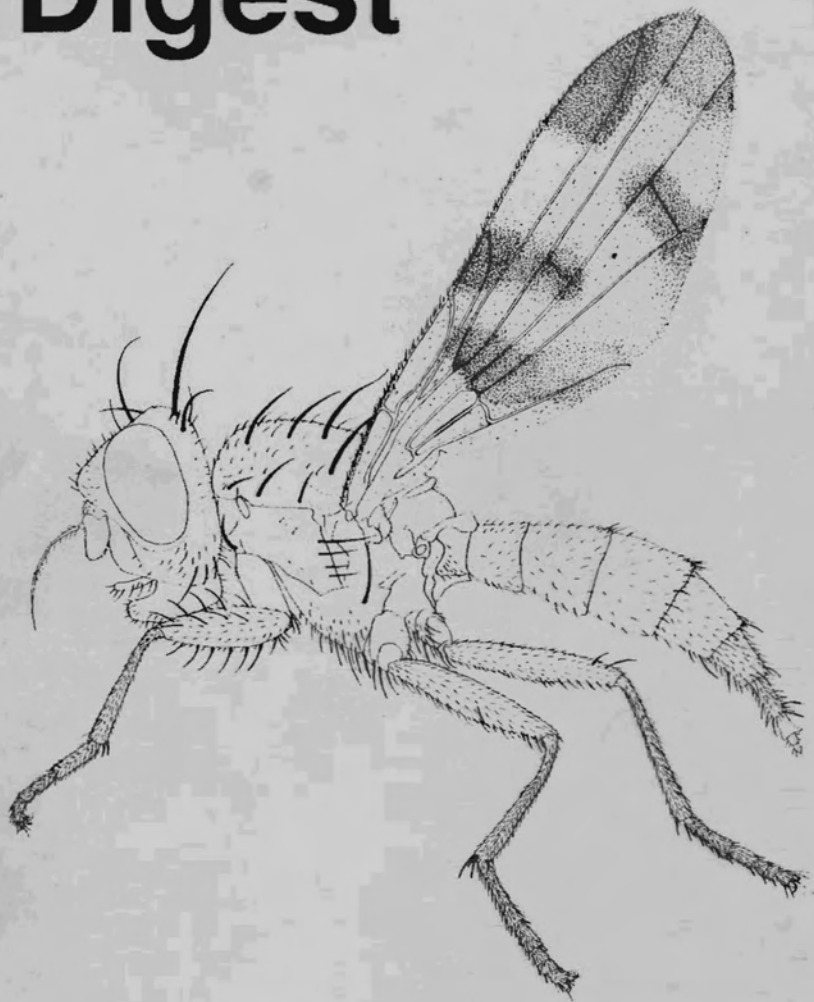


Dipterists Digest



No. 6

1990

Dipterists Digest is a popular journal aimed primarily at field dipterists in the UK, Ireland and adjacent countries, with interests in recording, ecology, natural history, conservation and identification of British and NW European flies.

Articles may be of any length up to 3000 words. Items exceeding this length may be serialised or printed in full, depending on the competition for space. They should be in clear concise English, preferably typed double spaced on one side of A4 paper. Only scientific names should be underlined. Tables should be on separate sheets. Figures drawn in clear black ink, about twice their printed size and lettered clearly.

Enquiries about photographs and colour plates — please contact the Production Editor in advance as a charge may be made.

References should follow the layout in this issue.

Initially the scope of Dipterists Digest will be:-

- Observations of interesting behaviour, ecology, and natural history.
- New and improved techniques (e.g. collecting, rearing etc.).
- The conservation of flies and their habitats.
- Provisional and interim reports from the Diptera Recording Schemes, including provisional and preliminary maps.
- Records of new or scarce species for regions, counties, districts etc.
- Local faunal accounts, field meeting results, and 'holiday lists' with good ecological information/interpretation.
- Notes on identification, additions, deletions and amendments to standard key works and checklists.
- News of new publications/references/literature scan.

Texts concerned with the Diptera of parts of continental Europe adjacent to the British Isles will also be considered for publication, if submitted in English.

DIPTERISTS DIGEST
DEREK WHITELEY
17 RUSTLINGS ROAD
SHEFFIELD S11 7AA

Dipterists Digest

No.6 1990

Edited by: Derek Whiteley

Published by:

Derek Whiteley - Sheffield - England
for the
Diptera Recording Scheme

ISSN 0953-7260

THE BEGINNING OF DIPTERA RECORDING SCHEMES IN BRITAIN

Alan Stubbs

Hopefully the concept of recording schemes has a long term future. It makes sense for individuals to join forces and combine their efforts in a common goal of improving our knowledge.

A pattern of activities has become established for many dipterists, centred on the recording schemes, such as annual meetings and field meetings. And out of this base *Dipterists' Digest* has emerged as the evolution of activities continues. Where this evolutionary process will lead, time will tell, but before the past becomes faded and lost, the early years of recording are reviewed here for posterity.

It was the botanists that set the groundwork starting in 1954 under the Botanical Society of the British Isles. The revolutionary and seemingly impossible task was to map the distribution of some 1700 higher plants on a 10km grid of the British Isles - about 3,600 recording units, with records divided for the most part into pre and post 1950. They succeeded when an *Atlas of the British Flora* (London, BSBI) was first published in 1962. No one could pretend that every inch of Britain had been surveyed but it was an enormously improved statement of knowledge, and open to more considered analysis of the factors affecting distribution.

The plant mapping became the basis of the Biological Records Centre, founded in 1962 at Monks Wood. From our point of view, the options suddenly opened up in 1967 with the appointment of John Heath to promote insect mapping. That year he launched the butterfly and macro moth recording schemes and a flurry of interest and activity resulted.

As regards Diptera, perhaps the story should begin with Sciomyzidae. In 1966 or perhaps early 1967, Dr L.V. Knutson of the USA sent out a circular to British dipterists. He asked for records of sciomyzids as a basis for distribution information in a forthcoming Royal Entomological Society Handbook on the family, which was to be submitted for publication in late 1968. The news that BRC was promoting insect mapping was timely so that a published review of the records received (Stephenson, J.W and Knutson, L.V. 1970, *Entomologist's Monthly Magazine* 106: 16-21) included the first published BRC maps for Diptera, *Tetanocera ferruginea* Fln. and *T. elata* F.. Since the record format sheets in the original circular sought only locality data but did not allow for grid reference, the maps for the first time focused strong emphasis on 10km squares as the recording unit (an image developed by early BRC schemes). The authors requested further records though do not speak of a recording scheme as such. This vigorous initiative then faded though it is believed that a Sciomyzidae Recording Scheme was the first Diptera scheme to be listed by BRC (the exact date is uncertain). The scheme never seems to have functioned as such, with no record card and Dr Stephenson, a mollusc specialist, simply being left to receive records that never came. The Handbook was not completed and there was apparently no further promotion of the scheme.

In 1967/8 I was assembling data on *Ptychoptera* as a side line since the distribution pattern of a few species was so vague in the literature. With seven species, about 1000 records were soon accumulated based on my material, records from some museums and friends, and from literature. By that time I was recording crane flies at large numbers of sites.

Now those BRC maps looked mighty neat compared with anything I could do as an amateur. When approached, John Heath encouraged me and agreed to

process my *Ptychoptera* records into maps; the sting was that I had to re-write all data onto individual record cards! The maps duly appeared and were eventually published as part of a review on the genus in 1972 (*Entomologist* 103: 23-38, 308-312), this as a pilot study for crane-fly recording.

It was an encouraging period to consider a recording scheme. The previous decade or so had seen publication of a number of papers on crane-flies. Brindle had produced a series of papers on the taxonomy of larvae and pupae. The British check list had been updated, including extra species and a revision of classification, by Hutson and Vane-Wright. The *Journal of Animal Ecology* and some other journals had a stream of tipulid papers involving a number of authors including J. Coulson, B. Freeman, M. Hadley, R. Laughlin, R.M. Payne and myself. This momentum in fact continued with vigour well into the 1970's with others publishing as well including, J. Butterfield, J.B. Carter, J. Dobson and M. Service. This was very much an era of growth in scientific ecological studies using crane-flies, a stimulus against which a broader brush of information collected by amateurs would give a complementary perspective and taxonomic grey areas could be usefully improved.

In the period 1969-71 there were perhaps five or six people particularly keen on crane-flies at the time. Even if no one else was interested, combining the data of those few specialists, and a concerted effort to trawl collections and the literature, would give a worthwhile data base. Informal discussions took place with Dick Vane-Wright and Tony Hutson who were at the BM(NH) and Dr. Brian Freeman who was doing ecological research. Ron Payne had just published an Epping Forest list and was recording in Wales and I was recording intensively on some Surrey sites and more widely over Britain. Other people were recording to some degree.

BRC agreed to back a Crane-fly Recording Scheme to embrace Tipulidae, Trichoceridae, Anisopodidae (then classified as Tipuloidea) and Ptychopteridae. It seems that 1970 was taken up sorting out how to operate and produce a check list, and 1971 was a time to be patient whilst BRC produced the record card.

The scheme was not concerned just with dot maps, the aim was to improve all aspects of knowledge - ecology, life history, taxonomy etc. as well as distribution. Full site records, not just 10km squares were needed.

By March 1972 everything was ready. There were 16 pages of information, covering the nature of the scheme, how to fill in record cards, notes on the check list, revised key couplets, taxonomic illustrations and a questionnaire.

Thus in April 1972 the Crane-fly Recording Scheme was officially launched with details going out to 50 people who were thought to have potential interest, most of them amateurs. The scheme organisers were Dick Vane-Wright and Tony Hutson (who had joint responsibility for taxonomy, identifying collections and covering literature) and Alan Stubbs (administration of scheme, ecological matters and identifying unmounted material).

It must have been 1972 when some of the early hopes started to slip. Dick Vane-Wright was increasingly working on foreign butterflies, Brian Freeman moved to Jamaica, Ron Payne gave up crane-flies on moving back to Essex and Alan Brindle was more firmly transferring his efforts to foreign earwigs. Also, about this time the relevant Royal Entomological Society key went out of print and the Society at that stage was not prepared to reprint existing keys. However, the scheme was to press on and 1973 was an action packed year.

The Crane-fly Recording Scheme produced its first newsletter in February 1973, including the beginning of a regular bibliography. *Molophilus lackschewitzianus* Alex. and *Limonia omissinervis* (de Meij.) were noted as new to Britain. To fill the literature gap on identification a series of articles by Alan Stubbs were started (in 1972) in the Amateur Entomologist's Society Bulletin.

On 24 March 1973 there was an instruction meeting on crane-flies held in the Diptera section at the British Museum (Natural History). Remarkably 28 people attended (coming from as far afield as Liverpool, Warwickshire, Peterborough and Southampton) and one of them (who was a complete novice) had a box of unidentified material which included *Dicranoptycha fuscescens* Schum., a crane-fly genus and species new to Britain.

Newsletter 2 appeared in April 1973 which included an address list of 51 participants and a questionnaire to see what people wanted from the scheme. It also mentioned that BRC agreed to produce an atlas to Tipulinae in the winter of 1974/75, though such an early date proved unattainable. Newsletter 3 followed in August 1973, announcing an *Idiognomomyia* new to science from Berkshire and there was a start of circulation of Newsletters to some foreign crane-fly specialists. A new check list and a genitalia atlas to Tipulinae were included.

The first field meeting was held on 18-24 August 1973 in the Forest of Dean: the cost £1.50/day! Fourteen people booked, though as a result of illness only 11 attended. It was an instruction as well as a recording meeting. We gained 110 species of crane-fly from 26 localities in 15 10km squares, plus 200 other Diptera identifications and about 1000 specimens of fungus gnats were pinned for further study. We managed to find a crane-fly new to Britain, *Limonia frontalis* (Staeg.), also a large chloropid, *Platycephala umbraculata* (F.) and the fungus gnat *Neompheria winnertzi* Edw., both new to Britain.

The close of the 1973 season saw the second London meeting on 10 November when 31 people attended a series of lectures and practicals. This was the real start to the autumn events which became the pattern into the 1980's.

The following year was also pretty active, Newsletter 4 appeared in January 1974 and in April there was circulation of a four and a half page review entitled "crane-fly ecology and collecting hints". On 18 May there was the first day field meeting, in the River Darent Valley, Kent.

The second major field meeting was held on 25-31 July 1974 at Rogate Field Centre, West Sussex. About 20 dipterists attended and some instruction lectures on Diptera as a whole were included. The event produced 124 species of crane-fly, including the second British record of *Tasiocera jenkinsoni* Freeman and the third record of *Limonia bezzii* (Alex. & Leon.). Recording of other families was not neglected, with finds such as *Xanthandrus comtus* (Harris) (hoverfly), *Thyridanthrax fenestratus* (Fla) (bee fly), *Eutolmus rufibarbis* Mg. (robber fly) and the second British record of *Evibrissa vittata* (Mg.) (tachinid). Newsletter 5 in September reported this meeting and reviewed various recent crane-fly records.

The third Crane-fly Recording Scheme meeting was held in London on 9 November 1974.

Momentum slackened rather in 1975, in part because by now the scheme was run virtually single handed by myself and also because I changed jobs, with the disruption that entailed. However, it was to prove a very significant year as the

whole nature of the enterprise responded to popular demand and spread the available energies onto a wider front.

Cranefly Recording Scheme Newsletter 6 in September 1975 proved the last in the series. *Tipula dilatata* Schum. was announced as new to Britain and there was mention of another recording scheme that had been registered with BRC, the Dixidae organised by Henry Disney, coinciding with the publication of his Freshwater Biological Association key which included BRC maps to all the dioxids.

Great difficulty had been experienced in organising a venue for a summer field meeting. As some consolation, there was the first autumn field meeting, held in a cottage near Dolgellau in central Wales on 9-13 October 1975. This event was so successful in terms of records that the autumn foray has become an established part of the season's programme. On this occasion we covered 34 localities in 22 10km squares, producing 68 species of craneflies (this is still an autumn record) and 138 species of fungus gnats. Eight species were new to Britain (still a autumn meeting record) comprising a platypezid *Agathomyia* sp. nov., the mycetophilids *Anatella dampfi* Land., *Phoronia egregia* Dz., *Phormia electa* Dz. and *Exechia sororcula* Lack. and the chironomids *Chaetocladius laminatus* Brandin, *Eukiefferiella* sp. (*bavarica* group) and *Bryophaenocladus* sp. (nr. *musculicola* Kieffer). We do not often cover chironomids (Peter Cranston was with us) but the first five are in mainstream recording groups.

The fourth Cranefly Recording Scheme meeting on 8 November 1975 was in many respects also the first "modern" Annual Meeting in London. It was open to all dipterists, the lecture programme being widened accordingly. It was also the occasion of the first Dipterist's Supper, thanks to the initiative of Adrian Pont. About 50 people were present during all or part of the day.

Hence in the space of only three years since the first "testing of the water" meeting, the nature of the venture had evolved rapidly into the basic framework that has continued to the present. The launching of the Cranefly Recording Scheme identified a need, a need for meeting each other, improving communication and providing mutual help with identifications. It had relatively little to do with craneflies and very quickly the lobbying was for real mainstream interests such as hoverflies. If the initiative was to grow and bring more people into studying Diptera, a hoverfly recording scheme was needed. But such a scheme was not practical without a new key (the Royal Entomological Society key was difficult and out of print). Someone had to produce a new key, and that fell upon me; what was seen as a two year task was to take ten because many of the taxonomic problems proved fraught.

Thus the Cranefly Recording Scheme has suffered since there was a limit to what could be developed and promoted simultaneously. But through the field meetings and other recording, the scheme has gained one of the largest data sets of any scheme, with coverage of well over 2000 10km squares. After the preparation of the Larger Brachycera book is out of the way, new cranefly keys and further atlases are the objective - and hopefully a new series of cranefly newsletters. But that is for the future.

Because I have remained as an organiser of events, the reader may underrate the part that others played. The Cranefly Recording Scheme launch and early years owe much to Dick Vane-Wright and Tony Hutson whose taxonomic knowledge, enthusiasm and personality were of crucial importance. I was an amateur at the time of the early development of the scheme and it made a lot of difference to confidence to be accepted by professionals. The tradition in Britain of amateurs and professionals working together as one is, I believe, the most important aspect

of what has been achieved in recent years. Also Dick and Tony were able to arrange access to the British Museum (Natural History) as a meeting venue in central London and that was and still is crucial. The Museum deserves great credit for its part in the development of the venture (and it has gained tangibly in specimens of new and rare species). And the success of what has happened owes much to many other people who have contributed so much in so many ways.

In closing upon the initial era of the Crane-fly Recording Scheme, I cannot let the matter pass without a nostalgic view of what was, in crane-fly terms, a golden age. Six crane-flies new to Britain was pretty good going. But more than that I recall the efficiency and expertise of gathering crane-flies in the field of Dick Vane-Wright, Tony Hutson and Peter Cranston - crane-fly recording on field meetings was in a class unequalled since.

A new era began in May 1976 with the first issue of the Diptera Recording Schemes Bulletin, announcing the inauguration of four further Recording Schemes (Hoverflies, Tachinoidea & Asiloidea, Conopidae and Sepsidae) and the setting up of a Central Panel to co-ordinate recording schemes and to promote the study of Diptera as a whole. The stage was set for the 1980's.

POLYANDRY IN *MERODON EQUESTRIS* (FAB.) (SYRPHIDAE)

Neville L. Birkett.

At 9-45 a.m. B.S.T. on 19 June 1989, a hot sunny morning with the shade temperature about 90 F., my wife was in our garden near a large shrub of *Senecio* sp. (? *laxifolius*) when her attention was drawn to a pair of flies resting on a floret and from which emanated a loud buzzing.

She called me to the scene and there was a pair of Syrphids, superficially like Eristalids, in cop. I went indoors for a small glass jar in which to capture the pair for determination. While I was away my wife observed that another fly arrived on the scene, ousted the male that was already there in cop., and proceeded to mate with the female. I captured the specimens without difficulty and they proved to be *Merodon equestris*. While incarcerated in the jar the second copulation continued for about ten minutes. Throughout the period of the pairing the male emitted a loud buzzing, in just such a manner as do *Eristalis* spp. in similar circumstances.

The second male proved to be a rather worn specimen while his bride was pristine. Both specimens were well-covered with yellow pollen, presumably from the *Senecio*.

Alan Stubbs (British Hoverflies, 1986 Appendix p.II) refers to the aggressiveness of *Merodon equestris* against territorial intruders. In the present instance the intruder triumphed!

Neville L. Birkett, Beardwood, Carter Road, Grange-over-Sands, Cumbria, LA11 7AG.

THE DISTRIBUTION OF THE GENUS *Anopheles* IN BRITAIN

Alun T. Rees and Keith R. Snow

Of all the genera of mosquitoes in Britain, the genus *Anopheles* is considered to be the most important because of its potential to transmit malaria. In the past, malaria was indigenous to Britain, being transmitted in the valleys and marshlands where suitable mosquito vectors were found. The most efficient vector was *Anopheles atroparvus* and this was the chief source of the benign tertian form of malaria occurring in these islands. The disease was commonly called ague and was especially rife in the marshlands and estuaries of East Anglia, Essex, Kent and the counties of the south coast. The drainage of the marshlands, housing improvements, climatic changes and availability of the anti-malarial drug quinine, led to the decline of ague in Britain, and by the beginning of this century it had been eliminated.

During the First World War (1914–1918) transmission of malaria occurred once again as thousands of soldiers returned to Britain with the disease. During the period 1917–1921 there were 481 confirmed indigenous cases of malaria in Britain. However by 1921 the number had declined to only a few incidents per year (Shute, 1949). There was a second influx of imported cases during and shortly after the Second World War (1939–1945), but the numbers were considerably lower than for the previous wartime period, only 34 cases being reported from 1941–1948 (Shute, 1949).

Nowadays several thousand cases of imported malaria are detected each year, all contracted abroad. However, during exceptionally hot summers it is possible for our native mosquitoes to transmit malaria as shown by Shute (1954). In 1953 two cases caused by *Plasmodium vivax* occurred in Lambeth, London. *Anopheles plumbeus* was suspected to be the vector as it was found breeding in a collection of water in the hollow of a plane tree close to the houses where the cases of malaria occurred. Of greater importance today is the phenomenon of "airport malaria" whereby infective mosquitoes may be imported on board aircraft arriving from the tropics and subsequently bite people in the vicinity of the airport (White, 1985). A specific case of "airport malaria" occurred in 1983 when two people contracted falciparum malaria close to Gatwick Airport (Whitfield *et al.*, 1984).

In their investigation into the distribution of ague, Nuttall *et al.* (1910) mapped the known distribution of *Anopheles* in England and Wales but did not distinguish between species. Although widespread most of their records were from south-east England with few records from the rest of England and Wales except for Yorkshire and Lancashire.

An extremely detailed map of *Anopheles* distribution for England and Wales followed at the end of the First World War. This was the classic work of Lang (1918). In this he showed the distribution of the three species recognised at that time, namely

An. claviger (as *An. bifurcatus*), *An. maculipennis* and *An. plumbeus*. It was not until the 1920's that *maculipennis* was recognised as being a complex of species (e.g. Van Thell, 1927) with *atroparvus* and *messeae* being recorded in Britain. A decade later *An. algeriensis* was first discovered here, in Norfolk (Edwards, 1932). The records given by Lang (1918) for England and Wales together with those for Scotland (Ashworth, 1927) have been transformed by the authors into 10km squares to conform to the standards established by the Biological Records Centre of the Institute of Terrestrial Ecology.

No further distribution maps for *Anopheles* have appeared in the literature. Distribution records are listed by Marshall (1938), but only rarely are they sufficiently specific to enable a 10km square Ordnance Survey grid reference to be determined. It is therefore difficult to equate these records with either those of Lang (1918) or those gathered more recently by the British Mosquito Recording Scheme (BMRS).

The following maps were produced from data stored in a computer database (dBASE II) and analysed by a BASIC program developed on an IBM-compatible PC. The records prior to 1940 are primarily those from Lang (1918; 1920) and Marshall (1938). Where possible, reference was made to the original literature references by these authors in order to produce as accurate a record as possible. 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.

***Anopheles algeriensis* (Fig. 1).**

Adults of this species are reddish-brown and readily separated from the other British *Anopheles* by the absence of (a) wing spots and (b) tufts of pale scales on the head and scutum. Larvae may be distinguished easily from other British *Anopheles* by the conspicuous head markings which form three distinct transverse bands. The pupae usually (though by no means always) have a darkly pigmented apical spot on the paddle, unlike any other British mosquito.

The main distribution of *An. algeriensis* is in the Mediterranean countries, but it was recorded in Norfolk as adults and larvae in shallow puddles at the margin of marshes in Catfield, Hickling Broad, Waxham and Foulden Common in 1932 (Edwards, 1932) and for a further 15-20 years (Hart, 1954). More recently, in 1987, it was discovered at Cors Goch Nature Reserve in Anglesey (Morgan, 1987), larvae being found in shallow unpolluted water, among emergent sedges and rushes in fenland. The present status of this mosquito in Norfolk is uncertain. A recent search of Foulden Common, Norfolk (O.S. grid reference 53/760 002) failed to find any stage of this mosquito (Rees & Rees, 1989, unpublished data).

In other parts of its range larvae are found in both natural and artificial collections of fresh and brackish waters. In both Britain (Rees & Rees, 1989) and continental Europe it overwinters in the larval stage. Adults bite humans readily in the open, entering houses only rarely.

***Anopheles atroparvus* and *Anopheles messeae* (Figs. 2 - 4).**

These two species are members of the *Anopheles maculipennis* complex and are morphologically identical except for the patterning on the decks of the eggs. The combination of (a) dark wing spots and (b) uniformly dark legs and abdomen differentiates these two species from all other British mosquitoes. Larvae are characterised by the design of the pecten and certain setae on the head (Cranston *et al.*, 1987).

Aquatic stages develop in relatively clean, permanent, standing or very slow moving waters with either surface or emergent vegetation. *An. messeae* is found in fresh water but *An. atroparvus* prefers brackish-water pools and ditches.

Both species rest in houses, feeding on the occupants, but whereas in the last century human dwellings were often heavily infested, modern houses are less attractive to these mosquitoes and they now rest and feed mainly in animal shelters. Only females which have not laid eggs (nullipars) survive to overwinter. *An. messeae* seeks cold shelters, normally unoccupied by people, and undergoes complete hibernation, surviving on its food reserves. *An. atroparvus*, however, enters warm animal houses and sometimes human dwellings and feeds periodically on the occupants.

In both species eggs are laid from April onwards and adults which develop from these appear in May or June. There are two or three generations a year.

Because of the difficulty in separating these species, many records, especially those predating the recognition of the two species as distinct, are of limited value. Since these data form the vast majority of records, however, they are included as *An. maculipennis s.l.* in Fig. 4.

***Anopheles claviger* (Fig. 5).**

Although similar in size and colour to *An. atroparvus* and *An. messeae*, this species is distinguished from them by the absence of dark wing spots. It shares with *An. plumbeus* the pale scales on the head and scutum (unlike *An. algeriensis* in which the scales are dark), but whereas *An. plumbeus* is a small, blackish mosquito, *An. claviger* is generally larger and brownish and the contrast between light and dark scales is less pronounced. Larvae of *An. claviger* are recognised by their pecten and setal characters (Cranston *et al.*, 1987).

An. claviger exploits a variety of fresh and brackish water habitats including ponds, ditches and rain barrels, usually in shaded situations. Overwintering is as larvae and the first adults of the year appear in March, or exceptionally February. There may be two or more generations each year. Adults may shelter indoors early in the year but usually rest outdoors as the weather becomes more clement. Females feed on various mammals and bite people readily, mainly in the open.

Anopheles plumbeus (Fig. 6).

The unspotted wings, pure white scales on the head and scutum and dark colouration differentiate this small mosquito from other *Anopheles*. Aquatic stages are found almost exclusively in water-filled tree holes.

In common with the other two tree-hole mosquitoes (*Aedes geniculatus* and *Orthopodomyia pulcripalpis*), and in contrast to all other British species, the antennae of the larvae do not have spines.

The adult season extends from April or early May until late autumn. Eggs are laid on the sides of tree holes just above the water line and do not hatch until flooded. There may be one or several generations per autumn. Winter is normally passed as larvae although the eggs are frost-resistant. Pupation occurs in the early spring.

An. plumbeus is a persistent biter, especially around dusk, both in and out of doors.

GENERAL COMMENTS

As can be seen from the specific maps (Figs. 1-6), there appears to be a general bias of anopheline distribution to the south-east of Britain, particularly in the more recent data. This is most prominent for *An. atroparvus* and *An. messeae*. The anomaly of this is emphasised by the contrast with the widespread distribution of *An. maculipennis*, which by necessity must be either *atroparvus* or *messeae* (the other members of the complex never having been recorded in Britain). The reason for this is common to all distribution schemes. When the number of collectors of specimens is small, distribution records demonstrate the locality of the entomologists almost as much as that of the species studied. In this specific case, the principle collectors with sufficient expertise to distinguish the members of the *maculipennis* complex live in the south east of England.

Fig. 7 depicts the collected distribution records for all British mosquitoes (including the Culicines). Clearly there is plenty of work ahead in mapping the "barren areas", and the authors will be grateful for all records received for any British mosquito. It is of interest to note that on a provincial basis, both Wright (1923) and Walton (1927) described *An. maculipennis* as being abundant in North Wales. After 3 years of

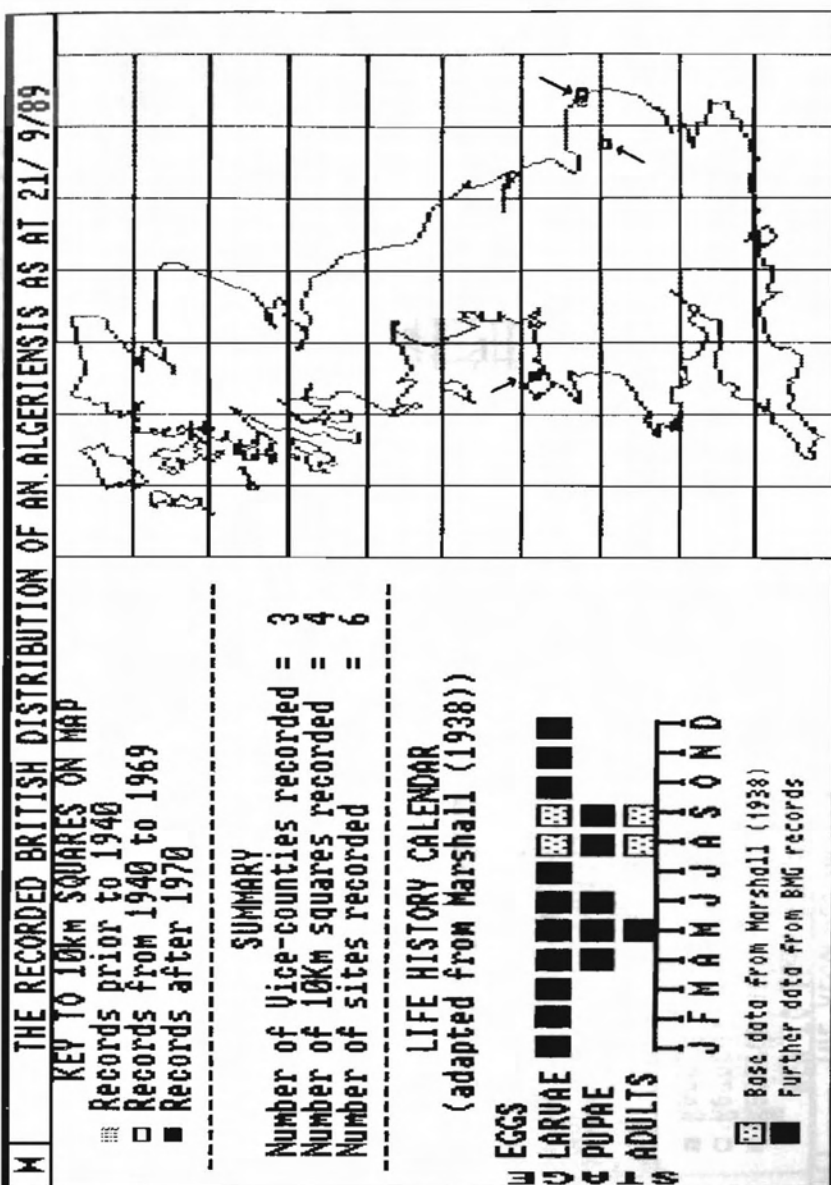


Fig. 1. Map and summary information of records held by the British Mosquito Group for *An. algeriensis*. Most recent records take precedence on map, whereas Marshall's data receives priority in the life history calendar.

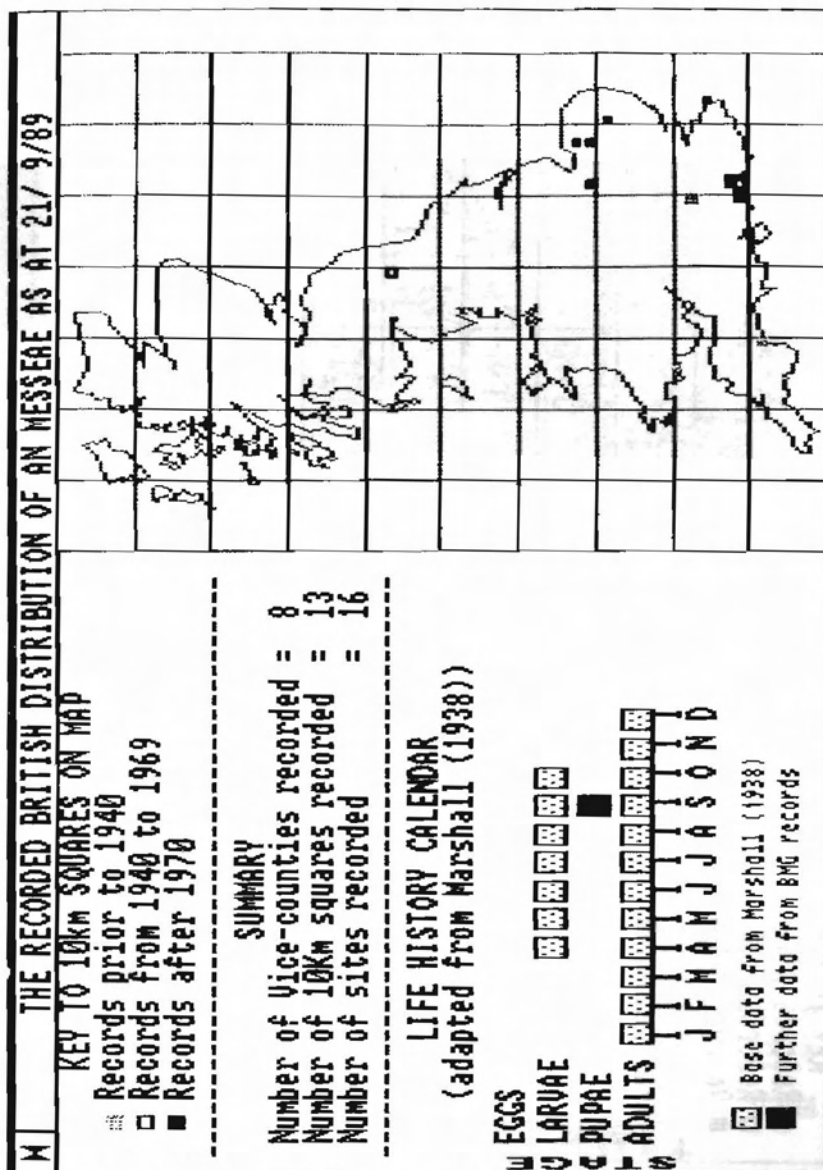


Fig. 3. Map and summary information of records held by the British Mosquito Group for *An. messeae*. Most recent records take precedence on map, whereas Marshall's data receives priority in the life history calendar.

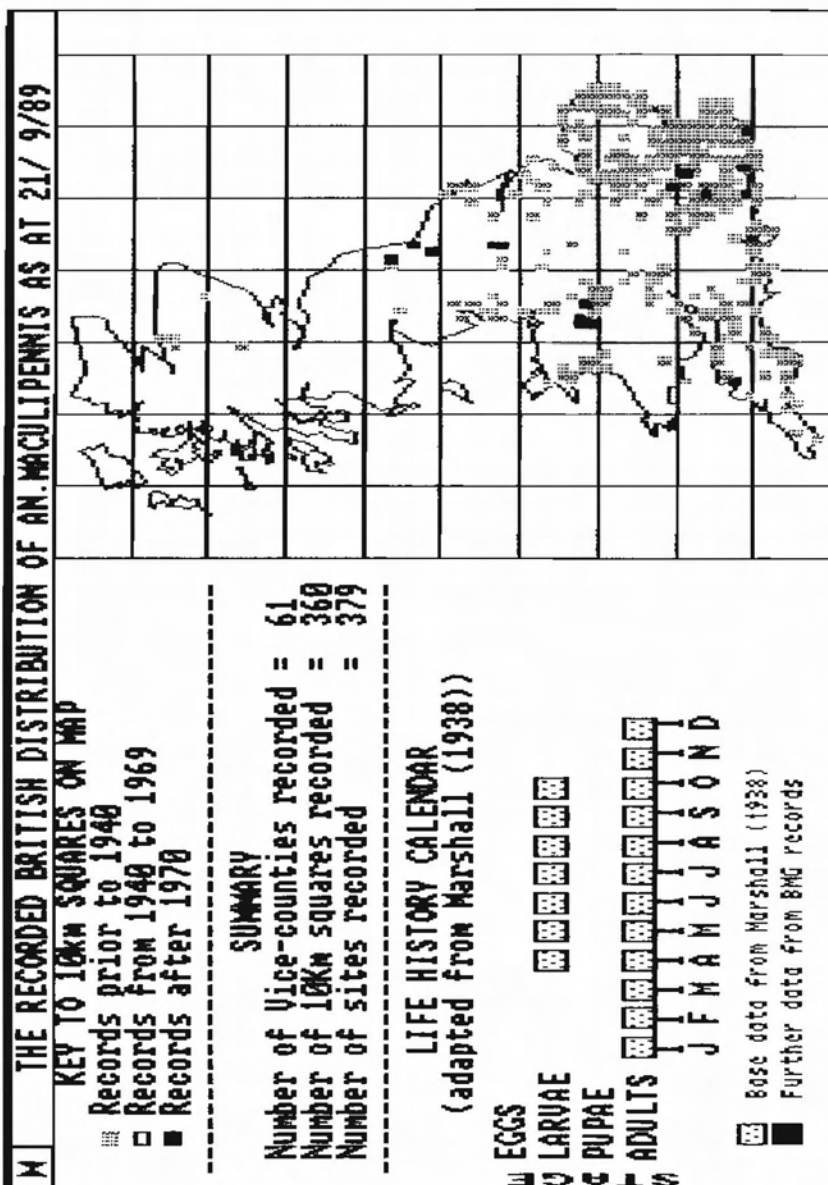


Fig. 4. Map and summary information of records held by the British Mosquito Group for *An. maculipennis* s.l.. Most recent records take precedence on map, whereas Marshall's data receives priority in the life history calendar.

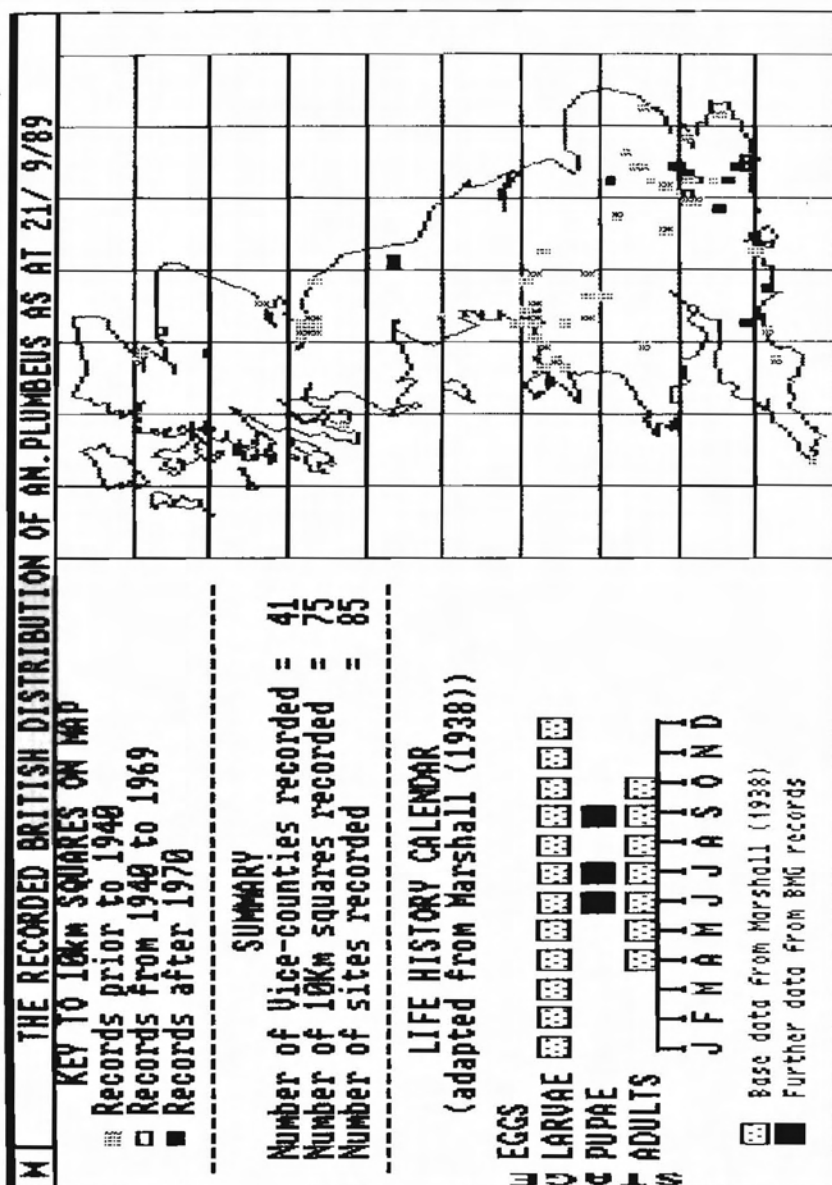


Fig. 6. Map and summary information of records held by the British Mosquito Group for *An. plumbeus*. Most recent records take precedence on map, whereas Marshall's data receives priority in the life history calendar.

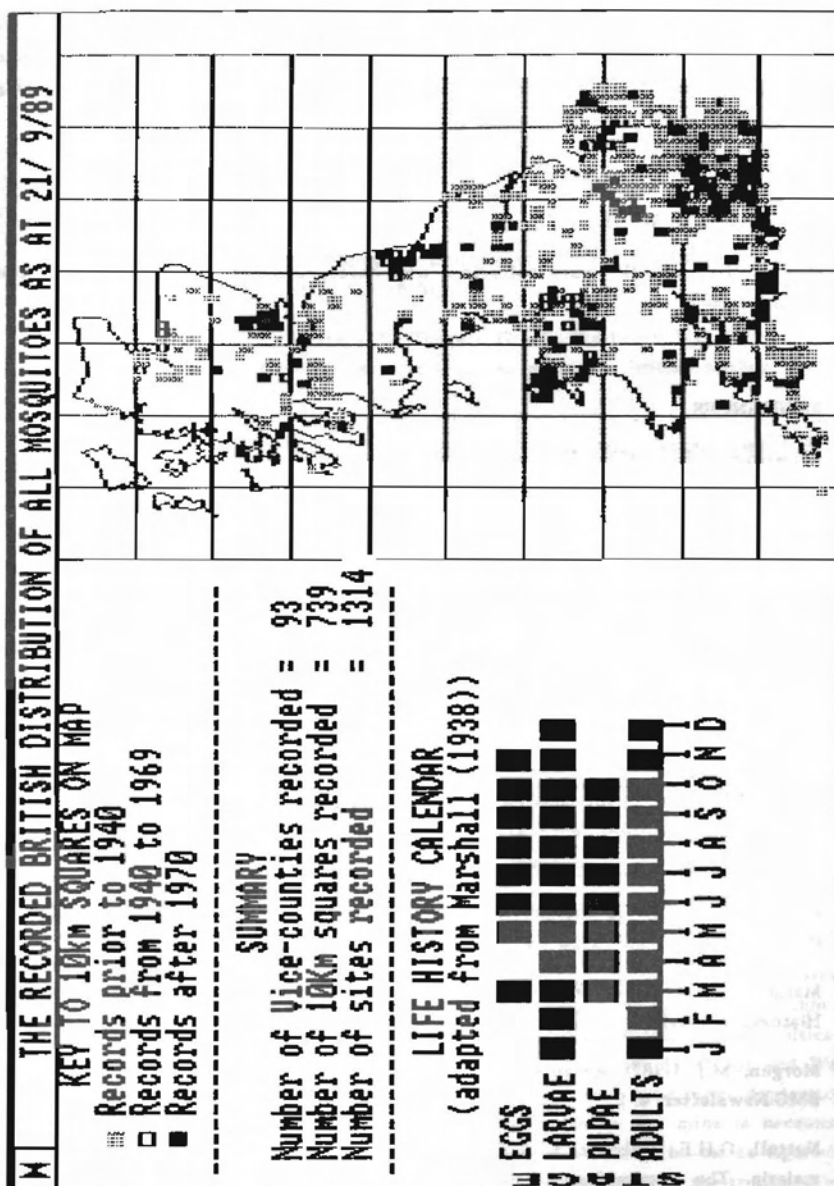


Fig. 7. Map and summary information of records held by the British Mosquito Group for all mosquito species. Most recent records take precedence on map.

intensive and extensive searching throughout North Wales by Rees and Rees (unpublished data 1986-89) not one specimen of this "common" species has been found in the vice-counties of Caernarfonshire and Anglesey. The need for continual surveying to monitor distribution changes with the passage of time cannot be overstated.

ACKNOWLEDGEMENTS

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

REFERENCES

- Ashworth, J.H. (1927). The distribution of anopheline mosquitoes in Scotland. **Proceedings of the Royal Society of Edinburgh**, 47: 81-93.
- 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. 152 pages.
- Edwards, F.W. (1932). *Anopheles algeriensis* Theobald (Diptera, Culicidae) in Norfolk. **Journal of the Entomological Society of the South of England**, 1: 25-27.
- Hart, G.F.W. (1954). Rediscovery of *Anopheles algeriensis* Theob. (Dipt.: Culicidae) in Norfolk. **Entomologist's Monthly Magazine**, 90: 63.
- Lang, W.D. (1918). **A map showing the known distribution in England and Wales of the anopheline mosquitoes, with explanatory text and notes**. London. British Museum (Natural History). 63 pages + map.
- Lang, W.D. (1920). **A Handbook of British Mosquitoes**. London. British Museum (Natural History). 125 pages + 4 plates.
- Marshall, J.F. (1938). **The British Mosquitoes**. London. British Museum (Natural History). xi + 341 pages + 20 plates.
- Morgan, M.J. (1987). Re-appearance of *Anopheles algeriensis* Theobald in Britain. **BMG Newsletter**, 4: 1.
- Nuttall, G.H.F., Cobbett, L. & Strangeways-Pigg, T. (1901). Studies in relation to malaria. The geographical distribution of *Anopheles* in relation to the former distribution of ague in England. **Journal of Hygiene**, 1: 4-77.

Rees, A.T. & Rees, A.E. (1989). *Anopheles algeriensis* on Anglesey: the story so far. **BMG Newsletter**, 6: 1-5.

Shute, P.G. (1949). A review of indigenous malaria in Great Britain after the War of 1939-1945, compared with the corresponding period after the 1914-1918 War. (With some observations of the aetiology). **Monthly Bulletin of the Ministry of Health**, 8: 2-9.

Shute, P.G. (1954). Indigenous *P. vivax* malaria in London believed to have been transmitted by *An. plumbeus*. **Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service**, 13: 48-51.

Whitfield, D.; Curtis, C.F.; White, G.B.; Targett, G.A.T.; Warhurst, D.C. & Bradley, D.J. (1984). Two cases of falciparum malaria acquired in Britain. **British Medical Journal**, 289: 1607-1609.

White, G.B. (1985). Airport malaria and jumbo vector control. **Parasitology Today**, 1: 177-179.

Van Theil, P.H. (1927). Sur l'origine des variations de taille de l'*A. maculipennis* dans les Pays-Bas. **Bulletin de la Société Pathologie Exotique**, 20: 366-390.

Walton, C.L. (1927). **Agricultural Zoology in North Wales**. Bangor.

Wright, W.R. (1923). A preliminary account of the results of surveys for breeding-places of mosquitoes in North Wales. **Annals of Tropical Medicine & Parasitology**, 17: 539-547.

A further note on *Phytomyza scolopendri* R.-D. (Agromyzidae).

John Robbins

The miner *Phytomyza scolopendri* Robineau-Desviody, recorded recently from Scotland by Bland (Dipt. Digest. 2: 44), is actually quite a common species in suitable parts of the country, i.e. those western and northern parts where ferns grow well. Within the last few years I have received specimens or records from several new localities in: Exmoor (V-C 5), the Cotswolds (V-C 7), the West Midlands (V-C 38) and Wales (V-C 48). The species is not restricted to *Phyllitis*, but will mine other Aspleniaceae (*Asplenium*, *Ceterach*) and also *Polypodium*. In *Asplenium* the mine is necessarily convoluted, and indeed a whole leaflet may be mined out; but the mines figured by Bland are not typical of those in *Phyllitis*, where it is more usual for the tracks to have fairly long straight stretches. Even more misleading is the delineation of the frass track in the figure. The frass of *P. scolopendri* is very black and it is deposited in a very fine (narrow) line. This line lies close to the sides of the mine, whereas the figure shews it generally in the centre: such central frass lines are characteristic of various Coleoptera and Lepidoptera, but not of Diptera, nearly all of whose larvae lie on their sides when mining.

E.G. Hancock

Introduction

The crane fly *Dicranota robusta* Lundstroem has been infrequently recorded in the British Isles since its discovery here (Edwards 1939). Such observations as available indicate a preference for upland streams at altitudes between 350-2500 ft (109-762m.) (Edwards 1939, Brindle 1958, Kidd and Brindle 1959, Coulson 1959, Payne 1968, Hancock 1987). The larvae, in common with other members of the same genus, are aquatic and carnivorous. Unlike *Dicranota bimaculata* (Schumm.) and *D. guerini* Zett. which have been described in detail (Elliott 1983, Fahy 1972) the life cycle has not been studied. Brindle (1962) collected larvae and was able to confirm their physical similarity to other members of the same genus and later illustrated them and described them as "very active" carnivores (Brindle 1967). The pupae are described as usually occurring within lightly constructed silken tubes.

Distribution

In the British Isles *D. robusta* is known from South Wales, the Pennines, from Derbyshire through to Westmoreland and from southwest Scotland and Inverness. This last record is based on three females in the British Museum (Natural History) from Loch Avon at an altitude of 2,500 ft (762m) collected in early July, 1951. I was unaware of the existence of these specimens when I announced this species as new to Scotland (Hancock 1987). The particular interest in these specimens is their late capture date reflecting the latitude and altitude of the locality. In all the other recorded instances dates of collection are from mid-April to mid-May. Abroad I can find no further recorded instances than those given by Edwards (1939) as Finland and Latvia. It is likely that this species is more widespread than is currently understood (though this can be said of almost any insect) but it is worth mentioning that two more southern studies in Europe have not listed *robusta* that might have been expected to have found it (Brunhes and Dufour 1984, Mendl 1973). This may be an indication that it is a northern palaearctic species. However, its habits, as described below, tend to preclude casual observation.

Behaviour

Most accounts of the finding of *robusta* as adults refers to their habit of resting under small stones or rocks at the shingly margins of streams and rivers. This has led to an element of serendipity in their discovery. The first time I found them was when looking for insects of other orders and an extreme Coulson's record (1959) was as the result of falling down a stream bed (in litt.). He then was able to see them walking about on the rocks during warm weather. I have also seen them moving in the open, usually on the sides of boulders but in inclement conditions they will only be found if the stones are turned over.

In several reports it has been claimed that *robusta* is either able or unable to fly (cf. Brindle 1958, Coulson 1959). I believe that ambient temperature affects the use of its wings and that up to a point it depends on how one defines flying. A few simple experiments have been conducted during warm sunny weather to test the animal's behaviour. On taking a small stone, on which an adult was at rest, to the centre of a small pool and gently lowering it below the surface, the fly gradually moved to the diminishing dry area until it was forced to abandon it. On doing so it skittered across the surface a distance of a few metres to dry land. Raising another off the ground and letting it go resulted in it "flying" at an angle of about 45 degrees back to the surface. Trying to persuade the flies to take off by poking or otherwise annoying them only induces rapid walking movements in the opposite direction. In this respect they are also distinctly negatively phototactic. If a stone is rotated to face the sun the flies will run around into the

shade. Their movement is distinctly reminiscent of arachnids, especially an opiloid such as *Nemastoma bimaculata*, principally because of the dark colouring, short indistinguishable wings and rapid motion.

Pairs have been found *in copula* under stones and so the ability to fly may not be utilised in finding mates so much as escaping from unfavourable situations. The general conclusion is that the flies remain close to their emergence site for the purposes of mating and egg-laying and would be reluctant colonisers of new river systems.

External Morphology

D. robusta is principally characterised within the genus by the reduced segmentation of the flagellum of the antenna as well as shortened wings. Both these are physical expressions of its behaviour. Sensory requirements are reduced in a situation where mates and oviposition sites are close at hand. The total number of antennal segments is normally eleven (it is sixteen in other British pediciine craneflies). In a sample of five females all had eleven; of eight males, five had eleven, one had ten, one nine. The remaining male had the basal flagellomere partially divided giving an apparent total of 10.5 antennal segments. This gives an indication that the process of reduction probably takes place by loss or fusion from the base of the flagellum rather than the tip.

The wings are at a ratio of 1.23 to the body length in a sample of twenty males and 1.06 in eight females (which are on average longer because of the ovipositor) so there is no significant difference between the sexes in this respect. Of those species examined by Brunhes and Dufour (1984), nine of the thirteen had lost the ability to fly only in the females. They comment that the selective pressures against flying in both sexes have to be stronger and cite temperature and wind as the identifiable factors.

Summary

There are some general conclusions possible from these behavioural and physical observations. *Dicranota robusta* appears to be a species in flux that with time might lead to a total loss of flight and atrophy of the thorax. It is adapting to an ecological niche which tends to extremes of exposure. In doing this it is avoiding competition with other species in the same genus with similar habits.

References

- | | | |
|-----------------------------|------|---|
| Brindle, A. | 1958 | New Diptera records for Lancashire, Yorkshire and Westmorland. <i>Ent. Record</i> , 70: 211-3. |
| Brindle, A. | 1962 | The natural groups of the British Pediciini (Diptera; Tipulidae). <i>Ent. mon. mag.</i> 98: 234-7. |
| Brindle, A. | 1967 | The larvae and pupae of the British Cylindrotominae and Limoniinae (Diptera; Tipulidae). <i>Trans. Soc. Brit. Ent.</i> 17: 151-216. |
| Brunhes, J.
& Dufour, C. | 1984 | Les différentes étapes de la perte de l'aptitude au vol chez les Tipulidés et les Limonidés vivant sous climat froid. <i>Bull. Ecol.</i> 15: 185-198. |
| Coulson, J.C. | 1959 | Observations on the Tipulidae (Diptera) of the Moor House Nature Reserve, |

- Westmorland. *Trans. roy. ent. soc., London* 111: 157-74.
- Edwards, F.W. 1939 Additions to list of British crane flies. *Ent. mon. mag.* 75: 241-9.
- Elliott, J.M. 1983 Life cycle and growth of *Dicranota bimaculata* (Schumm.) (Diptera; Tipulidae). *Ent. Gazette*, 34: 291-6.
- Fahy, E. 1972 The larvae and life history of *Dicranota guerini* Zett. (Diptera; Tipulidae). *Entomologist*, 105: 260-3.
- Hancock, E.G. 1987 Two species of crane fly new to Scotland. *Glasgow Naturalist*, 21: 223.
- Kidd, L.N. 1959 The Diptera of Lancashire and Cheshire. *Lancs & Cheshire Fauna Committee* 33: 1-136.
- & Brindle, A.
- Mendl, H. 1973 Limoniinen aus dem Breitenbach (Diptera; Tipulidae). *Arch. Hydrobiol.* 71:255-270.
- Payne, R.M. 1968 Two crane flies new to Wales. *Entomologist*, 101: 138.

E.G. Hancock, Glasgow Museum and Art Gallery, Kelvingrove, Glasgow G3 8AG.

PSYCHODA SURCOUFI IN GLASGOW, 1990

The first of the numerous exhibitions to contribute to the cultural life of the city during 1990 was a modern sculpture display. It included an untitled installation featuring twelve old filing cabinets each bottom drawer of which contained a small roll of old carpet partially immersed in stagnant water. Whatever the visitors thought of this, a species of sewage fly had found it a haven and was emerging in numbers. A combination of smell and unwelcome interaction between flies and people meant that sterilization of the "sculpture" had to take place. Prior to this, I was asked to examine the phenomenon and the insect proved to be *Psychoda surcoufi*, as ultimately identified by Phil Withers. This species has been seen rarely in the British Isles, previous records being from the Isle of Wight, Surrey and Yorkshire. The circumstances of an indoor situation and its thriving in January may be due to the infestation taking place at the point of creation, this particular work of art originating from rubbish collected out of doors further south.

E. Geoffrey Hancock

**EUPEODES LUNDBECKI (SOOT-RYEN) (DIPTERA: SYRPHIDAE) NEW TO
BRITAIN AND ITS SEPARATION FROM RELATED SPECIES**

K.R. Watt and D.M. Robertson

Eupeodes lundbecki (Soot-Ryen) is a widespread species in northern countries of continental Europe (Peck, 1988). It is not, however, previously recorded from Britain. In this paper we give records of the species from Scotland, review the characters used to distinguish *E. lundbecki* from similar species and suggest amendments to the most recent key to *Eupeodes* (= *Metasyrphus*) species (Stubbs and Falk, 1983).

A male *E. lundbecki* was taken at Grandhome Moss, Aberdeen (NJ 908123) on 4.viii.1976 by S.M. Swift. This specimen came to light during examination of material from Swift's collection now held at Aberdeen University (K.R.W.). Further specimens, a male and a female, were located in the collections of the National Museums of Scotland; these specimens were collected by the late Sir Arthur B. Duncan. The female was taken on Fair Isle (HZ 27) on 11.viii.1982 and the male at Tynron, nr Dumfries, Dumfriesshire (NX 8093) on 10.viii.1984.

In order to compare *E. lundbecki* with other similar species, six further specimens of *E. lundbecki*, all from the collections of the Natural History Museum, London, were examined: two males and two females from Finland, and a male and female from Sweden. The Finnish specimens were dated from 2-11.viii.1979, and the Swedish specimens 14-17.vii.1980. A note on one of the Finnish specimens and an unidentified *Eupeodes* is included at the end of this paper.

Most authors refer to the similarity of *E. lundbecki* to *Scaeva* (*pyrastris* (L.) or *selenitica* (Mg.) where species are named). In general appearance however *E. lundbecki* is more like a large specimen of the common and widespread *Eupeodes luniger* (Mg.). It is in any case readily distinguished from *Scaeva* by having bare eyes; the eyes of *Scaeva* are distinctly hairy. Differences between *E. lundbecki* and *E. luniger* are rather less obvious. Males of the two species are more readily separated than females. Dušek and Láska (1973) have drawn attention to the variability of the characters of *E. luniger* used in identification, but have nonetheless recognised its usefulness as a standard species against which to compare other *Eupeodes*. The following appear to be the most reliable characters separating *E. lundbecki* and *E. luniger*:-

E. lundbecki males

Frons inflated (though not as pronounced as in *Scaeva*); dark hairs in posterior half or more, dense (view from side)

Eye angle at frons wide about 120 degrees

E. luniger males

Frons not inflated; long dark hairs covering more than posterior half, not dense.

Eye angle at frons much less wide, 90 degrees at most.

Clear transition from enlarged to smaller eye facets about midway between the levels of the antennae and the knob of the face.

Gradual transition from enlarged to smaller facets making enlarged facets less obvious.

Wing membrane extensively bare of microtrichia (general pattern as in Fig. 1).

Wing with more extensive coverage of microtrichia (general pattern as in Fig. 2)

E. lundbecki females

E. luniger females

Frons somewhat inflated; no extension from black area in posterior third, or with short extension not clearly defined (but see note below on two problem specimens).

Frons not inflated; usually with Y shaped extension from black area in posterior third.

Wing membrane extensively bare of microtrichia (general pattern as in male but with tendency to be further reduced).

Wing with more complete coverage of microtrichia (general pattern as in male but with tendency to be reduced).

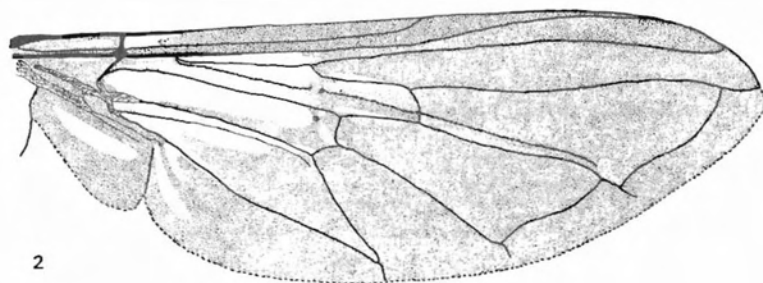
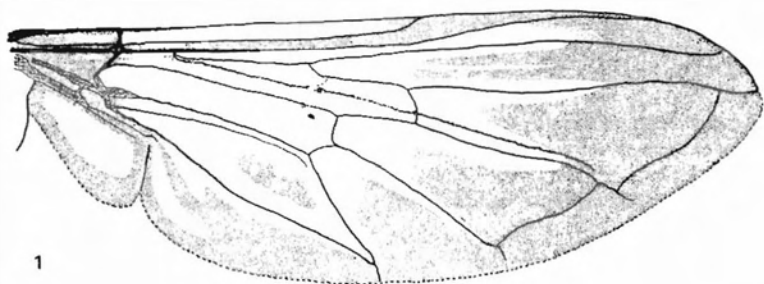


Fig. 1. *Eupeodes lundbecki*, wing, stippled area showing general pattern of microtrichia.

Fig. 2. *Eupeodes luniger*, wing, stippled area showing general pattern of microtrichia.

In their key to *Eupeodes*, Stubbs and Falk (1983) separate males of *E. luniger* and *E. latilunulatus*/*E. lundbecki* on the eye angle of the frons; thereafter *E. latilunulatus* and *E. lundbecki* are separated on wing length and whether or not the frons is inflated. In the first of these couplets the eye angle of *E. luniger* is given as "about 70 degrees". This figure seems too low: Dušek and Láška give the normal range of this angle as 77-86 degrees, but it can reach 90 degrees. The effect of increasing the eye angle for *E. luniger* in the couplet would be to make it extremely difficult to distinguish *E. luniger* from *E. latilunulatus*. On the other hand there is a sufficiently large difference between the eye angles of *E. luniger* and *E. lundbecki* to make this a useful comparative character for these two species. Also the extent to which the wing membrane is covered with microtrichia seems a more reliable character than wing length. The following couplets are therefore suggested as replacements for the existing ones:-

5 Alula completely covered in microtrichia; mouth margin normally continuously dark male *latilunulatus*

- Alula with an area in the middle at the base bare of microtrichia; mouth margin not continuously dark 6

6 Frons with angle between eyes about 120 degrees; wing extensively bare of microtrichia (general pattern as in Fig. 1) male *lundbecki*

- Frons with angle between eyes at most 90 degrees; wing with more complete coverage of microtrichia (general pattern as in Fig. 2) male *luniger*

Females of *E. luniger* and *E. lundbecki* are separated in Stubbs and Falk (1983) on (a) whether the hind femora are entirely yellow or have the basal half black and (b) whether the spots on tergite 2 are fully half the length of the tergite or about a third the length of the tergite. Neither character seems entirely satisfactory as a means of distinguishing between the two species. Dušek and Láška (1973) say that in *E. luniger* the basal 1/5-1/2 of the hind femora can be dark (as well as completely or almost pale) and our experience confirms that it is not unusual for *E. luniger* to have hind femora which are black in the basal half. Coupled with that, the Swedish specimen of *E. lundbecki* examined is incompletely dark in only the basal quarter of the hind femora. Regarding the spots on tergite 2, it is not unusual to come across specimens of *E. luniger* with the spots occupying less than half the length of the tergite; indeed, in dark specimens, the spots may occupy less than a third the length of the tergite. The extent to which the wing membrane is covered with microtrichia and the degree of inflation of the frons seem to be more reliable characters and accordingly we suggest the following couplets to replace the existing ones:-

5 Tergites 3 and 4 with lunulate spots reaching lateral margin; black area on frons without a forward extension (or sometimes with a short bilobed extension) female *corollae*

- Tergites 3 and 4 with lunulate spots not reaching lateral margin 6

6 Wing extensively bare of microtrichia (general pattern as in male, Fig. 1, but with tendency to be further reduced); frons somewhat inflated
.... female *lundbecki*

- Wing with more complete coverage of microtrichia (general pattern as in male, Fig. 2, but with tendency to be reduced); frons not inflated female *luniger*

The three currently known British specimens of *E. lundbecki* were caught over a wide area: from Shetland in the north to Dumfriesshire in the south with Aberdeen almost midway between the two. This might suggest that it is a migrant species. The precise site is known in only one case: this is Grandhome Moss, an area of fenland bordered by birch woodland and heath, about one mile from the northern outskirts of Aberdeen; it is close to the famous Scotston Moor, which G.H. Verrall visited in July 1873 (Verrall, 1873-74). *E. lundbecki* was taken from an area of heath with rowan on the edge of Grandhome Moss. The fact that all three specimens were initially misidentified suggests that further specimens may exist elsewhere in collections. *Eupeodes* particularly *luniger*, are well worth checking, and *Scaeva* should not be overlooked.

Note on two problem specimens

Two female specimens which key to *E. lundbecki*, are not typical morphologically. One is a Finnish specimen from the Natural History Museum. The other was taken at Loch Lubnaig Marshes NNR (NN 5515) on 19.vi.1985 (D.M.R.). Both specimens have the frons somewhat inflated, and extensive absence of microtrichia on the wing membrane, the general pattern of microtrichia being as in typical *E. lundbecki*. They are smaller, particularly the Finnish specimen (Finnish specimen: body - 9mm, wing - 7mm; Loch Lubnaig specimen: body - 10.5mm, wing - 8.5mm; typical *E. lundbecki*: body - 12mm, wing - 10mm). The spots are a whitish yellow rather than the orangey yellow of *E. lundbecki* - it should be noted, however, that the Finnish specimen appears to be teneral. The spots on tergites 3 and 4 of both specimens are narrower, occupying a quarter the length of both tergites, compared with a third of tergite 3 and between a third and a quarter of tergite 4 in typical *E. lundbecki*. In addition, the Loch Lubnaig specimen has narrower spots on tergite 2 (under a third the length of the tergite) than either the Finnish specimen or typical *E. lundbecki* (over a third). The spots on tergite 2 of both atypical specimens are well separated from the margin, whereas in typical *E. lundbecki* they reach the margin. The character which perhaps most strongly suggests that they may not be *E. lundbecki* is that both have a distinct bilobed extension from the black area in the posterior portion of the frons; typical *E. lundbecki* do not have this extension: Lundbeck (1916) describes the "prolongation" as "short and often vague or almost wanting". Doubtless the characters of *E. lundbecki* are subject to variation and until more is known about the extent of such variation, the status of these specimens remains in doubt.

Acknowledgements

We wish to thank Alan Stubbs and Steven Falk for confirming the identification of *E. lundbecki*. We are also grateful to Dr Mark Young for helpful comments on a first draft of this paper. Particular thanks are due to Dr Graham Rotheray for his practical help, encouragement and advice, and for arranging a loan of specimens from the Natural History Museum, London, administered by Nigel Wyatt.

References

- Dušek, J. & Láska, P. (1916) *Descriptions of five new European species of the genus Metasyrphus* (Diptera, Syrphidae), with notes on variation within the species. *Acta ent. bohemoslov* 70: 415-426.
- Lundbeck, W. (1916) *Diptera Danica. Part V* Lonchopteridae, Syrphidae. Copenhagen.
- Peck, L.V. (1988) *Syrphidae*. pp 11-230 in Soos, A. & Papp, L. Eds., *Catalogue of Palaearctic Diptera, & Syrphidae - Conopidae*. Elsevier, Amsterdam.
- Stubbs, A.E. & Falk, S. (1983) *British Hoverflies*. British Entomological and Natural History Society, London.
- Verrall, G.H. (1873-74) *Diptera at Braemar, Aberdeen, and Aberlady, including six species not hitherto recorded as British*. *Scot. Nat.* 2: 199-202.
- K.R. Watt, 64 Hilton Drive, Aberdeen, AB2 2NP.
D.M. Robertson, 3 Claremont Park, Leith, Edinburgh, EH6 7PH.

EGGS AND EGGS-LAYING : SOME DETAILS ABOUT HOVERFLIES

Jon Heal

Some aspects of insect behaviour are fairly easy to observe; only time and patience are required. Some other aspects are more elusive. Although I have spent much time in making field observations of hoverfly behaviour, the few opportunities to watch egg-laying have arisen more or less by chance.

On 22 July 1987 I saw a curious, but easily understood, piece of oviposition behaviour while watching some female *Eristalis intricarius*. This syrphid is a hairy species with a good mimetic resemblance to bumblebees. The observations were made at Apedale in north Staffordshire. Apedale is an area of several hundred acres near to Newcastle-under-Lyme, and it used to contain various interesting habitats worthy of conservation. I was making surveys of some sites prior to destruction of the whole area by opencast mining. This area is now within the High Lane site currently being worked by the Opencast Executive of British Coal.

The particular spot visited by *Eristalis intricarius* was in rough pasture grazed by a few cows, and there were several water-filled depressions; these depressions had been dug by local people digging for coal in the 1920s. One pool contained a large amount of cattle dung, so it provided an ideal medium for *Eristalis* larvae. All *Eristalis* larvae are rat-tailed maggots that feed in various kinds of rotting organic matter, usually in a fairly liquid state.

Three *E. intricarius* were present there on a sunny July afternoon, and they were clearly searching for places in the manure pool in which to lay eggs. They seemed to need a crevice under some mud just above the water level. On one occasion a female was laying eggs in one crevice when a second female landed alongside and started to use the same crevice for placing her own eggs. Obviously stealing an oviposition site saves time and energy, when a single hoverfly might spend many minutes on its own in the search for a suitable place. This was the first occasion on which I had seen something that could only be interpreted as one hoverfly copying from another one.

In passing, it is worth pointing out that a few accidents of history had provided a breeding site for this interesting species. The massive destruction of habitats caused by opencast mining will cause a loss of breeding space for this and many other animal and plant species, and the habitats will not be recreated overnight when mining has been completed.

Oviposition by another species of *Eristalis*, *E. pertinax*, was seen on 3 June 1987 in Kingswood, an old piece of woodland within the Trentham estate, Stoke-on-Trent. (This is, by coincidence, also owned by British Coal, and also has an uncertain future). About 3 female *E. pertinax* were flying around an area of deep mud by a stream. The vegetation was mainly creeping buttercup (*Ranunculus repens*) and the mud must have contained a lot of decomposing plant material. One female chose a crevice under a blob of mud and within 10 minutes laid just over 100 eggs. Some of these eggs were collected but, curiously, most of them turned out to be infertile. In laboratory cages I have also noticed that many batches of eggs laid by *E. pertinax* did not hatch. This occurred less frequently with other *Eristalis* species, and was then often due to insufficient pollen in the diet. It would be interesting to find out if *E. pertinax* does, in fact, take in less pollen in its diet than other related species - but, in that case, why should it lay eggs that are destined to be unsuccessful?

Eristalis pertinax also has larger eggs than the other species I have reared. The ones collected at Trentham were about 1.6mm in length. *E. tenax* eggs are very uniform in size, at 1.3mm. The eggs of *E. arbustorum* are slightly smaller, and those of *E. intricarius* usually slightly larger than this; they also vary in length more than *E. tenax*.

In mixed laboratory cages the method of oviposition can be used to distinguish batches of eggs from different species. *E. intricarius* usually glues its eggs by one end on to a horizontal surface. *E. tenax* prefers to use a vertical surface, with the eggs attached by their sides in neatly placed rows. Interestingly, the rows are not produced one after the other. By watching females in laboratory cages it was seen that after the first few eggs were placed in position, any further eggs were then placed alongside one of the eggs already there, but not in any regular order. A regular pattern was built up slowly by this method. In contrast, both *E. arbustorum* and *E. pertinax* tend to leave loose clumps, but the eggs of *E. pertinax* are identified by their larger size.

Obviously, in all of these species a position close to some decomposing organic material is usually chosen. For rearing purposes it does not seem to be crucial whether the food is of plant or animal origin, but I believe that *E. tenax* and *E. intricarius* would normally select liquid manure, while *E. pertinax* is more likely to choose muddy ditches. The breeding site of the closely related hoverfly, *Myathropa florea*, is tree rot-holes, often in beech trees, and the larvae can be found there feeding on the debris of rotting leaves during the winter. In all these species the batches of eggs produced generally contain over 50, and may exceed 200 eggs. Hatching time from oviposition is about 2 days, though this is influenced by temperature to some extent, and is a bit longer for the larger eggs.

Anybody who attempts to breed these species should note that diapause can interrupt a well-designed breeding programme. In the case of *E. tenax* it is the adult female that hibernates; females caught in autumn will not lay eggs then unless they can be persuaded that spring has already arrived by artificially extending the amount of light they get each day. The other species mentioned in this article overwinter as larvae in diapause. For instance, I collected some eggs of *E. intricarius* from the manure pool at Apedale mentioned at the start. These were removed on 22 July. This brood had produced 25 adults in August, but then the surviving larvae entered a winter diapause and did not pupate until the following April. A further 55 adults emerged then. Previous studies have suggested that it is the experience of the parent female that determines whether her offspring enter diapause, or develop directly. Long days produce another generation of adults at once, but the short days of autumn tend to make some of the larvae wait before they pupate. Obviously in an uncertain environment it pays to spread the risks and have offspring emerging at different times. At this particular site in Staffordshire the early ones would have made the correct choice, because the Apedale area had been bulldozed away for an opencast mine by the following summer.

Jon Heal, 24 Russell St, Wolstanton, Newcastle-under-Lyme, Staffs.

THE PUPARIA OF *XANTHOGRAMMA FESTIVUM* AND *XANTHOGRAMMA PEDISSEQUUM* (SYRPHIDAE)

Martin C.D. Speight

General characteristics of the puparia of *Xanthogramma* species are well shown by the figure of the puparium of *X. flavipes* Loew given by Heiss (1938). Heiss also figures the posterior spiracular process (prp) of *X. flavipes*. In the present note the prp of *X. festivum* (L.) (Fig. 1A) is shown, which does not seem to have been figured previously, together with that of *X. pedissequum* (Fig. 1B), as illustrated by Rotheray and Gilbert (1989). The puparium of *X. festivum* is a unicolorous sandy brown, rather like the puparia of *Doros* species.

The known puparia of *Doros* (see Speight, 1988) and *Xanthogramma* species lack:

- 1) a median, dorso-ventral groove or channel on the prp, separating the two spiracular plates,
- 2) dorsal spurs (sensu Rotheray and Gilbert, l.c.) on the prp.

Together, these features distinguish the puparia of these two genera from the puparia of other European genera of Syrphinae.

In both European *Doros* species (Speight, l.c.) the spiracular slits are virtually straight, while in the three *Xanthogramma* species whose puparia are known they are serpentine, thus providing a basis for separating the developmental stages of these two genera. A second useful feature is that in *Doros* the conical projections between the spiracular slits on the prp each carry a rosette of long hairs. These hairs are absent in *Xanthogramma*. Based on Heiss's figure of *X. flavipes* I suggested previously (Speight, l.c.) that in *Xanthogramma* there is a mediodorsal indentation in the surface of the prp, which also helps to distinguish that genus from *Doros*. However, this indentation is absent from the prp of both *X. festivum* and *X. pedissequum*, so it cannot be regarded as of generic significance in *Xanthogramma*. Most of the 35 features of larval morphology employed by Rotheray and Gilbert (1989), to characterise Syrphine genera, are not interpretable in puparia. However, in all of 16 features which can be used, the puparium of *X. festivum* exhibits the same condition as is recorded for *X. pedissequum* by those authors. This reinforces the utility of these features in characterising *Xanthogramma*. Using their numerical system, these features are numbers 1, 3, 7, 8, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 30, and 34 (for further details see Rotheray and Gilbert, l.c.).

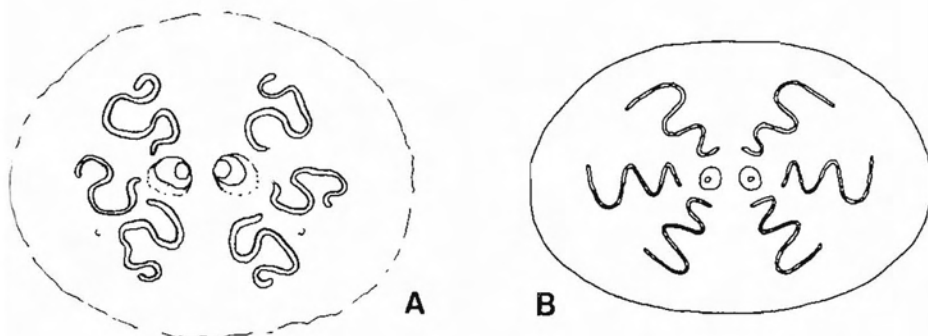


Figure 1: posterior spiracular processes of *Xanthogramma* species, end view, draw to same size;

A) *X. festivum* (orig.),

B) *X. pedissequum* (after Rotheray & Gilbert, 1989).

From the accompanying figures it can be seen that the puparia of the two *Xanthogramma* species occurring in the British Isles may easily be distinguished by means of the form taken by the prp spiracular slits: in *X. pedissequum* the convolutions in the spiracular slits take the form of a chain of zig-zags, with the bends consistently at 30–40 degrees to each other, while in *X. festivum* they form nearly closed loops curving first one way and then the other. These differences in the prp would also distinguish the larvae of these two species from each other.

The figure of *X. festivum* prp is from a puparium carried on the pin of a bred specimen of *X. festivum* in the collections of the Muséum National d'Histoire Naturelle, in Paris. The specimen carries no information about the conditions under which it was found, but has a locality label indicating it was collected as a larva by J. Menier, in April 1967, from Dixmont, Yonne (just S of Paris). Larvae of *X. festivum* have been found in nests of ants of the genus *Lasius*, by Hölldobler (1929). *X. pedissequum* larvae have been found among root aphid "herds" also tended by *Lasius* (Pontin, 1960).

Acknowledgments

I am grateful to Loic Matile (MNHN, Paris) for the loan of the *X. festivum* specimen referred to above.

References

- Heiss, E.M. (1938) A classification of the larvae and puparia of the Syrphidae of Illinois exclusive of aquatic forms.
Illinois Biol Mon. , 16(4): 1–141.
- Hölldobler, K. (1929) Über die Entwicklung der Schwierfleige
Xanthogramma citrofasciatum im Neste von *Lasius alienus* und *niger*.
Zool. Anzeig. , 82: 171–176.
- Pontin, A.J. (1960) Some records of predators and parasites adapted to attack aphids attended as ants. **Entomol. Mon. Mag.** , 95 : 154–155.
- Rotheray, G.E. & Gilbert, F.S. (1989) The phylogeny and systematics of European predacious Syrphidae (Diptera) based on larval and puparial stages.
Zool. J. Linn. Soc. , 95 : 29–70.
- Speight, M.C.D. (1988) *Doros destillatorius*, espèce nouvelle pour la France, avec désignation des types des deux espèces européennes du genre *Doros*, description de leurs pupes et clés de détermination des adultes et des pupes.
Bull. Soc. ent. Fr., 92(5–6) : 193–200.

PROVISIONAL KEYS TO THE OTITIDAE AND PLATYSTOMATIDAE OF THE BRITISH ISLES

David K Clements

The lack of a single key in English covering the so-called 'picture-wing' flies of the families Otitidae and Platystomatidae has been a considerable deterrent to dipterists in studying these families. The key to genera by Speight and Chandler (1983) goes some way in fulfilling this requirement, but is sparsely illustrated and gives little assistance in dealing with the polyspecific genera. With persistence, it is possible to determine British species using Hennig (1939, 1940) and other sources, but it should be said at once that the Otitidae in particular are beset by numerous taxonomic difficulties which have yet to be resolved. Not least amongst these is the unsatisfactory nature of the family definition as used by British workers, which embraces a heterogeneous assemblage of differing fly types. These are not easily characterized, and are imperfectly isolated from closely related families such as the Tephritidae, Pallopteridae, Platystomatidae and Lonchaeidae. Consequently, a number of differing family arrangements have been put forward, some of which are briefly mentioned by Speight and Chandler (*op. cit.*). This paper makes no attempt to add to this debate, dealing solely with the families as listed in Kloet and Hincks (1976), since these are the species groups for which keys are deficient. It should be noted, however, that the current Palaearctic catalogue (Soós and Papp, 1984) treats the subfamily Ulidiinae as a family in its own right.

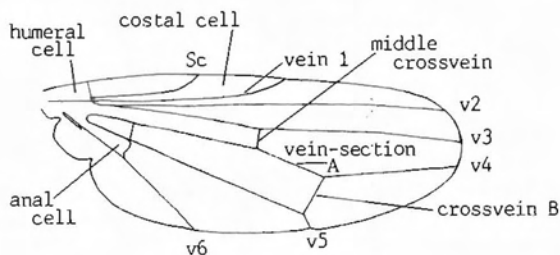
The families considered here can be keyed-out using the family key of Unwin (1981), although the composite nature of the Otitidae is revealed by the fact that the different sub-groups key out in different parts of the key. As presently grouped, the only way to get a feel for the family initially is by trial and error, although most of the genera are highly characteristic, especially in the wing markings, and can be readily recognized on subsequent occasions. Typical recognition characters for the Otitidae are:

- Frons invariably has numerous small hairs across the middle
- Face often has conspicuous grooves or pockets behind the antennae
- Anal cell of wing often has a triangular extension to its lower corner
- Many species have blotched or banded wings
- No vibrissae around mouth, or pre-apical bristles on tibiae
- Post-vertical bristles are parallel or divergent.

Confusion is perhaps most likely with members of the Tephritidae, many of which are superficially similar. Tephritids, however, may be distinguished by the presence of one or more pairs of incurved lower orbital bristles, and by the characteristic sub-costal vein (vein Sc), which runs parallel with vein 1 but then fades apically after a sharp, often right-angled, bend towards the costa.

It should be emphasized that this is a provisional key only, and that it deals uncritically with the species as currently recognized in the British literature. The British fauna is still imperfectly known, and the possibility of additional species, particularly in problematic genera such as *Herina* and *Melieria* should be borne in mind. I hope to deal with these genera in a more critical fashion in a future paper, which will also make reference to some of the potential additions to watch out for.

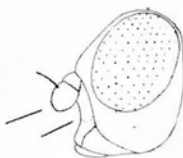
For the purposes of simplification, the wing-veins have been numbered according to the following pattern. Users are referred to Speight and Chandler (*op. cit.*) for a more technical appraisal of wing-vein morphology.



Body length is given in millimetres, and is measured from the base of the antennae to the tip of the abdomen, excluding the ovipositor.

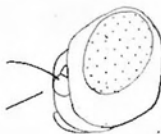
MAIN KEY TO SPECIES

- 1 Wing with no markings of any kind. Body dark in coloration ----- 2
- Wing with markings of some description, even if small or vague.----- 3
Body coloration various.
- 2 Thorax normally dull metallic green above, abdomen glossy black.
Antennae stand out at an angle to the face. Face conspicuously
concave beneath antennae.



Physiphora demandata

- Thorax and abdomen glossy black. Antennae actually recessed into
pockets in the face. Face more nearly flat beneath antennae.



Ulidia erythrophthalma

- 3 Antennae conspicuously elongated, the 2nd antennal segment almost as long as the 3rd. Thoracic dorsum with long stripes and wing with rather vague markings elongated through the spaces between veins.



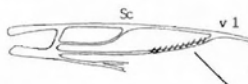
Dorycera graminum

- Not with this combination of characteristics. 2nd antennal segment obviously shorter than the 3rd. ----- 4
- 4 Vein 1 with no hairs or bristles above (observe carefully). Wing with a single dark apical blotch and darkened costal cell. Body glossy black, like a large (c 7mm long) *Sepsis* sp.

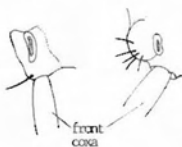


Scioptera vibrans

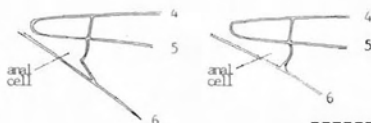
- Vein 1 with small bristles above, at least in outer section and sometimes for whole length - (these may be difficult to see, since they tend to be small and black. Try viewing sideways on). Wing markings various, but frequently more extensive.



- 5 Propleural bristles present: either a single one immediately above the front coxa, or a small group in front of the prothoracic spiracle. Often there is a conspicuous sternopleural bristle.



- No propleural bristles, although there may be a few fine hairs. Never has a conspicuous sternopleural bristle. Wings as shown in couplet 14. ----- (Platystomatidae) ----- 14
- 6 Anal cell entirely without an apical extension of any kind in the lower corner. Vein Sc has small bristles above. ----- 7
- Anal cell has an apical extension, either very obvious, or if not discernable, then wing has a series of dark crossbands. Vein Sc without bristles above.



- 7 Wing has a small, partial crossband extending from costal cell to the middle crossvein.



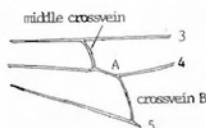
Homalocephala albitarsis

- No crossband in this part of the wing, although the costal cell (and possibly the middle crossvein) may be darkened.



Homalocephala bipunctata

- 8 Vein-section A is obviously shorter than crossvein B. Conspicuous extension to anal cell, and wing pattern as shown.



Myennis octopunctata

- Vein-section A as long or longer than crossvein B. Smaller or no extension to anal cell, and wing pattern otherwise. ----- 9
- 9 Wing with 3 or 4 unbroken crossbands reaching from the costa to at least vein 5 (illustrated at couplet 10). ----- 10
- Wing markings otherwise, any crossbands that may be present being fewer in number and not so extensive. ----- 11
- 10 A large, dark fly, body length usually 6mm or more. 3rd antennal segment pointed at tip. Crossbands of wing not united below vein 5.

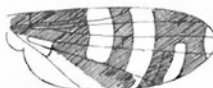


3rd Antennal segment



Ceroxys urticae

- A smaller fly, body length usually less than 5mm. 3rd antennal segment rounded at tip. Crossbands of wing united below vein 5.



Herina frondescentiae

- 11 Thoracic dorsum with short stripes. Wing with rather vague brownish markings, giving a mottled effect.



Otites guttata

- Thoracic dorsum without stripes. Wing markings otherwise. ----- 12

- 12 Frons conspicuously elongated and flattened, and with small, rounded antennae. A pale-coloured species with small, indistinct wing markings. Humeral cell always unmarked.



Tetanops myopinus

- Frons not as above and antennae longer. Body colour usually medium grey to black. Wing markings various and humeral cell sometimes darkened. ----- 13

- 13 Genae beneath eye (from lowest point of eye to lowest point of head) usually no deeper than $\frac{1}{2}$ of the eye's vertical height. Body length 6mm at most, usually less. Wings usually with fewer than 5 blotches, and the humeral cell darkened. Body colour black, tibiae black.



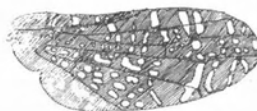
Herina sp
KEY A

- Genae beneath eye usually at least as deep as $\frac{1}{2}$ of the eye's vertical height. Small (4mm long) to large (8mm long) species. Wings usually with 5 or more rounded blotches, but with the humeral cell unmarked. Body colour greyish, tibiae partly or wholly pale.



Melieria sp
KEY B

- 14 Wing as shown. A mottled fly of rather hunched appearance. Body length 5mm or more.



Platystoma seminationis

- Wing as shown. Body glossy black. Body length usually less than 5mm.



Rivellia syngenesiae

Key A – *Herina* species (other than *frondescentiae*)

Herina is the most difficult of the otitid genera represented in the British Isles, and is one of those most in need of revision at a Palaearctic level. The male genitalia offer good features for the recognition of species, segregation of which is easily achieved on this basis. There is, however, a need for re-examination of the Type material in order to stabilize current name usage. There may well be additional species presently unrecognized in the British fauna.

H. frondescentiae is a very distinctive species, and is keyed-out in the Main Key to Species above. Key A therefore deals with the remaining species of the genus, entirely as they are listed in Kloet and Hincks (1976), and should allow the non-critical determination of the majority of specimens encountered. It should be noted, however, that the inclusion of *H. lacustris* (Meigen) on the British list is very probably erroneous, resulting from the misidentification of *Myennis octopunctata* by Verrall and earlier workers (see Blair, 1948).

It is advisable to reflex the surstyli of fresh male specimens, and to extrude the ovipositors of females, since these contain critical identification features. A future paper will provide illustrations of these structures.

Key A

- 1 Wing usually with a continuous crossband traversing from the costal cell to the middle crossvein. Wing markings typically strong and conspicuous. Body length typically around 5.5mm or longer.



----- 2

- Middle crossvein unmarked, or if with a blotch, then this is separated from markings in the costal cell. Wings typically much less strongly marked. Body length typically around 5mm or less.



----- 3

- 2 Apical wing-blotch runs around the tip of the wing. Basal wing-band usually poorly developed. Legs sometimes completely black.



germinationis

- Apical wing-blotch does not run around the tip of the wing, and the basal wing-band is better developed. Legs always with at least the hind tarsi pale.



lugubris

- 3 The remaining four species are difficult to separate consistently, since all of the key characters may vary between the species, and none can be said to be universally reliable. The following couplets are therefore tentative only.

- a Vein-section A no longer than crossvein B. Lower face orange. Third antennal segment about twice as long as deep.
(Probably recorded from the British Isles in error).



lacustris

- Vein-section A obviously longer than crossvein B. Lower face usually shining black. Third antennal segment at least 2.5 to 3 times longer than deep.

- b Frontal stripe blackish. Third antennal segment about 4 times longer than deep. Apical wing-blotch typically runs around the tip of the wing.



paludum

- Frontal stripe more-or-less reddish. Third antennal segment about 2.5 to 3 times longer than deep. Apical wing-blotch typically does not run around the tip of the wing.

- c Third antennal segment usually ends in a point and is about 3 times longer than deep. Body length typically greater than 3.5mm. Maximum wing length usually no more than 2.7 times the maximum depth. Surstyli of ♂ distinctively long and curved when reflexed.



palustris

- Third antennal segment usually rounded at the tip, and is somewhat less than 3 times longer than deep. Body length typically less than 3.5mm, and the wing is more slender, the maximum length being about 2.8 to 3 times the maximum width. Surstyli of ♂ much shorter when reflexed.



oscillans

Key B – Melieria species

Melieria is the other problem genus of the British fauna, although there are only four species currently recognized: there may well be others waiting to be noticed. As with *Herina*, the male genitalia are distinctive and a future paper will illustrate these, but examination of the Type specimens would be a desirable prerequisite in establishing the true identity of the British species.

The key characteristics are variable and can intergrade, so a conventional key does not work smoothly. The four known British species fall fairly neatly into two size classes as indicated in the character table below. Check all of the characteristics listed to find the best fit.

	crassi- pennis	omissa	picta	cana
Body length 6mm or more	*	*		
Body length 5mm or less			*	*
Hind margins of abdominal tergites darkened	*		*	
Abdominal tergites entirely grey		*		*
Basal crossband extends into costal cell	*			
Basal crossband not reaching this cell		*	1	*
Femora broadly darkened	*		*	*
Femora not or only narrowly darkened		*		
Apical wing-blotches separated	*	*		*
Apical wing-blotches united			*	

1 = crossband may just reach into this cell in *picta*

costal cell basal crossband



note: short 3rd Antennal segment, of variable shape

crassipennis



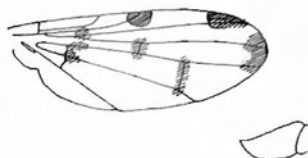
note: Long, sickle-shape 3rd Antennal segment

omissa



note: large, rounded wing-blotches

picta



cana

Acknowledgements

Special thanks are due to Jon Cole for much helpful discussion and criticism, and also to Peter Chandler, Andrew Godfrey and Alan Stubbs, all of whom have contributed to this work in various ways. I'm grateful to the National Museum of Wales, Cardiff, for the loan of specimens, and to Countryside Planning and Management, Quenington, for encouragement and the use of facilities. Finally, my thanks to Sarah Tilly for typographical assistance.

References

In addition to the references cited below, I have also had sight of manuscript keys prepared by Dr Martin Speight, Alan Stubbs and others.

- Blair, K.G. (1948) Some recent additions to the British insect fauna. **Entomologist's mon. Mag.** 84: 51-52 (1 plate).
- Hennig, W. (1939) Otitidae (46. Pterocallidae und 47. Ortalidae). **Fliegen palaearkt. Reg.** 46/47: 78pp.
- Hennig, W. (1940) Ulidiidae. **Fliegen palaearkt. Reg.** 45: 34pp.
- Kloet, G.S. & Hincks, W.D. (1976) A Check List of British Insects. Diptera & Siphonaptera (2nd. Ed.) **Handbks. Ident. Br. Ins.** 11(5): 71-72.
- Soós, A. & Papp, L.(Eds.) (1984) **Catalogue of the Palaearctic Diptera** Vol.9: 44-66.

- Speight, M.C.D. & Chandler, P.J. (1983) Irish Otitidae & Platystomatidae (Diptera) including a key to the genera known in Ireland and/or Great Britain.
Ir. Nat. J. 21: 130-136.
- Unwin, D.M. (1981) A key to the families of British Diptera.
[AIDGAP Series].
Field Studies 5: 513-553.

David Clements, 9 Cecily Hill, Cirencester, Glos, GL7 2EF

Two Species of *Pherbellia* (Dipt: Sciomyzidae) new to Britain

Ivan Perry.

During 1989 I was fortunate enough to find two species of *Pherbellia* previously unrecorded from Britain. Both are very similar to *P. scutellaris* and it seems likely that they have been overlooked in the past for that reason. They can only be separated with certainty by examination of the male genitalia and identification was confirmed by using Rozkosny (1984).

A male *P. rozkosnyi* was swept from damp, shaded woodland on 14 June at Peppercombe on the North Devon coast during the Diptera Recording Scheme Field Meeting. Unfortunately the true identity of the specimen was not realised until my return and the chance to obtain further material was lost.

On 24 June a male *P. sordida* was swept from rough grass and nettles beneath Pines at The Kings Forest, Suffolk. The habitat, on the edge of Breckland, is mainly Pine plantation but with areas of mature deciduous woodland and open grassland.

I wish to thank Dr. I.F.G. McLean for checking my identifications.

References

- Rozkosny, R. 1984. The Sciomyzidae (Diptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* vol. 14.

CONTENTS

The Beginning of Diptera Recording Schemes in Britain - <i>Alan Stubbs</i>	2
Polyandry in <i>Merodon equestris</i> (Fab.) (Syrphidae) - <i>Neville L. Birkett</i>	6
The Distribution of the Genus <i>Anopheles</i> in Britain - <i>Alun T. Rees and Keith R. Snow</i>	7
Notes on the Biology of <i>Dicranota robusta</i> Lundstroem (Diptera; Tipulidae) - <i>E.G. Hancock</i>	20
Psychoda surcoufi in Glasgow, 1990 - <i>E.G. Hancock</i>	22
Eupeodes lundbecki (Soot-Ryen) (Diptera: Syrphidae) New to Britain and its Separation from Related Species - <i>K.R. Watt and D.M. Robertson</i>	23
Eggs and Eggs-laying: Some Details about Hoverflies - <i>J. Heal</i>	27
The Puparia of <i>Xanthogramma festivum</i> and <i>Xanthogramma pedissequum</i> (Syrphidae) - <i>Martin C.D. Speight</i>	29
Provisional Keys to the Otitidae and Platystomatidae of the British Isles - <i>David K. Clements</i>	32
Two Species of Pherbellia (Dipt: Sciomyzidae) new to Britain - <i>Ivan Perry</i>	41

Cover by David Gibbs (*Melieria picta*).
Additional lasersetting by Ros Coard and S. Chan.

Cover sponsored by

BIOSCAN (UK) LTD.

ENVIRONMENTAL CONSULTANTS

Stevenson House, Wey Hill, Haslemere
Surrey, GU27 1BZ

Tel: (0428) 56676 . Telex: 858458 SAFEOP G

