) gave external characters separating *C. distincta* from *C. fuscimana* and their genitalia were figured by Hackman *et al.* (1970), who keyed the four European species then know. The lack of dark mark below the tip of R2+3 in *C. wirthi* and differences in the structure of the genitalia (Fig. 1b,c) separate this species from *C. distincta*.

Brief description of *Chymomyza wirthi*

Head: arista blackish with four branches above and two below, the upper ones becoming shorter towards the apical fork. Antennae yellowish, 3rd segment infuscated above. Frons and face orangey-yellow, ocellar triangle, upper part of occiput, lower third of face and vibrissal angle blackish-brown, head below eye yellowish white. All bristles black.

Thorax: faintly shining, orangey, slightly darkened on mid-dorsal and dorsocentral lines and humeri. Scutellum and postnotum blackish brown. Haltere whitish, stem darker, yellowish. All bristles black, acrostichals in 8-10 irregular rows, two pairs of dorsocentral and two pairs of scutellar bristles.

Abdomen: tergites shining and blackish, sternites pale yellow clothed with short black hairs. Genitalia (Fig. 1a, c).

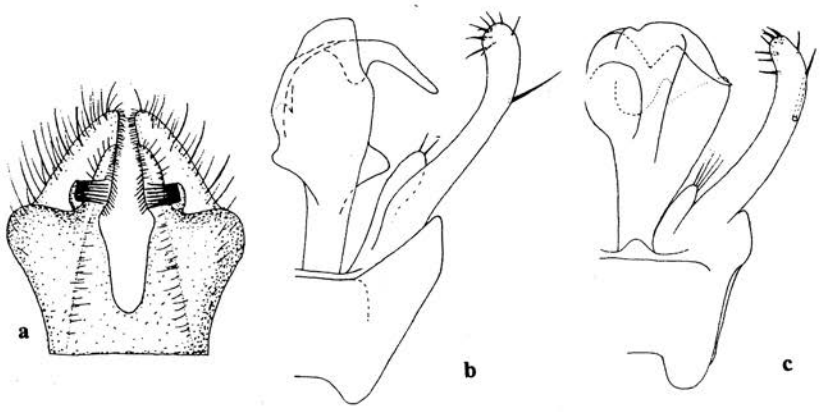


Fig. 1 a-c. Genitalia of male *Chymomyza wirthi* and *Chymomyza distincta*. **a,** periphallic organ of *C. wirthi*; **b,** phallic organs of *C. withi*; **c,** phallic organs of *C. distincta*, b and c reproduced by kind permission of Paul Beuk.

Wings: costa blackish from base to 2/3 of the distance between R2+3 and R4+5. R1 blackish. Rest of veins pale yellowish. Costal cell distinctly smoky, front half of cell R1 very slightly darkened, wing-tip whitish, rest of membrane clear.

Legs: entirely clear yellow, front coxae and tarsi of all legs rather paler whitish. Front femur with an anteroventral fringe of black bristles as long as the femur is deep on basal half and a row of shorter hairs behind them. Also with a short but distinct posterodorsal bristle 1/3 of length of femur from tip. Mid tibia with short black ventroapical bristle.

Females from North America differ from males in having black front legs except for pale coxae and base of femora. Also lack of anteroventral fringe of bristles. Anal plates protruding and pale yellow; last two sternites blackish.

As far as I know, all previous records of *C. wirthi* are from North America where it has been found in Virginia, Illinois, Ontario and Alaska (Wheeler, 1954 and Stone *et al.*, 1965). In Virginia it was found to be rather common in June and July where most specimens were taken at windows. Its biology is not recorded but other species assemble on recently exposed sapwood where courtship takes place (Chandler, 1978). That it should turn up on the exposed seaward edge of an Essex saltmarsh is very surprising. It is likely that this fly made its way to our shores in the cargo of one of the many ships using the Thames estuary.

The specimen is in the collections of the Natural History Museum, London.

Acknowledgements

I am very grateful to Peter Chandler and Paul Beuk for identifying this specimen and their comments on this paper.

References

Chandler, P.J. (1978) Some dipterous opportunities at Windsor Forest, Berks: the attractions for flies of bonfires, wood ash and freshly cut logs. *Entomologists Gazette.* **29**: 253-257.

Fonseca, E.C.M. d'Assis (1965) A Short Key to the British Drosophilidae (Diptera) Including a New Species of *Amiota*. *Transactions Society British Entomology*. **16**: 233-244.

Hackman, W., Lakovaara, S., Saura, A. & Vepsalainer, K. (1970) On the biology and karyology of *Chymomyza costata* Zetterstedt, with reference to the taxonomy and distribution of various species of *Chymomyza* (Dipt., Drosophilidae). *Annales Entomologica Fennica*. **36**: 1-9.

Okada, T. (1976) Subdivision of the Genus *Chymomyza* Czerny (Diptera, Drosophilidae), with description of Three New Species. *Kontyû, Tokyo* **44(4)**: 496-511.

Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H. & Coulson, J.R. (1965) A catalog of the Diptera of America north of Mexico. *Agric. Handbook* 1696pp. Washington, D.C.

Wheeler, M.R. (1954) V. Taxonomic studies on American Drosophilidae, pp. 47-64. In Patterson, J.T., Studies in the genetics of *Drosophila* VIII. Articles on genetics, taxonomy, cytology and radiation. *Texas University Publication* **5433**: 1-307.

THE DISTRIBUTION AND BIOLOGY OF TWO LEAF-MINING SPECIES OF *CRICOTOPUS* (DIPTERA: CHIRONOMIDAE) IN SCOTLAND

KEITH BLAND, 35 Charterhall Road, Edinburgh EH9 3HS

GRAHAM ROTHERAY, Royal Museum of Scotland, Chambers Street, Edinburgh EH1 1JF

Several widely-separated genera of non-biting midges have developed leaf-mining larvae. In one of these genera, *Cricotopus* Wulp, 1874, three British species occur with this life-style, all in the subgenus *Isocladius* Kieffer. Of these 3 species (*C. brevipalpis* Kieffer, *C. tricinctus* (Meigen) and *C. trifasciatus* (Meigen)), only the first two are discussed in this note.

Cricotopus brevipalpis was first discovered in Scotland mining the leaves of *Potamogeton natans* L. at Kindrogan (NO 0463), Perthshire (Disney, 1977). It was taken again at the same place a few years later (Disney, 1981). This species is probably quite widespread, for we have reared it from two widely separated localities. Occupied leafmines in *P. natans* collected from a pool by Loch Con (NN 6868), Perthshire on 7.viii.1990 produced this species, while similar mines in *P. polygonifolius* Pourr. from near Grishipool (NM 1859), Isle of Coll on 23.viii.1990 also turned out to be this species. The leaf-mining habits of *C. brevipalpis* are known in Britain (Disney 1975 & 1977) and in Europe have been described by Gripekoven (1914) and Hering (1957). Its preferred host-plant appears to be *P. natans* (Gripekoven, *op. cit.*; Hirvenoja, 1973; Disney, 1975, 1977) although Hering (*op. cit.*) states "most frequently *P. natans*" implying that other species of *Potamogeton* are also utilised. The leaf-mines follow erratic routes (Fig. 1) and are true mines with the leaf matrix removed but both upper and lower epidermis intact, although very thin and easily damaged. The larva leaves the mine occasionally and recommences mining either elsewhere in the same leaf or in another leaf. At the termination of some of the mines a special double-walled chamber is constructed, possibly for moulting.

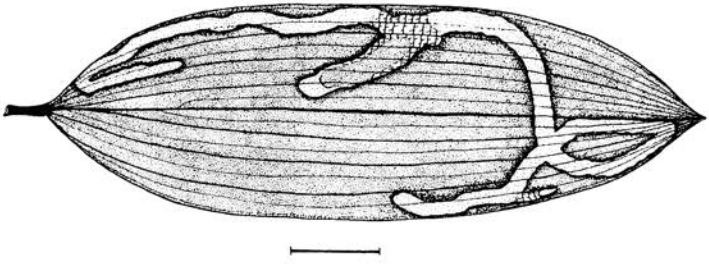


Fig. 1. Leaf-mine of *Cricotopus (Isocladius) brevipalpis* Kieffer in *Potamogeton natans* from Loch Con, Perthshire showing the erratic course of the mine and the double-walled chamber at its widest point. Scale line = 1cm.

Cricotopus tricinctus appears to be widespread with imagines found in diverse parts of Scotland, namely: Bonhill, Dunbartonshire, 4.vii.1906, collected by J.R. Malloch, specimen in collections of National Museums of Scotland; South Uist, Outer Hebrides, vi.1910; collected by P. Grimshaw (Waterston, 1981), specimen in collections of National Museums of Scotland; Loch Garten, Inverness-shire (Coe, 1950); Loch Dunmore, near Pitlochry, Perthshire (Morgan & Waddell, 1960).

Little biological information is available for this species. Gripekoven (*op. cit.*) simply says that the larvae mine in *Potamogeton natans*. While Hirvenoja (*op. cit.*) described the habits of both *C. tricinctus* and *C. trifasciatus* as "halbminierend" (half mining). Hering (*op. cit.*) gives a brief description of the half-mine and habits of *C. trifasciatus*, but makes no mention of *tricinctus*. Both species probably mine a variety of water plants (Hirvenoja, *op. cit.*). On 23.viii.1990 we found an occupied leaf-mine in a floating leaf of *Sparganium minimum* Wallr. from a small lochan near Grishipool (NM 1859), Isle of Coll. It consisted of a 1cm long straight mine along the midline of the upperside of the leaf (Fig. 2a). The larva rested in this retreat during the day, emerging to devour the upper epidermis of the leaf during the hours of darkness. Feeding occurred from both ends of the retreat to a similar degree. From the occurrence of a similar, but smaller, empty working nearby (Fig. 2b), it appears that once the distance to the ungrazed area is greater than the length of the larva, it moves to a new part of the leaf, or another leaf, and forms a new retreat. On 17.viii.1990 the larva left the mine and formed a free-floating pupa. An imago of *C. tricinctus* emerged on 29.viii.1990.

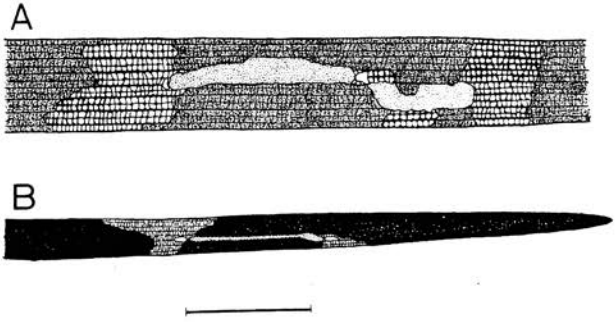


Fig. 2a-b. Leaf-mine of *Cricotopus (Isocladius) tricinctus* (Meigen) in *Sparganium minimum* from Grishipool, Isle of Coll. **a,** leaf-mine of full-grown larva showing the grazed areas at either end of the midline mine; **b,** smaller mine presumably the work of an earlier instar. Scale line = 1cm.

Most species of *Cricotopus* do not form leaf-mines and are detritivores. Within the subgenus *Isocladius* there appears to be a transition from detritus-feeding to full leaf-mining. Further study of species of *Isocladius* would help to elucidate more precisely the stages leading to leaf-mining in this group of flies. For example the head capsule of *C. (I.) brevipalpis* is narrower than that of *C. (I.) tricinctus* and has a more compact grinding surface on the hypochilum, suggesting adaptation to the confined space within a leaf-mine (see figures 215 and 191 respectively in Hirvenoja, *op. cit.*).

Acknowledgement

We are grateful for free access to the Scottish Insect Records Index housed in the Royal Museum of Scotland, Chambers Street, Edinburgh.

References

Coe, R.L. (1950) Diptera: Chironomidae. *Handbooks for the Identification British Insects* **9(2)**.

Disney, R.H.L. (1975) Two interesting additions to the list of Chironomidae (Dipt.) for the Malham Tarn area of Yorkshire. *Entomologist's monthly Magazine* **111**: 173.

Disney, R.H.L. (1977) *Cricotopus brevipalpis* Kieffer (Dipt., Chironomidae) from Scotland. *Entomologist's monthly Magazine* **113**: 175.

Disney, R.H.L. (1981) Annual Report of the Scottish Field Studies Association, p. 38.

Gripekoven, H. (1914) Minierende Tendipediden. *Archiv für Hydrobiologie und Planktonkunde, Supplement* **2**: 129-230.

Hering, E.M. (1957) *Bestimmungstabellen der Blattminen von Europa*. W. Junk, 'S-Gravenhage.

Hirvenoja, M. (1973) Revision der Gattung Cricotopus van der Wulp und ihrer Verwandten (Diptera, Chironomidae). *Annales Zoologici Fennici*. **10(1)**: 1-363.

Morgan, N.C. & Waddell, A.B. (1960) Chironomidae (Diptera) new to Perthshire including some species new to Britain. *Entomologist* **93**: 62-65.

Waterston, A.R. (1981) Present knowledge of the non-marine invertebrate fauna of the Outer Hebrides. *Proceedings Royal Society Edinburgh* **79B**, 215-321.

THE DISTRIBUTION OF THE GENERA *COQUILLETTIDIA*, *CULISETA* AND *ORTHOPODOMYIA* IN BRITAIN

ALUN T. REES & KEITH R. SNOW, University of East London, Romford Road, London E15 4LZ.

To date, no distribution maps for these three genera of mosquitoes have appeared in the literature. A comprehensive list of older records is given by Marshall (1938), but only rarely are they sufficiently specific to enable a 10km square Ordnance Survey grid reference to be determined. In most cases it is therefore difficult to equate these records with those gathered most recently by the British Mosquito Recording Scheme (BMRS). Selected distribution data are also presented by Cranston *et al.* (1987).

The following maps were produced form data stored in a computer database (dBASEII) and analysed by a BASIC program developed on an IBM-compatible PC. The records prior to 1940 are primarily those from Lang (1920) and Marshall (*op. cit.*) Where possible, the original distribution references cited by these authors were examined in order to produce accurate distribution records. The records for 1940-1969 have been gleaned from published records, and the most recent group (1970 to date) are primarily those received directly by the BMRS.

Each species will now be considered in turn with a brief description of the larvae and adults, and a summary of their life histories.

***Coquillettidia richiardii* (Fig. 1)**

Adults of this species are reddish-brown with striped legs; the pale abdominal bands, when present, are inconspicuous. It shares a characteristic pale ring in the middle of the first tarsal segments with *Cs. annulata* and *Cs. subochrea* but, unlike these two species, *Cq. richiardii* does not have dark spots on its wings (Cranston *et al., op. cit.*).

Larvae and pupae are unique among the British mosquitoes in possessing siphons and trumpets designed to pierce roots and stems of water plants, from which they obtain their oxygen. Eggs are laid in rafts on the water surface from May to August and the young larvae descend to attach to sweet flag (*Acorus*), water crowfoot (*Ranunculus*), the grass *Glyceria* or reed mace (*Typha*) as soon as they emerge. Although some larvae reach the fourth instar by late summer, pupation does not occur until the following spring. Pupae remain attached to plants, ascending only to emerge. Adults appear in May and have been recorded as late as September, females feeding mainly on mammals and biting humans inside and outside buildings. There is only one generation per year.

This species has been recorded throughout England, where it has a wide distribution, and from Scotland. There are also records from Belfast and Co. Wicklow. A recent record from Tayside, reported by Cranston *et al.* (*op. cit.*) is a misidentification and has therefore been omitted from this paper.

***Culiseta longiareolata* (Fig. 2)**

Cs. longiareolata adults have a characteristic reddish-brown scutum with white markings, while the short siphon and arrangement of the pecten spines help identify the larva (Cranston *et al., op. cit.*). This appears to be a very rare mosquito in this country and it is doubtful whether it is established here. It has been recorded on only three occasions, all from the south of England (Staley, 1940; Shute, 1953 [unpublished]; Service, 1969). In the Mediterranean area it develops in almost any type of water whether fresh or brackish, clean or polluted, artifical or natural. Little is known of the ecology or behaviour of *Cs. longiareolata* in Britain, but it does not appear to bite humans.

***Culiseta fumipennis* (Fig. 3)**

The appearance of adults of this species is similar to that of *Cs. litorea* and *Cs. morsitans*

but the larva can be distinguished by the isolated spines of the pecten (Cranston *et al., op. cit.*). On the limited data it would appear that the life cycle, too, is similar, although larval records of *Cs. fumipennis* refer solely to unshaded freshwater bodies, both temporary and permanent, suggesting that it may be more restricted in its habitats than *Cs. morsitans*. *Cs. fumipennis* females do not appear to bite humans or domestic animals.

Cs. fumipennis is widely distributed in Britain with records from northern Scotland to the south coast of England.

***Culiseta litorea* (Fig. 4)**

Culiseta litorea adults closely resemble those of *Cs. morsitans* and *Cs. fumipennis* and larvae are difficult to distinguish from those of *Cs. morsitans* (Cranston *et al., op. cit.*). The life cycle is essentially the same as that of *Cs. morsitans* and it too can tolerate slightly brackish water. However, it has been found only in open waters. Females feed mainly on birds, although they occasionally bite reptiles and mammals including man.

This species is known from England and Northern Ireland (Belfast) but has not, as yet, been recorded from Wales or Scotland. Please note that the records of this species for Arbrook Common and Walton (Surrey) from Nye (1955) are not included in the present work as we are unable to obtain a 10km square grid reference for either site.

***Culiseta morsitans* (Fig. 5)**

Morphologically, adult *Cs. morsitans* are almost identical to *Cs. fumipennis* and *Cs. litorea*. While the larvae of the first two species can be distinguished by the spacing of the pecten spines, there is more difficulty separating larvae of *Cs. morsitans* from those of *Cs. litorea* (Cranston *et al., op. cit.*). The life cycle of *Cs. morsitans* is similar to many *Aedes* species in that eggs are deposited during the summer months in dry hollows or above the level of standing water. The eggs hatch following immersion by autumn and winter rainfall. Larvae may hatch as early as November, but pupation does not occur until spring. Larvae cannot withstand freezing, although they can survive under ice for long periods. There is only one generation per year. Aquatic sites are either fresh or slightly brackish waters in ponds, ditches and pools in either open or shaded situations. Adults have been recorded from May to October (Service, 1969) and the majority of females feed on birds with just a small percentage feeding on reptiles and mammals including man.

Cs. morsitans has a wide distribution in England and Wales. There are several records from Scotland and a single record from Ireland.

***Culiseta alaskaensis* (Fig. 6)**

There have been only occasional reports of this species in Britain, almost all as adults, from Scotland and England north of the Humber between the months of March and October. Little ecological data exist for *Cs. alaskaensis* in Britain, but elsewhere in its range larvae are found in open pools and adults can pose a serious human biting problem (Natvig, 1948). In appearance, adults closely resemble *Cs. annulata*, but lack the pale rings near the tip of

each femur and on the middle of the first tarsal segments. Larvae are similar to those of *Cs. annulata* and *Cs. subochrea* (Cranston *et al., op. cit.*).

The record of *Cs. alaskaensis* from Grange (Cumbria) in Cranston *et al., op. cit.* is incorrect. In the original publication (Kidd & Brindle, 1959) the authors cite the record as being for Vice County 60, i.e. West Lancashire. This therefore excludes Grange, Cumbria (formerly Cumberland - Vice County 70) and Grange, Merseyside (formerly Cheshire - Vice County 58). We conclude that the record is for Grange-over-Sands and treat it as such in this paper.

***Culiseta annulata* (Fig. 7)**

Cs. annulata is both widespread and common throughout Britain, which reflects its varied choice of aquatic sites (Marshall, *op. cit.*). Egg rafts are laid in natural or artificial waters in sunlit or shaded areas. The water may be fresh or brackish and clean or, more often, polluted. Examples of such sites are ponds, ditches, drains, marshes, garden water butts and cisterns. There may be several generations each year. Adults are often found in houses where they feed readily on the occupants. They also bite out-of-doors, attacking man, other mammals and birds. *Cs. annulata* is able to overwinter in any stage under suitable conditions. Females do not enter diapause but vary between quiescence and cycles of feeding and egg-laying (Ramsdale & Wilkes, 1985). Experiences of mosquito bites between late autumn and early spring are almost always attributable to *Cs. annulata*. This is among the largest of the British mosquitoes and is easily recognised by its size, spotted wings and white rings on the legs. Larvae have a basal siphonal hair and hair-like spines in the pecten (Cranston *et al. op. cit.*).

***Culiseta subochrea* (Fig. 8)**

This mosquito is uncommon in Britain having been recorded from England only. It resembles *Cs. annulata* closely in form in all stages apart from the more yellowish adult colouration, details of the male genitalia and in the fringing of the pupal paddles (Marshall, *op. cit.*; Cranston *et al., op. cit.*). There are no apparent differences in the aquatic habitats and life history of this species and *Cs. annulata* except that egg-laying without a prior bloodmeal (autogeny) has exceptionally been observed in *Cs. subochrea* but not in *Cs. annulata* (Mattingly, 1950).

***Orthopodomyia pulcripalpis* (Fig. 9)**

The adult mosquito is easily recognised by the black and white patterning of the scutum, abdomen and hind legs and the relatively long female palps. Larvae, too, have their peculiarities; this is the only British species to lack a pecten apart from *Cq. richiardii* in which the siphon is highly modified (Cranston *et al., op. cit.*). *Or. pulcripalpis* breeds in water-filled tree holes, especially those in beech, elm and horse chestnut. North American species of *Orthopodomyia* lay their eggs singly on the sides of tree holes close to the water line and the larvae descend into the water on hatching (Carpenter & La Casse, 1955) but whether this is true of *Or. pulcripalpis* is not known. In Britain, larvae are the main overwintering stage and these develop to pupae by June-July and adults emerge soon after

(Fallis & Snow, 1983). Only one generation occurs each year. Little is known of adult ecology and behaviour, but females appear to feed on birds. The few distribution records which exist for this species are all from the south of England.

Since the preparation of the distribution maps for the genus *Culex* in July 1991 (Rees & Snow, 1992), 104 new records have been added (Fig. 10). This makes a total of 1690 sites in Britain from which mosquitoes have been reported. These range over 850 10km squares and 101 Vice Counties. The maps show clearly that there are many areas including 11 Vice Counties in which no species have been recorded. A short time collecting in these areas may well prove extremely profitable, and potential recorders are urged to concentrate on these areas and so make a significant contribution to the Mosquito Recording Scheme.

Acknowledgement

We wish to thank the many collectors who have provided records upon which this paper is based.

References

Carpenter, S.J. & La Casse, W.J. (1955) *Mosquitoes of North America (North of Mexico). Berkely & Los Angeles. University of California Press.* 360pp.

Cranston, P.S., Ramsdale, C.D., Snow, K.R. & White, G.B. (1987) *Adults, larvae and pupae of British Mosquitoes (Culicidae).* Freshwater Biological Association Scientific Publication No. 48. 152pp.

Fallis, S.P. & Snow, K.R. (1983) Larval development in *Orthopodomyia pulchripalpis* (Rondani) (Dipt., Culicidae). *Entomologists monthly Magazine.* **119**: 75-79.

Kidd, L.N. & Brindle, A. (1959) *The Diptera of Lancashire and Cheshire. Part 1.* Lancashire and Cheshire Fauna Committee, 136pp.

Lang, W.D. (1920) *A Handbook of British Mosquitoes.* British Museum (Natural History). 125pp.

Marshall, J.F. (1938) *The British Mosquitoes.* British Museum (Natural History). 341pp.

Mattingly, P.F. (1950) Family Culicidae, subfamily Culicinae. In Diptera 2, Nematocera. *Handbooks for the Identification British Insects.* **9(2)**: 102-120.

Natvig, L.R. (1948) Contributions to the knowledge of the Danish and Fennoscandian Mosquitoes; Culicini. *Norsk Entomologisk Tidsskrift, Supplement 1.* 567pp.

Nye, E.R. (1955) The flies of the London area. II. Culicidae Sub-Family Culicinae (Mosquitoes). With a key to the species of *Culex*. *London Naturalist* **34**: 114-126.

Ramsdale, C.D. & Wilkes, T.J. (1985) Some aspects of overwintering in southern England of the mosquitoes *Anopheles atroparvus* van Thiel, 1927 and *Culiseta annulata* Schrank, 1776 (Diptera, Culicidae). *Ecological Entomology* **10**: 449-454.

Rees, A.T. & Snow, K.R. (1992) The distribution of the genus *Culex* in Britain. *Dipterist's Digest* **11**: 22-32.

Service, M.W. (1968) Aquatic insect fauna of Brownsea Island and the Isle of Purbeck, Dorset. *Transactions of the Society for British Entomology.* **18**: 19-33.

Service, M.W. (1969) Observations on the ecology of some British mosquitoes. *Bulletin of Entomological Research.* **59**: 161-194.

Staley, J. (1940) A species of mosquito (Diptera, Culicidae) new to Britain. *Nature,*

London **146**: 368.

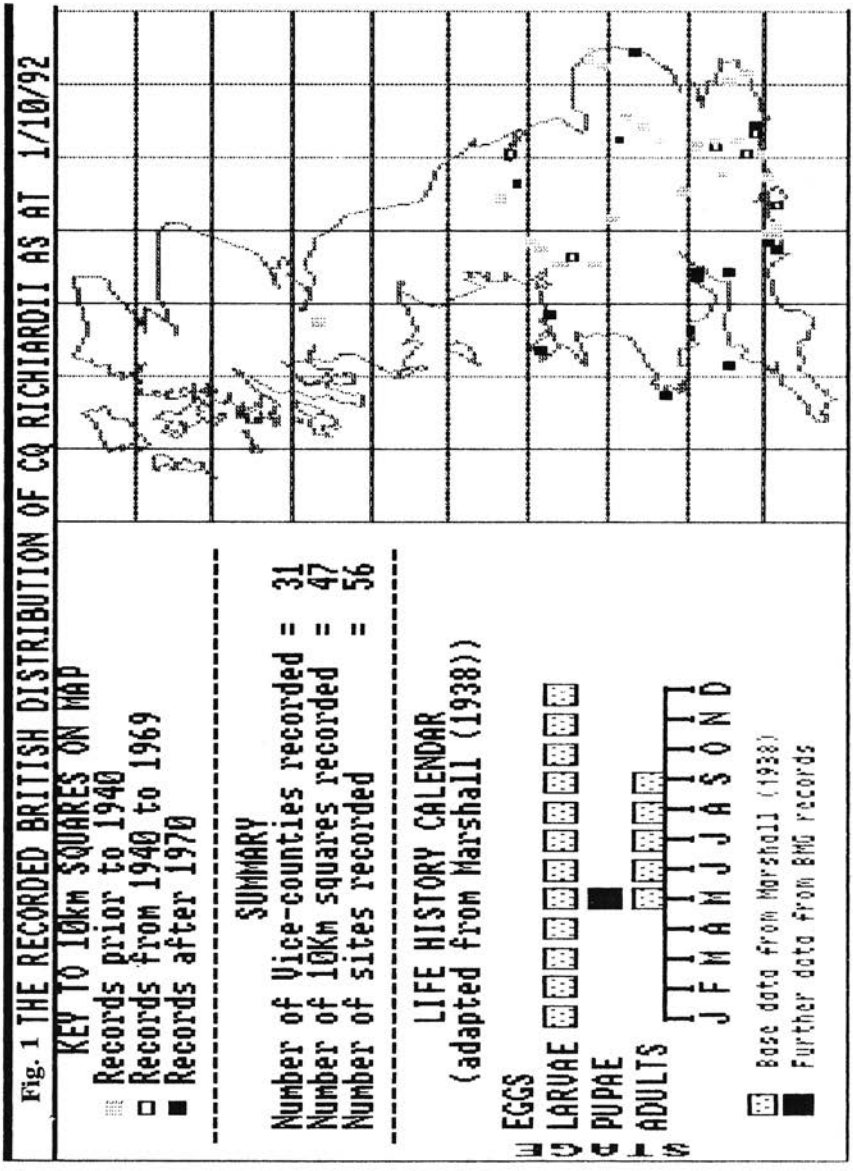


Fig. 1 THE RECORDED BRITISH DISTRIBUTION OF CQ RICHIARDII AS AT 1/10/92

Fig. 2 THE RECORDED BRITISH DISTRIBUTION OF CS LONGIAREOLATA AS AT 1/10/92

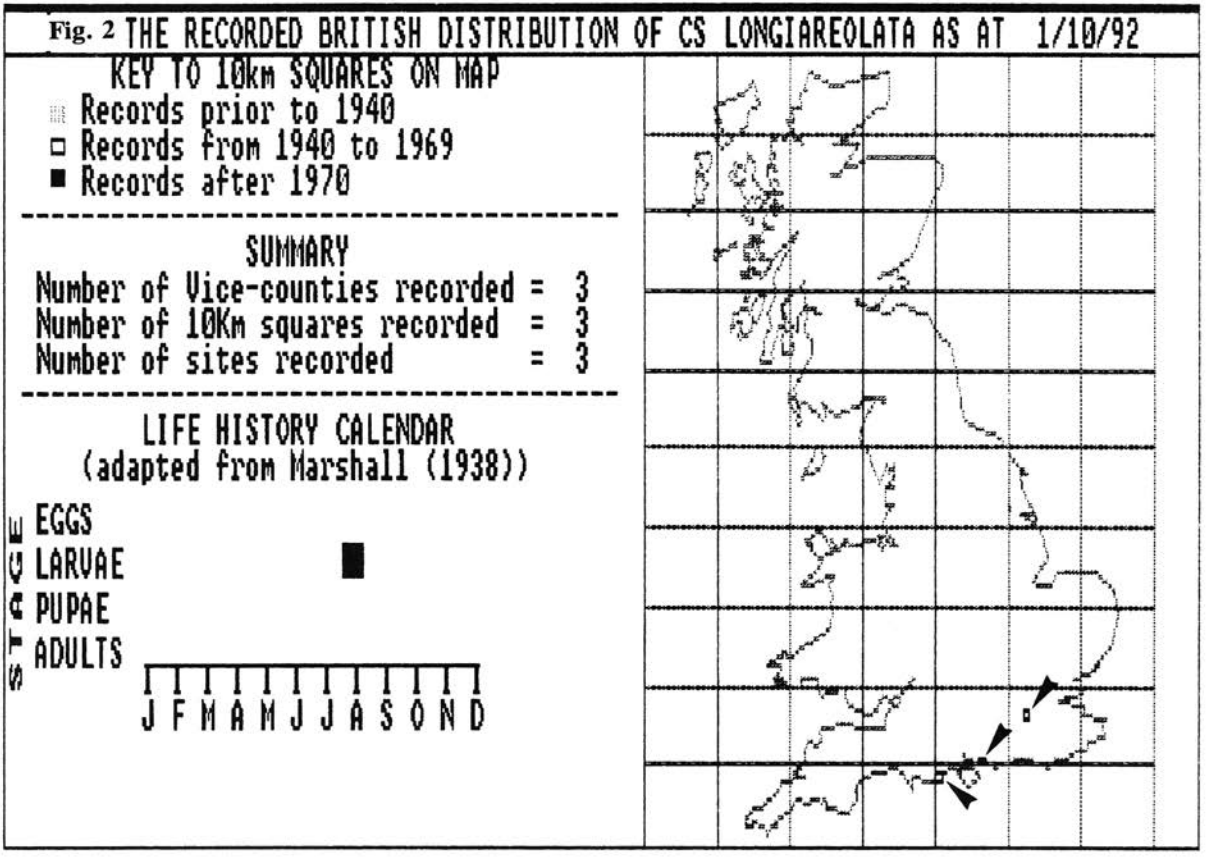


Fig. 3 THE RECORDED BRITISH DISTRIBUTION OF CS FUMIPENNIS AS AT 1/10/92

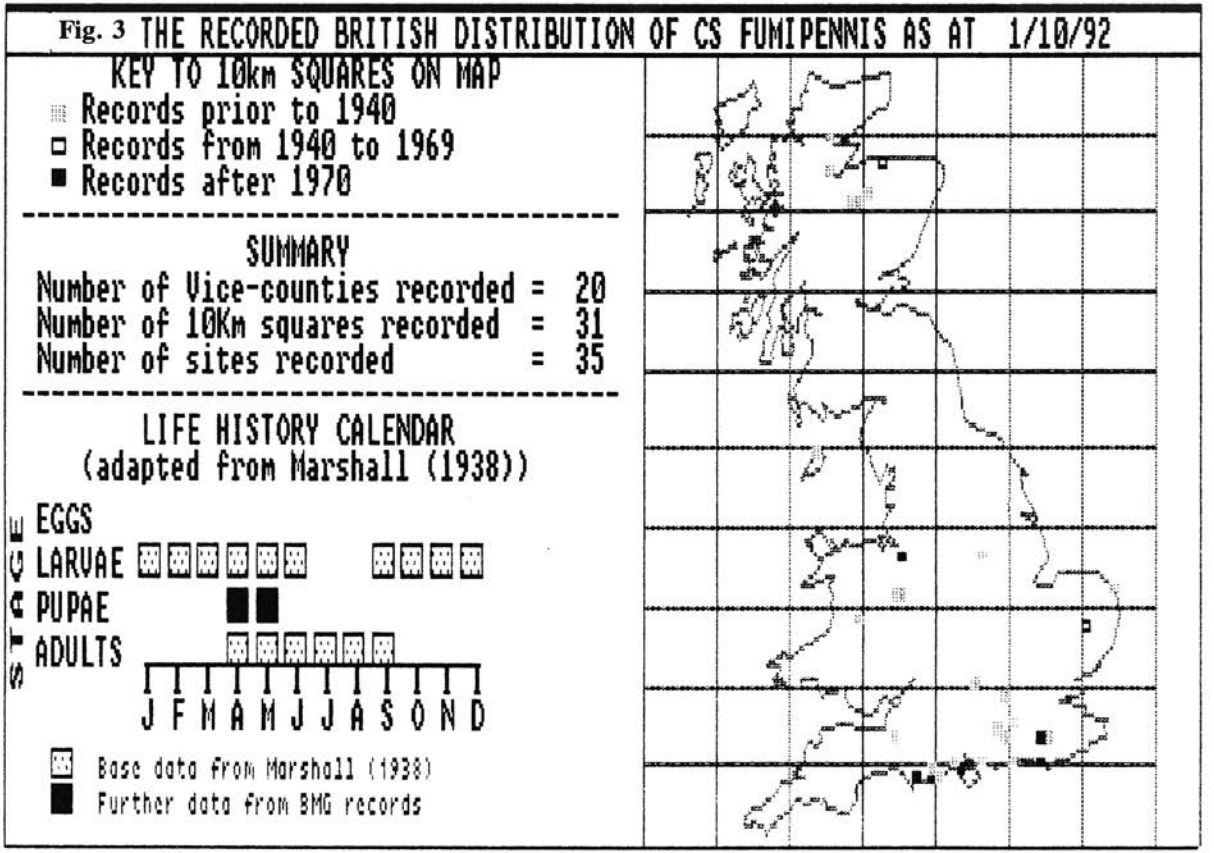


Fig. 4 THE RECORDED BRITISH DISTRIBUTION OF CS LITOREA AS AT 1/10/92

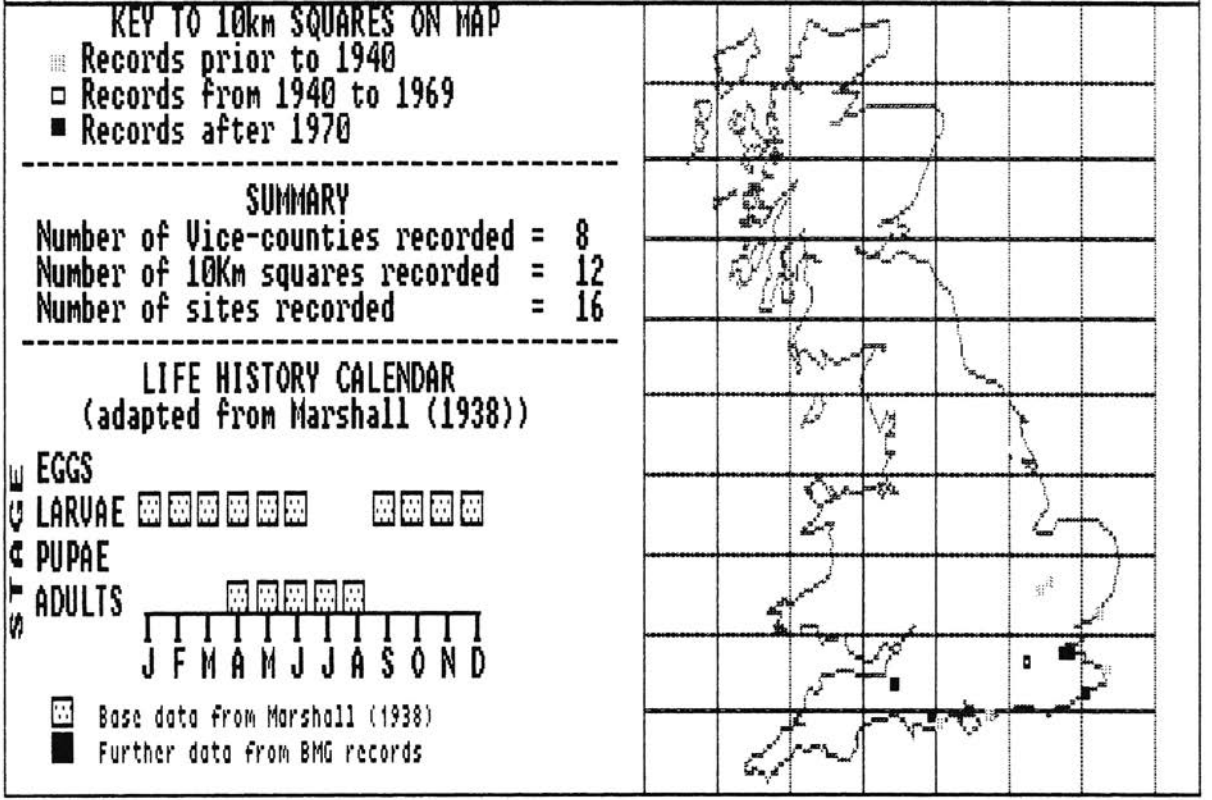


Fig. 5 THE RECORDED BRITISH DISTRIBUTION OF CS MORSITANS AS AT 1/10/92

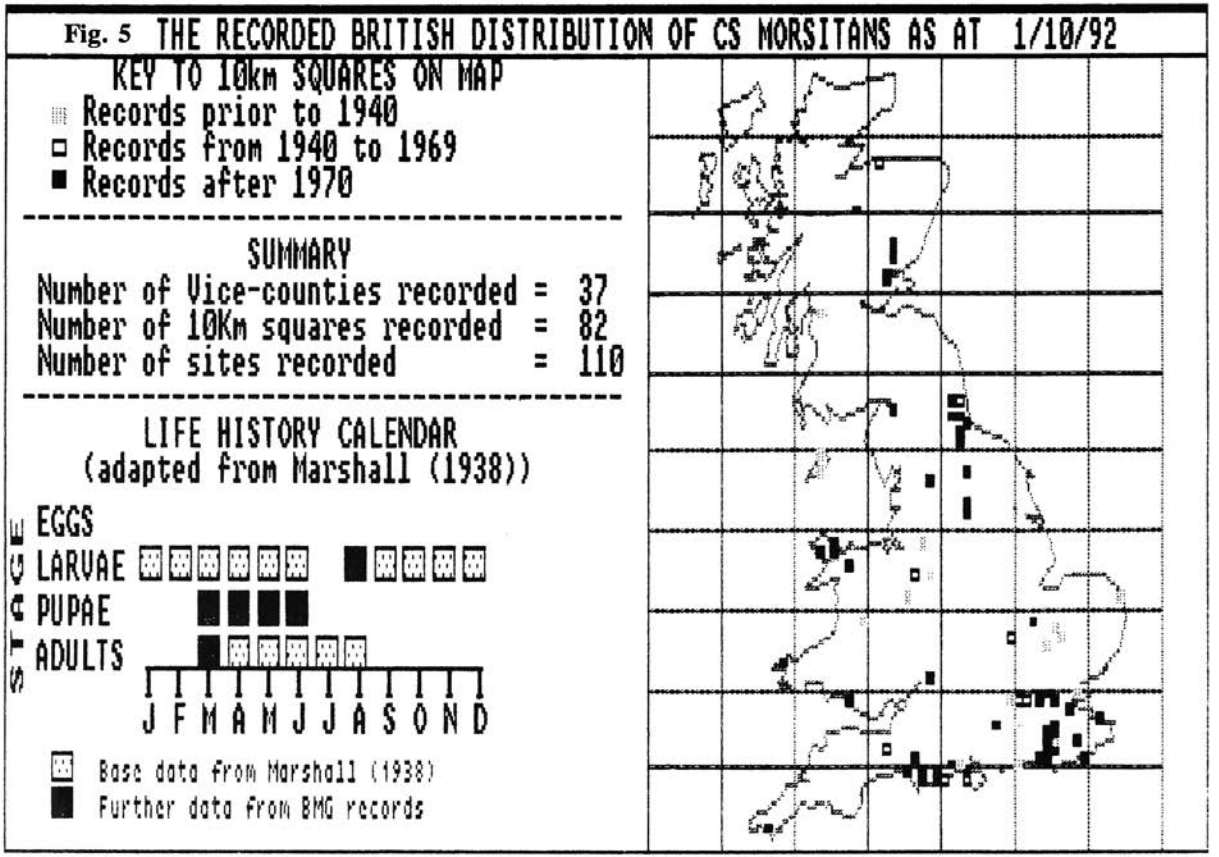


Fig. 6 THE RECORDED BRITISH DISTRIBUTION OF CS ALASKAENSIS AS AT 1/10/92

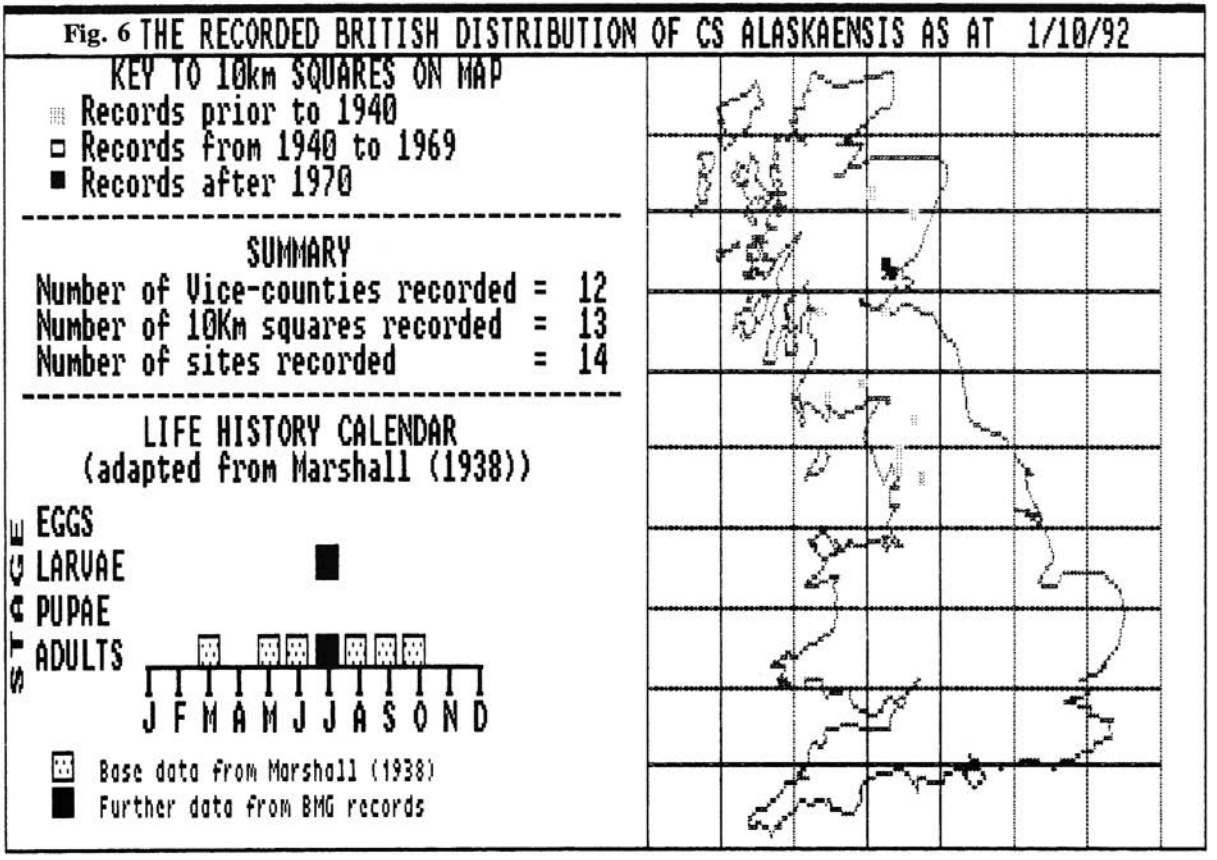


Fig. 7 THE RECORDED BRITISH DISTRIBUTION OF CS ANNULATA AS AT 1/10/92

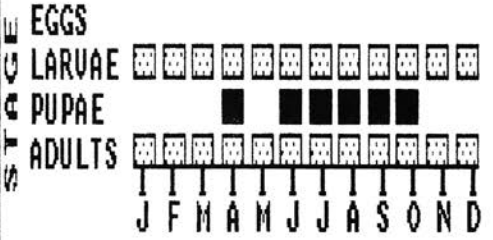
KEY TO 10km SQUARES ON MAP

- Records prior to 1940
- Records from 1940 to 1969
- Records after 1970

SUMMARY

Number of Vice-counties recorded	=	55
Number of 10Km squares recorded	=	124
Number of sites recorded	=	215

LIFE HISTORY CALENDAR
(adapted from Marshall (1938))



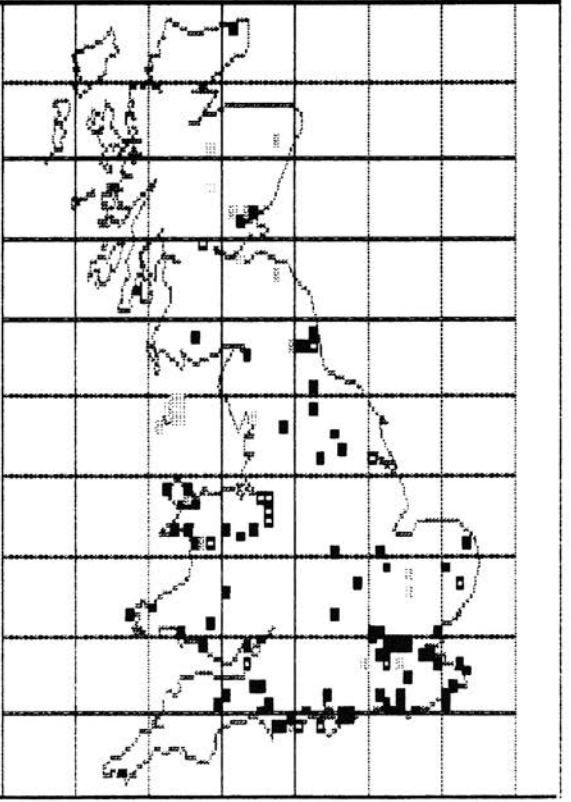


Fig. 8 THE RECORDED BRITISH DISTRIBUTION OF CS SUBOCHREA AS AT 1/10/92

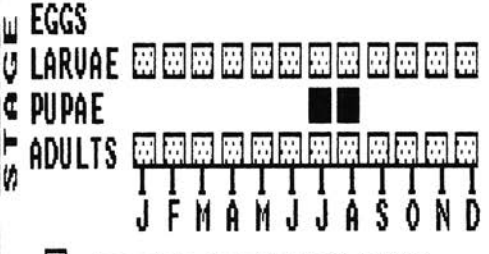
KEY TO 10km SQUARES ON MAP

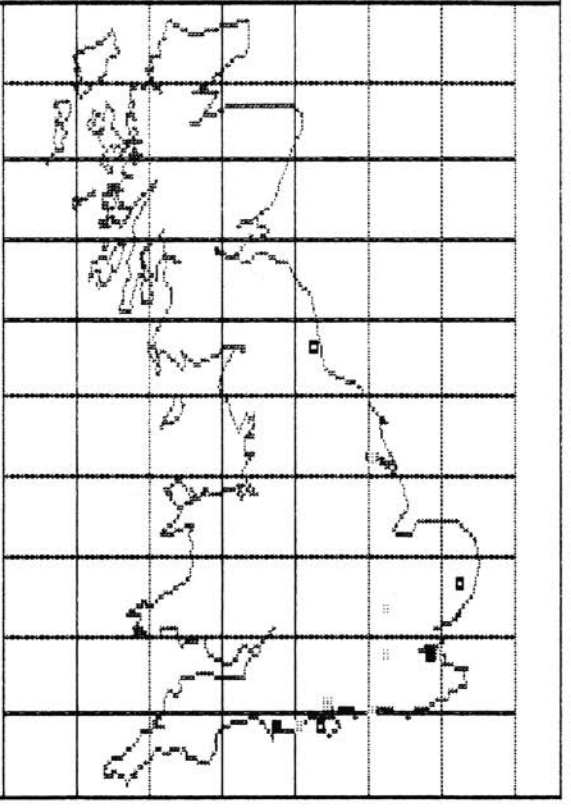
- Records prior to 1940
- Records from 1940 to 1969
- Records after 1970

SUMMARY

Number of Vice-counties recorded = 11
Number of 10Km squares recorded = 14
Number of sites recorded = 15

LIFE HISTORY CALENDAR
(adapted from Marshall (1938))





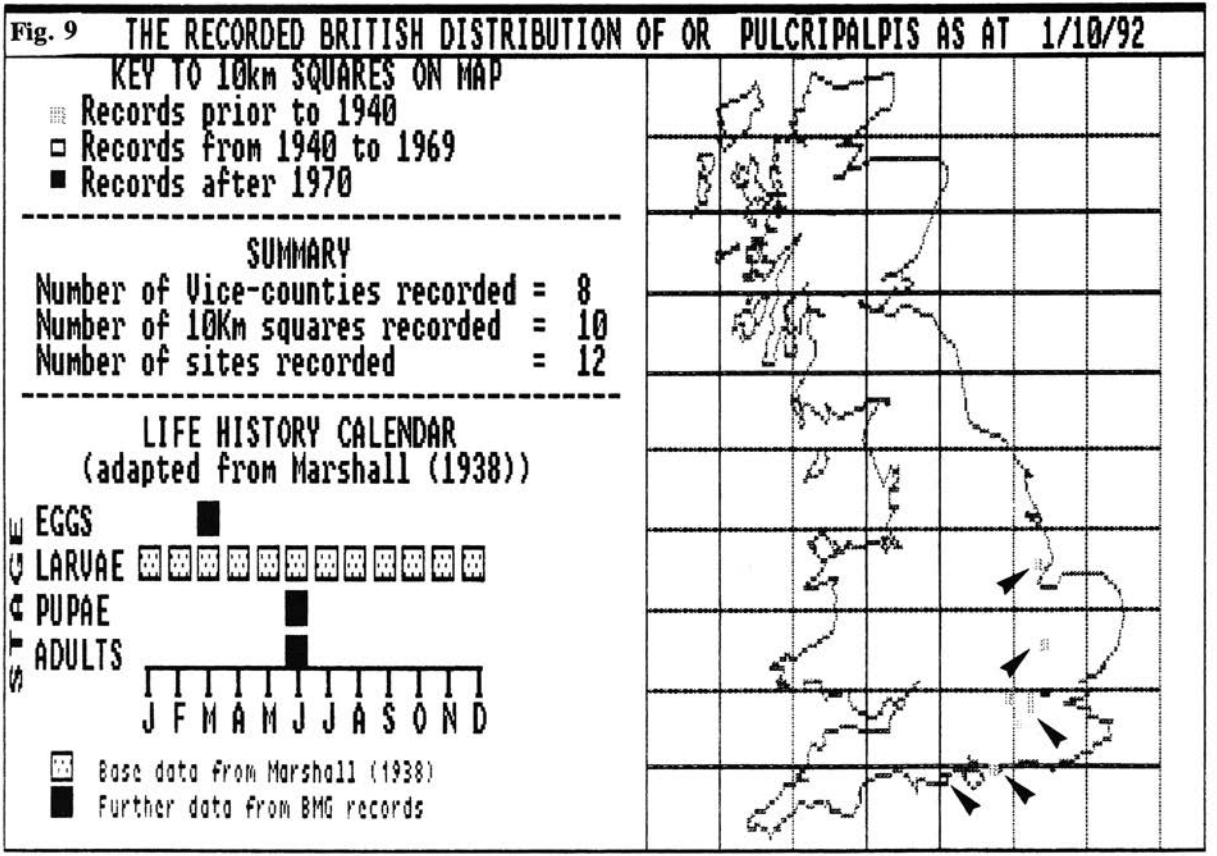
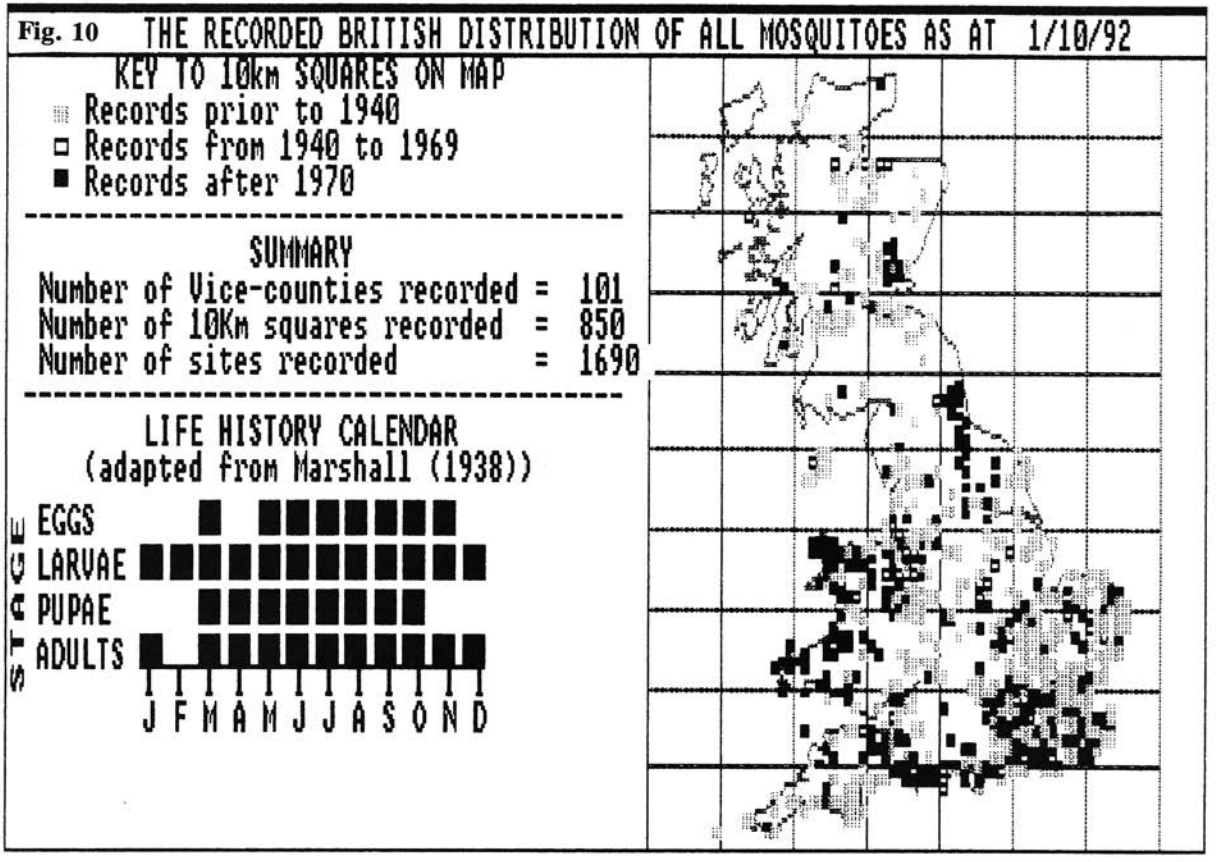


Fig. 9 THE RECORDED BRITISH DISTRIBUTION OF OR PULCRIPALPIS AS AT 1/10/92
KEY TO 10km SQUARES ON MAP
Records prior to 1940
Records from 1940 to 1969
Records after 1970
SUMMARY
Number of Vice-counties recorded = 8
Number of 10Km squares recorded = 10
Number of sites recorded = 12
LIFE HISTORY CALENDAR
(adapted from Marshall (1938))
STAGE
EGGS
LARVAE
PUPAE
ADULTS
J F M A M J J A S O N D
Base data from Marshall (1938)
Further data from BMG records

Fig. 10 THE RECORDED BRITISH DISTRIBUTION OF ALL MOSQUITOES AS AT 1/10/92



Printed in 1994 by Quacks the Booklet Printer, 7 Grape Lane, Petergate, York, YO1 2HU. Tel. (0904) 635967

Dipterists Digest (second series) Vol. 1, No. 1, August 1994

Contents

Published by Derek Whiteley 17 Rustlings Road Sheffield S11 7AA