

REF
595.77
(41)

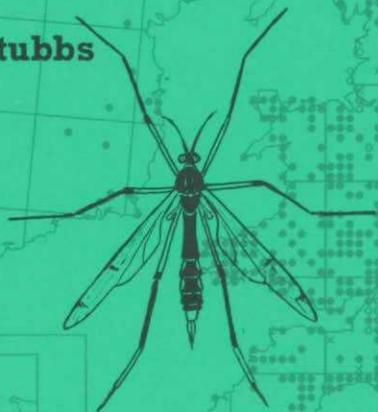
**NATURAL
HERITAGE
CONSERVATION
COMMITTEE**



**Institute of
Terrestrial
Ecology**

Provisional atlas of the ptychopterid craneflies (Diptera: Ptychopteridae) of Britain and Ireland

Alan E Stubbs



Printed in Great Britain by Dixon Printing Co Ltd

© NERC Copyright 1993

Published in 1993 by
Biological Records Centre
Institute of Terrestrial Ecology
Monks Wood
Abbots Ripton
Huntingdon
Cambs PE17 2LS

ISBN 1 870393 19 8

The Institute of Terrestrial Ecology (ITE) is a component research organisation within the Natural Environment Research Council. The Institute is part of the Terrestrial and Freshwater Sciences Directorate, and was established in 1973 by the merger of the research stations of the Nature Conservancy with the Institute of Tree Biology. It has been at the forefront of ecological research ever since. The six research stations of the Institute provide a ready access to sites and to environmental and ecological problems in any part of Britain. In addition to the broad environmental knowledge and experience expected of the modern ecologist, each station has a range of special expertise and facilities. Thus, the Institute is able to provide unparalleled opportunities for long-term, multidisciplinary studies of complex environmental and ecological problems.

ITE undertakes specialist ecological research on subjects ranging from micro-organisms to trees and mammals, from coastal habitats to uplands, from derelict land to air pollution. Understanding the ecology of different species of natural and man-made communities plays an increasingly important role in areas such as monitoring ecological aspects of agriculture, improving productivity in forestry, controlling pests, managing and conserving wildlife, assessing the causes and effects of pollution, and rehabilitating disturbed sites.

The Institute's research is financed by the UK Government through the science budget, and by private and public sector customers who commission or sponsor specific research programmes. ITE's expertise is also widely used by international organisations in overseas collaborative projects.

The results of ITE research are available to those responsible for the protection, management and wise use of our natural resources, being published in a wide range of scientific journals, and in an ITE series of publications. The Annual Report contains more general information.

The Biological Records Centre is operated by ITE, as part of the Environmental Information Centre, and receives financial support from the Joint Nature Conservation Committee. It seeks to help naturalists and research biologists to co-ordinate their efforts in studying the occurrence of plants and animals in the British Isles, and to make the results of these studies available to others.

Biological Records Centre
Institute of Terrestrial Ecology
Monks Wood
Abbots Ripton
HUNTINGDON, Cambs PE17 2LS

Joint Nature Conservation Committee
Monkstone House
City Road
PETERBOROUGH
Cambs PE1 1JY

04873 (Abbots Ripton) 381

0733 62626

INSTITUTE OF TERRESTRIAL ECOLOGY
BUSY LANE, SHARNBOROUGH, LEICESTERSHIRE
MIDLEHAM, LEICESTERSHIRE
LE12 6QB

Provisional atlas of the ptychopterid craneflies (Diptera: Ptychopteridae) of Britain and Ireland

**Alan E Stubbs
(Peterborough)**

Edited for the Biological Records Centre
by Paul T Harding and Julian C M Dring

Biological Records Centre
NERC Institute of Terrestrial Ecology
Monks Wood
Huntingdon

INSTITUTE OF TERRESTRIAL ECOLOGY
BUSH ESTATE, PENICUIK
MIDLOTHIAN
EH26 0QB

Citation information:

Stubbs, A.E. 1993. *Provisional atlas of the ptychopterid craneflies (Diptera: Ptychopteridae) of Britain and Ireland*, edited for the Biological Records Centre by P T Harding & J C M Dring. Huntingdon: Biological Records Centre.

INSTITUTE OF TERRESTRIAL ECOLOGY
BUSH ESTATE, PENICUIK
MIDLOTHIAN
EH26 0QB

8/10/93

CONTENTS

	Page
Preface	5
Introduction	6
Species status	6
Future recording	7
Identification	8
Key to British and Irish species of <i>Ptychoptera</i>	9
Identification of females of <i>P. contaminata</i> and <i>P. albimana</i>	12
Identification of females of <i>lacustris</i> and <i>minuta</i> groups	12
The European fauna	15
Early stages	18
Distribution maps and species accounts	21
Overall coverage of Ptychopteridae records	23
<i>Ptychoptera albimana</i>	24
<i>Ptychoptera contaminata</i>	25
<i>Ptychoptera lacustris</i>	26
<i>Ptychoptera longicauda</i>	27
<i>Ptychoptera minuta</i>	28
<i>Ptychoptera paludosa</i>	29
<i>Ptychoptera scutellaris</i>	30
Acknowledgements	31
References	32
Species index	34

PREFACE

This *Atlas* is the second to cover sections of the crane-fly fauna of Britain and Ireland. It follows closely on the publication, by the Biological Records Centre in 1992, of the *Provisional atlas of the long-palped crane-flies (Diptera: Tipulinae) of Britain and Ireland*. The data compiled by the Crane-fly Recording Scheme are described in that *Atlas* and it includes maps which summarise the data up to 1984.

The *Ptychopteridae Atlas* was prepared concurrently with the *Tipulinae Atlas*, but it has been possible to update the maps as far as possible within new publication deadlines. This update has drawn on a growing body of computerised data (using the RECORDER data management package) which include those from the former Nature Conservancy Council's Welsh Peatlands Invertebrate Survey and East Anglian Fens

Invertebrate Survey, and from several Diptera Recording Schemes field meetings. In addition, the majority of the data on record cards and in other forms have been used in the update.

The *Atlas* summarises data received and processed to the end of 1992. The notes on the European fauna include a species described as new to science early in 1993.

The Ptychopteridae are a distinctive family of flies whose species, at least the males, are easy to identify even in the field. Keys to adults are included in this *Atlas* and it is hoped they will provide a stimulus to recorders to improve the coverage of the family. Most of the species are good indicators of habitat quality and are useful in site evaluation where standing water or streams are present.

Alan E Stubbs

June 1993

INTRODUCTION

The Ptychopteridae are a distinctive family of flies which is represented by the single genus *Ptychoptera*. There are seven species in Britain and one less in Ireland. Superficially they resemble Tipulidae (true craneflies) and have been included in the species covered by the Cranefly Recording Scheme, although the evolutionary relationship is not close.

This *Atlas* updates an earlier paper (Stubbs 1972) which was the first comprehensive review to be published on the distribution of a genus of insects based on Biological Records Centre (BRC) maps. This paper on *Ptychoptera* acted as a model, which demonstrated that a recording scheme for selected groups of Diptera was a practical proposition. It led to the formation of the Cranefly Recording Scheme, covering more than 300 species within the families Tipulidae, Trichoceridae, Anisopodidae and Ptychopteridae, which was launched in 1973 when BRC produced record cards for craneflies.

Knowledge of the Irish fauna has been updated by Speight and O'Connor (1981), the only review concerning the Ptychoptera fauna of Britain or Ireland to have been published in the last 20 years.

The present *Atlas* provides distribution maps for the seven

Ptychoptera species, together with a statement on the habitat, seasonal occurrence and any features of the distribution illustrated by the maps. These maps summarise the majority of the data currently available for which there are grid references.

Keys to adults of the species of *Ptychoptera* occurring in Britain and Ireland are supplemented by notes on the other European species.

It is hoped, at a later stage, to produce new keys to larvae.

Species status

BRC maps, such as those in this *Atlas*, assist in the assessment of the national and regional status of species, with any necessary allowance for the extent and biases in coverage by recorders. The scarcer species are often regarded to be of particular importance in evaluating the conservation value of sites.

None of the species of *Ptychoptera* qualify for inclusion in the *British Red Data Book* for insects (Shirt 1987). The rarest species, *P. longicauda*, is listed by Falk (1991) as being 'notable' (a category which has been defined for species which occur or are likely to occur in 16-100 10 km squares in Britain). Several species have a very

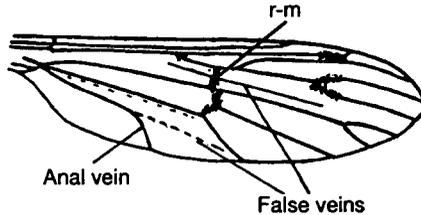
localised occurrence in some regions, for example *P. contaminata* in Scotland and *P. scutellaris* in Wales and south-west Scotland. Further details of the definition of species status are given in the *Provisional atlas of long-palped craneflies* (Stubbs 1992).

Future recording

It is hoped that the keys, maps and other information in this *Atlas* will act as a stimulus to further recording and other studies of *Ptychoptera* in Britain and Ireland. There is considerable potential for improvement of the coverage summarised in the maps, and further clarification is needed of the habitat requirements of species such as *P. minuta*, *P. scutellaris* and *P. longicauda*.

IDENTIFICATION

Ptychoptera species resemble craneflies (Tipulidae) in having long legs. They are black, sometimes with wing spots, and sometimes with orange markings on the abdomen. The typical body length for the genus is 8-15 mm. There are very few Tipulidae of that size which are black or black and orange. The wing venation (below) is unlike that of any member of the Tipulidae, notably in having only one anal vein (which strongly curves down apically, well beyond the wing base) and in the presence of a *vena spuria* (a false vein running through r-m; there is another very weak *vena spuria* between veins Cu and A).



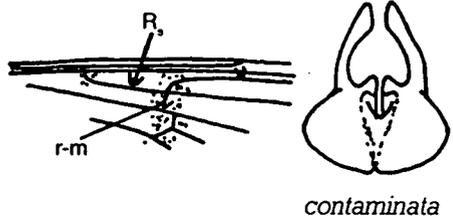
In the field, the posture of adults is characteristic of the genus. The wings are held in a delta shape (at about 45° to the body axis), slightly raised and with the plane of the wings angled inwards. In flight, they slightly resemble ichneumonids. Once recognised, these flies are very distinctive.

The adults are normally found near potential breeding sites such as marshy seepages, swampy woodland, ditches, streams, ponds and lakes, but occasional individuals may be found as strays some distance from water. Most black Tipulidae in such situations have a discal cell in the wing, but even *Pedicia immaculata*, which lacks this cell, has a very different wing venation, particularly the two anal veins (and no wing spots).

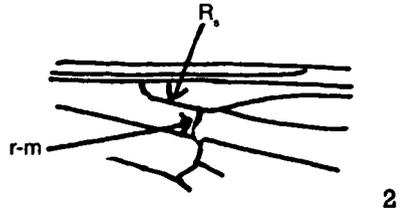
Key to the British and Irish species of *Ptychoptera*

Both sexes of the two commonest species (*P. albimana* and *P. contaminata*) are easy to identify. The males of the other species are also readily recognised, but the females are more difficult. Illustrations of male genitalia show a dorsal view. Dead specimens may show some distortion of the male styles, particularly in *P. lacustris*.

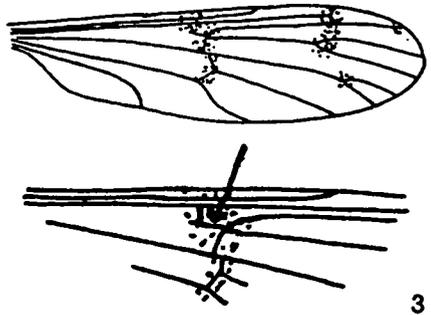
1. Wings with intense black markings and with vein R_s very long (between 3 and 4 times length of r-m), clearly visible in clear zone between spots.



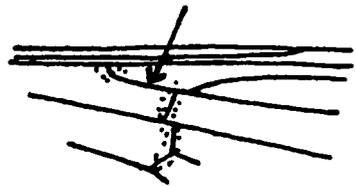
Wings with shorter R_s , confined within a black spot or wing markings not intense.



2. Wings with intense black wing markings; R_s very short with right-angled bend and confined within a black spot. Sides of thorax without silvery areas and scutellum dark.



Wings with faint or moderate markings; R_s of intermediate length (about twice as long as r-m), gently bowed, rarely entirely covered by a spot. Sides of thorax with silvery pubescent areas and scutellum usually partly yellow.



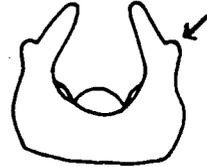
3. Males (genitalia with paired processes as illustrated).

4

Females (paired blade-like ovipositor). (See notes below)

Key to *lacustris* group

4. Abdomen black (but check other characters). Male styles with outer knob.

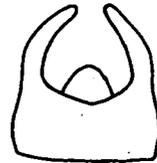


paludosa male

Abdomen with orange markings.
Male styles without outer knob.

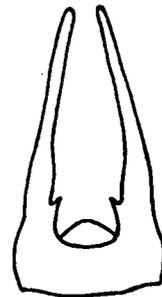
5

5. Male styles short.



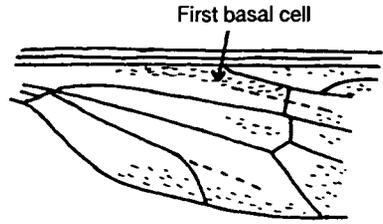
lacustris male

Male styles very long.



longicauda male

6. Abdomen usually with orange markings. Hind tarsi with basal segment whitish yellow (most obvious in females). Wing spots usually distinct (though not as intense as previous species). First basal cell with plentiful macrotrichia in front half.



albimana male

Abdomen always entirely black. Hind tarsi with basal segment dark. Wing spots faint or absent (as occasionally in *albimana*). First basal cell almost entirely free of macrotrichia.

7

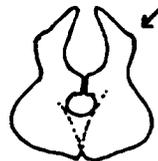
7. Males (genitalia with paired processes as illustrated).

8

Females (paired blade-like ovipositor).

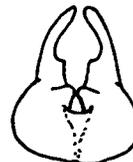
Key to *minuta* group

8. Male styles with outer knob.



minuta male

Male styles lacking an outer knob.



scutellaris male

Identification of females of *P. contaminata* and *P. albimana*

The females of these two species are easy to identify. Both species have yellow markings on the abdomen and therefore could be confused only with *P. lacustris* and *P. longicauda*.

In *P. contaminata* the vein R_s is clearly longer than in either *P. lacustris* or *P. longicauda*. However, the intense dark markings of *P. lacustris* and *P. longicauda* are superficially similar to *P. contaminata* so that it is essential to check that the vein R_s is long and runs between two dark spots whilst being clear in the middle.

P. albimana has less intense wing markings, some specimens having feeble markings similar to those in *P. minuta* and *P. scutellaris*, but in the latter two species the abdomen is entirely black. Female *P. albimana* usually have distinct pale bases to the hind tarsi.

Identification of females of *lacustris* and *minuta* groups

Apart from *P. albimana* and *P. contaminata*, it has become widely accepted that female *Ptychoptera* cannot be identified accurately to species level. Some continental literature, notably Peus (1958) and Zwyrket (1971), illustrates the sub-genital plates and the spermatheca, but the differences between closely allied species are slight and the illustrations of spermathecae are not consistent between the two authors.

Surprisingly, previous authors have not recognised that the antennae and the distribution of wing trichia provide good characters, and this *Atlas* provides the first published means of separating females using these characters. The wing trichia are on the wing membrane. The term macrotrichia is used in this key because these are larger than the microtrichia of the wings of hoverflies (Syrphidae); the distinction is used in the fungus gnat (Mycetophilidae) genus *Macrocera*, where both types occur. Nevertheless, caution is necessary and, for this reason, the provisional keys to females are given separately and not in the main key to species. Experience will show whether or not the characters used are satisfactory. An earlier difficulty in describing the *lacustris* group was that no female specimens of *P. longicauda* were available for study, but specimens have now been obtained.

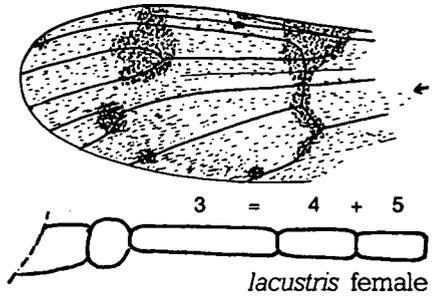
Those who are not experienced in comparing the relative lengths of features should be warned that such apparently simple characters can prove deceptive without the aid of a graticule or grid in the microscope eye-piece. Wing macrotrichia can be seen with a x 20 hand lens.

***lacustris* group**

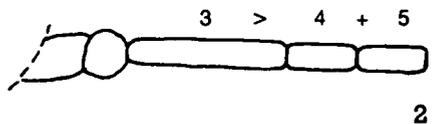
Freeman (1950) followed earlier practice with a key in which specimens with a black abdomen were referred to *P. paludosa*, whereas those with yellow markings were regarded to be *P. lacustris* or *P. longicauda*. Many female specimens of *P. lacustris* have reduced orange markings, and entirely black females of *P. lacustris* have been recorded mating with normally coloured males.

Provisional key to females of the *lacustris* group

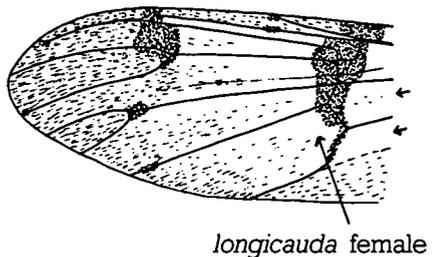
1. Second basal cell in apical fifth extensively covered in macrotrichia. Antennal segment 3 equal to or slightly exceeding segments 4 + 5. (Abdomen usually yellow marked but can be entirely black).



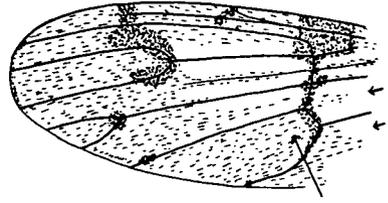
Second basal cell with few macrotrichia, even at apex. Antennal segment 3 longer than segments 4 + 5.



2. Cell below second basal cell almost bare in front of faint vena spuria; cell beyond with few macrotrichia in basal half. (Abdomen yellow marked but potentially could be entirely black).



Cell below second basal cell with macrotrichia at apex; cell beyond well covered in macrotrichia. (Abdomen always entirely black, but other species can be similar).



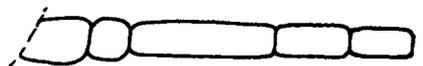
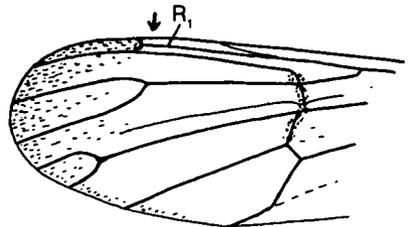
paludosa female

***minuta* group**

In typical specimens, the two species are easily separated on the basis of differences in the relative length of the antennal segments. However, it is not uncommon to come across individuals with fusion of some antennal segments or other aberrations, in particular specimens of *P. minuta* can have segments 3 and 4 fused. Normally, there is a total of 15 antennal segments. If there are appear to be fewer than 15 segments, some fusion of segments may have taken place. There are also differences in the distribution of wing macrotrichia, but it would seem unwise to rely totally on the small differences involved. Hence, in the absence of males, it is best to obtain several females, and to be satisfied that both characters are consistent in at least two specimens and on both left and right sides of the insects. Further confusion is possible because both *P. minuta* and *P. scutellaris* can occur together. Records based solely on females should be made only where there is complete confidence in the identification.

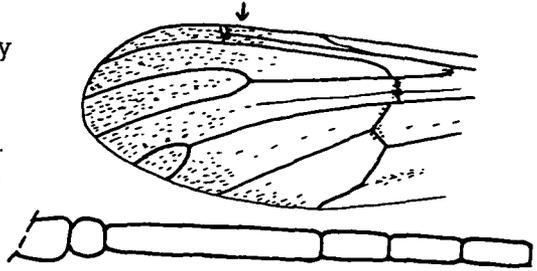
Provisional key to females of the *minuta* group

1. Antennae with segment 3 equal to segments 4 + 5 and about 1 times the length of 1 + 2. Wing vein R_1 about apex without macrotrichia on membrane either side.



minuta female

Antennae with segment 3 very long, equal to 4 + 5 + 6 and 2 times the length of 1 + 2 (but *minuta* can have 3 + 4 fused!). Wing vein R₁ about apex with macrotrichia on membrane either side.



scutellaris female

The European fauna

A total of 13 species of *Ptychoptera* have been recorded from Europe and a further one occurs on the Mediterranean fringe of North Africa. These include several species added as new to science in recent years. It is possible that additional species of *Ptychoptera* could be found in Britain or Ireland, as, for example, there have been several East European Tipulidae discovered in England during the last 20 years. These notes on the additional species which occur in continental Europe are primarily designed for experienced recorders.

1. Sides of thorax with silvery pubescence (allies of *P. minuta* and *P. scutellaris*)

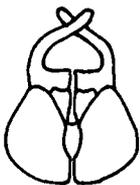
There are two species in this group.

P. hugoi Tjeder 1968

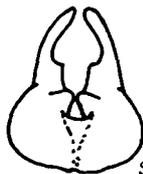
This species has been described from the northern parts of Norway and Sweden. It resembles *P. scutellaris* except that the palpi are entirely pale (apical segment dark in *P. scutellaris*).

P. obscura (Peus 1958)

Known only from the type area, Berlin. The simplest distinguishing feature is the yellow scape (basal segment of the antenna) but the following areas are also yellow (rather than dark) - clypeus, pedicel, pronotum and dorso-pleural membrane. The abdomen is dull brownish. The form of the male genitalia is very different from other species, but because of damage to the specimen, the styles seem to be missing.



hugoi



scutellaris



obscura

Sides of thorax without silvery pubescence

2 and 3

2. Sides of thorax at least partly yellow and the antennae also partly yellow. No known British species have such characters though the general appearance is rather similar to *P. lacustris*.

There are three species in this group.

***P. handlirchi* (Czizek 1919)**

The most frequent of the European species with partly yellow pleurae.

***P. silvicola* Zwyrtek & Roskosny 1967**

Described from easternmost Slovakia. Closely resembles *P. handlirchi*.

***P. surcoufi* (Seguy 1925)**

Known from Algeria (thus not European). The pleurae are entirely yellow and the third tergite mainly so.



handlirchi



silvicola

3. Sides of thorax black

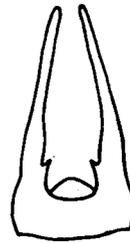
There are two species in this group.

***P. helena* (Peus 1958)**

An ally of *P. longicauda* described from Greece. The male styles of *P. helena* are almost as long as in *P. longicauda* and a little more substantially chitinised than the very flimsy styles of that species. In dorsal view the basal flap-like process between the styles is distinctly bifid in *P. helena*.



helena



longicauda

***P. agnes* Krzeminski & Zwick 1993**

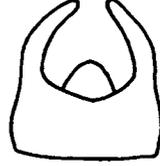
A species described from Hungary which is related to *P. lacustris* and *P. paludosa*. The inner base of the styles has a single spine which is absent in the other species. The styles have a ventral process, rather than the lateral one found in *P. paludosa*.



agnes



paludosa



lacustris

EARLY STAGES

The larvae of the species occurring in Britain and Ireland were described and illustrated by Brindle (1962, 1966), and Hansen (1982), in a revision of the Danish Ptychopteridae, gave a larval key to the same species, but neither author included *P. longicauda*. The larvae of *P. longicauda* have now been collected in Britain and it is hoped, at a later stage, to produce new keys to larvae.

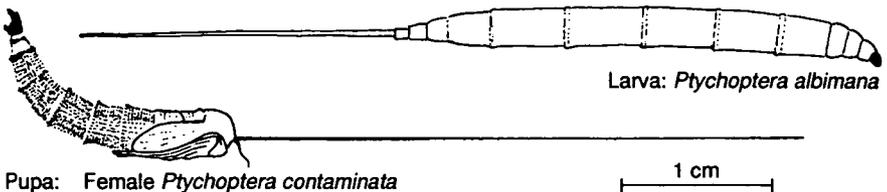
It is easy to recognise *Ptychoptera* larvae because they have a long siphon which extends from the hind end of the abdomen. This tail-like appendage is a retractable, telescopic, breathing tube, which in the *lacustris* group can be almost completely retracted. The pupae similarly have a long breathing tube, which extends vertically from one side of the head as a stiff thread-like structure. Larvae and pupae are adapted to live submerged, but near the surface, in silt and mud in situations such as streams, pond margins and seepages.

Larvae and pupae may be sieved from sediment at or just below

water level, and they are often plentiful once a suitable site is found. A household flour sieve is suitable for collecting. Larvae or pupae, placed in a small quantity of their natural sediment in a polythene bag with plenty of air, remain alive if kept cool in a shaded place. Dishes, jam jars and other containers can be used, but, although larvae and pupae have long breathing tubes, it is not necessary to rear them in deep sediment and there should not be water above the sediment surface.

By searching in April or May, fully grown larvae may be reared quickly to pupation and then through to adults. The larvae of the main species groups have different ways of rolling up and have siphons of different lengths. If larvae are being collected, the catch should be separated into different types as far as possible, with some larvae preserved in alcohol (or substitute) and the rest reared through. Cast pupal skins should be retained for reference.

The rat-tailed maggot larvae of hoverflies (*Syrphidae*) belonging to



Pupa: Female *Ptychoptera contaminata*

Larva: *Ptychoptera albimana*

the tribes Eristalini and Sericomyiini are somewhat similar to the larvae of *Ptychoptera*. However, the larvae of hoverflies are far more compact and can contract into an oval shape or else remain very soft and flaccid. The body shape of *Ptychoptera* larvae is cylindrical and elongate, and the larvae tend to roll up when disturbed.

DISTRIBUTION MAPS AND SPECIES ACCOUNTS

The earlier review (Stubbs 1972) was based on records available up to 31 December 1969. The coverage map showed that there were records from 289 10 km squares. The review covered most of the main sources of published data, and collated data from collectors and some of the main museum collections. A draft *Atlas* prepared in 1981 summarised data for 715 10 km squares.

The present *Atlas* summarises data for 1043 10 km squares, an increase of over 350% in coverage since 1969. Most of this increase comes from new field samples, with a high proportion of the specimens having been identified by the author, but with some data submitted by other recorders. Earlier records have been re-evaluated because it has become clear that some published records may not be entirely reliable, for example those of Cheetham and Morley.

The Ptychopteridae data held in the computerised database at BRC consist only of summary 10 km square records compiled from hand-plotted maps prepared by the author. These hand-plotted maps have symbols for various types of source, and also indicate whether or not the sex of specimens was recorded. The full data, which are the source of both the author's hand-plotted maps and the derived maps prepared by BRC for this *Atlas*, are not yet computerised and are held by the author.

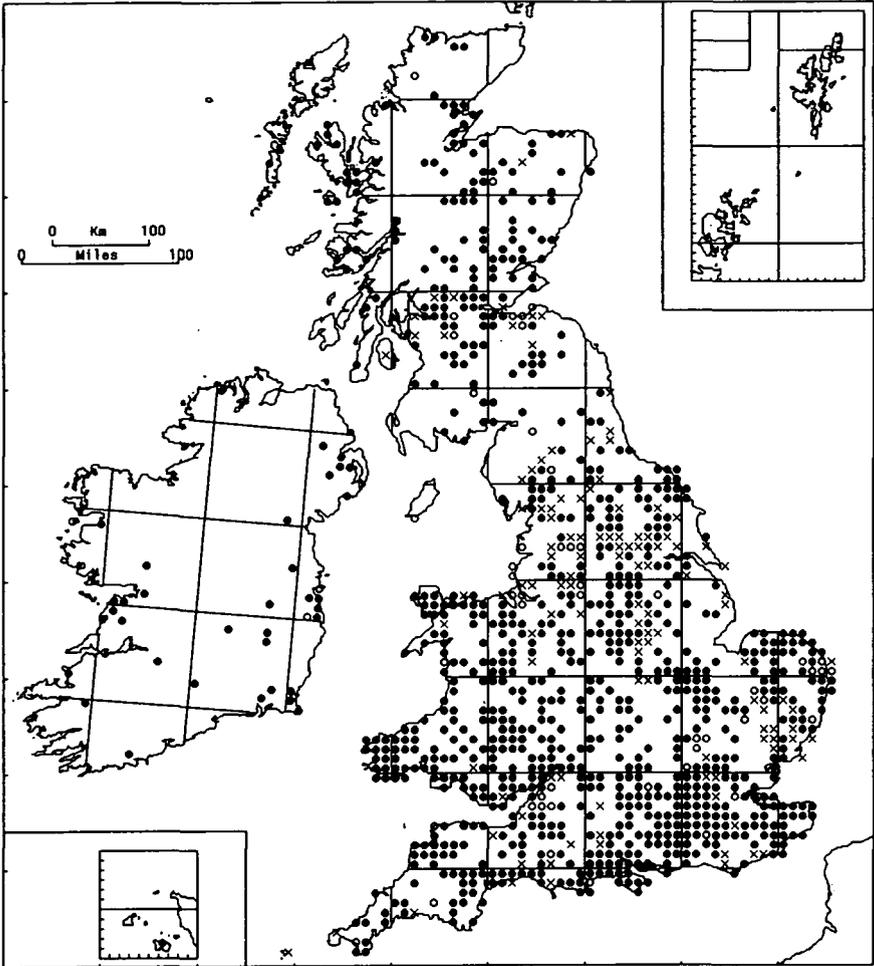
The maps in this *Atlas* summarise the majority of the data for which grid references are available. The coverage (Map 1) is of 1043 10 km squares, of which 867 squares are from the period since 1960. Records are summarised in the maps using the following three simplified categories.

- Records from 1960 onwards for which specimens have been examined by the author or another specialist.
- Records from before 1960 only for which specimens have been examined by the author or which are based on identifications by a specialist, whether published or not.
- x Records which have not been authenticated by the author or a specialist, most of which date from before 1960.

The last category includes the following:

- published records by non-specialists;
- records for which the sex is not stated;
- records of females of species for which a record of a male is now regarded to be essential for a reliable identification (even if the source was a specialist);
- records which predate taxonomic revisions leading to the splitting of species;
- records from museum card indexes where the validity of the source is not stated and other data where an element of caution is necessary. These indexes often contain both published and unpublished data and a future task is to check which data can be supported by voucher specimens or to assess whether the person who identified the specimens was reliable;
- records lacking a date or date class;
- records which cannot be precisely allocated to a 10 km square.

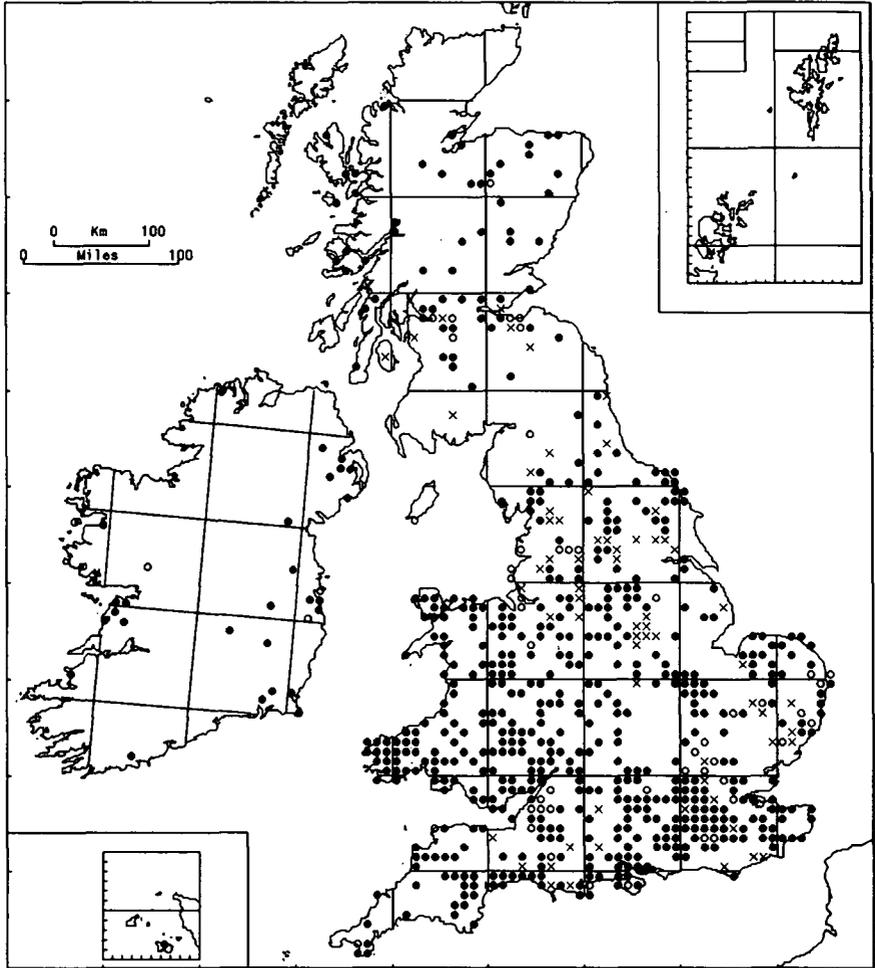
Map 1 Overall coverage



The overall coverage is as follows, the highest category below being adopted in those cases where several categories of data are available for a 10 km square.

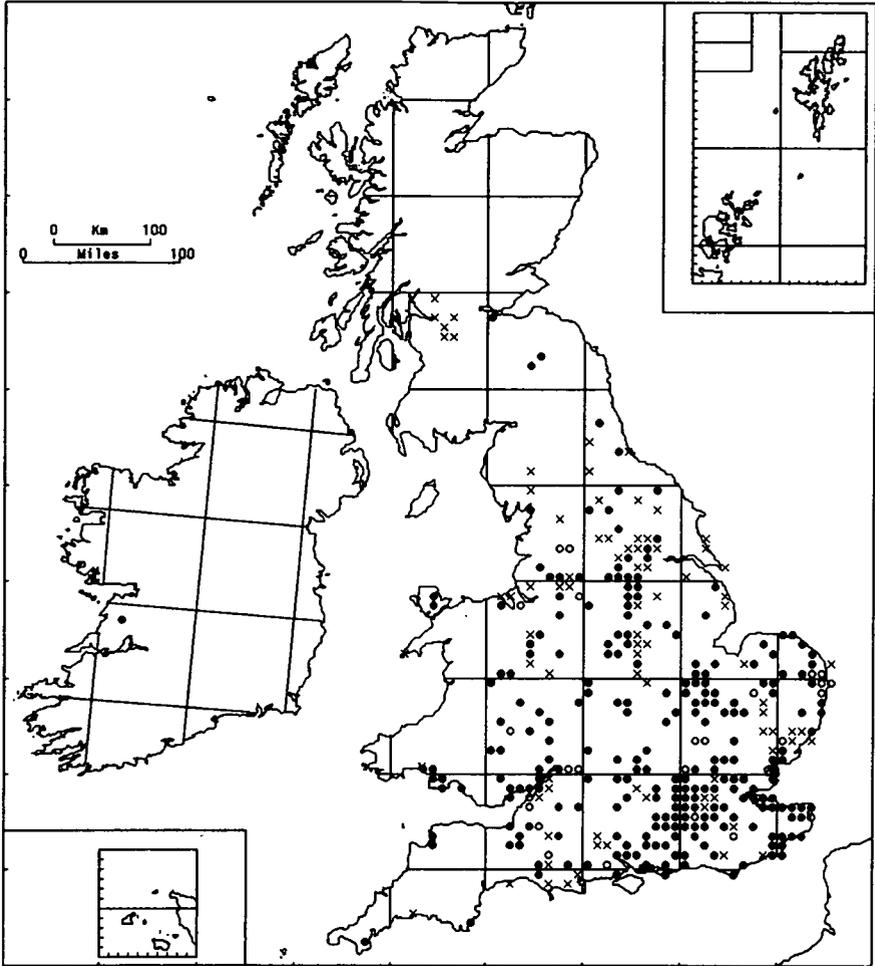
- | | | |
|--------------------|-------------|----------------------------|
| ● | 867 squares | 1960 onwards |
| ○ | 55 squares | before 1960, but not since |
| x | 121 squares | unvalidated records |
| Total 1043 squares | | |

Map 2 *Ptychoptera albimana* (Fabricius 1787)



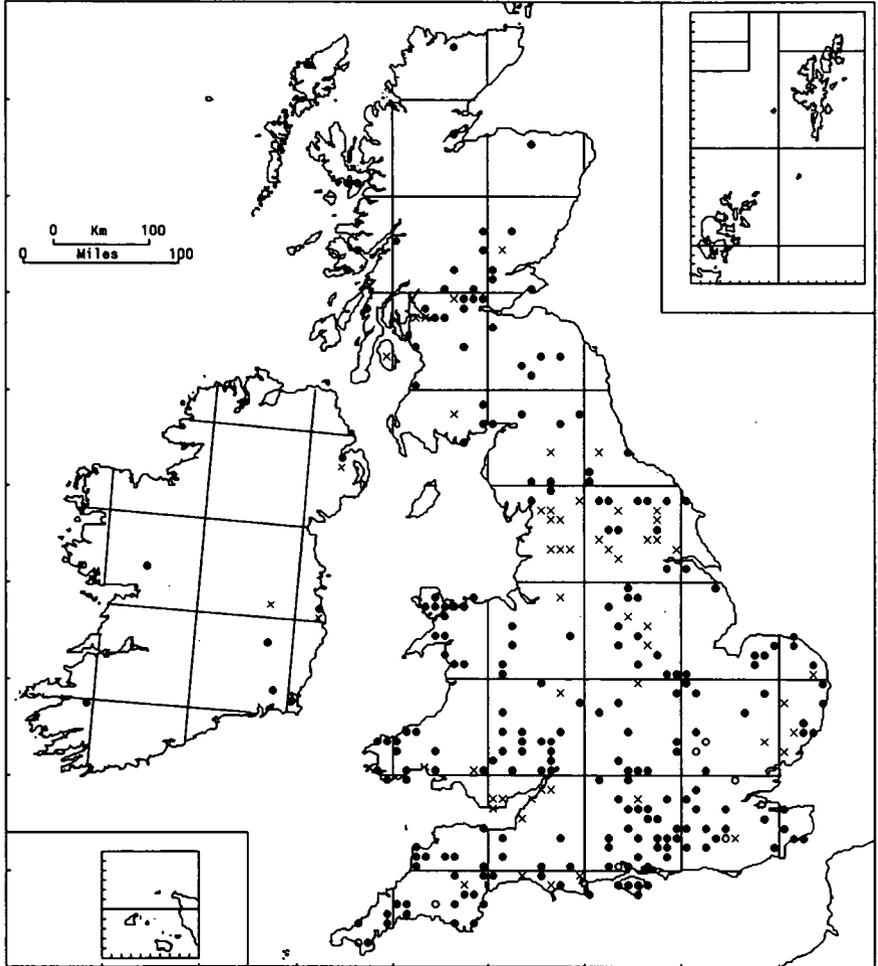
This is the most widespread of our *Ptychoptera* species, probably occurring in all districts except the most acid areas and in bleak upland terrain. It breeds in mud at seepages, muddy puddles in woodland rides, pond margins and similar habitats. In southern England two emergence periods have been recorded at some localities, from mid-April to mid-June and from late August to mid-October, but this pattern varies considerably and adults can be found during the intervening period in many places. Earliest date 8 April, latest date 29 October.

Map 3 *Ptychoptera contaminata* (Linnaeus 1758)



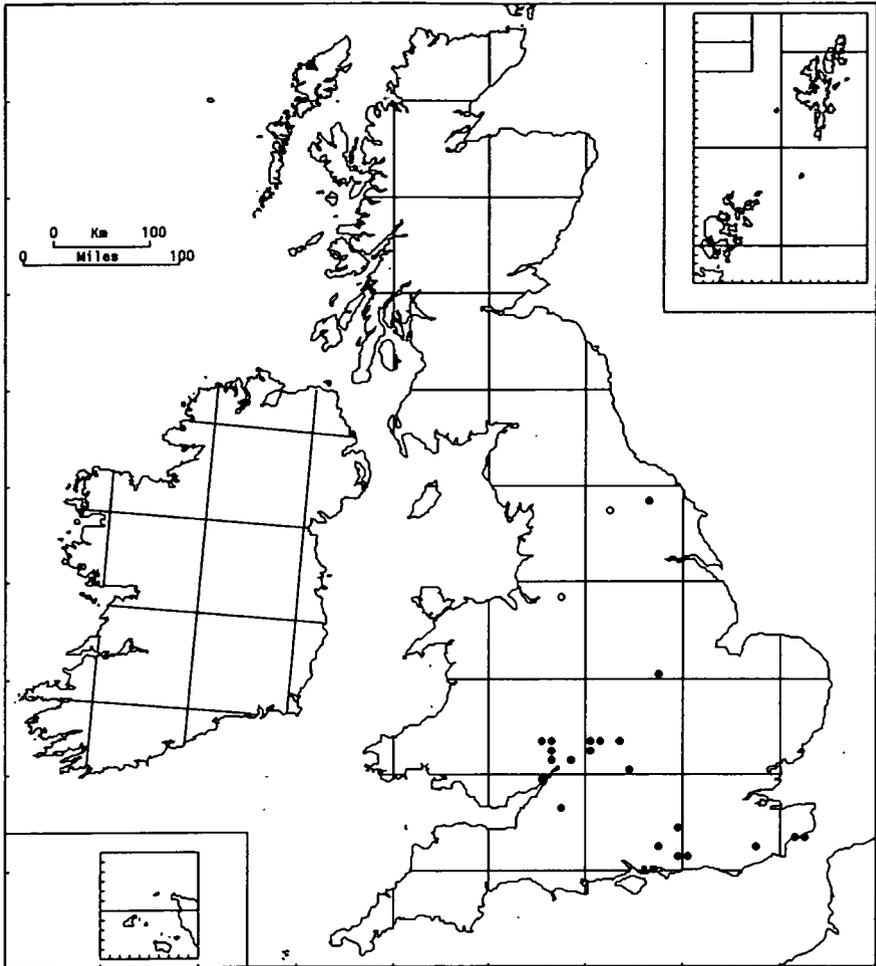
This species is widespread in England in most districts where suitable habitat with tall emergent vegetation is present. It is a characteristic species of ditches on coastal drainage levels and is found around the margins of lowland eutrophic and mesotrophic ponds, lakes, canals and very slow-flowing rivers. Compared with other species, the larvae can occur in more steeply shelving water edges. There are a few coastal records from Wales. Most of the Scottish records were from around Glasgow, about 90 years ago, but were almost certainly misidentifications. Specimens were found in 1992 beside a canal in West Lothian. There is one record from Ireland based on material from the Burren. This species is most plentiful from mid-June to mid-August. Earliest date 13 May, latest date 23 September.

Map 4 *Ptychoptera lacustris* Meigen 1830



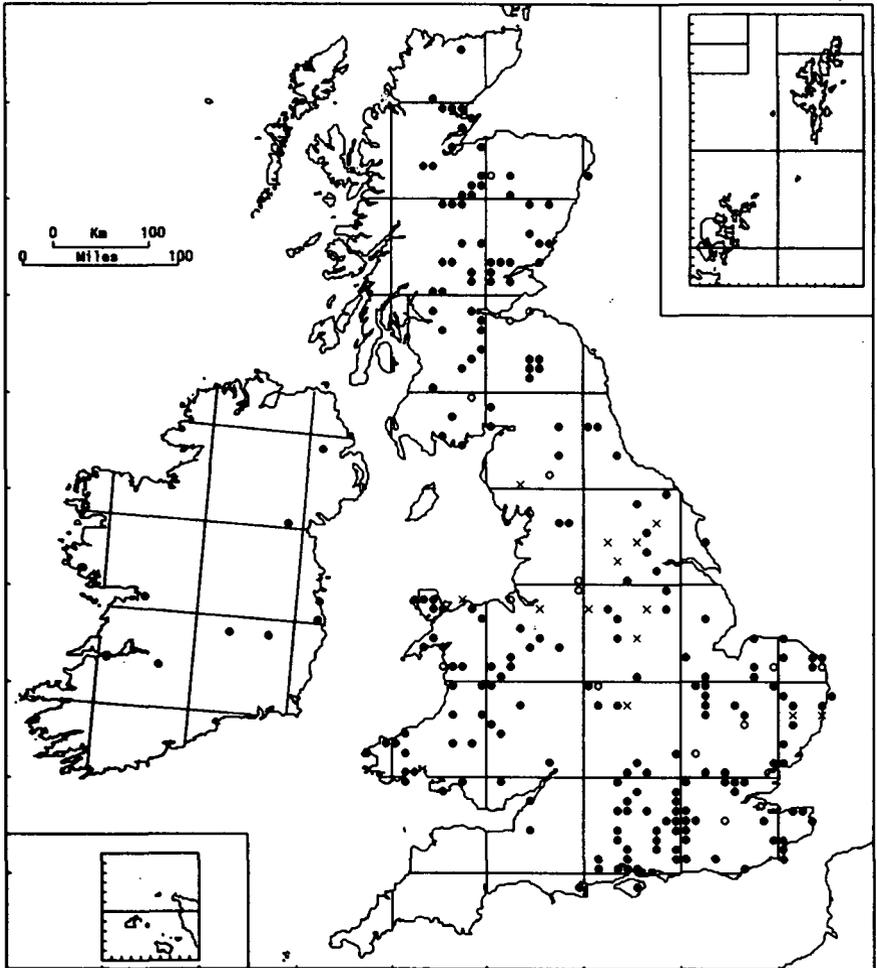
It occurs beside woodland streams throughout much of Britain. The species is largely absent from the core upland areas of the Scottish Highlands and Wales; in these areas, such silted streams are rare because of the high rainfall, steep terrain and poor soils. Its presence in the Pennines indicates that it can tolerate upland areas, at least in sheltered valleys where the soils are locally suitable. The main habitat is lightly shaded seepages, as well as silted shaded streams, but it occurs occasionally in open seepage marshes. Where the woodland canopy is dense, casting heavy shade, *P. lacustris* is infrequent and tends to be replaced by *P. paludosa*. This species is usually most plentiful from mid-May through into June. Earliest date 6 May, latest date 27 September.

Map 5 *Ptychoptera longicauda* (Tonnoir 1919)



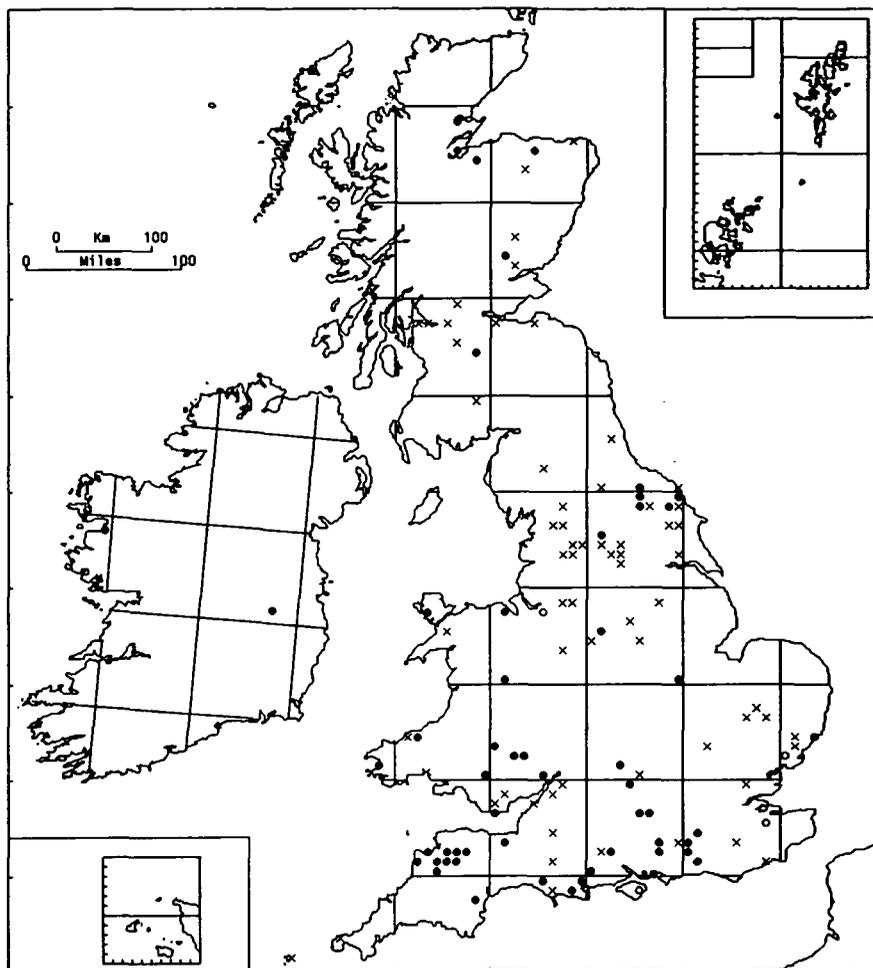
This is the rarest species, with a concentration of records from the Cotswolds and the Forest of Dean. At least half of the localities are obviously calcareous and it seems probable that, if the Cotswolds were explored at the right time of year, it would be found to be widespread. All the post-1960 records are from partly silted, woodland streams. The ecological relationship with *P. lacustris* should be investigated. The peak adult flight period would seem to be in July and August. Earliest date 22 June, latest date 9 September.

Map 6 *Ptychoptera minuta* Tonnoir 1919



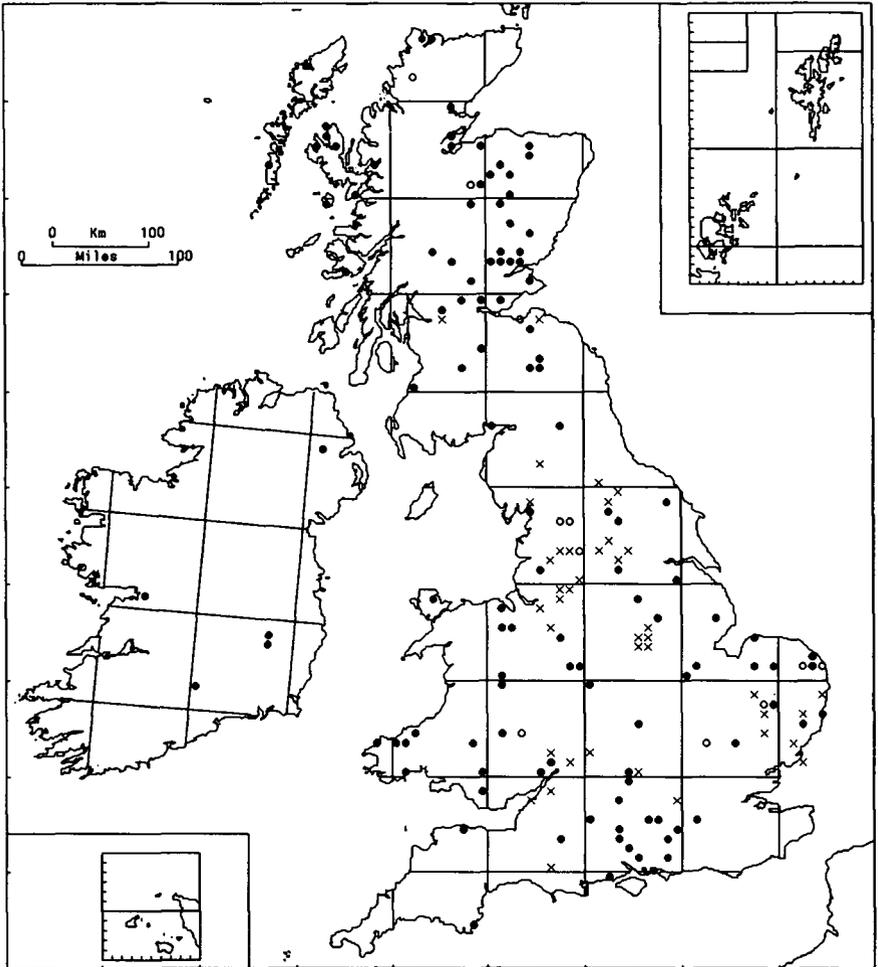
It has become apparent that this species is much more frequent than was previously thought. It is associated with standing water and can occur with *P. albinana*, *P. contaminata* or *P. scutellaris*, but there are distinct differences of habitat preference and some marked differences in distribution at both local and national levels. Its preferred habitat is eutrophic ponds and swamps, including swamp carr, where organically rich mud or peat occurs at the water surface. It is tolerant of a wide pH range, from fairly acid to moderately calcareous, but tends to be replaced by *P. scutellaris* in truly base-rich conditions. In most districts, June and July are probably the peak months for *P. minuta*. Earliest date 2 May, latest date 16 October.

Map 7 *Ptychoptera paludosa* Meigen 1804



The distribution of this species is generally similar to that of the allied species *P. lacustris*, but it is found even less often in the upland areas of Scotland and Wales. However, reliable records are relatively few and this is the less frequent of the two species. Many of the published and other older records lack voucher material, so it is not known which sex was found. The keys refer to the difficulties of identifying females and there is a risk that some of the old records may have been based on misidentified, melanic females of *P. lacustris*. *P. paludosa* inhabits more densely shaded, silted streams than does *P. lacustris*, and it also occurs along the banks of small, shaded, lowland rivers, a habitat in which *P. lacustris* has not been recorded. Most records are from May and June. Earliest date 13 May, latest date 9 October.

Map 8 *Ptychoptera scutellaris* Meigen 1818



The distribution pattern of this species is similar to that of *P. minuta*, except that it has not been found in Kent and is more localised in Wales.

P. scutellaris is present in the Inner Hebrides and the western edge of the Scottish Highlands, areas where *P. minuta* has not yet been discovered. The ecology of this species is not clear; it seems to prefer a relatively high pH, such as in southern calcareous springs and fen carr, but it also occurs on basalts in the Inner Hebrides. May and June are the peak months for *P. scutellaris* in most districts. Earliest date 1 May, latest date 2 September.

ACKNOWLEDGEMENTS

Thanks are passed to all those listed below who have contributed records and samples over the last 20 years. Please forgive the author if anyone has been omitted by oversight.

Dr K N A Alexander, the late Sir C H Andrewes, D M Appleton, P T Bailey, Dr S G Ball, W B Booker, J Bowden, J H Bratton, A Brindle, J M Brummitt, Dr J E L Butterfield, H Carter, P J Chandler, L Clemons, J H Cole, Dr J C Coulson, Dr P Cranston, R Crossley, the late P Crow, J Dear, Dr R H L Disney, Dr M Dobson, Dr C M Drake, the late Sir A Duncan, M Edwards, G R Else, W A Ely, G Glombeck, E G Hancock, G Hosie, A M Hutson, Dr A G Irwin, Dr J W Ismay, Dr P Kirby, the late F H Latham, R Leeke, C Little, Dr I F G McLean, W Massey, V Measday, K Merrifield, S Miles, Mrs M J Morgan, R Nash, M Nelson, M Oates, Mrs M A Palmer, R M Payne, Mrs B van Peperzeel, I Perry,

E G Philp, C W Plant, M Pugh, R Roper, Dr D Sheppard, the late K Side, P Skidmore, D A Smith, K G V Smith, Dr P J Tilbrook, R Uffen, Dr R I Vane-Wright, the late G Waller, Dr I M White, P F Whitehead, D Whiteley.

Special thanks are due to R I Vane-Wright and A M Hutson, who in the initial years of the Crane-fly Recording Scheme joined me as co-organisers. The resultant close relationship of the Natural History Museum to the Scheme, and indeed the subsequent wider range of Diptera schemes, has been invaluable. The Museum collection has become the main taxonomic underpinning of the Scheme, and the recipient of voucher specimens. The author wishes to express his thanks to the Trustees and the staff of the Diptera Section for access to the collection over the years and for the friendly co-operation that has always been available.

REFERENCES

- Brindle, A.** 1962. Taxonomic notes on the larvae of British Diptera 9. The family Ptychopteridae. *Entomologist*, **95**, 212–216.
- Brindle, A.** 1966. Taxonomic notes on the larvae of British Diptera no. 24 - revisional notes. *Entomologist*, **99**, 225–227.
- Czizek, K.** 1919. Die mährischen formen der Dipteren familie Liriopidae. *Zeitschrift des Mährischen Landesmuseums*, **17**, 1–16.
- Falk, S.J.** 1991. *A review of the scarce and threatened flies of Great Britain*. (Part 1). (Research and survey in nature conservation no.39) Peterborough: Nature Conservancy Council.
- Freeman, P.** 1950. Ptychopteridae. In: *Handbook for the identification of British insects*, **IX(2)**, 73–76. London: Royal Entomological Society.
- Hansen, S.B.** 1982. Key to larvae of Danish Ptychopteridae (Diptera; Nematocera), with notes on habitat preferences. *Entomologiske Meddeleser*, **49**, 59–64.
- Krzeminski, W. & Zwick, P.** 1993. New and little known Ptychopteridae (Diptera) from the Palaearctic region. *Aquatic Insects*, **15**, 65–87.
- Peus, F.** 1958. 10b, Liriopidae. In: *Die Fliegen der Palaearktischen Region*, edited by E. Lindner, **3** (1), Lief. 200, 10–44.
- Rozkošný, R.** 1992. Family Ptychopteridae (Liriopidae). In: *Catalogue of Palaearctic Diptera*, edited by A. Soós, L. Papp & P. Oosterbroek, **1**, 370–373. Budapest: Hungarian Natural History Society.
- Séguy, E.** 1925. Description d'un nouveau Paraptychoptera. *Encyclopédie Entomologique* (B II) Dipt., **2**, 22.
- Shirt, D.B.**, ed. 1987. *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.
- Speight, M.C.D. & O'Connor, J.P.** 1981. The Irish Ptychopteridae (Diptera). *Bulletin of the Irish Biogeographical Society*, **5**, 29–37 (plus maps).
- Stubbs, A.E.** 1972. A review of information on the distribution of the British species of *Ptychoptera* (Dipt.: Ptychopteridae). *Entomologist*, **105**, 23–38, 308–312.
- Stubbs, A.E.** 1992. *Provisional atlas of the long-palped craneflies (Diptera: Tipulinae) of Britain and Ireland*. Huntingdon: Biological Records Centre.
- Tjeder, B.** 1968. Notes on the

Scandinavian Ptychopteridae, with description of a new species (Diptera). *Opuscula Entomologica*, **33**, 73–79.

Zwyrket, K. 1971. Czechoslovak species of the family Ptychopteridae (Diptera). *Acta Entomologica Bohemoslovaca*, **68**, 416–426.

Zwyrket, K. & Roskošný, R. 1967. *Ptychoptera silvicola* sp. n. - eine neue Ptychopteriden-Art aus der Ost-slowakei (Diptera). *Acta Musei Moraviae, Sci. Nat.*, **52**, 197–200.

SPECIES INDEX

Species	Page no	
	Map/Account	Key
<i>Ptychoptera agnes</i>	-	17
<i>albimana</i>	24	11
<i>contaminata</i>	25	9
<i>handlirchi</i>	-	16
<i>helena</i>	-	16
<i>hugoi</i>	-	15
<i>lacustris</i>	26	10,13,17
<i>longicauda</i>	27	10,13,16
<i>minuta</i>	28	11,14
<i>obscura</i>	-	15
<i>paludosa</i>	29	10,14,17
<i>scutellaris</i>	30	11,15
<i>silvicola</i>	-	16
<i>surcoufi</i>	-	16
