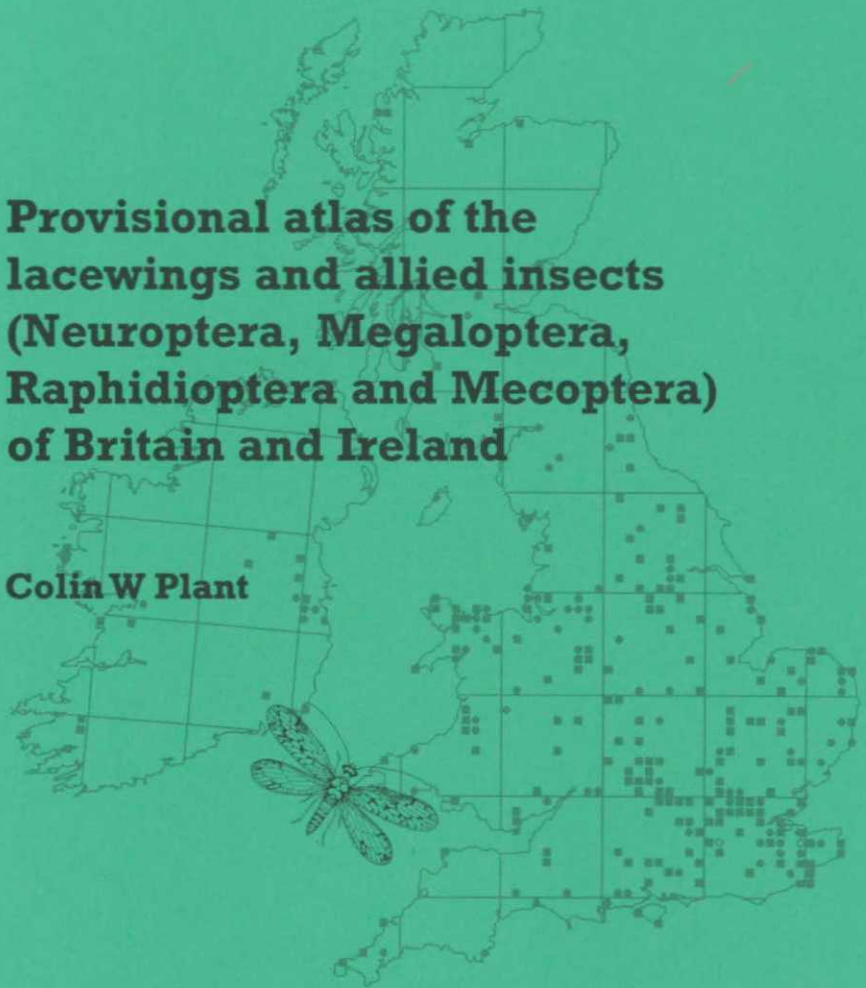
JOINT NATURE CONSERVATION COMMITTEE

Institute of Terrestrial Ecology



Provisional atlas of the lacewings and allied insects (Neuroptera, Megaloptera, Raphidioptera and Mecoptera) of Britain and Ireland

Colin W Plant

Natural Environment Research Council

Printed in Great Britain by Dixon Printing Co Ltd

Published in 1994 by
Biological Records Centre
Institute of Terrestrial Ecology
Monks Wood
Abbots Ripton
Huntingdon
Cambs PE17 2LS

ISBN 1 870393 18 X

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 unparallelled 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
04873 (Abbots Ripton) 381

Mr C W Plant
Newham Museum Service
The Visitor Centre
East Ham Nature Reserve
Norman Road, East Ham
LONDON E6 4HN
081 470 4525

Provisional atlas of the lacewings and allied insects (Neuroptera, Megaloptera, Raphidioptera and Mecoptera) of Britain and Ireland

Colin W Plant
(Newham Museum Service,
formerly the Passmore Edwards Museum)

Edited for the Biological Records Centre
by Paul T Harding, Brian C Eversham and Henry R Arnold

Biological Records Centre
NERC Institute of Terrestrial Ecology
Monks Wood
Huntingdon

Citation information:

Plant, C. W. 1994. *Provisional atlas of the lacewings and allied insects (Neuroptera, Megaloptera, Raphidioptera and Mecoptera) of Britain and Ireland*, edited for the Biological Records Centre by P T Harding, B C Eversham and H R Arnold. Huntingdon: Biological Records Centre.

CONTENTS

PREFACE

The four orders of insects covered in this *Atlas* have traditionally been studied together, even though the Mecoptera are not particularly closely related to the other three orders. This small group of just over 70 British and Irish species is of no great economic importance in this country (though some species are used as biological control agents elsewhere in the world), neither do they have the aesthetic appeal of, say, the Lepidoptera, yet they have long been a popular group to collect and study. This interest in an apparently insignificant group may well have been stimulated by Killington's two-volume work on the Neuroptera published over 50 years ago by the Ray Society, and this monograph is still considered a model of its kind.

The first Neuroptera recording scheme began in the 1970s, but unhappily it proved to be a false start, and the resultant records are no longer available. Fortunately, Colin Plant agreed to set up a new scheme in 1988, and his enthusiasm and hard work have achieved striking results in a very short time. In just four years we have gained a great deal of up-to-date information on the distribution and status of nearly all the British and Irish species, thanks to the combination of a dynamic new recording scheme and a stimulating newsletter, which has a circulation of nearly 150 copies. Four species have been reported as new to the British list since the new recording scheme began, and one has been removed.

This is a *Provisional Atlas*, and our knowledge of the British and Irish species will certainly be refined over the next few years, but there is no doubt that the hard work of Colin Plant, coupled with that of the staff of the Biological Records Centre, has produced a new milestone in the study of lacewings in Britain and Ireland.

Peter Barnard December 1993

INTRODUCTION

Lacewings are one of the more familiar and easily recognised groups of insects. In some countries, they are regarded to be of considerable economic importance as predators of aphids. Yet in Britain and Ireland we know little about the species which occur here, and the ecological importance and potential economic value of our lacewing fauna are scarcely acknowledged by ecologists, agronomists or foresters. The term 'lacewing' is used here in a broad sense, to cover all the orders included in this *Atlas*.

The Lacewing Recording Scheme

In an attempt to establish a baseline of information on the lacewings of Britain and Ireland, the Lacewing Recording Scheme was set up by the author, in collaboration with the Biological Records Centre. The Scheme was set up to examine and document the composition and distribution of the fauna of Britain and Ireland, and to record information on the phenology, voltinism and habitat preferences of each species.

The Lacewing Recording Scheme started in April 1988 after failure to revitalise an earlier data gathering operation which had been launched in 1977. The present Scheme was launched with the first issue of the newsletter, *Neuro News*, and a newly designed recording card. Initial fears that such a small group of insects, which were supposed to be difficult to identify and would not find great popularity, were soon dispelled. The newsletter circulation list now contains nearly 150 names and, although not all are or ever will be active recorders for the Scheme, it is a good measure of the interest in this group in Britain and Ireland.

The recording card

The new recording card (RA 68) (Figure 1) was designed with several intentions. Simple distribution data (including detailed site-relatable information), whilst being the principal objective of the Scheme, are not the only information required from the work of the recorders. The existing literature on several species is vague regarding aspects such as larva/plant associations and adult phenology, and the card was designed to aid the recording of such information. In addition, many species seem to have been regarded as rare, mainly because they had not been recorded by traditional collecting methods. Therefore, the card was designed to gather information on the collecting method used to obtain records, in

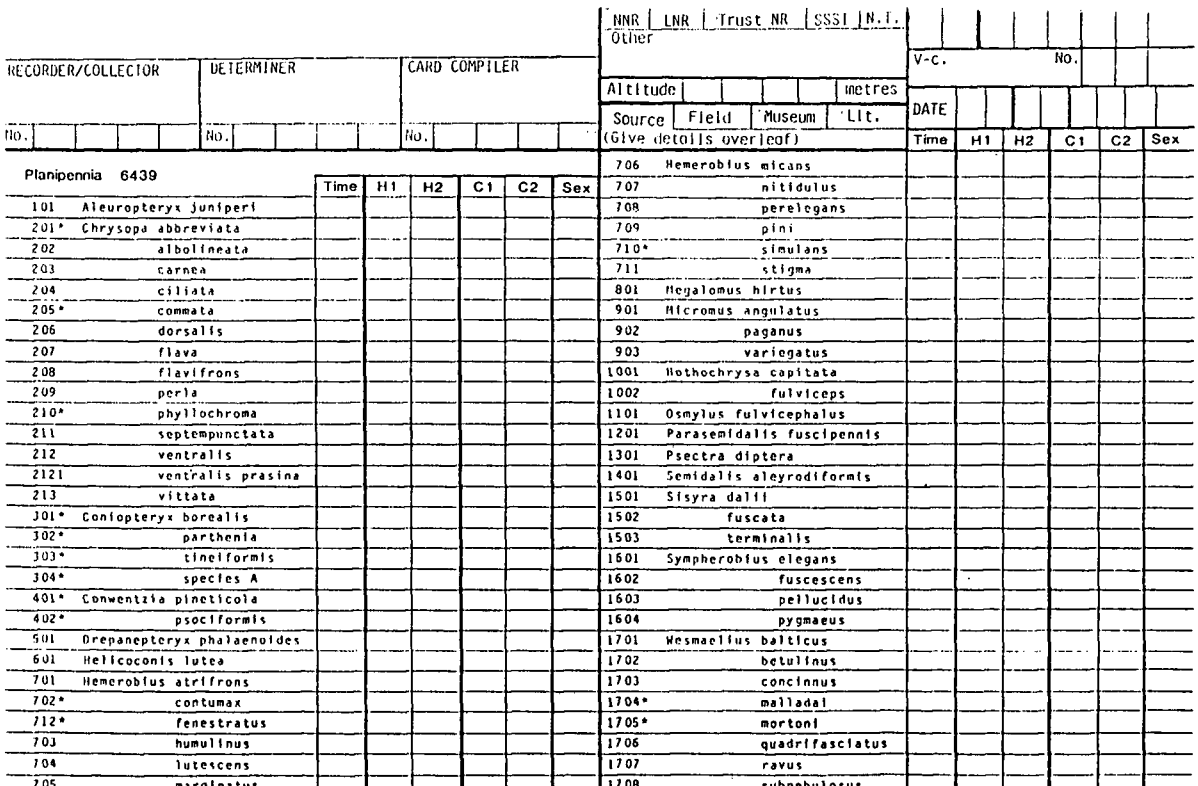
an attempt to see if any patterns of occurrence and collecting methods would emerge.

This combined approach to recording has resulted in new information on species such as *Psectra diptera*. This species was considered to be very rare, but has proved to be quite widespread in England and Wales, a fact which has been revealed through extensive use of pitfall traps and water traps in grassland habitats.

Whilst wishing to gather this additional information, it was important to keep the card as simple and easy to use as possible. Furthermore, it was important to include, on a single card, the 72 species then known from Britain and Ireland. The result was a balance between these and other considerations, and the card has served the Scheme well.

Unless otherwise stated, all of the data concerning habitats, capture methods and adult flight period originate from completed RA68 cards received between April 1988 and November 1992, to the exclusion of previously published information, much of which cannot be substantiated.

Figure 1. RA68 record card – front and reverse



RECORDER/COLLECTOR
No.

DETERMINER
No.

CARD COMPILER
No.

NNR | LNR | Trust NR | SSSI | N.T.
Other

Altitude metres

Source | Field | Museum | Lit.
(Give details overleaf)

V-C. No.

DATE

Planipennia 6439

		Time	H1	H2	C1	C2	Sex
101	Aleuropteryx juniperi						
201*	Chrysopa abbreviata						
202	albolineata						
203	carnea						
204	ciliata						
205*	commata						
206	dorsalis						
207	flava						
208	flavifrons						
209	perla						
210*	phyllochroma						
211	septempunctata						
212	ventralis						
2121	ventralis prasina						
213	vittata						
301*	Coniopteryx borealis						
302*	parthenia						
303*	tineiformis						
304*	species A						
401*	Conwentzia pineticola						
402*	psociformis						
501	Drepanepteryx phalaenoides						
601	Helicoconis lutea						
701	Hemerobius atrifrons						
702*	contumax						
712*	fenestratus						
703	humulinus						
704	lutescens						
705	marginatus						
706	Hemerobius micans						
707	nitidulus						
708	perelegans						
709	pini						
710*	simulans						
711	stigma						
801	Megalomus hirtus						
901	Micromus angulatus						
902	paganus						
903	variegatus						
1001	Nothochrysa capitata						
1002	fulviceps						
1101	Osmylus fulvicephalus						
1201	Parasemidalis fuscipennis						
1301	Psectra diptera						
1401	Semidalis aleyrodiformis						
1501	Sisyra dalii						
1502	fuscata						
1503	terminalis						
1601	Sympherobius elegans						
1602	fuscescens						
1603	pellucidus						
1604	pygmaeus						
1701	Wesmaelius balticus						
1702	betulinus						
1703	concinnus						
1704*	malladai						
1705*	mortoni						
1706	quadrifasciatus						
1707	ravus						
1708	subnebulosus						

Time	H1	H2	C1	C2	Sex

Mecoptera 6443	Time	H1	H2	C1	C2	Sex	DETAILS OF SOURCE (Lit. ref.; location of museum spns., etc)
101 Boreus hyemalis							
201 Panorpa cognata							
202 communis							
203 germanica							COMMENTS
Megaloptera 6438							
101* Raphidia cognata							
102 maculicollis							
103 notata							
104* xanthostigma							
201 Sialis fuliginosa							
202 lutaria							
203 nigripes							

Code numbers and letters for completing boxes

Time Enter one only

1 Dark
2 Dawn
3 Light
4 Dusk

H1 First level habitat

Enter one code number per species in box H1 overleaf

01 Coniferous woodland
02 Mixed woodland
03 Deciduous woodland
04 Scrub
05 Heath
06 Unimproved grassland
07 Semi-improved grassland
08 Improved grassland
09 Arable
10 Urban
11 Ornamental parks and gardens
12 Quarry/gravel pit
13 Saltmarsh
14 Freshwater marsh
15 Edge habitat
16 Sand dune
17 Submerged aquatic

H2 Second level habitat

Enter one code number per species in box H2 overleaf

Woodlands
01 Coppice
02 Coppice with standards
03 Pollard
04 High
05 Clear felled
06 Recent even-aged plantation
07 Parkland

Scrub
08 hawthorn
09 blackthorn
10 gorse
11 broom
12 juniper
13 Salix
14 birch
15 ornamentals

Grasslands
16 calcareous
17 neutral
18 acidic

Heathlands
19 grass dominated
20 bracken dominated
21 heather dominated
22 with scrub invasion

Edge habitats
23 hedge
24 roadside verge
25 on bank
26 dry ditch
27 damp ditch
28 disused railway line
29 active railway line
30 riverside/streamside
31 lakeside/pondside

General
32 inside building
33 dry
34 wet

Parks and gardens
35 domestic garden
36 allotment
37 town park
38 cemetery

C1 & C2 Collecting method

Enter up to 2 code numbers for each species

01 At rest
02 Netted in flight
03 Swept
04 Beaten
05 Aquatic larva found

06 Light trap
07 Malaise trap
08 Sticky trap
09 Water trap
10 Pitfall trap
11 Suction trap
12 Bred

13 Other: please specify

Sexes Enter as many as appropriate against each species

Males M
Females F
Unsexed U

IDENTIFICATION

Two English language publications are potentially available to neuropterists working on the fauna of Britain and Ireland.

F J Killington's *Monograph of the British Neuroptera*, published by the Ray Society in two volumes in 1936 and 1937, is a useful work and contains some helpful identification keys. Unfortunately, it has been out of print for many years and is only rarely available from specialist second-hand book sellers. However, this work is weak in certain areas, notably the Coniopterygidae, and the Megaloptera, Raphidioptera and Mecoptera are not included. It should also be noted that, since its publication, several additional species have been recognised amongst the existing lacewing fauna, and these cannot be differentiated using Killington's *Monograph*.

The second work is the volume by F C Fraser, *Neuroptera, Megaloptera and Mecoptera* in the series of *Handbooks for the identification of British insects*, published by the Royal Entomological Society of London in 1959. Unfortunately, this work is afflicted with a number of ambiguities and errors and it too is out of print.

For those entomologists who read German, the publication *Die Neuropteren Europas* (Aspöck, Aspöck & Hölzel 1980) is certainly the best text. Even for those who do not read German, the two-volume work is still important for the drawings of genitalia, the European distribution maps and other data. The Raphidioptera have also been described in the German language; *Die Raphidiopteren der Erde* (Aspöck, Aspöck & Rausch 1991) is in two volumes. Both works are very expensive.

Thus, anyone working on the British/Irish lacewings does not have ready access to up-to-date literature in English. It is hoped that a new version of the Royal Entomological Society's *Handbook* will be prepared in the not too distant future. Dr Peter Barnard, whose responsibilities at the Natural History Museum have included curation of the lacewing collections, has already produced a number of provisional keys, which have appeared in *Neuro News* to enable some field testing to take place. Other works, on identification of the Coniopterygidae and of female *Panorpa* species, have recently been published in the entomological literature, whilst several aids to identification have appeared in *Neuro News*.

Table 1 is a guide to the various

Table 1. Identification guides

Taxonomic group and stage	Recommended text for identification
Megaloptera (adults)	Barnard (1977) Genitalia drawings in *Neuro News* **4**
Megaloptera (larvae)	Elliott, O'Connor and O'Connor (1979)
Raphidioptera (adults)	*Provisional key by Barnard and discussion by* Plant in *Neuro News* **2**. Genitalia drawings in Aspöck *et al* (1991) – includes keys to other European species (in German)
Neuroptera	
Coniopterygidae (adults, to species)	Plant (1991a) Plant (1992) – addition of *Semidalis pseudouncinata*
Hemerobiidae (adults, to genus)	Provisional key by Barnard (1990a) in *Neuro News* **5**
Hemerobiidae (larvae, to genus)	Veenstra, Feichter and Gepp (1990)
Wesmaelius (adults, to species)	Provisional key by Barnard (1990b) in *Neuro News* **6**
Chrysopidae (adults, to species)	Provisional key by Barnard (1990c) in *Neuro News* **7** notes by Plant in *Neuro News* **8**
Sisyridae (adults, to species)	Elliott (1977)
Remaining Neuroptera (adults)	Fraser (1959), Killington (1936–37)
Mecoptera	
Panorpidae (adult males)	Fraser (1959) illustrates genital capsules, redrawn in *Neuro News* **3**
Panorpidae (adult females)	Plant (1991c)

works required for determination of larvae and adult insects.

Confirmation of identifications

The author is always willing to examine specimens for other entomologists or institutions. These should be sent, carriage paid to:

C W Plant,
The Visitor Centre,
East Ham Nature Reserve,
Norman Road,
London E6 4HN.

Only specimens which are accompanied by full data (minimum information required – year collected, locality and collector's name) will be

examined. By prior arrangement, the author is prepared to examine specimens without data for those intending to develop a comparative collection.

Sources of the data set

No records are available from the data gathering exercise which preceded the present Recording Scheme. The present *Atlas* is, therefore, compiled from data submitted to the Scheme since April 1988. These data are supplemented by records derived from collections at museums (see Appendix 1), which the author has examined, either on loan or by visiting the museums in question.

To these records must be added others from the entomological literature: a list of journals researched is given in Appendix 2. Two major published sources of data have been those of Morgan (1976) for Wales, and Barnard, O'Connor and Speight (1991) for Ireland.

Another major source of records has been the light traps operated under the auspices of the Rothamsted Insect Survey. Through the kindness of the staff at the Rothamsted Experimental Station and the efforts of the trap operators, a large number of monthly samples of lacewings have been received from 66 traps for the period 1988–91. These traps are located throughout Great Britain and the Channel Islands, with one locality in Ireland (Figure 2).

Validation of records

Validation – making sure that all the records are 'good' records – has not been a problem, but it has taken time. It has been approached in two ways. First, every effort has been made to ensure that lacewings have been correctly identified and, second, steps have been taken to detect and correct the inevitable errors. Incorrect data can arise as a result of accidental errors in completing recording cards and mistakes in entry of the data on to the computer. There have been remarkably few errors, but in order to make this assurance, each of the 14 094 records which make up the data set have required checking individually.

To ensure that identifications were correct, a set of rules has been rigorously applied, and the author is very grateful for the co-operation received from contributors, some of whose records may have been rejected. Nomenclatural changes, splitting of species, the raising to species status of former subspecies and recent advances in methods for identification have provided much amusement for those long winter evenings. Clearly, it was both unreasonable and impossible to insist on personal examination of every specimen. Therefore, the first stage was to draw up a list of

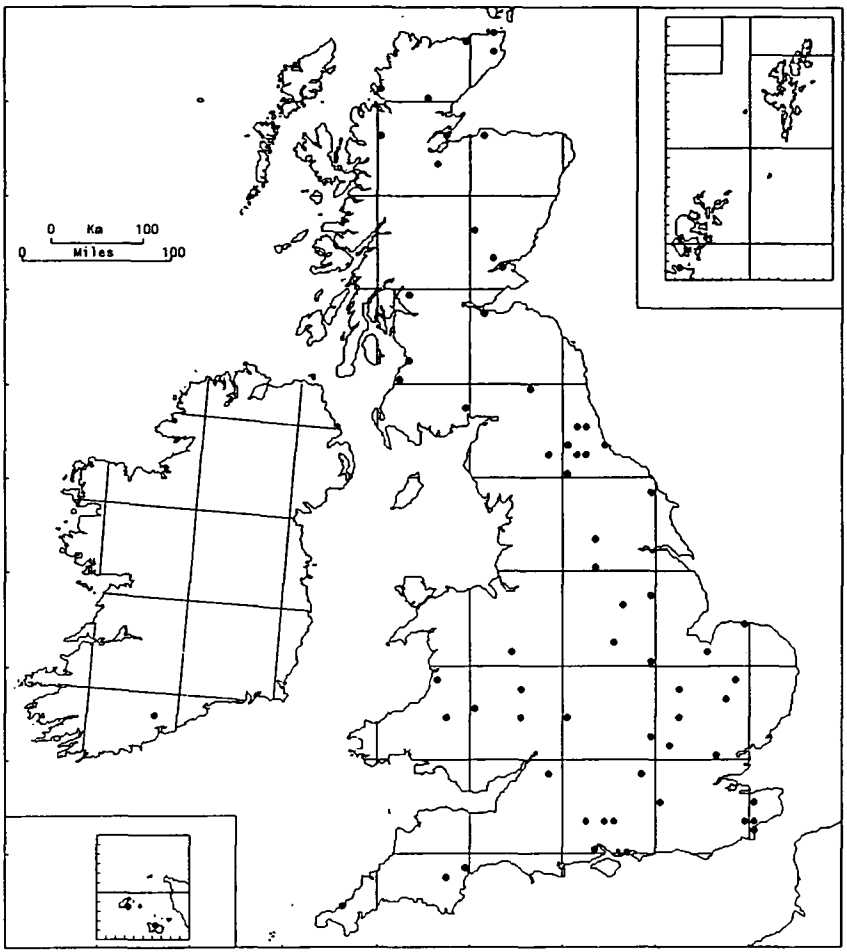


Figure 2. Distribution of Rothamsted Insect Survey light traps from which monthly samples have been received (1988–91)

Table 2. Species requiring confirmation by experienced entomologists

Species	Nature of difficulty
Hemerobius contumax *H. fenestratus* *H. perelegans* *Megalomus hirtus* *Nothochrysa fulviceps* *Sisyra dalii*	Rare species
Chrysopa abbreviata *C. commata* *C. phyllochroma*	Identity confused in Fraser (1959)
Mallada prasina *M. ventralis*	*M. prasina* raised to species status
Coniopterygidae (all species)	Genitalia examination of males essential (see Plant 1991a)
Hemerobius simulans	Frequently confused with *H. humulinus*
Wesmaelius spp. (females)	Examination of genital plates essential
Panorpa spp.	Females separable only on genitalia (see Plant 1991c).
Raphidioptera (all species)	Fraser (1959) is unreliable for some specimens, particularly of *Subilla confinis* and *Xanthostigma xanthostigma*
Sialis spp.	Examination of genitalia essential

species which present problems of identification or nomenclature (Table 2). Records of these species were accepted only from entomologists with experience of the group. Records of these selected species, submitted by persons of unknown ability, were verified either by the author or by another entomologist of known experience, always involving examination of voucher specimens.

The second part of the validation has involved careful scrutiny of every card received. Common errors included transposed northings and eastings in the grid reference, incorrect 100 km square references, incorrect vice-county numbers and dates in the wrong sequence. All cards have been examined, and where necessary corrected. As a further safeguard against rogue grid references, the data set was validated at BRC using a computer routine which searches for incompatibility between the grid reference and vice-county.

The complete data set was printed out from the computer and checked manually against the recording cards to eliminate any entry errors, although only 0.25% of the 14 094 records had keyboarding errors.

Following this checking and validation, a draft set of distribution maps was printed from the BRC computer; these were examined for such things as lacewing records in the middle of the North Sea (there were a couple!). Any record which did not fit the general pattern for the species was then recalled from the data base, and checked by referring back to the original recorder with a request to see the specimen. If no specimen existed, and there was a real cause for doubt about the validity of the identification, the record was rejected.

Finally, complete print-outs of all records from selected English and Scottish vice-counties, for all of Wales and all of Ireland were generated from the computer and disseminated to various regional specialists for scrutiny. The errors thus detected were so few, and so inconsequential, that it was agreed generally that the data set was fully validated.

Vice-county records

The occurrence of species in the Watson/Praeger biological vice-counties of Britain and Ireland has been reviewed as part of the preparation of this *Atlas*. Many of the known vice-county records are not included on the distribution maps as 10 km square records, because many old specimens in museums have data labels with insufficient information to be able to allocate records even to 10 km squares. Similarly, literature records often have only imprecise data. Wherever possible, original specimens have been examined before records have been accepted.

It is evident from reviewing the vice-county records that Surrey is the place to go to record lacewings. There are 63 species on the county list, 53 of them recorded since the end of 1979; most of the species missing from the Surrey list are found only in Scotland. It is not clear whether this remarkably high total reflects a county which is genuinely good for lacewings, or whether it results from many notable entomologists living or collecting in the county. Surrey is a topographically and ecologically varied county, but it is also a favoured area for collecting.

In Table 3, the numbers of species recorded in vice-counties with a total of 40 or more species are compared.

There are experienced entomologists living in all of these areas, but interesting comparisons exist. South Essex, where the author has been most active during the last ten years, has 38 species since 1979. Doubtless there are more species to find, but the county is considered to be fairly well covered. For the last seven years

Table 3. Comparison of the number of species recorded in selected vice-counties

Vice-county Name (number)	Number of species recorded All time	Since 1899	Since 1979
Surrey (17)	63	61	53
South Hampshire (11)	53	51	28
Hertfordshire (20)	50	49	41
Berkshire (22)	49	46	33
Staffordshire (39)	46	46	34
S.W. Yorkshire (63)	44	43	36
Dorset (9)	44	41	17
Caernarvonshire (49)	42	42	30
South Devon (3)	41	36	27
Middlesex (21)	41	39	26
West Kent (16)	41	27	12
South Essex (18)	40	40	38
Bedfordshire (30)	40	39	17

the author has lived in Hertfordshire, which has 41 species since 1979. Hertfordshire is not well recorded, and most records have come either from the author's garden light trap or from the Rothamsted Insect Survey light trap at a garden in Harpenden. In spite of this very uneven coverage, the numbers of species recorded in the two vice-counties are remarkably similar, which suggests that either Hertfordshire will prove to have more species than South Essex or both counties have an approximately similar fauna. Only time, and more field work, will provide an answer. Another question which one could reasonably ask is why the vice-county which contains the New Forest (South Hampshire) has ten fewer species than Surrey.

There are large areas of Britain and Ireland where field work is urgently needed. There are no records, for any period in history, for the Scottish vice-counties of Renfrewshire, or North Ebudes, or the Irish vice-counties of Limerick, North Tipperary, East Mayo, Fermanagh or Londonderry. There are no recent (post–1979) records from Kincardineshire, North Aberdeenshire, Mid Ebudes or West Sutherland or for 19 of the 40 Irish counties.

SYNONYMIC CHECKLIST

A revised checklist of the Neuroptera was published by Barnard (1978), but this does not cover the Megaloptera, Raphidioptera or Mecoptera. Although Barnard's list includes several generic synonyms, the combinations of genus names and specific epithets are not fully synonymised. Also, there have been many changes in nomenclature since 1978, whilst a total of four new species has been added, and one more is deleted from the list in this *Atlas*. In the following checklist, complete synonyms have been incorporated, including a number (affecting British/ Irish species) used only in the foreign literature. Awareness of such synonyms is essential if use is being made of the world literature for identification and study of the biology of species.

A revised synonymic checklist of the Neuroptera, Megaloptera, Raphidioptera and Mecoptera of Britain and Ireland

RAPHIDIOPTERA

RAPHIDIIDAE Navás 1916

SUBILLA Navás 1916
confinis (Stephens 1836)
- ***Raphidia confinis*** Stephens 1836
- ***Raphidia cognata*** Rambur 1842
- ***Raphidia schneideri*** Ratzeburg 1844
- ***Raphidia colubroides*** Costa 1855
- ***Raphidia sericea*** Albarda 1891

ATLANTORAPHIDIA Aspöck & Aspöck 1968
maculicollis (Stephens 1836)
- ***Raphidia maculicollis*** Stephens 1836
- ***Raphidia ophiopsis*** Curtis 1824, partim, nec auctt.
- ***Raphidia affinis*** Stephens 1836
- ***Raphidia centrodes*** Navás 1915

PHAEOSTIGMA Navás 1909
notata (Fabricius 1781)
- ***Raphidia notata*** Fabricius 1781
- ***Raphidia ophiopsis*** Curtis 1824, partim, nec auctt.
- ***Raphidia megacephala*** Stephens 1836
- ***Raphidia media*** Burmeister 1839
- ***Raphidia angustata*** Ratzeburg 1844
- ***Raphidia laticeps*** Wallengren 1871
- ***Erma abdita*** Navás 1918
- ***Lesna navasi*** Steinmann 1963
- ***Lesna stigmata*** Steinmann 1963
- ***Lesna laticaput*** Steinmann 1963
- ***Navasana perumbrata*** Steinmann 1963

XANTHOSTIGMA Navás 1909
xanthostigma (Schummel 1832)
- ***Raphidia xanthostigma*** Schummel 1832
- ***Raphidia londinensis*** Stephens 1836
- ***Raphidia chalybocephala*** Ratzeburg 1844
- ***Raphidia schummeli*** Girard 1864
- ***Raphidilla germanica*** Steinmann 1964
- ***Raphidilla rapax*** Steinmann 1964
- ***Agulla trilobata*** Bartos 1965
- ***Agulla rostrata*** Bartos 1965

MEGALOPTERA

SIALIDAE Leach 1815

SIALIS Latreille 1803
lutaria (Linnaeus 1758)
- ***Hemerobius lutarius*** Linnaeus 1758
- ***Sialis flavilatera*** Kolbe 1880

fuliginosa Pictet 1836
- ***fusconebulosa*** Imms 1934 nomen nudum

nigripes Pictet 1865

NEUROPTERA

CONIOPTERYGOIDEA Burmeister 1839
CONIOPTERYGIDAE Burmeister 1839
CONIOPTERYGINAE Burmeister 1839

CONWENTZIA Enderlein 1905
psociformis (Curtis 1834)
Coniopteryx psociformis Curtis 1834
Coniopteryx aphidiformis Rambur 1842
pineticola Enderlein 1905
Coniopteryx reticulata Tullgren 1906
Conwentzia angulata Navás 1914
Conwentzia axillata Navás 1914
Conwentzia cryptoneuris Bagnall 1915
Conwentzia hageni Banks 1906
Conwentzia psociformis (Curtis 1834) f. *pineticola* sensu Killington 1936

CONIOPTERYX Curtis 1834
subgenus CONIOPTERYX Curtis, 1834
tineiformis Curtis 1834, nec Burmeister 1839
Malacomyzia lactea Wesmael 1836
Sciodus fuscus Zetterstedt 1840
Sciodus lacteus, Wesmael 1840
borealis Tjeder 1930
parthenia (Navás & Marcet 1910)
Deasia parthenia Navás & Marcet 1910
Coniopteryx pygmaea auctt., nec Enderlein 1906

subgenus *METACONIOPTERYX* Kis, Nagler & Mandru 1970
esbenpeterseni Tjeder 1930
lentiae Aspöck & Aspöck 1964

SEMIDALIS Enderlein 1905
aleyrodiformis (Stephens 1836)
Coniopteryx aleyrodiformis Stephens 1836
Coniopteryx tineiformis Burmeister 1839, nec Curtis 1834
Semidalis aleurodiformis Lucas 1927 (mis-spelling)
Semidalis curtisiana Enderlein 1906
Semidalis albata Enderlein 1907
Semidalis alpina Withycombe 1925
Semidalis poincianae Withycombe 1925
pseudouncinata Meinander 1963

PARASEMIDALIS Enderlein 1905
fuscipennis (Reuter 1894)
Coniopteryx fuscipennis Reuter 1894
Parasemidalis annae Enderlein 1905

ALEUROPTERYGINAE Enderlein 1905

ALEUROPTERYX Löw 1885
juniperi Ohm 1968

OSMYLOIDEA Leach 1815

OSMYLIDAE Leach 1815

OSMYLUS Latreille 1802
fulvicephalus (Scopoli 1763)
Hemerobius fulvicephalus Scopoli 1763
Hemerobius maculatus Fabricius 1787
Hemerobius laurifoliaeformis Razoumowsky 1789
Osmylus maculatus Latreille 1802
Osmylus chrysops Hagen 1858, nec Linnaeus 1758

SISYRIDAE Handlirsch 1908

SISYRA Burmeister 1839
fuscata (Fabricius 1793)
Hemerobius fuscatus Fabricius 1793
Hemerobius confinis Stephens 1836
Hemerobius nitidulus Stephens 1836, nec Fabricius 1777, nec Walker 1853
Sisyra morio Burmeister 1839
Sisyra nigripennis Wesmael 1841
Branchiotoma spongillae Westwood 1842
Hemerobius fumatus Motschulsky 1853
dalii McLachlan 1866
Hemerobius nitidulus Walker 1853, nec Fabricius 1777, nec Stephens 1836
Sisyra dalei Navás 1935 (mis-spelling)
terminalis Curtis 1854

MYRMELEONTOIDEA Latreille 1803
MYRMELEONOIDEA Latreille 1803
MYRMELEONTIDAE Latreille 1803
MYRMELEONIDAE Latreille 1803

MYRMELEONTINAE Latreille 1803
MYRMELEONINAE Latreille 1803

EUROLEON Esben-Petersen 1918
nostras (Fourcroy 1785) [Channel Islands only]
Myrmeleon nostras Fourcroy 1785

MYRMELEON Linnaeus 1767
formicarius Linnaeus 1767

HEMEROBIOIDEA Latreille 1803

HEMEROBIIDAE Latreille 1803

PSECTRA Hagen 1866
diptera (Burmeister 1839)
Hemerobius dipterus Burmeister 1839
Hemerobius delicatulus Fitch 1856
Psectra buenoi Navás 1909
Notiobiella galloisi Navás 1924

MICROMUS Rambur 1842
variegatus (Fabricius 1793)
Hemerobius variegatus Fabricius 1793
Micromus pulchellus Nakahara 1915
angulatus (Stephens 1836)
Hemerobius aphidivorus Schrank 1781
Hemerobius angulatus Stephens 1836
Hemerobius villosus Zetterstedt 1840
Hemerobius intricatus Wesmael 1840
Micromus tendinosus Rambur 1842
Hemerobius lineatus Goszy 1852
Micromus jonas Needham 1905
Eumicromus angulatus (Stephens) Killington 1936
Nesomicromus angulatus (Stephens) Fraser 1959
paganus (Linnaeus 1767)
Hemerobius paganus Linnaeus 1767
Hemerobius nemoralis Stephens 1836
Micromus lineosus Rambur 1842
Hemerobius elegans Goszy 1852, nec Stephens 1836
Eumicromus alpinus Nakahara 1915
Eumicromus paganus (Linnaeus) Killington 1936
Nesomicromus paganus (Linnaeus) Fraser 1959

HEMEROBIUS Linnaeus 1758
humulinus Linnaeus 1761
Hemerobius humuli Linnaeus 1761, nec Zetterstedt 1840
Hemerobius subfasciatus Stephens 1836
Hemerobius crispus Stephens 1836, nec Walker 1853
Hemerobius apicalis Stephens 1836
Hemerobius obscurus Stephens 1836
Hemerobius affinis Wesmael 1840, nec Stephens 1836
Hemerobius maculatus Wesmael 1836
Mucropalpus lutescens (Fabricius 1793) in Rambur 1842
Hemerobius obliteratus Walker 1853
Hemerobius castaneae Fitch 1855
Hemerobius castanae Fitch 1855 (mis-spelling)
Hemerobius tutatrix Fitch 1855
Hemerobius gossypii Ashmead 1895
Hemerobius algonquinus Banks 1924
Hemerobius obtusus Nakahara 1954
perelegans Stephens 1836
simulans Walker 1853
Hemerobius crispus Walker 1853, nec Stephens 1836
Hemerobius stigmaterus Fitch 1855
Hemerobius orotypus Wallengren 1870
Hemerobius nevadensis Banks 1904
Hemerobius placidus Banks 1908
Hemerobius piceus Navás 1925
stigma Stephens 1836
Hemerobius irroratus Stephens 1836
Hemerobius strigosus Zetterstedt 1840
Hemerobius limbatellus Zetterstedt 1840 partim
Hemerobius limbatus Wesmael 1841
Hemerobius crispus Walker 1853, nec Stephens 1836
Hemerobius stigmaterus Fitch 1855
Hemerobius stephensii Fitch 1855
Hemerobius phaleratus Hagen 1858
Hemerobius moestus Banks 1897, nec Hagen 1854
Hemerobius dyari Currie 1904
Hemerobius simplex Banks 1905
Hemerobius buyssoni Navás 1909
Hemerobius periphericus Navás 1913
atrifrons McLachlan 1868
Hemerobius fasciatus Goszy 1852, nec Stephens 1836
pini Stephens 1836, nec Leach
Hemerobius fasciatus Stephens 1836, nec Goszy, 1852
Hemerobius suecicus Mjöberg 1909
Hemerobius phaleratus Hagen 1858 (part)
contumax Tjeder 1932
Hemerobius limbatellus (Zetterstedt 1840) partim
fenestratus Tjeder 1932
Hemerobius limbatellus (Zetterstedt 1840) partim

nitidulus Fabricius 1777
Hemerobius humuli Zetterstedt 1840 partim, nec auctt.
Hemerobius ochraceus Wesmael 1840
Mucropalpus obscurus Rambur 1842
Hemerobius haematicus Navás 1908
micans Olivier 1792
Hemerobius punctatus Stephens 1836, nec Goszy 1852
Hemerobius pallidus Stephens 1836
Hemerobius lutescens Burmeister 1839, nec auctt.
Mucropalpus fuscinervis Schneider 1845
Mucropalpus irroratus Costa 1855
lutescens Fabricius 1793, nec auctt.
Hemerobius affinis Stephens 1836 partim, nec Wesmael 1840
Hemerobius paganus Stephens 1836, nec Linnaeus 1767
marginatus Stephens 1836
Hemerobius lutescens Zetterstedt 1840, nec. auctt.
Hemerobius flexuosus Hagen 1858
Hemerobius humuli Zetterstedt 1840 partim, nec auctt.
Hemerobius irregularis Nakahara 1915

WESMAELIUS Krüger 1922
subgenus *KIMMINSIA* Killington 1937
malladai (Navás 1925)
Hemerobius malladai Navás 1925
Boriomyia mortoni (McLachlan 1899) Killington 1937
Kimminsia killingtoni Fraser 1942
mortoni (McLachlan 1899)
Hemerobius mortoni McLachlan 1899
Boriomyia enontekiensis Klingstedt 1929
Boriomyia enontekiensis Klingstedt 1930 (wrong date)
ravus (Withycombe 1923)
Boriomyia rava Withycombe 1923
Kimminsia rava (Withycombe 1923) Killington 1937
balticus (Tjeder 1931)
Boriomyia baltica Tjeder 1931
Kimminsia baltica (Tjeder 1931) Killington 1937
betulinus (Strøm 1788)
Hemerobius betulinus Strøm 1788
Hemerobius nervosus Fabricius 1793
Kimminsia nervosa (Fabricius 1793) Killington 1937
Hemerobius nebulosus Stephens 1836 partim
Hemerobius conspersus Burmeister 1839
Mucropalpus distinctus Rambur 1842
Hemerobius disjunctus Banks 1897
Boriomyia nervosa (Fabricius) Banks 1906
Boriomyia betulina (Strøm) Esben-Petersen 1925
Hemerobius frostinus Navás 1933
Kimminsia cinerea Nakahara 1960
Kimminsia melaleuca Nakahara 1965
Kimminsia alexanderi Nakahara 1965
subnebulosus (Stephens 1836)
Hemerobius subnebulosus Stephens 1836
Kimminsia subnebulosa (Stephens 1836) Killington 1937
Hemerobius fuscus Stephens 1836
Hemerobius nebulosus Stephens 1836 partim
Boriomyia maorica Tillyard 1923

subgenus *WESMAELIUS* Krüger 1922
concinnus (Stephens 1836)
Hemerobius concinnus Stephens 1836
Hemerobius hirtus Burmeister (nec Linnaeus) 1839
Hemerobius cylindripes Wesmael 1841
Hemerobius atomarius Goszy 1852
quadrifasciatus (Reuter 1894)
Hemerobius concinnus Stephens 1836 var. *quadrifasciatus* Reuter 1894
Boriomyia quadrifasciata (Reuter) Banks 1906

SYMPHEROBIUS Banks 1904
elegans (Stephens 1836)
Hemerobius elegans Stephens 1836, nec Göszy 1852
Hemerobius marshami Stephens 1836
Hemerobius beckwithii Stephens 1836
Hemerobius paucinervis Zetterstedt 1840
Hemerobius striatellus Klapalek 1905
Sympherobius venustus Navás 1908
Sympherobius vicentei Navás 1914
Nefasitus catalaunicus Navás 1930
pygmaeus (Rambur 1842)
Mucropalpus pygmaeus Rambur 1842
Hemerobius coccophagus Göszy 1852
Micromus pumilio Stein 1863
Sympherobius venosus Navás 1908
Sympherobius conspersus Navás 1908
Sympherobius lambereti Navás 1910

Sympherobius bellus Navás 1911
Sympherobius menendezi Navás 1913
Sympherobius melanogaster Navás 1915
Sympherobius fortini Lacroix 1924
Nefasitus italicus Navás 1932
Sympherobius laetus Steinmann 1967
pellucidus (Walker 1853)
Hemerobius pellucidus Walker 1853, nec Wallengren 1871
Sympherobius carpathicus Kis 1965
fuscescens (Wallengren 1863)
Hemerobius fuscescens Wallengren 1863
Hemerobius pellucidus (Walker 1853) in Wallengren 1871
Hemerobius obscurellus Zetterstedt 1840
Hemerobius inconspicuus McLachlan 1868
Niremberge limpida Navás 1909

MEGALOMUS Rambur 1842
hirtus (Linnaeus 1761)
Hemerobius hirtus Linnaeus 1761
Hemerobius fimbriatus Curtis 1828
Hemerobius decussatus Leach cf Hagen 1866

DREPANEPTERYX Leach, 1815
DREPANOPTERYX Burmeister 1839
phalaenoides (Linnaeus 1758)
Hemerobius phalaenoides Linnaeus 1758

CHRYSOPIDAE Schneider 1851
CHRYSOPINAE Schneider 1851

CHRYSOPA Leach 1815
abbreviata Curtis 1834
Chrysopa immaculata Stephens 1836
Chrysopa chlorophanus Ratzeburg 1844
Chrysopa germanica Esben-Petersen 1913
phyllochroma Wesmael 1841
Chrysopa pusilla Brauer 1850
Chrysopa tenella Brauer 1850
Chrysopa abbreviata Schneider 1851 partim, nec Curtis 1834
Chrysopa peterseni Navás 1910
Chrysopa magnicauda Tjeder 1936
commata Kis & Ujhelyi 1965
perla (Linnaeus 1758) nec Stephens 1836, nec Evans 1848
Hemerobius perla Linnaeus 1758
Hemerobius chrysopa Fabricius 1775, nec Linnaeus 1758
Chrysopa cancellatus Schrank 1802
Chrysopa reticulata Leach 1815
Chrysopa maculata Stephens 1836
Chrysopa nigriceps Okamoto 1914
Cintameva perla (Linnaeus) Navás 1915
Chrysopa nothochrysodes Navás 1936
dorsalis Burmeister 1839
Chrysopa pini Brauer 1850
pallens (Rambur 1838)
Hemerobius pallens Rambur 1838
Chrysopa septempunctata Wesmael 1841
Hemerobius mauricianus Rambur 1842
Chrysopa nobilis Brauer 1851
Chrysopa cognata McLachlan 1867
Chrysopa centralis McLachlan 1875
Chrysopa robusta Gerstaecker 1894
Chrysopa ricciana Navás 1910

CHRYSOPERLA Steinmann 1964
carnea (Stephens 1836)
Chrysopa carnea Stephens 1836
Chrysopa affinis Stephens 1836
Chrysopa microcephala Brauer 1850
Chrysopa vulgaris Schneider 1851
Chrysopa plorabunda Fitch 1856
Chrysopa lampropter Stein 1863
* *Chrysopa lucasina* Lacroix 1912
Chrysopa pillichi Pongracz 1913
Chrysopa nipponensis Okamoto 1914
Chrysopa kurisakiana Okamoto 1914
** *Chrysopa kolthoffi* Navás 1927
Chrysopa angelina Navás 1931
Chrysopa quettana Navás 1931
Chrysopa downesi Smith 1932
Chrysopa ferganica Navás 1933
Chrysopa pictavica Lacroix 1933
* *Chrysopa renoni* Lacroix 1933
Chrysopa sinica Lacroix 1933
Chrysopa mohave Banks 1938
Chrysopa canariensis Tjeder 1939
Chrysopa lundbladi Tjeder 1939
Chrysopa maderensis Tjeder 1939

CHRYSOPIDIA Navás 1910
ciliata (Wesmael 1841)
Chrysopa ciliata Wesmael 1841

* Now regarded as having full specific status by Leraut (1991)
**Now regarded as having full specific status by Leraut (1992)

Chrysotropia ciliata (Wesmael 1841)
Chrysotropia lacroixi Navás 1911
Chrysopa japonica Nakahara 1915
Chrysopa linensis Navás 1916
Chrysopa melaneura Navás 1916
Chrysopa alba Lacroix 1924, nec auctt.

CUNCTOCHRYSA Hölzel 1970
albolineata (Killington 1935)
Chrysopa albolineata Killington 1935
Chrysopa tenella Schneider 1851, nec Brauer 1850

MALLADA Navás 1925
flavifrons (Brauer 1850)
Chrysopa flavifrons Brauer 1850
Anisochrysa flavifrons (Brauer 1850)
Chrysopa lineolata McLachlan 1880
Chrysopa narcissina Navás 1910
Chrysopa luteola Navás 1915
prasina (Burmeister 1839)
Chrysopa prasina Burmeister 1839
Chrysopa aspersa Wesmael 1841
Hemerobius prasinus (Burmeister) Rambur 1842
Chrysopa coerulea Brauer 1850
Chrysopa zelleri Schneider 1851
Chrysopa abdominalis Brauer 1855
Hemerobius ramburii Costa 1855
Chrysopa mariana Navás 1905
Chrysopa sachalinensis Matsumura 1911
Chrysopa nikkoensis Okamoto 1914
Chrysopa caucasica Navás 1914
Chrysopa burri Navás 1914
Chrysopa ventralis Curtis 1834 f. *prasina* sensu Killington 1937
Anisochrysa prasina (Burmeister) Ressl 1971
ventralis (Curtis 1834)
Chrysopa ventralis Curtis 1834
Anisochrysa ventralis (Curtis 1834) Hölzel 1970

NINETA Navás 1912
flava (Scopoli 1763)
Hemerobius flavus Scopoli 1763
Chrysopa perla Stephens 1836 partim, nec Linnaeus 1758
Chrysopa subfalcata Stephens 1836
Chrysopa vittata Schneider 1851, nec Wesmael 1841
Chrysopa vittata Brauer 1857, nec Wesmael 1841
vittata (Wesmael 1841)
Hemerobius albus Fabricius 1775, nec Linnaeus 1758
Chrysopa perla Stephens 1836 partim, nec Linnaeus 1758
Chrysopa alba Burmeister 1839, nec Linnaeus 1758
Chrysopa vittata Wesmael 1841
Hemerobius proximus Rambur 1842
Chrysopa alba Brauer 1851, nec Linnaeus 1758
Chrysopa integra Hagen 1852
Chrysopa olivacea Gerstaecker 1893
Chrysopa inornata Matsumura 1911
Chrysopa inornatella Nakahara 1914
Chrysoscera vittata (Wesmael) Lacroix 1924

NOTHCHRYSINAE Navás 1910

NOTHOCHRYSA McLachlan 1868
capitata (Fabricius 1793)
Hemerobius capitatus Fabricius 1793
Chrysopa capitata (Fabricius) Stephens 1834
Nathanica capitata (Fabricius) Navás 1913
fulviceps (Stephens 1836)
Chrysopa fulviceps Stephens 1836
Hemerobius erythrocephalus Rambur 1842
Nathanica fulviceps (Stephens) Navás1913

MECOPTERA

BOREIDAE McLachlan 1868

BOREUS Latreille 1825
hyemalis (Linnaeus 1767)
Panorpa hyemalis Linnaeus 1767
Panorpa proboscideus Panzer 1796
Boreus gigas Brauer 1876 nomen nudum

PANORPIDAE Leach 1815

PANORPA Linnaeus 1758
cognata Rambur 1842
Panorpa alpina Hagen 1858, nec Rambur 1842
Panorpa ghilianii McLachlan 1869
Panorpa subalpina Navás 1927
Panorpa osellai Willmann 1976

communis Linnaeus 1758
  Panorpa diffinis McLachlan 1869
  Panorpa raehlei Lauterbach 1970
germanica Linnaeus 1758
  Panorpa affinis Leach 1815
  Panorpa apicalis Stephens 1836
  Panorpa borealis Stephens 1836
  Panorpa montana Brauer 1857
  Panorpa gibberosa Mclachlan 1869
  Panorpa ruizi Navás 1926
  Panorpa riegeri Lauterbach 1971

DISTRIBUTION MAPS AND SPECIES ACCOUNTS

Recording coverage

Map 1 shows the 10 km squares from which records have been received. This map includes records from all sources. The map also serves as a guide to areas from which there are no records, where surveys are essential before the data base can be updated and further maps produced.

To be able to provide information to aid species and site conservation, it is important to know which species are present at this time, rather than which species were recorded at some time in the past. Map 2 summarises the numbers of species recorded from each 10 km square during the period 1980–92. This map shows groupings of well-recorded squares, and reflects the intensity of recording by a few active entomologists rather than the distribution patterns of species. Such bias in recording, which is inevitable in the early stages of a scheme, will be reduced as more records are received.

Total number of validated records

As a result of the validation of records described earlier, many records, mainly from early published sources, have been eliminated from the data set. The full data set, as summarised in this *Atlas*, consists of the following:

Total number of records from before 1900: 438

Total number of records from 1.1.1900 to 31.12.1979: 6173

Total number of records from 1.1.1980 to 15.11.1992: 7483

Overall total number of validated records: 14 094

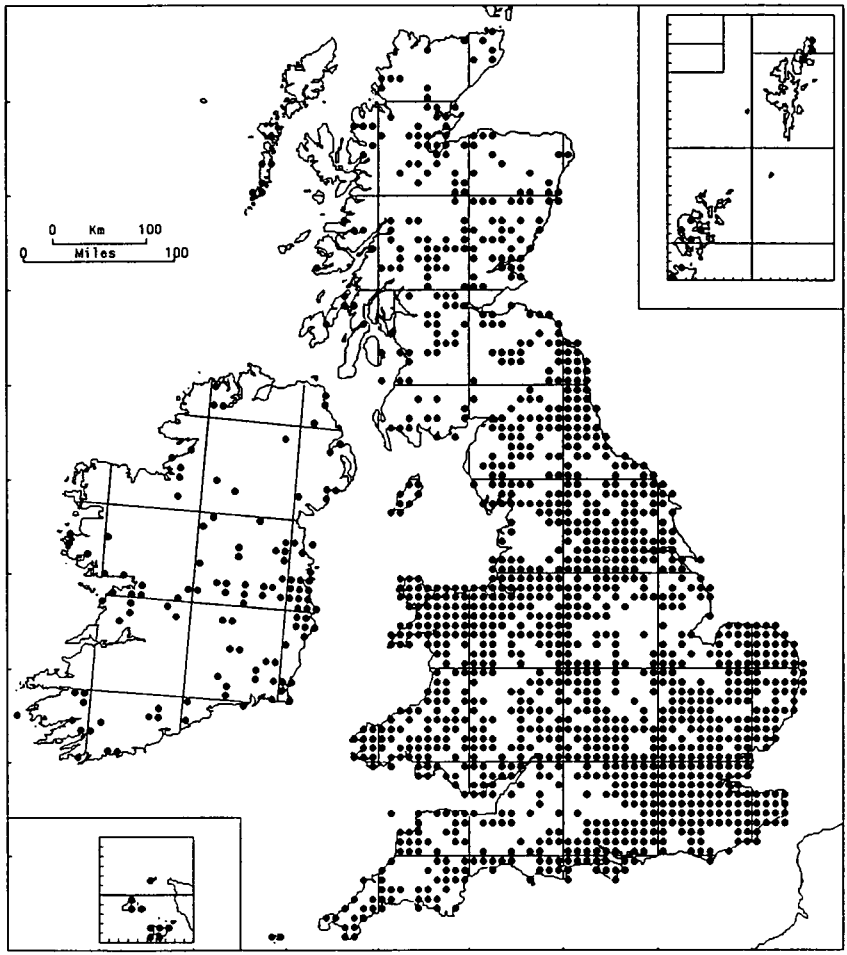
Species accounts

The species accounts, with few exceptions, include the following sections.

Distribution and status

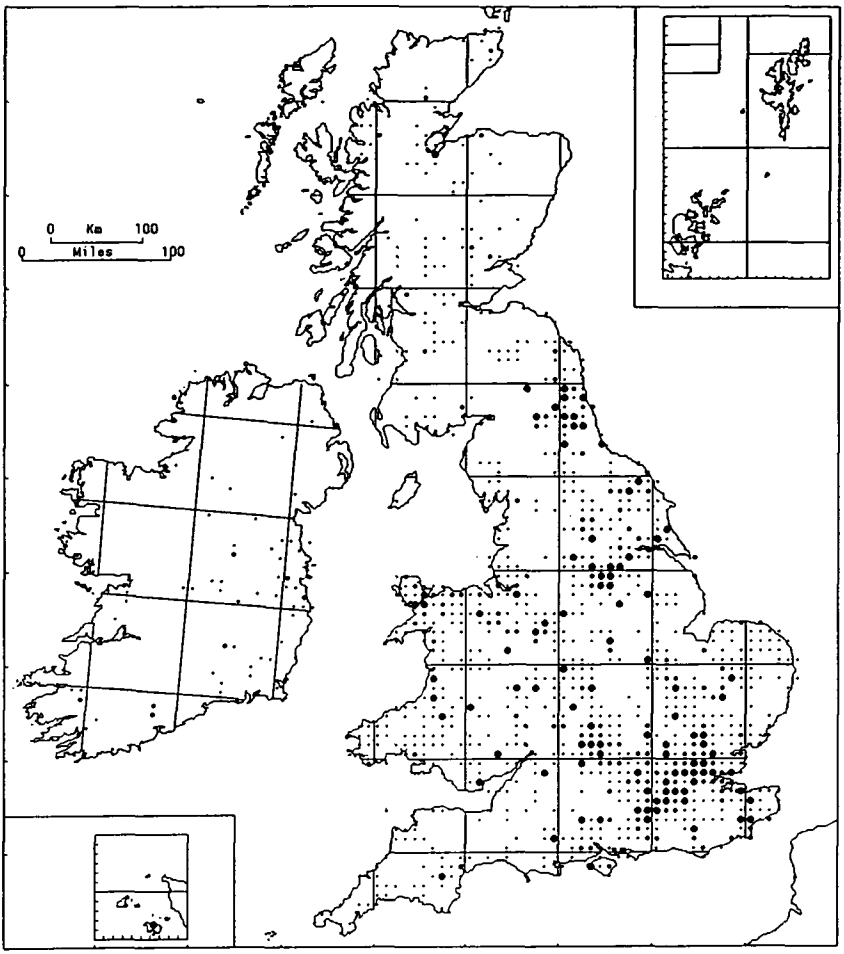
General statements are given on the occcurrence and status of species. There has been some confusion of terms used to define range with terms which define abundance. In these accounts, the terms *widespread* and *local* are used to refer to the range of a species as summarised in the distribution map. The terms *common* and *rare* refer to the status of the species, effectively its abundance at the regional or national scale. Therefore, it is possible for a rare species to be widespread, but equally possible for a species to have a local distribution and to be common.

Map 1 Neuroptera – recorded squares



● **All records**

Map 2 Neuroptera – number of species per square 1980–92



- ● 11–32
- ● 6–10
- • 1–5

Table 4. The Standard Weeks used to tabulate and analyse adult flight periods

Week No	Dates	Week No	Dates	Week No	Dates	Week No	Dates
1	1 Jan– 7 Jan	14	2 Apr– 8 Apr	27	2 Jul– 8 Jul	40	1 Oct– 7 Oct
2	8 Jan–14 Jan	15	9 Apr–15 Apr	28	9 Jul–15 Jul	41	8 Oct–14 Oct
3	15 Jan–21 Jan	16	16 Apr–22 Apr	29	16 Jul–22 Jul	42	15 Oct–21 Oct
4	22 Jan–28 Jan	17	23 Apr–29 Apr	30	23 Jul–29 Jul	43	22 Oct–28 Oct
5	29 Jan– 4 Feb	18	30 Apr– 6 May	31	30 Jul– 5 Aug	44	29 Oct– 4 Nov
6	5 Feb–11 Feb	19	7 May–13 May	32	6 Aug–12 Aug	45	5 Nov–11 Nov
7	12 Feb–18 Feb	20	14 May–20 May	33	13 Aug–19 Aug	46	12 Nov–18 Nov
8	19 Feb–25 Feb	21	21 May–27 May	34	20 Aug–26 Aug	47	19 Nov–25 Nov
9	26 Feb– 4 Mar	22	28 May– 3 Jun	35	27 Aug– 2 Sep	48	26 Nov– 2 Dec
10	5 Mar–11 Mar	23	4 Jun–10 Jun	36	3 Sep– 9 Sep	49	3 Dec– 9 Dec
11	12 Mar–18 Mar	24	11 Jun–17 Jun	37	10 Sep–16 Sep	50	10 Dec–16 Dec
12	19 Mar–25 Mar	25	18 Jun–24 Jun	38	17 Sep–23 Sep	51	17 Dec–23 Dec
13	26 Mar– 1 Apr	26	25 Jun– 1 Jul	39	24 Sep–30 Sep	52	24 Dec–31 Dec

Habitat

The comments summarise information from recorders, compiled on completed RA68 recording cards, supplemented by personal observations and, in some cases, published information. However, published information which was considered to be imprecise, or based on supposition, has been omitted.

Collecting

It is essential to collect specimens for reliable identification of almost every species. Collecting methods found to be appropriate for individual species are noted, but reliance on one or a few methods will inevitably lead to some species being overlooked.

Season

There is little published information on the phenology of lacewings. Data from completed record cards provide the first large-scale set of information on the phenology of species in Britain and Ireland. Although much of this information is fragmentary, results are summarised for all species. In some cases the data have been allocated to standard weeks (see Table 4).

Distribution maps

A distribution map is included for all but the rarest species. The following symbols are used on the species maps:

- ○ Recorded prior to 1900, but not since
- ● Recorded since 1900, but not since 1979
- ■ Recorded during the period 1980–92

RAPHIDIOPTERA

The Raphidioptera (snakeflies) are separated from the Megaloptera *sensu stricto* (with which they were formerly grouped), partly on the life history of the larvae: Raphidioptera have larvae which are terrestrial, whereas the larvae of Megaloptera are aquatic. Adult snakeflies are characterised by their enormously elongated pronota, from which the English name is derived.

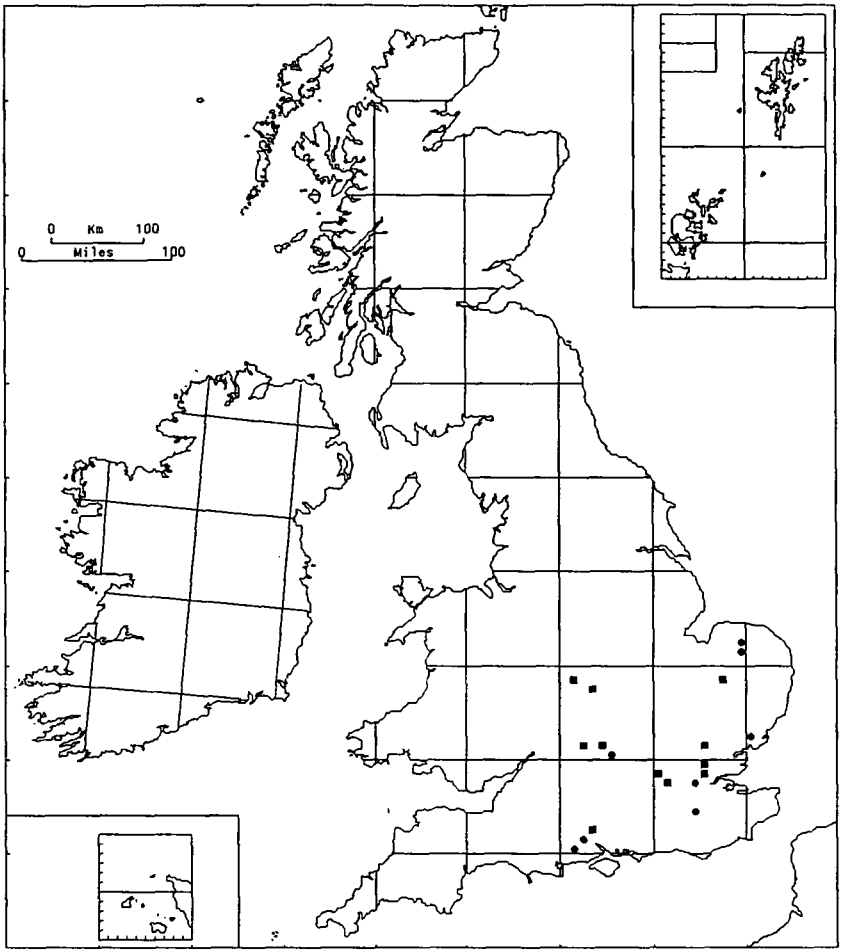
The distinctive ovipositor of the female is used to deposit eggs in the cracks of bark on either standing trunks or fallen logs. The larvae are predatory on beetle larvae, especially Tenebrionidae, and probably on other larvae, such as those of Diptera. They are, however, rather inactive and seem not to hunt their prey actively. In British species, the life cycle is over two years and larvae can be parasitised by Ichneumonidae. Pupation takes place either in debris at the foot of the tree or in loose bark or debris on the surface. Emergence is usually synchronised in *Atlantoraphidia maculicollis* (and is likely to be so in the other British species) so that there is a mass emergence of adults over a short period of time. Mating usually takes place immediately after emergence and the adult snakeflies then ascend to the tree tops where they remain, feeding on aphids, larvae of micro-lepidoptera and other small insects, seldom descending unless blown by strong winds.

Identification

Most specimens can be reliably identified using the key in Fraser (1959), but this does not deal fully with the variation within each species. In *A. maculicollis*, the vein R is sometimes forked at its distal end. The pterostigma of *Subilla confinis* is typically yellow, not dark brown to black as stated by Fraser, which has led to several museum examples of *S. confinis* being misidentified as *Xanthostigma xanthostigma*. Revised keys have been published in *Neuro News* **2**, and by Aspöck *et al.* (1991) (see Table 1).

Four species are currently known in Britain, but they are poorly recorded, especially in Scotland, and it is possible that at least one species may remain as yet undiscovered there. There are no records of snakeflies in Ireland. The classification of the Raphidioptera has recently undergone major revision and our four species are no longer considered to belong to the single genus *Raphidia*, but all belong to the family Raphidiidae.

Map 3 *Subilla confinis* (Stephens 1836)



Subilla confinis (Stephens 1836)

Distribution and status

This species is local and uncommon and has been recorded sparsely from the southern Midlands, East Anglia, and the south of England. Whether this apparent distribution is genuine is difficult to discern because, like the other three British species of Raphidioptera, it is mainly arboreal as an adult and is rarely collected.

Habitat

Fraser (1959) states that its habits and habitats are similar to those of *A. maculicollis*, which is confined to pine (*Pinus* spp.) and larch (*Larix* spp.) plantations. At present, there is insufficient reliable information to confirm the accuracy of that statement. Errors in Fraser's key and the difficulty experienced by many entomologists in determining species may have led to mistakes in attributing habitats to species.

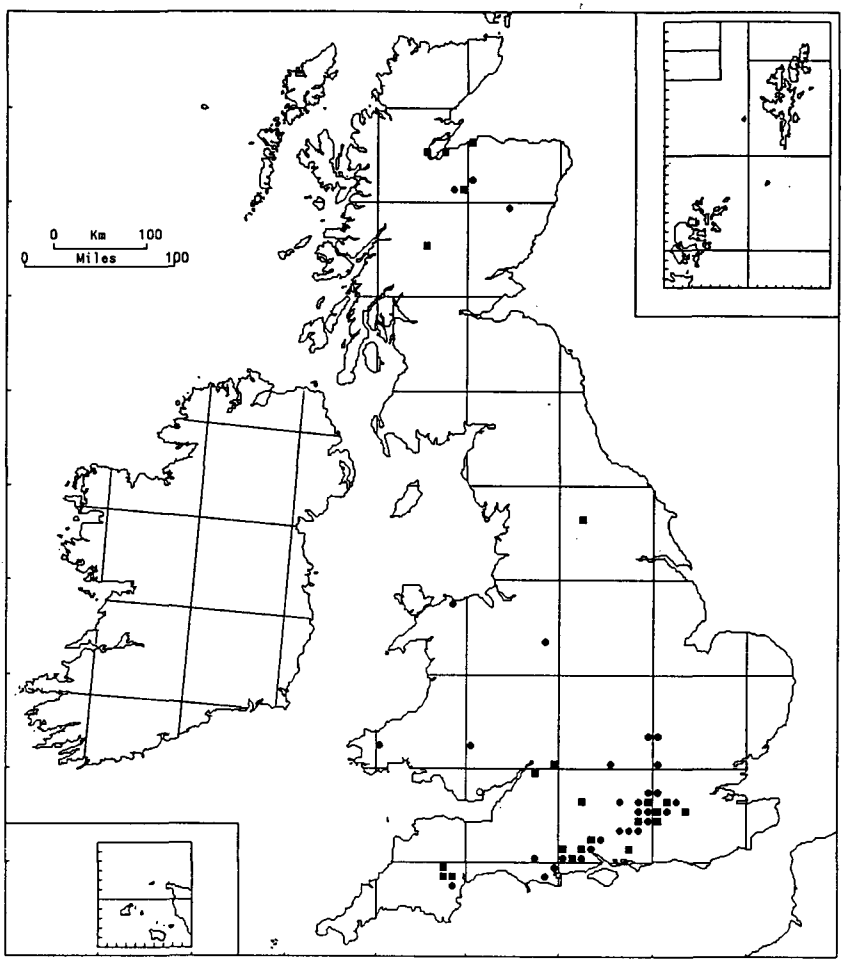
Collecting

Like all the snakeflies, *S. confinis* is most easily found low on the trunks of trees, where teneral examples will be found sitting for a short period immediately after emergence. Information on the species of trees on which this species is found is needed. Sweeping of vegetation adjacent to suitable trees soon after strong winds can also be rewarding. Any Scottish specimens, apparently of this species, should be checked to eliminate *Raphidia ophiopsis* – a very similar species not yet recorded in Britain.

Season

It overwinters as a larva. Adult records are from weeks 19 to 34, with a peak in week 23.

Map 4 *Atlantoraphidia maculicollis* (Stephens 1836)



Atlantoraphidia maculicollis (Stephens 1836)

Distribution and status

This species has a localised distribution, but may be common where it occurs. It is apparently absent from the Channel Islands and Ireland. The range in Britain appears disjunct, which may be real because the species seems to be restricted to large conifer plantations. The preponderance of southern records is a result of recorder bias. Fraser (1959) regards *A. maculicollis* as '... our commonest species; may be found emerging in numbers at the foot of pine trees during early May'. Whilst the species is indeed plentiful where it occurs, its distribution is by no means as general as that of *X. xanthostigma*.

Habitat

Where information was given, all records were directly related to, or associated with, pines or larches.

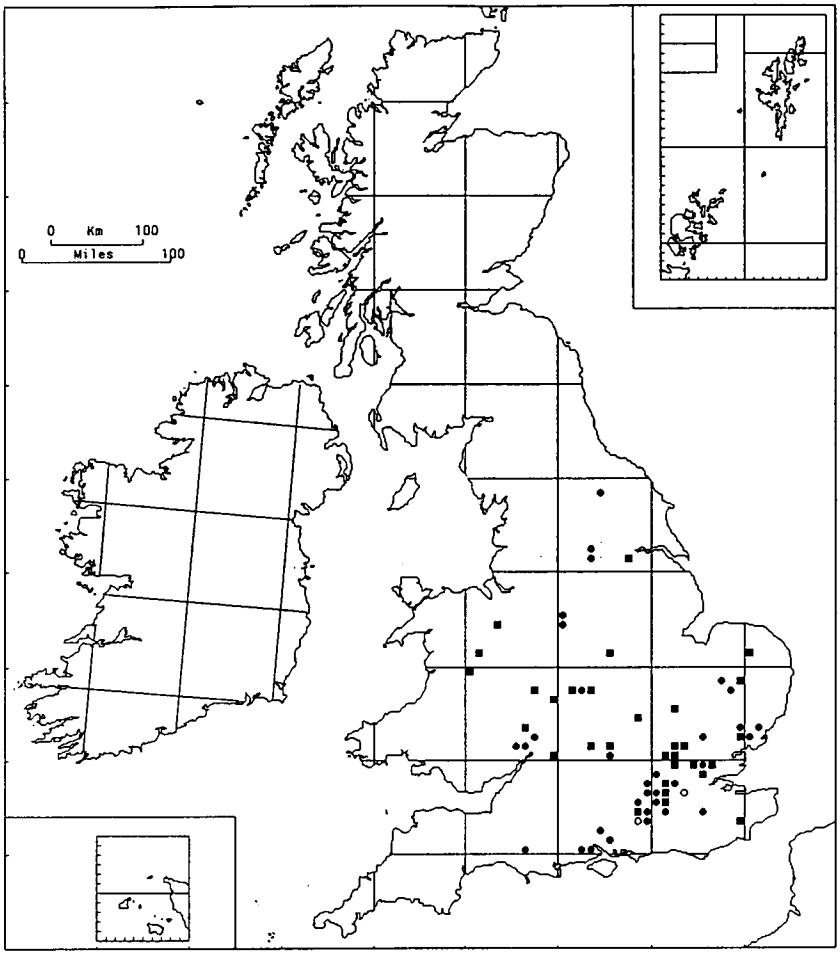
Collecting

One of the best ways to find this species is to look for adults sitting at the ends of pine branches on sunny days in early May (W R B Hynd pers. comm.). It has also been taken by beating pine and larch foliage, and in malaise traps. Larvae have been found under the loose bark of fallen pine logs.

Season

It overwinters as a pupa. The adult flight period is from May to July, with a distinct peak in June.

Map 5 *Phaeostigma notata* (Fabricius 1781)



Phaeostigma notata (Fabricius 1781)

Distribution and status

It is probably widespread and common wherever oaks (*Quercus* spp.) occur in England. It has not yet been recorded from the west country, western Wales, Scotland, and the Channel Islands, probably a result of under-recording.

Habitat

This, our largest species of snakefly, appears to be confined to oaks. The larvae are alleged to be predators of beetle larvae, under the bark of fallen logs or stumps.

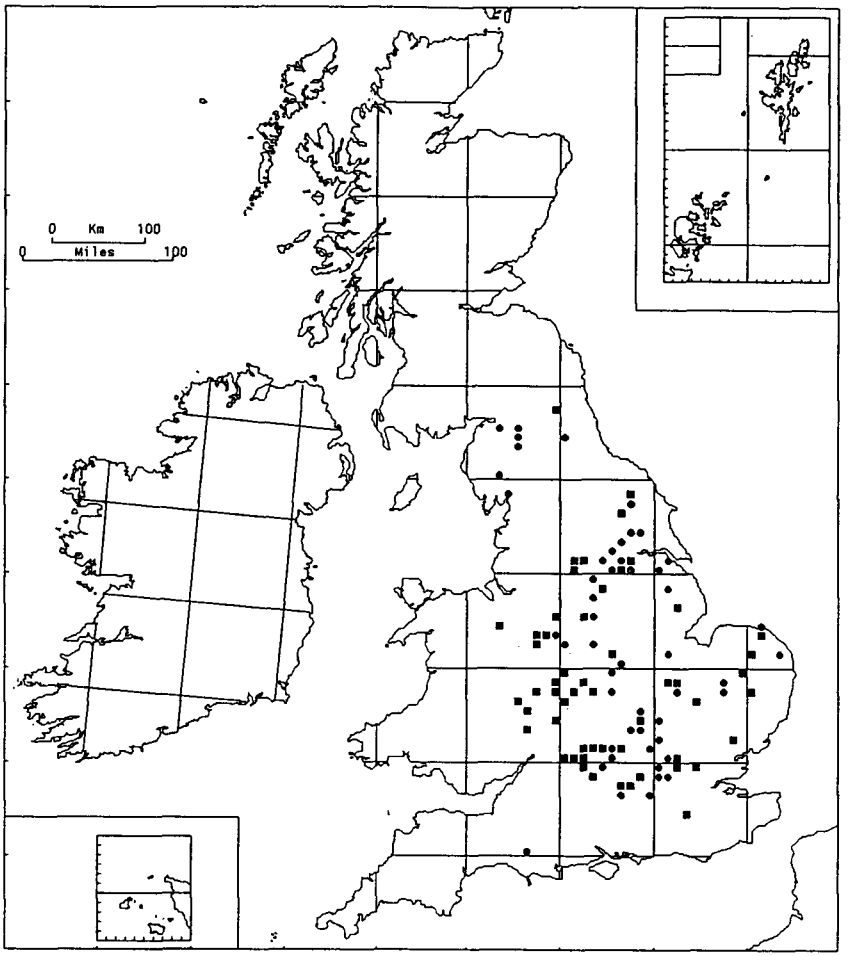
Collecting

The adults are strictly arboreal, but sweeping vegetation soon after stormy weather seems to be an effective method of capture. In Essex, adults have been beaten from oak trees at 6 metres above ground level, by standing on deer-shooting platforms constructed in the trees. There is a single record of an adult in a pitfall trap in June.

Season

It overwinters as a larva. The main adult flight period is in late May and June.

Map 6 *Xanthostigma xanthostigma* (Schummel 1832)



Xanthostigma xanthostigma (Schummel 1832)

Distribution and status

This species is widespread and locally common. Misidentifications as other species are partly responsible for the alleged rarity of the insect in earlier British publications. It has not yet been recorded from the Channel Islands, the south-west, western Wales, Scotland or Ireland.

Habitat

There seems to be no evidence to support Fraser's statement that this species is confined to willows (*Salix* spp.), but neither are there sufficient data to be able to suggest what its habitat may be. Many present-day records relate to oaks.

Collecting

Sweeping vegetation in woodlands, particularly after high winds, has produced several records. Two adults were beaten from oak and a larva was found the under flaking bark of an oak log in March. One adult was taken in a pitfall trap in April.

Season

It overwinters as a larva. The main adult flight period is in June.

MEGALOPTERA

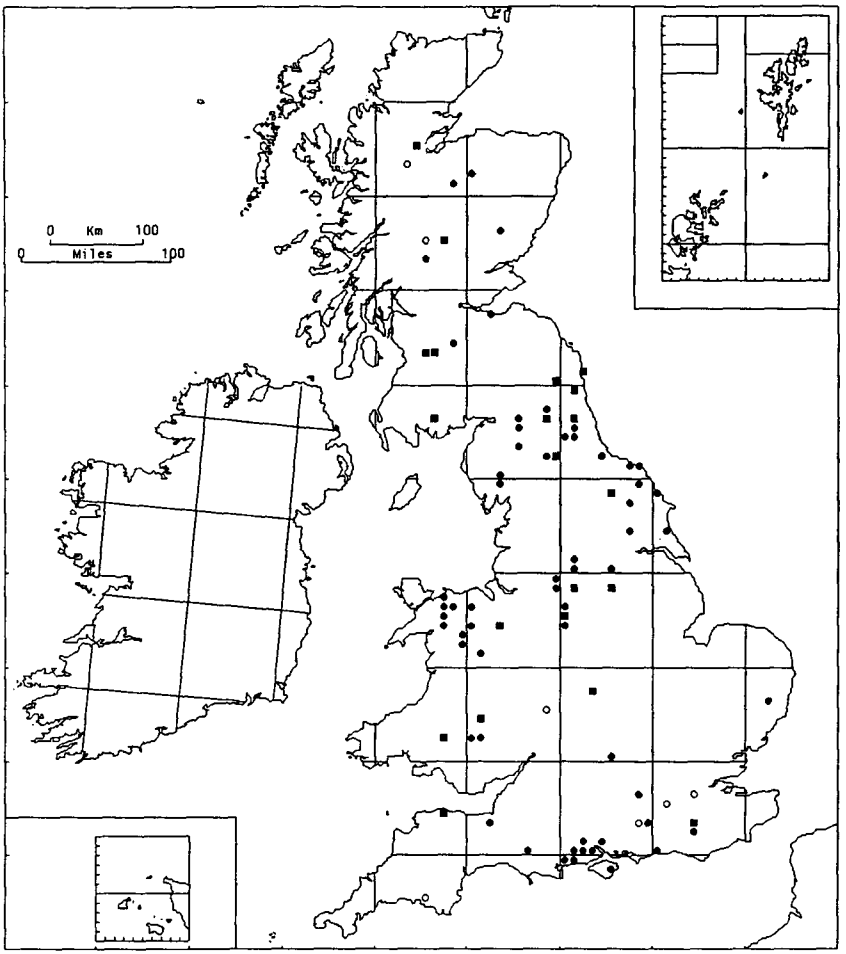
Alderflies are familiar and distinctive insects, which are typically associated with the marginal vegetation of rivers, lakes and ponds. They have no particular association with alder (*Alnus glutinosa*) trees.

The greyish egg masses are laid on emergent vegetation or, more rarely, on inorganic objects at the waterside. The larvae emerge after 7 to 14 days and fall or crawl to water. The eggs of *Sialis lutaria* are frequently parasitised, but no reliable data are available for the other two species. The larvae are truly aquatic and are predatory on a range of invertebrates. The larval stage lasts for two years in Britain, but, in high-altitude lakes abroad, the larval stage often spans three winters (Elliott 1977). The pupa is formed in a chamber which the larva digs about 1 cm down in waterside debris; after about three weeks the mobile pupa climbs emergent vegetation and the adult emerges. Emergence of adults is frequently synchronised, and it is not unusual to encounter several hundred teneral adults resting on waterside vegetation.

Identification

Until recently, only two species of Megaloptera: Sialidae were recognised in Britain and one in Ireland. The discovery of *Sialis nigripes* in 1976 (Barnard 1977) has placed in question earlier records, until such time as voucher material can be examined. For this reason, the distribution maps exclude a large number of older records. For correct determination, the genitalia of males or the anal plates of females must be examined. These features are illustrated, for all three species, by Barnard (1977) and in *Neuro News* **4**. The best key to the early stages is that of Elliott *et al.* (1979), whilst Barnard (1977) illustrates the distinctive eggs of *S. nigripes*.

Map 7 *Sialis fuliginosa* Pictet 1836



Sialis fuliginosa Pictet 1836

Distribution and status

This species is widespread, but rather locally distributed; it has an extensive range which suggests that it is under-recorded. There are no records from Ireland or the Channel Islands.

Habitat

All records are from flowing water and, though most are from fast-flowing streams and rivers, there are some from slow-moving water bodies. Torrents appear unsuitable for this species. A factor common to all the sites for which information is available is clean, clear water with an absence of silt. The pH of the water does not seem to be important.

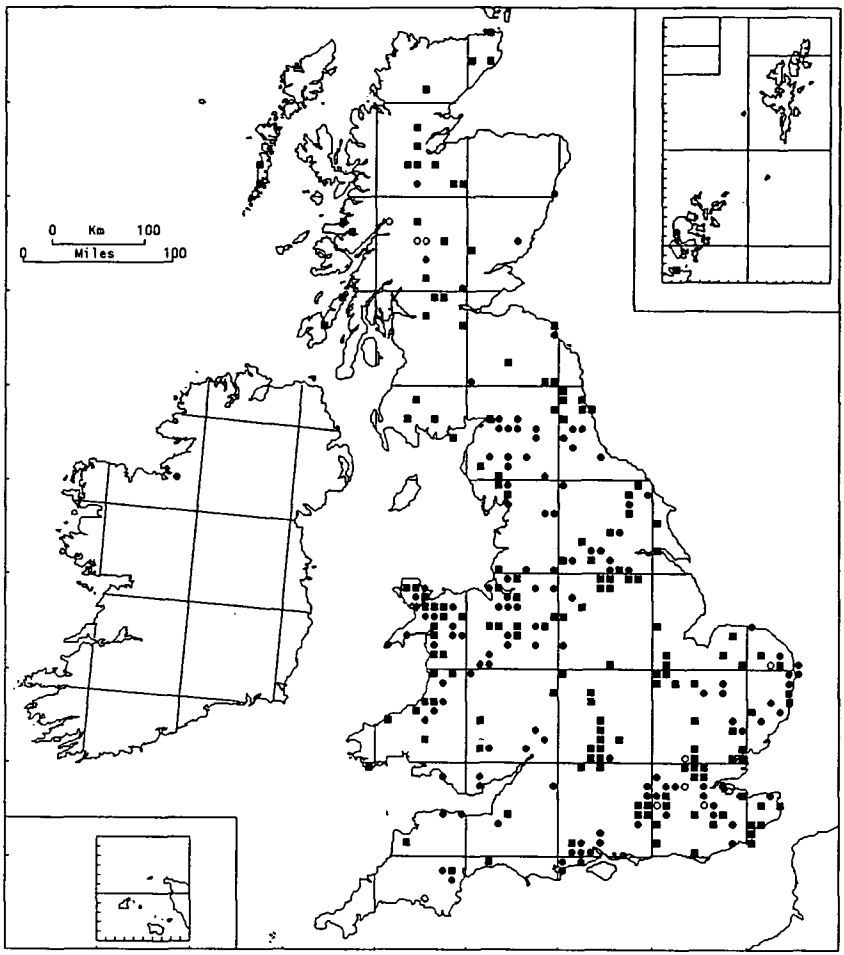
Collecting

Almost all records are of adults taken at rest or swept from waterside vegetation. Others were beaten from various trees or bushes close to water or were taken in malaise traps in wetlands. The species has not, so far, been recorded using light traps.

Season

The larvae leave water to pupate from late April to June (Elliott 1977) and the main adult flight period runs from May to July, with a peak in June.

Map 8 *Sialis lutaria* (Linnaeus 1758)



Sialis lutaria (Linnaeus 1758)

Distribution and status

S. lutaria is widespread and common throughout Britain, as far north as Orkney. It also occurs in Ireland, but is not recorded from the Channel Islands.

Habitat

This species is recorded from both static and moving water bodies: from small village ponds to large lakes and from small streams to major rivers. Where the flow of water is rapid, records all relate to small backwaters or side channels where the flow is slower. Common factors at sites where this species occurs are the presence of emergent vegetation and a bottom deposit of mud or silt. There are some records from heavily turbid rivers. Because of the difference in habitat requirements, *S. lutaria* often occurs in the absence of the other two species. However, there are several records of both *S. lutaria* and *S. fuliginosa* occurring together and two records, both from Wales, of all three species together.

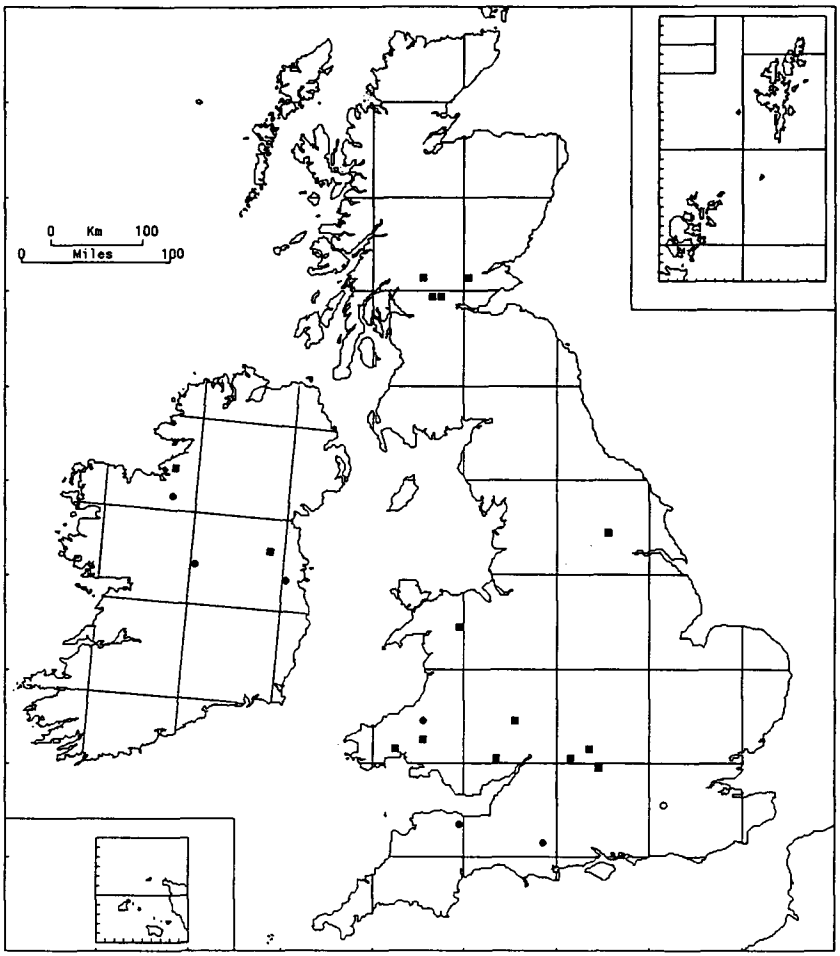
Collecting

Adults are most frequently recorded at rest on emergent vegetation, from which they are easily picked up or swept. Beating waterside trees and bushes also produced many records. One adult was taken on a yellow sticky trap at a wetland in Suffolk, and there are two records from light traps. Malaise traps in wetlands are also productive, but water traps seem ineffective.

Season

The adult flight period runs from early April to early August with a single marked peak in May and June.

Map 9 *Sialis nigripes* Pictet 1865



Sialis nigripes Pictet 1865

The wing venation characters of this species are frequently intermediate between those of *S. lutaria* and *S. fuliginosa*. Examination of the genitalia is the only reliable method of determination of this or any other *Sialis* species in Britain and Ireland.

Distribution and status

The first record published was that made by Martin Speight in Co Westmeath in 1976 (Barnard 1977). However, subsequent examination of museum specimens (labelled as the other *Sialis* species) has revealed that *S. nigripes* has occurred in both Ireland and Britain since at least 1867. Nevertheless, it seems to be genuinely more rare than the preceding two species, and so far has been reported only in small numbers.

Two Yorkshire records cited by Kirby (1991), from the River Derwent and the River Ribble, are not mapped because it has not been possible to locate the records to 10 km squares. A recent record from Norfolk is not mapped because it is unconfirmed.

Habitat

The Irish records suggest that *S. nigripes* is associated with calcareous rivers and lakes (O'Connor & O'Grady 1990). However, other records are from rivers of different character, such as the Tywi and Taf in Wales, where Ian Morgan found all three *Sialis* species together during 1991. Here the pH of the water is neutral and the bottom a mixture of sand and silt. Kaiser (1950) suggests that wide, open rivers are preferred by *S. nigripes*. Fozzard and Clelland (1981) provide data on bottom type, flow rates and macrophytes present (but not pH values) for the River Forth in Scotland where both *S. nigripes* and *S. lutaria* occur together. There are, as yet, insufficient data to be able to characterise the habitat requirements of this species.

Season

The adult flight period is in May and June.

NEUROPTERA

The original Linnean order 'Neuroptera' included many groups, such as caddisflies (Trichoptera) and dragonflies (Odonata), which were subsequently considered to be valid orders in their own right. During this century, the Raphidioptera, Megaloptera and Mecoptera have also been separated from the 'Neuroptera' and raised to full order status. The present-day Neuroptera is the grouping which was formerly regarded as the sub-order Planipennia.

Six families of the Neuroptera (lacewings) occur in Britain and Ireland:

1. Coniopterygidae (11 species) – waxflies or dustywings
2. Osmylidae (1 species)
3. Sisyridae (3 species) – spongeflies
4. Myrmeleontidae (1 species plus one on the Channel Islands only) – antlions
5. Hemerobiidae (30 species) – brown lacewings
6. Chrysopidae (13 species) – green lacewings.

Although the larvae of most lacewings are terrestrial, a few are amphibious and one or two genera are truly aquatic. The larvae are predatory and some are regarded to be aphid predators of economic significance. Although most adult lacewings are also predatory, again mainly on aphids, some are pollen feeders.

1 CONIOPTERYGIDAE

Members of the family Coniopterygidae (waxflies or dustywings) differ markedly from other lacewings. They are small, none exceeding 8 mm wing span, and generally resemble whiteflies (Hemiptera: Aleyrodidae) which are familiar pests of cultivated plants. However, the characteristic venation of the wings at once distinguishes the waxflies from the practically veinless whiteflies.

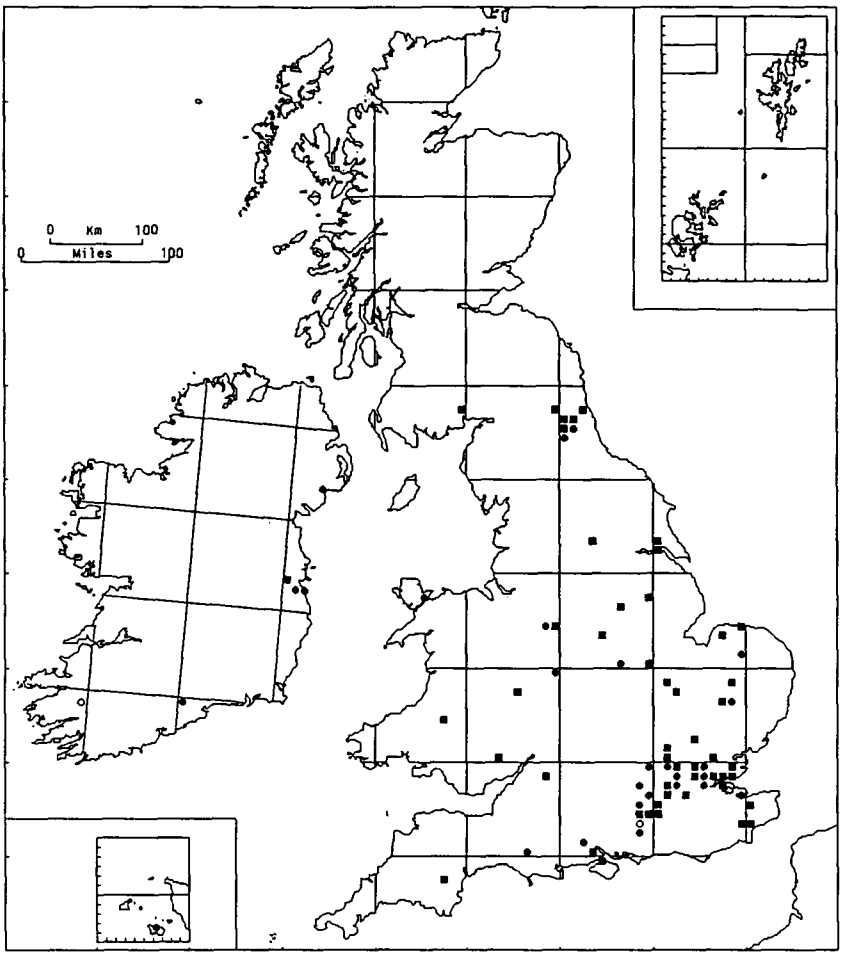
Not surprisingly, these minute insects are under-recorded in Britain and Ireland. Both Killington (1936–37) and Fraser (1959) recognised a total of seven British species – one each in the genera *Aleuropteryx*, *Conwentzia*, *Semidalis* and *Parasemidalis*, and three in the genus *Coniopteryx*. Later, Meinander (1972) transferred *Aleuropteryx lutea* to the genus *Helicoconis*, but the discovery in Britain of *Aleuropteryx juniperi* (Ward 1970) meant the retention of *Aleuropteryx* as a British genus. Since then, a second *Conwentzia*, a second *Semidalis* and two additional species of *Coniopteryx* have been added to the list, giving a total of 12 species, although one, *Helicoconis lutea*, is no longer regarded as having occurred in Britain. Only two species are recorded as occurring in Ireland. A review of the British and Irish species of Coniopterygidae is given by Plant (1991a) and updated by Plant (1992), and the Coniopterygidae of the world are reviewed by Meinander (1990).

Identification

The identification of adult coniopterygids requires examination of the internal genitalia of the male, drawings of which are given by Plant (1991a, 1992). It is probable that additional species have still to be discovered in Britain, and more than the present two species may occur in Ireland. Specimens which look atypical should be checked by reference to the drawings in Aspöck *et al.* (1980).

The species accounts which follow are based solely on records of males, of which the genitalia have been examined either by me or by another experienced person. A great many records, not validated in this way, have been excluded, such as published records in which the text does not make clear that the genitalia were examined. Recent records, submitted to the Scheme on RA68 cards, where the sex of the insect was either female or not stated, have also been omitted.

Map 10 *Conwentzia psociformis* (Curtis 1834)



Conwentzia psociformis (Curtis 1834)

Distribution and status

The comments on *C. pineticola* (q.v.), concerning older records, relate also to this species. Examination of specimens in museums has shown most to be *C. psociformis*, perhaps suggesting that this is the commoner of the two species. It is widespread in England, Wales and the Channel Islands, with isolated records from Ireland, but it has not yet been reliably recorded from Scotland. It is under-recorded and will probably prove to be a common species.

Habitat

It has been recorded on many species of native deciduous trees, but never on any species of coniferous tree.

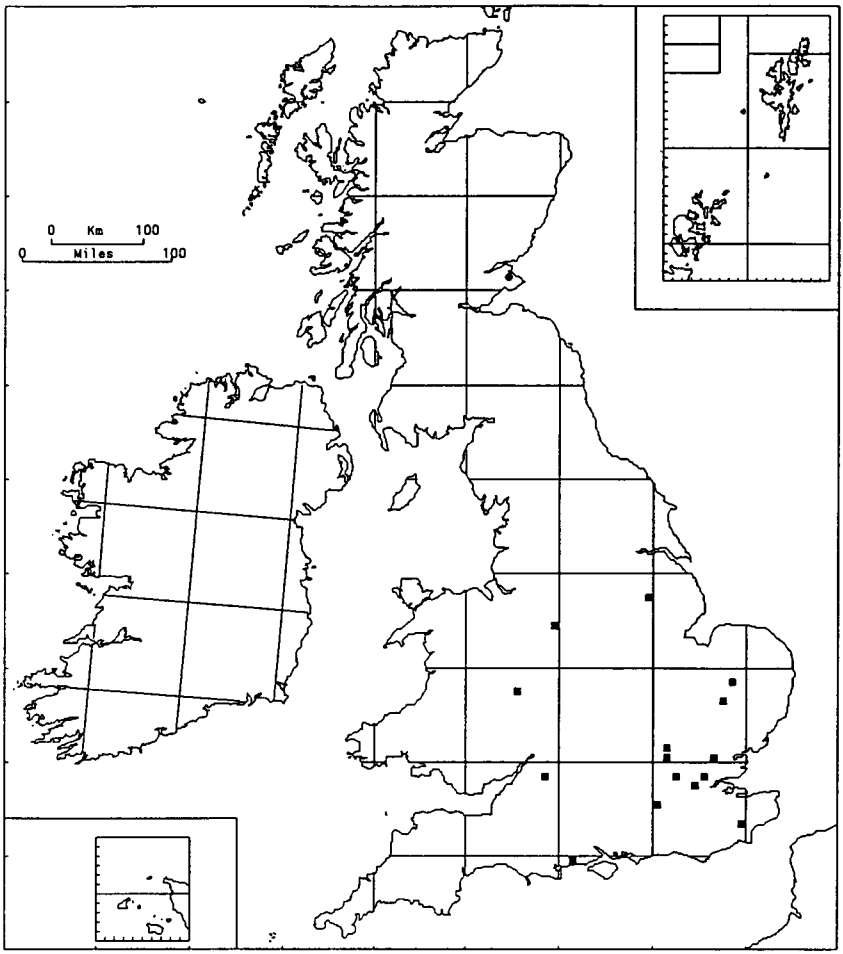
Collecting

Beating the foliage of deciduous trees is the best method of finding this species, with oaks producing most records. It is also frequently attracted to light traps and is very occasionally recorded in malaise traps.

Season

It has a long flight period, from April to September, suggesting that there may be two or more generations.

Map 11 *Conwentzia pineticola* Enderlein 1905



Conwentzia pineticola Enderlein 1905

Distribution and status

In spite of this being the type species of its genus (Enderlein 1905), both Killington (1936) and Fraser (1959) recognised only *Conwentzia psociformis* as a British species, regarding *C. pineticola* as a form of *C. psociformis*. It was not until recently that the existence of two species in Britain was published (Barnard 1978). Consequently, all previously published records have been disregarded unless supported by male specimens in collections.

C. pineticola is apparently widespread, but under-recorded, in central and south-eastern England and with a single old record from St Andrews, Fifeshire. It has not been reliably recorded in Wales, Ireland or the Channel Islands.

Habitat

It is apparently confined to Scots pine (*Pinus sylvestris*).

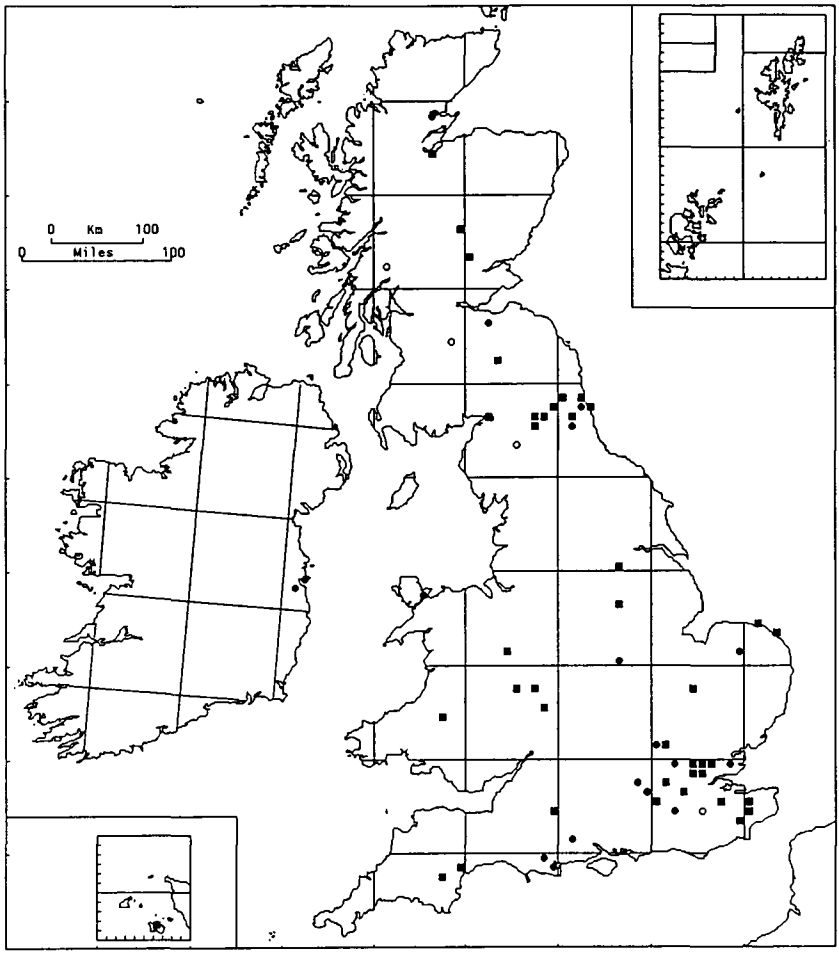
Collecting

All records, where capture details were given, were made by beating the foliage of Scots pines or from light traps in the vicinity of pines.

Season

Adults have been recorded in weeks 27, 31, 33 and 37.

Map 12 *Coniopteryx tineiformis* Curtis 1834



Coniopteryx tineiformis Curtis 1834

Distribution and status

This species is widely distributed and often very common throughout England and Scotland, with scattered records from Wales, Ireland and the Channel Islands. It is probably the most widespread *Coniopteryx* species in Britain.

Habitat

It has been recorded from deciduous and mixed woodland, scrubland, urban parks and suburban gardens. Adults have been recorded mainly from oaks, but also from birch (*Betula* spp.) and from various ornamental shrubs in parks.

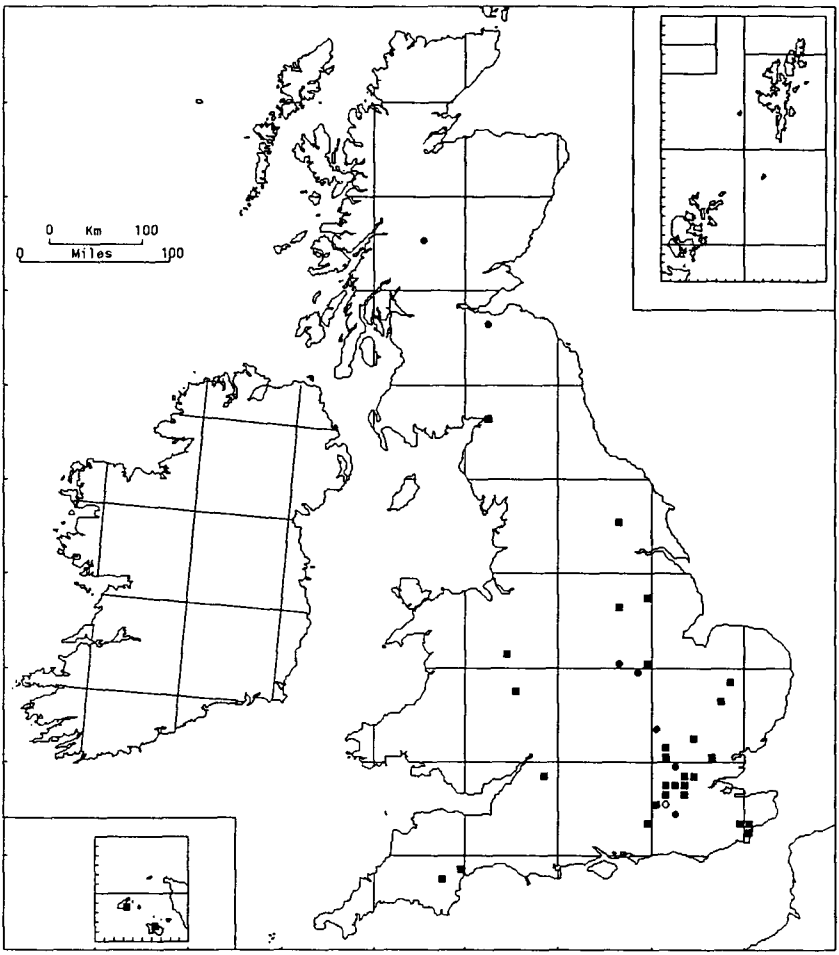
Collecting

Most records have come from light traps. Beating trees and shrubs, both deciduous and coniferous, can also be productive, although there may be no real association with conifers.

Season

The adult flight period extends over 19 weeks (19–37) suggesting that there may be more than one generation, but there appears to be a spring peak (weeks 20–26).

Map 13 *Coniopteryx borealis* Tjeder 1930



Coniopteryx borealis Tjeder 1930

Distribution and status

At the time of Killington's monograph in 1936, *C. borealis* was known only from two specimens collected by Morton in Scotland, at Rannoch, Mid Perthshire, in July 1903 and at Roslin Glen, Midlothian, June 1934. The same records are repeated by Fraser (1959). There is an earlier record from Surrey in 1895; the specimen is in the C A Briggs collection at the National Museum of Wales, but was under the label '*tineiformis*'. Recent records indicate that it is widespread and often common in south-eastern Britain. It has also been recorded from Yarner Wood, Devon, where it is very common, and from the Channel Islands. There are no confirmed records from Ireland or Wales and no recent records from Scotland.

Habitat

It occurs in deciduous woodland, scrub and suburban gardens, but the only specific association recorded is with oaks.

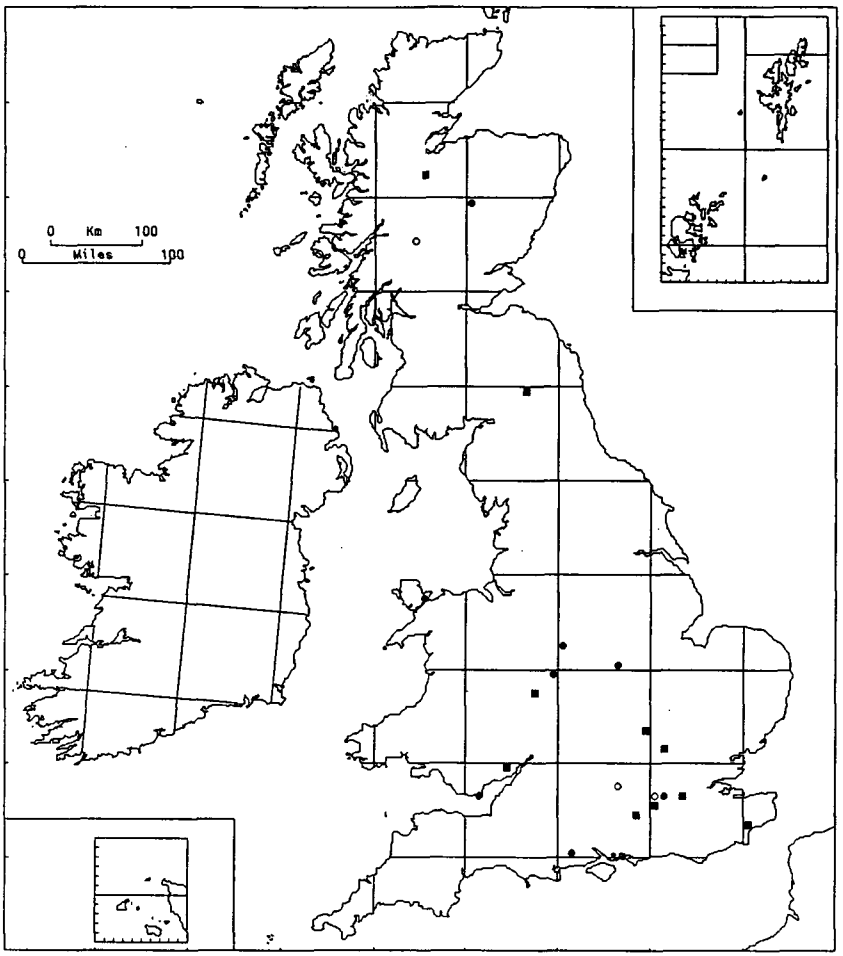
Collecting

Collections from light traps have provided 95% of all records. Beating the foliage of oaks is the only other reported method of capture.

Season

Although there are few data, the season appears long, extending from week 21 to week 37.

Map 14 *Coniopteryx parthenia* (Navás & Marcet 1910)



Coniopteryx parthenia (Navás & Marcet 1910)

Distribution and status

This species is apparently widespread but local over the whole of Britain, north to Inverfarigaig Forest, East Inverness-shire, but it is not recorded from Ireland and the Channel Islands. It is probably under-recorded, but is less frequently encountered than either *C. tineiformis* or *C. borealis*.

Habitat

Few data are available. Records have been from even-aged conifer plantations and mixed deciduous/coniferous woodland. Males have been beaten from holly (*Ilex aquifolium*) and yew (*Taxus baccata*).

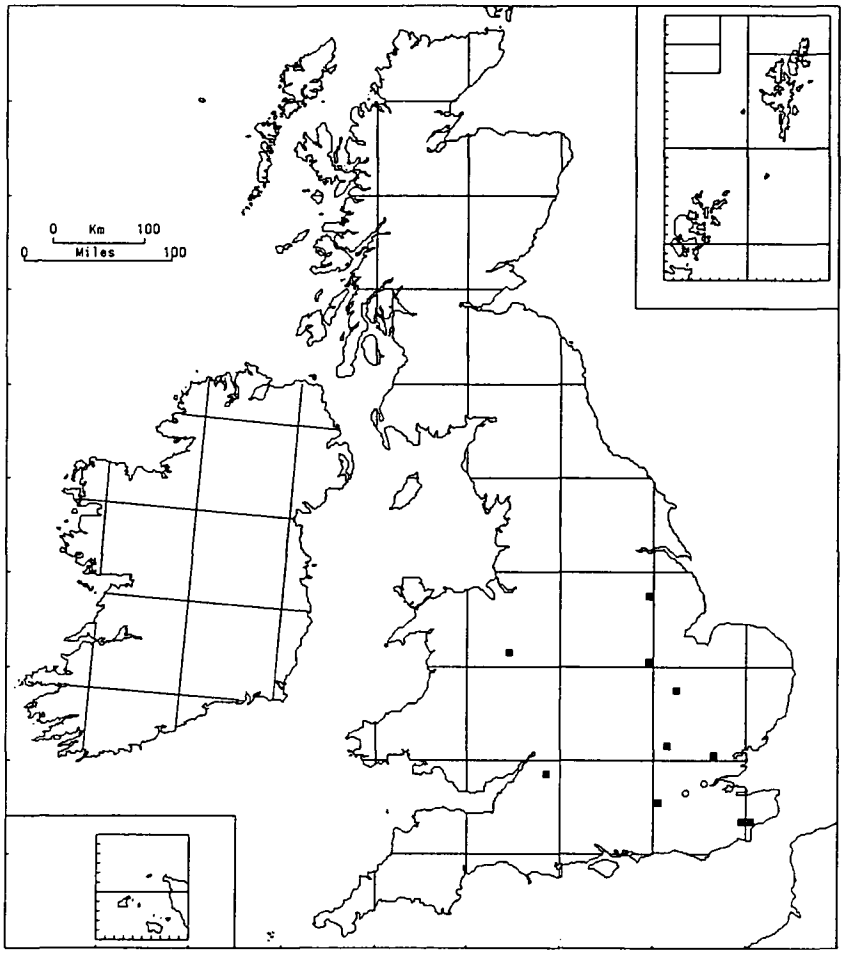
Collecting

It is only occasionally recorded in light traps. As with most others in the family, by day it probably resides in the upper layers of the canopy of trees, thereby making sampling difficult. Beating the foliage of trees, including holly, yew and Scots pine, has produced specimens.

Season

Although there are few data, the season appears long, extending from week 15 to week 37.

Map 15 *Coniopteryx esbenpeterseni* Tjeder 1930



Coniopteryx esbenpeterseni Tjeder 1930

(This is 'species A' on the RA68 recording card.)

Distribution and status

This species was first recognised in Britain in 1987 from a Rothamsted light trap sample at Wisley Gardens, Surrey, and subsequently from a light trap in a suburban garden at Harpenden, Hertfordshire in 1989 (Hynd & Plant 1991). At the latter site it is quite common. Subsequent examination of the material at the Natural History Museum, London, by Stephen Brooks, has revealed two old specimens – from Darenth, West Kent, in 1878 and from Croydon, Surrey, in 1881, indicating that, like *C. borealis* it has been an unacknowledged resident during the last 100 years. Although there are only nine current and two former localities, it could be expected to be more widespead; the species occurs in Norway (Greve 1971) and could, therefore, be expected in Scotland.

Habitat

Not known.

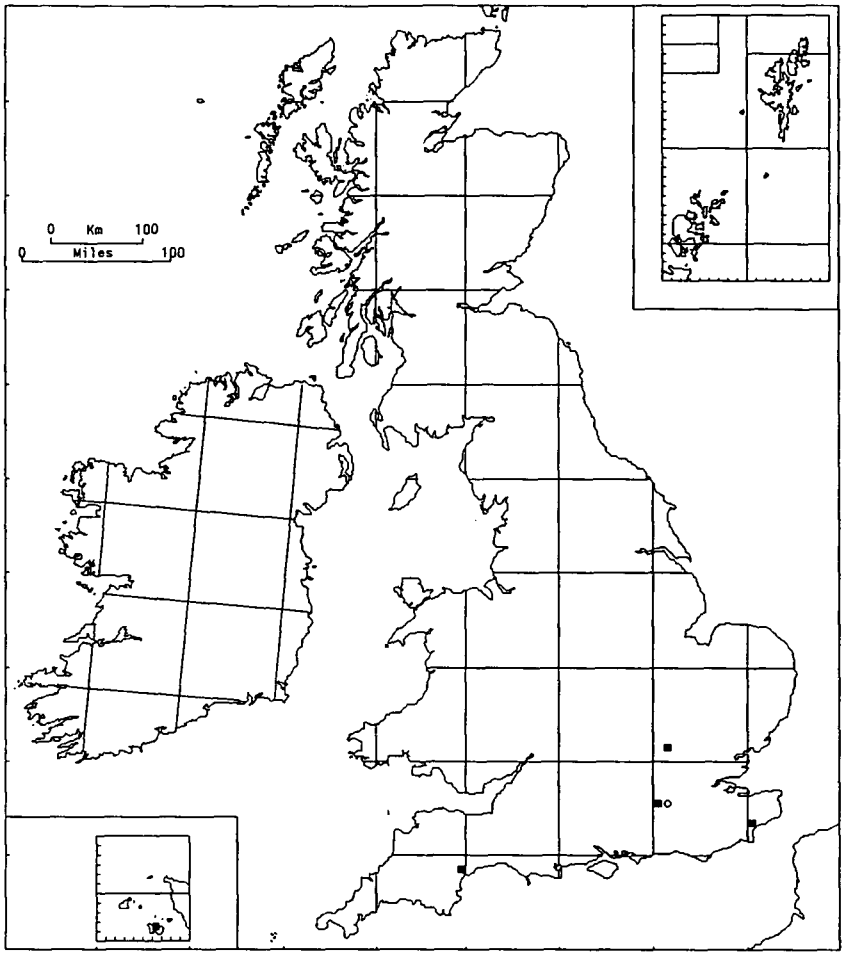
Collecting

In Britain it has been collected only in Rothamsted Insect Survey light traps, which use tungsten filament bulbs, but not yet from mercury vapour light traps.

Season

Adults have been recorded in weeks 19, 22, 24, 25 and 32.

Map 16 *Coniopteryx lentiae* Aspöck & Aspöck 1964



Coniopteryx lentiae Aspöck & Aspöck 1964

(This species is not on the current RA68 recording card.)

Distribution and status

This species was first recognised in Britain from Wisley, Surrey, in 1986 (Hynd 1989). Subsequently, two examples collected at Box Hill, Surrey, in 1895, were found in the collections of the National Museum of Wales (Plant 1991a). More recently, examples have been found in Rothamsted light trap samples from Harpenden, Hertfordshire; Ham Street, East Kent; Starcross, Devon; and Jersey. Like the preceding species, *C. lentiae* has remained undetected until very recently and may be less localised than present records suggest.

Habitat

Not known.

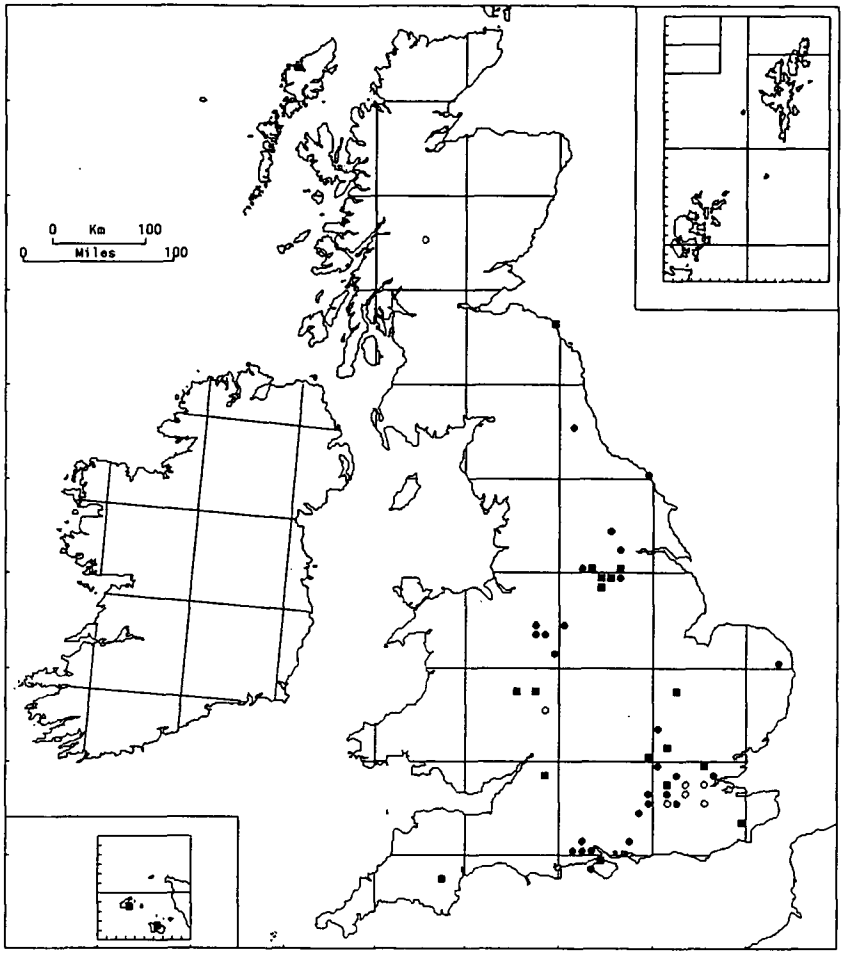
Collecting

Recent records have been only from Rothamsted Insect Survey light traps.

Season

Adults have been recorded in weeks 22, 25, 26 and 29.

Map 17 *Semidalis aleyrodiformis* (Stephens 1836)



Semidalis aleyrodiformis (Stephens 1836)

Distribution and status

This species is widespread and probably locally quite common in England. In Scotland there is a recent record at Coldingham Bay, Berwickshire, and there are 19th century records north to Rannoch, Mid Perthshire. It is also known from Jersey and Guernsey. It has apparently not been recorded from Wales or Ireland.

Habitat

It has been recorded from a wide range of native deciduous trees and shrubs.

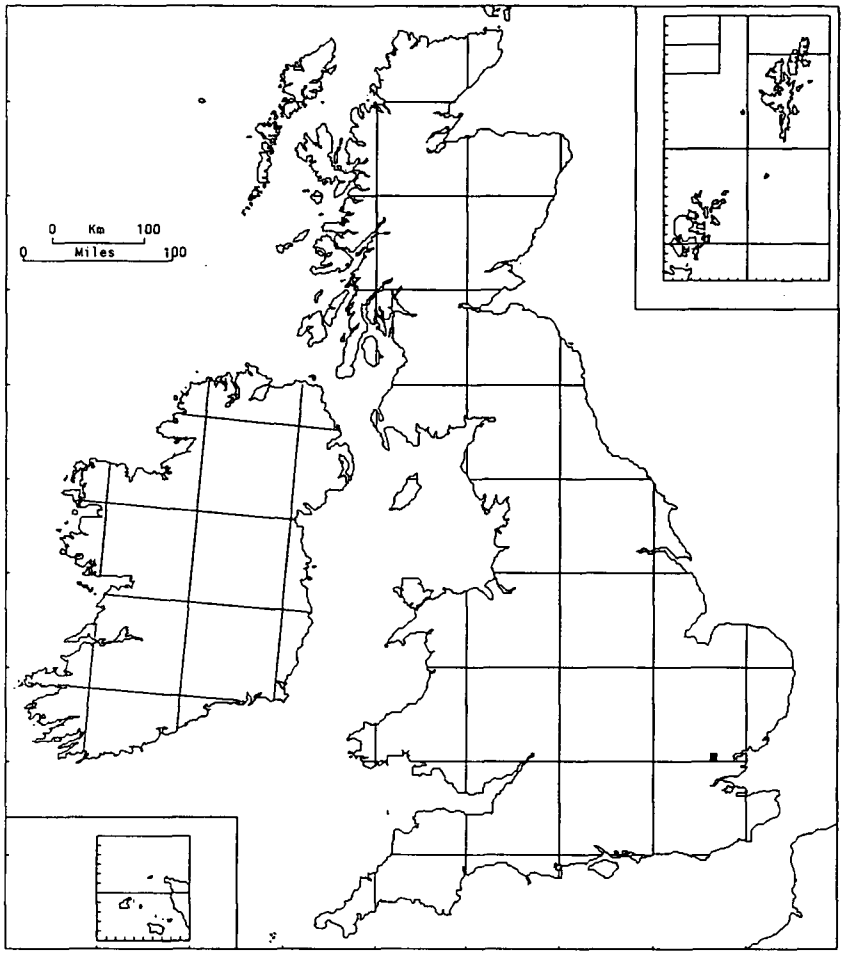
Collecting

Unlike other coniopterygids, this species is rarely recorded at light. Beating the foliage of deciduous trees is the most productive method of capture.

Season

The adult season spans about three months (weeks 21–32) with a peak in late June and early July.

Map 18 *Semidalis pseudouncinata* Meinander 1963



Semidalis pseudouncinata Meinander 1963

(This species is not on the current RA68 recording card.)

Distribution and status

This species was first recognised as British among Rothamsted Insect Survey light trap samples from Wisley Gardens, Surrey, and Writtle Agricultural College, North Essex, in 1990 (Plant 1992). It is numerous at both these sites but, to date, has not been recorded elsewhere. In recent years it has been spreading northwards across France (P Leraut pers. comm.) and is almost certainly a recent arrival in Britain.

Habitat

Not known. Abroad, it is associated with ornamental conifers of the family Cupressaceae, especially cypress (*Cupressus* spp.) and red-cedars (*Thuja* spp.), as well as with juniper (*Juniperus* spp.).

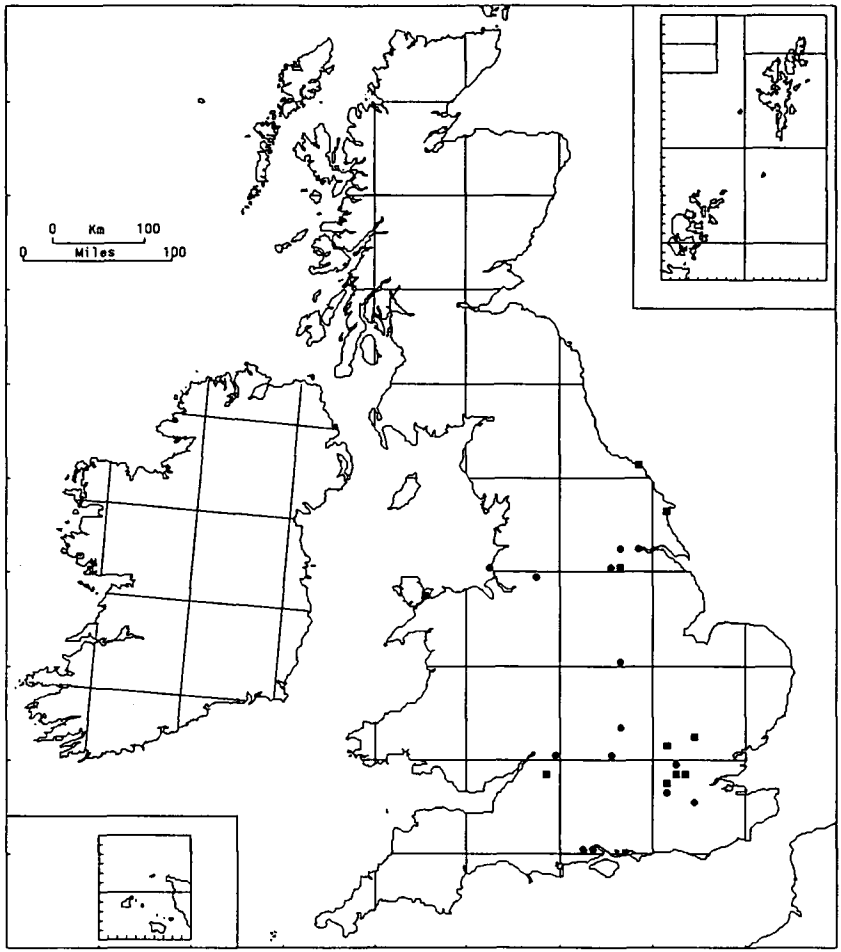
Collecting

All records are from Rothamsted Insect Survey light traps, which employ a 200 watt tungsten filament bulb.

Season

It has been recorded singly in May and June, and in numbers between 22 and 27 August.

Map 19 *Parasemidalis fuscipennis* (Reuter 1894)



Parasemidalis fuscipennis (Reuter 1894)

Distribution and status

Scattered records from eastern England, north to Scarborough, North-east Yorkshire, suggest a widespread distribution. There are also recent records from Lancashire and Caernarvonshire. It has not been recorded from Ireland or the Channel Islands.

Habitat

There seems to be an association with pines, especially Scots pine. Like most lacewings, it is an arboreal species, and it is the difficulty of sampling the canopy of pines, rather than the rarity of the insect, which has resulted in so few records. It has, however, also been taken from the canopy of an oak (Barnard, Brooks & Stork 1986) and on a stem of bulrush (*Typha latifolia*) (Richards 1928).

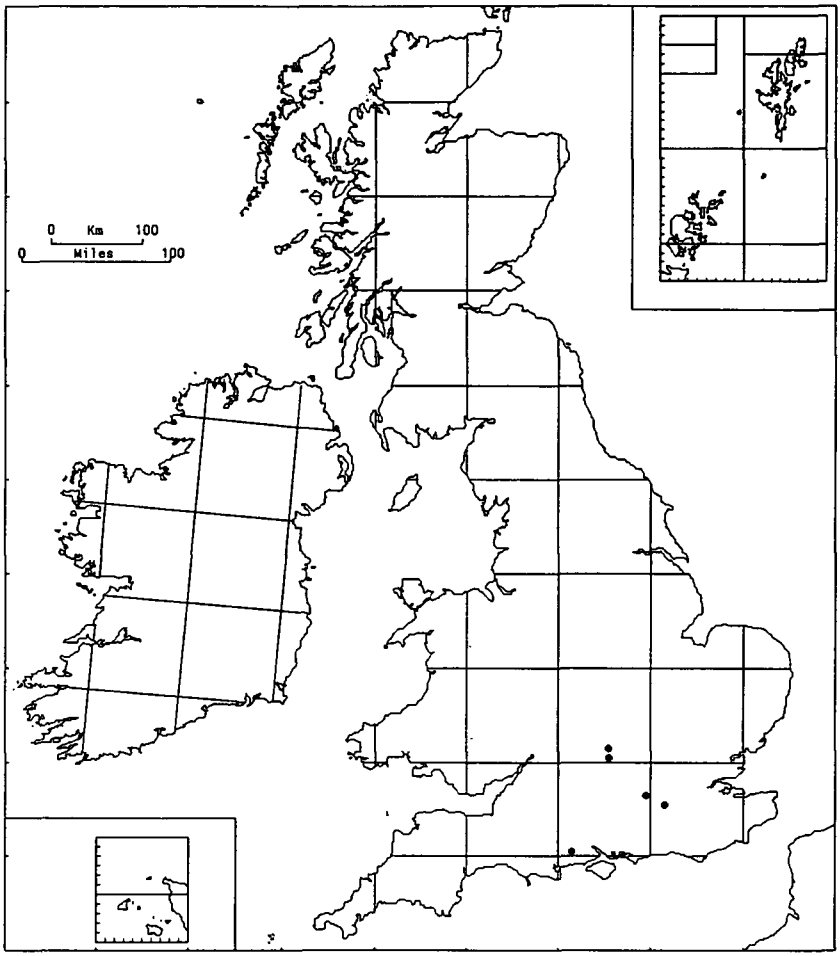
Collecting

Almost all records were made either by beating Scots pine or in light traps (both mercury vapour and tungsten filament).

Season

Although there is one record from week 13, most are from weeks 21–26, with later records in weeks 27, 31 and 35.

Map 20 *Aleuropteryx juniperi* Ohm 1968



Aleuropteryx juniperi Ohm 1968

Distribution and status

This species is known from only two localities: Box Hill, Surrey, in 1968 and 1969 (Ward 1970) and Silwood Park, Berkshire, in 1966. The latter was erroneously recorded by New (1967) as *Helicoconis lutea* (see Brooks 1991). The Box Hill site is now somewhat degraded. There is an erroneous statement in Kirby (1991) that *A. juniperi* has been recorded at other localities, due to a misreading of records of the hemipteran *Carulaspis juniperi* in Ward (1970).

Habitat

At Box Hill, larvae were collected on native juniper (*Juniperus communis*) in 1968 and in the following year two adults were beaten from juniper at the same site. At Silwood Park, a single adult was beaten from cypress.

Collecting

Beating or sweeping juniper and cypress foliage are the only methods used successfully so far in Britain.

Season

Adults have been recorded in May and June.

Helicoconis lutea (Wallengren 1871)

Distribution and status

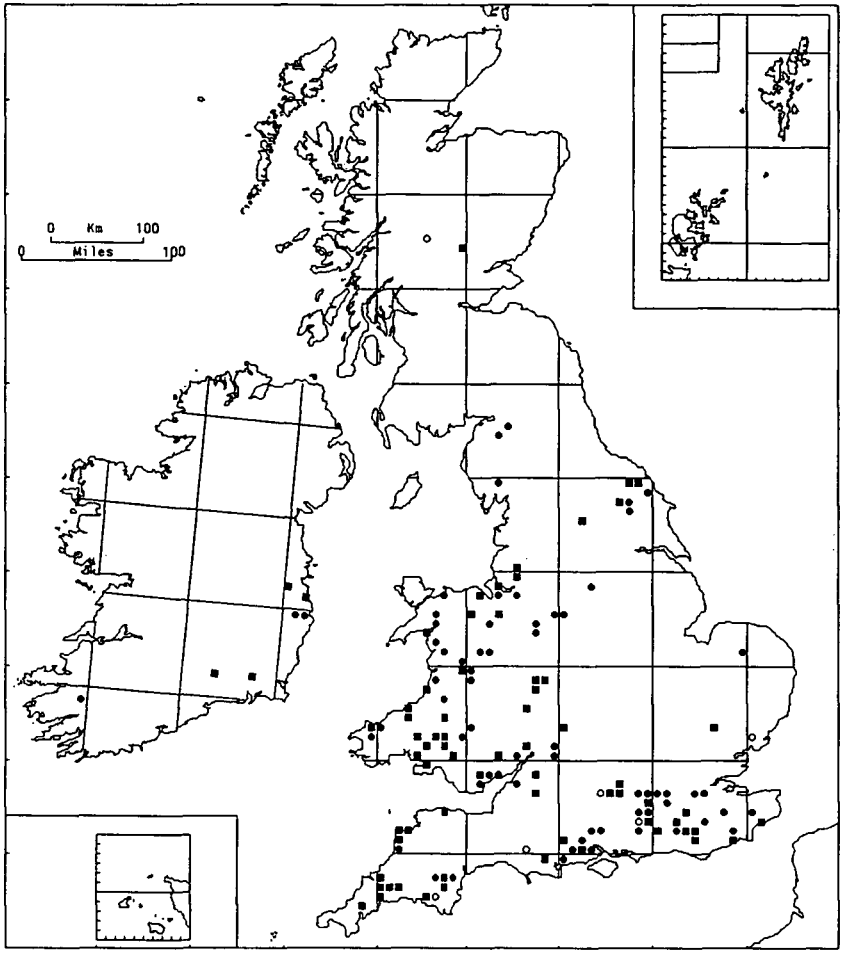
This species is not now considered to occur in Britain. It was recorded as two adults beaten from larch and birch beside the River Wear at Wolsingham, Durham, in July 1915 (Heslop-Harrison 1916). The authenticity of this record has been questioned by Plant (1991a). A putative second record, from Silwood Park, Berkshire, in 1966 (New 1967), was a mis-identified specimen of *Aleuropteryx juniperi* (Brooks 1991).

2 OSMYLIDAE

This widely distributed family is represented by only two species in Europe, one of which is restricted to the Caucasian Region and the other occurring in western Europe, including Britain and Ireland.

The life history of *Osmylus fulvicephalus* is summarised by Elliott (1977). The larvae live in damp mosses in the splash zone at the edge of rivers and streams, but are not truly aquatic, unlike the larvae of the closely related Sisyridae. The first instar larvae feed on mites and collembolans, but second and third instar larvae apparently prefer larvae of small Diptera. They overwinter as third instar larvae and can survive total immersion, thereby withstanding winter flooding. Pupation takes place in the late spring without further feeding.

Map 21 *Osmylus fulvicephalus* (Scopoli 1763) – the giant lacewing



Osmylus fulvicephalus (Scopoli 1763) – the giant lacewing

Distribution and status

This species is widespread and frequently common throughout Wales and the Welsh borders and in southern England, south of a line from London to Bristol. There are also records from Yorkshire, East Anglia and southern Ireland, with a single recent Scottish record from Mid Perthshire. There is an earlier Scottish record (Fraser 1959) which is supported by a specimen in the McLachlan collection at the Natural History Museum, London. It is labelled 'Rannoch, 1857', which is also in Perthshire. There are no Channel Islands records. This large insect may be far more widespread than suggested by the map. Though easily seen when in flight, it may be overlooked in areas where it is thought not to occur.

Habitat

All but two records received relate to the edge of streams, rivers or, rarely, non-flowing water bodies. The other two records relate to woodlands where there are suitable streams close by. Woodland habitats feature prominently on the record cards, with over 90% of records relating to streams or rivers passing through deciduous woodland.

Collecting

The species appears to be crepuscular; during evenings in May and June, adults fly low over the water surface, where they can be seen and netted easily. During the daytime they can be found under bridges or overhanging trees in shaded situations, usually resting under horizontal surfaces. They are rarely found under those parts of bridges which are only in shade for part of the day. There is also an old record of an adult at a lepidopterist's sugar-patch (Fassnidge 1931). Larvae can be found in damp moss at the water's edge, especially in August and September.

Season

The main adult flight period extends from the end of May to early August, with scattered records in April and September.

3 SISYRIDAE

The Sisyridae (spongeflies) are small brown lacewings represented by one genus (*Sisyra*) in Britain and Ireland. All three species have unpatterned wings and can easily be confused with *Sympherobius* species, which are superficially similar. The adults appear to be strictly nocturnal. There is no adequate key to the larvae, which are fully aquatic and parasitise freshwater sponges of the family Spongillidae.

The life cycle of *S. fuscata* is summarised by Elliott (1977). Eggs are laid on trees or other objects overhanging water and, on hatching, the larvae fall into the water and drift until they come into contact with a sponge. By this means, they have the capacity to disperse downstream over long distances. *S. fuscata* has been recorded on and inside *Spongilla lacustris* and *Ephydatia fluviatilis*. The final instar larvae leave the sponge and swim to the shore from where they seek out suitable crevices on a tree or a wall and overwinter in the prepupal state.

Little is known about the life cycle of *S. dalii* and *S. terminalis* and, because they are far less frequently encountered than *S. fuscata*, it is possible that there are significant differences in their habitat requirements. *S. terminalis* seems to prefer water overhung by oaks, so there may be some association with that tree, either as an oviposition site, an overwintering site or as a source of food for the adults.

Collecting adults is difficult because they are nocturnal and live in the canopy of trees. Although all three species will come to light, aerial malaise traps and insecticidal fogging could also be used in collecting.

Identification (see Figure 3)

Sisyra spp. are recognised by the subcostal vein which bends to meet vein R1 before the wing tip. In the superficially similar genus *Sympherobius*, the subcosta continues to the wing tip where it meets the costal vein. Identification to species level requires examination of the genitalia (see Elliott 1977).

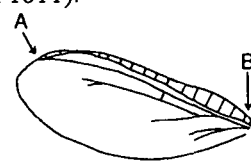


Figure 3.1 Left fore-wing of *Sisyra* spp.

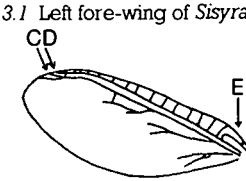
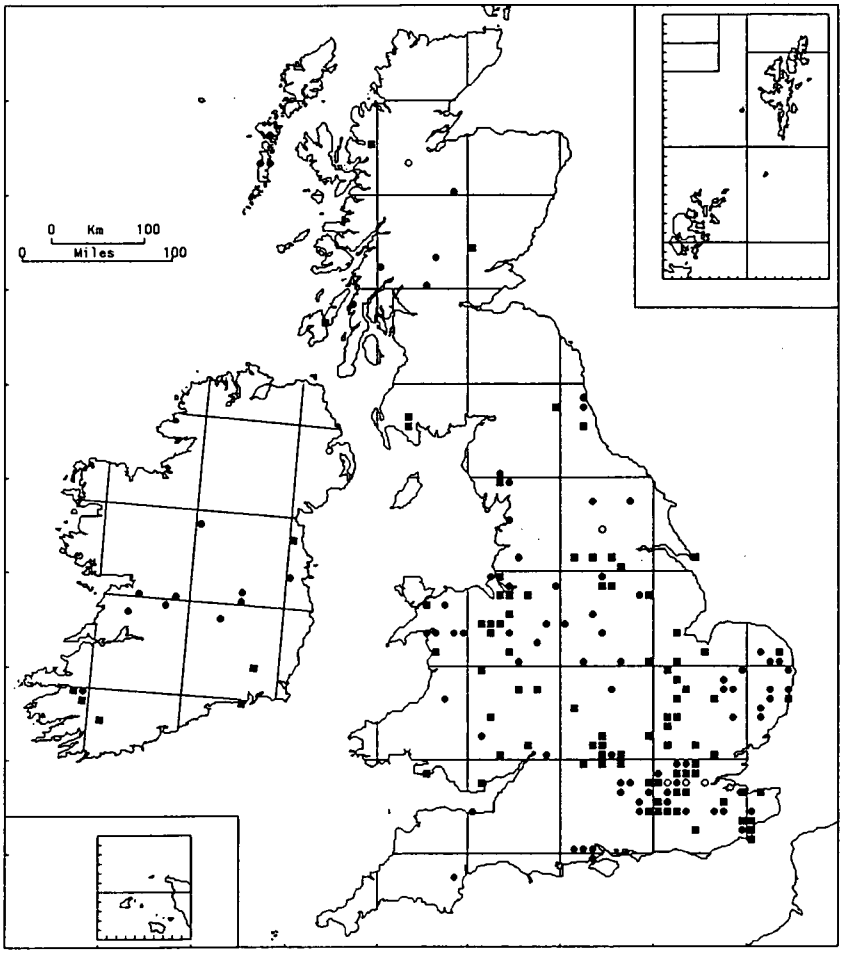


Figure 3.2 Left fore-wing of *Sympherobius* spp.

A: Subcosta fuses with vein R_1 before wing tip
B: No recurrent humeral vein
C: Vein R_1 reaches wing tip
D: Subcostal vein also reaches wing tip
E: Recurrent humeral vein

Map 22 *Sisyra fuscata* (Fabricius 1793)



Sisyra fuscata (Fabricius 1793)

Distribution and status

This is apparently the commonest and most widespread species of the genus. The map shows frequent records from England and Wales, although there is an area in south-west England and south-west Wales where it is apparently absent. The few Scottish and Irish records suggest that it may prove to be more widespread there. The scarcity of recent records in East Anglia may be due to under-recording. It has apparently not been recorded from the Channel Islands.

Habitat

The comment in Fraser (1959), that *S. fuscata* frequents similar situations to *S. dalii*, is not supported by data from the Recording Scheme. They indicate that slow or non-flowing water bodies are preferred by *S. fuscata*. Records are available from, or in association with, canals, slow rivers, garden and village ponds and flooded dune slacks, but there are some records associated with streams and fast-flowing rivers.

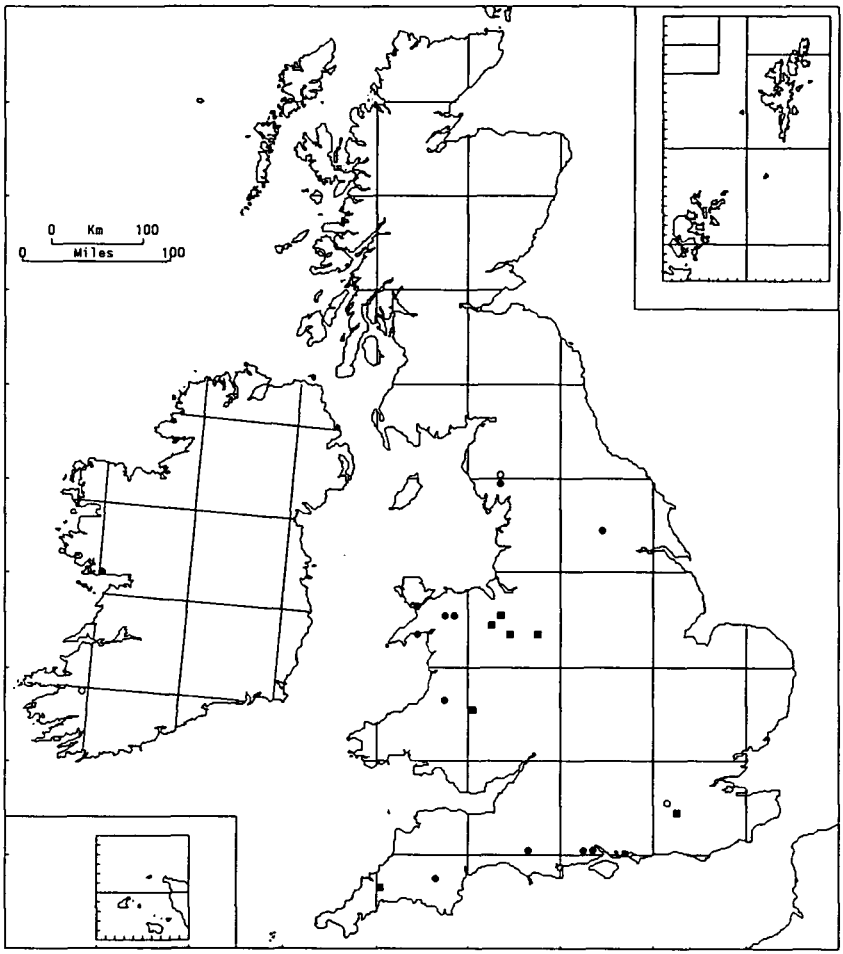
Collecting

Like all species in the genus, adults frequent the tops of trees near water and so are difficult to find. They can be taken by sweeping and beating foliage, but most records obtained in this way are of teneral specimens. Newly emerged adults can occasionally be found under bridges or tree branches over water. This species is frequently taken in mercury vapour light traps, though less frequently in Rothamsted light traps which use tungsten filament bulbs. It has been taken regularly in malaise traps at wetland sites.

Season

The adult flight period is mainly in June, July and August, with some records in May and a few through to October.

Map 23 *Sisyra dalii* McLachlan 1866



Sisyra dalii McLachlan 1866

Distribution and status

This species is usually local and scarce, but is sometimes abundant where it occurs. Most records are from Wales and Shropshire, the Lake District and extreme southern England, from Lands End to London. There is also an old record from Yorkshire and a single Irish record from Inverin, West Galway. It has not been recorded from Scotland or the Channel Islands. It is almost certainly under-recorded, but is probably a species of restricted distribution.

Habitat

The majority of records are from rock-strewn, fast-flowing rivers in upland areas. Most of these rivers are acidic, but there are also records from calcareous rivers such as the River Mole in Surrey. There are also confirmed records from a few still water sites such as the Shropshire Union Canal at Llangollen and Cole Mere, near Ellesmere. No information on host sponges is available.

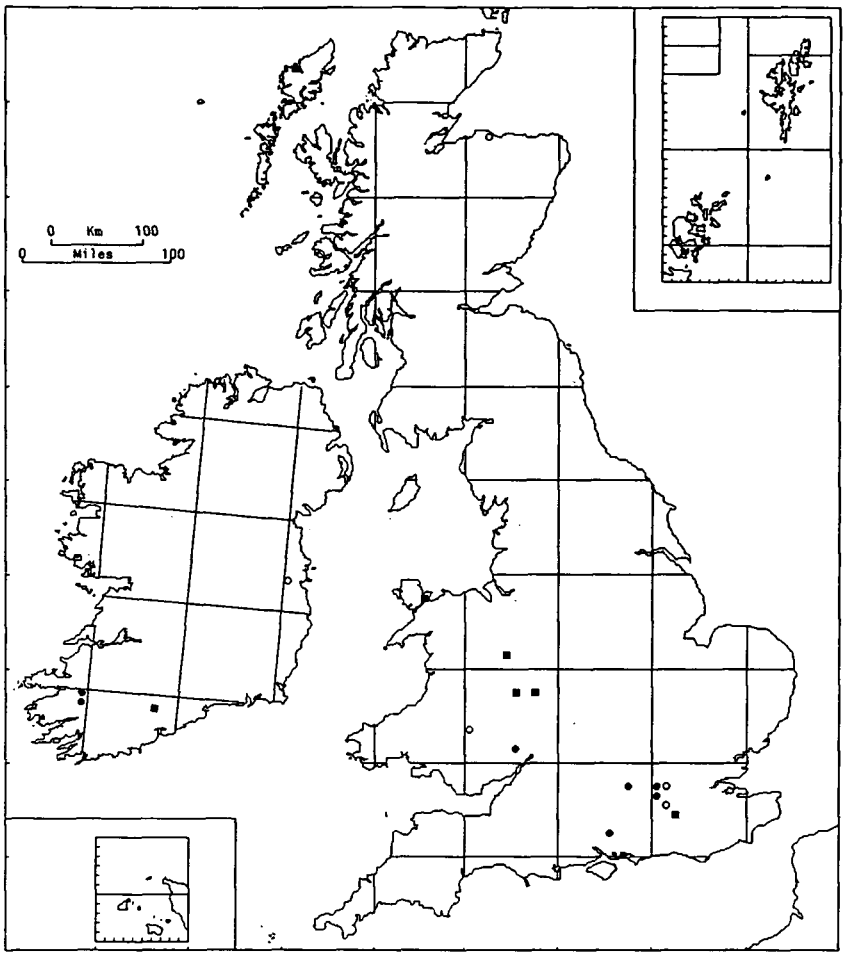
Collecting

It can be taken by sweeping riverside vegetation and beating riverside trees and bushes, and it has also been taken at light.

Season

The adult flight period extends from week 23 to week 34.

Map 24 *Sisyra terminalis* Curtis 1854



Sisyra terminalis Curtis 1854

Distribution and status

This is our rarest *Sisyra* species (or it may be the most difficult to find in the field). The few records received by the Scheme are widely scattered: in the west Midlands and south-east England, with outlying localities at Bangor and Symonds Yat, and in Killarney, Lucan and Fota in southern Ireland.

Habitat

Habitat was not recorded on any of the cards received for this species.

Collecting

Most of the records which include details of the capture method were from light traps, both mercury vapour and tungsten filament types. Specimens were netted on one occasion, when several hundred adults were seen swarming around bushes overhanging the River Thames near the centre of Staines, Middlesex.

Season

The adult flight period extends from week 23 to week 34.

4 MYRMELEONTIDAE

Two species of antlion have a slight claim to 'British' status. One occurs on Jersey, but is apparently absent from both Britain and Ireland, and the other was recorded as a single specimen in Suffolk, in 1931, and has not been recorded since.

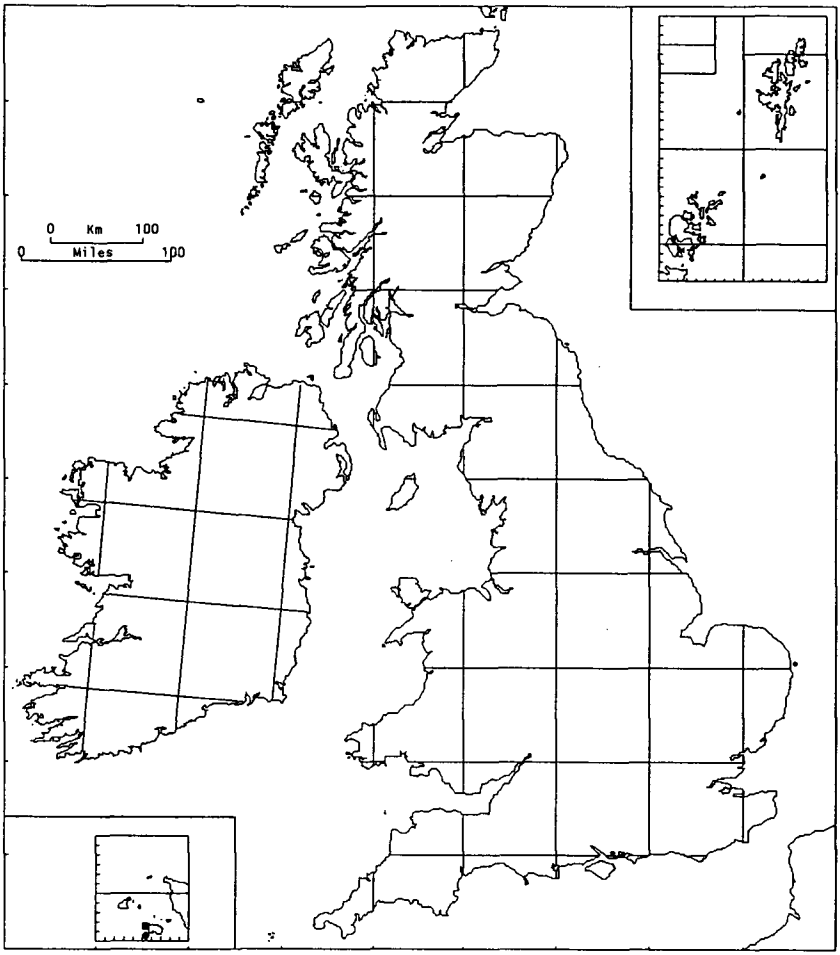
In the subfamily Myrmeleontinae, which includes both these species, the predatory larvae are subterranean, living individually in a vertical tunnel constructed in sand. A cone-shaped pit surrounds the entrance hole and the larva feeds on ants and probably other invertebrates which fall into this insect-equivalent of the entomologist's pitfall trap. Members of other subfamilies have differing methods of capturing ants; some live on tree trunks and others in dry rot-holes in trees.

Stable sand dunes are the principal habitat of antlions. It is possible, but unlikely, that one of the many species of antlion present in Europe may occur, as yet undetected, in suitable areas along the British, or even the Irish, coastline. The adults can look deceptively like teneral damselflies and could therefore be overlooked.

Identification

Keys to the European species, which include the two 'British' species, are published in French (Séméria & Berland 1988) and in German (Aspöck *et al.* 1980). A revision of the classification of the Myrmeleontidae, based on larval characters, is given by Stange and Miller (1990).

Map 25 *Euroleon nostras* (Fourcroy 1785)
Myrmeleon formicarius Linnaeus 1767



■ *Euroleon nostras* 1980–92
● *Euroleon nostras* 1900–79
• *Myrmeleon formicarius* 1900–79

Euroleon nostras (Fourcroy 1785)

Distribution and status

It occurs at several localities on Jersey, but is not yet recorded from Guernsey.

Season

The adult flight period is in mid-September.

Myrmeleon formicarius Linnaeus 1767

Distribution and status

There is a single record of a male of this species taken from a paling at Gorleston, on the East Suffolk coast, on 5 September 1931 (Doughty 1931; Killington 1932). The captor, C G Doughty, assumed it to be an uncommon species of dragonfly which lacked bright colours, and passed it to Claude Morley, who was responsible for the original identification. This identification was confirmed by Killington.

Stephens (1829) includes this species, but only as doubtfully indigenous. There is an even earlier reference to this as a British species, in Barbut (1781), though without details. Hagen (1858) states that it was 'almost certain that at least two species of *Myrmeleon* will be found in Britain, probably more,...' but provided no evidence. McLachlan (1868) considered that 'we have no native member of the handsome Myrmeleonidae' in Britain.

The Gorleston site stood 'upon glacial sand, not dissimilar from that of Fontainebleau Forest where *M. formicarius* abounds' and Morley adds, in an editor's footnote to Doughty (1931), that the area has been practically unworked for over a hundred years. In view of this evidence, it is just possible that there was a small, resident population of this ant-lion on the Suffolk coast which is now extinct. Killington (1932) considered that 'While the species can not be placed on the British list on the strength of this capture, it is quite possible that it will yet be found to breed here and entomologists living in sandy districts should keep an eye open for the pits made by the larvae'. Since that time, many of the sandy heaths of the area have been afforested, turned to arable land or grassed over as airfields, but many of the remaining areas have been the subject of entomological surveys.

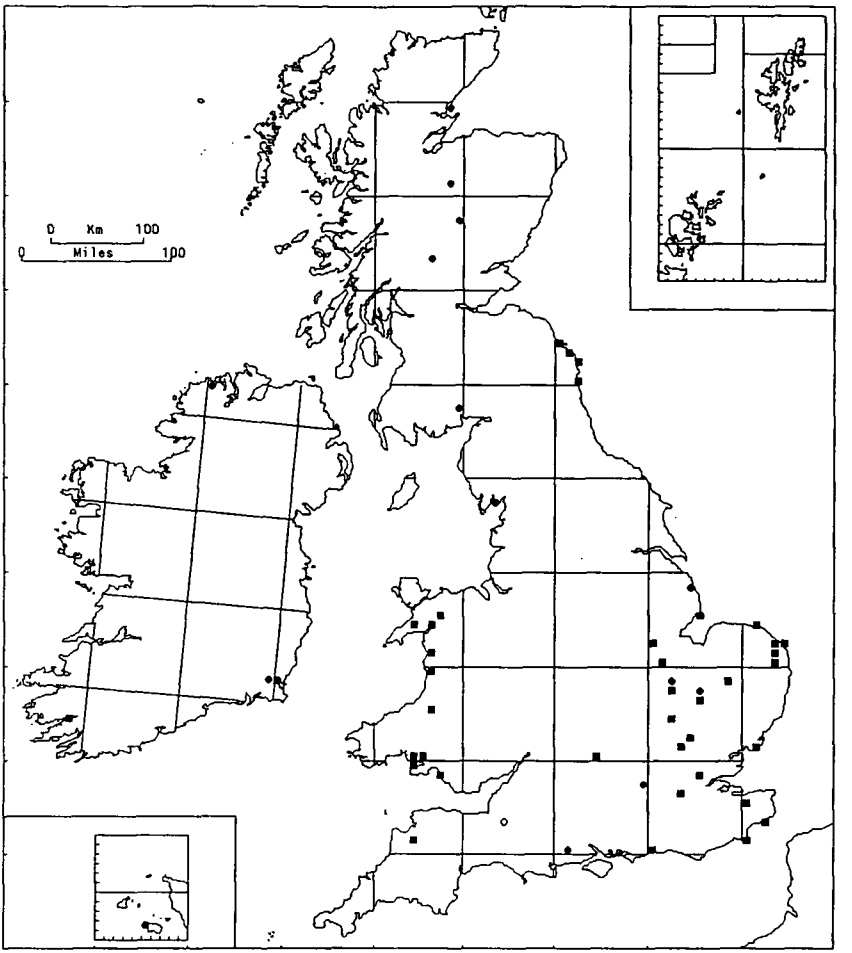
5 HEMEROBIIDAE

This large, and economically important, family of lacewings is represented in Britain by the seven genera: *Psectra*, *Micromus*, *Hemerobius*, *Wesmaelius*, *Sympherobius*, *Megalomus* and *Drepanepteryx*. The most recent check list of British species (Barnard 1978) includes 29 species in these genera, but, since then, *Hemerobius fenestratus* has been added (Plant & Barnard 1988), bringing the total to 30 species. Only 15 species have been recorded from Ireland (Barnard *et al.* 1991).

Identification

The standard work (Fraser 1959) contains several errors and some parts of its keys are unworkable. The recommended guides to identification are summarised in Table 1 and, for a wider perspective, the keys in Aspöck *et al.* (1980) are excellent. The male genitalia provide important diagnostic features: the figures in Killington (1936, 1937) can be used as a preliminary guide, but there are better figures in Aspöck *et al.* (1980). The genitalia of *Hemerobius fenestratus* are also figured by Plant (1989). There appear to be no satisfactory keys to species for the larvae of British/Irish Hemerobiidae, but there is a useful key to genera and some subgenera of European species in Veenstra *et al.* (1990). A full synonymic check list of the Hemerobiidae of the world is given by Monserrat (1990).

Map 26 *Psectra diptera* (Burmeister 1839)



Psectra diptera (Burmeister 1839)

Distribution and status

Killington (1936) listed only one Irish and four British records of this species and considered it to be rare. Fraser (1959) stated that it was 'widely distributed throughout the British Isles but most common in Scotland'. However, there are few published records or museum specimens from Scotland and the Scheme has only five Scottish records, all from before 1954. Records show it to be widespread but patchy in both Britain and Ireland, suggesting that the species is under-recorded. Recent work, in Wales and the East Anglian fens, indicates that appropriate collecting methods are very important in finding this species. It may indeed prove to be widespread in much of Britain and Ireland.

P. diptera exists in two forms, occurring in either sex, sometimes with both forms in the same population. In the so-called micropterous form, the hind wings are vestigial and the insect is probably incapable of flight. The macropterous form has all four wings fully developed and is certainly capable of flight. The macropterous form is more frequently reported at the end of hot, dry summers and affects second-generation adults, possibly being a dispersive phase.

Habitat

It is recorded from acid bogs in Wales, fens in East Anglia, and from acidic, neutral and alkaline unimproved grasslands, calcareous semi-improved grasslands, and sand dunes. It has also been recorded from rank vegetation at woodland edges, from roadside verges, disused railway lines and a range of similar habitats. Where it occurs there is a common habitat feature: tussocky, occasionally dense, grassy vegetation. It seems that the occurrence of *Psectra diptera* is linked to the microhabitat provided by grass tussocks, rather than to the habitat in which the tussocks occur (Kirby & Welch 1990).

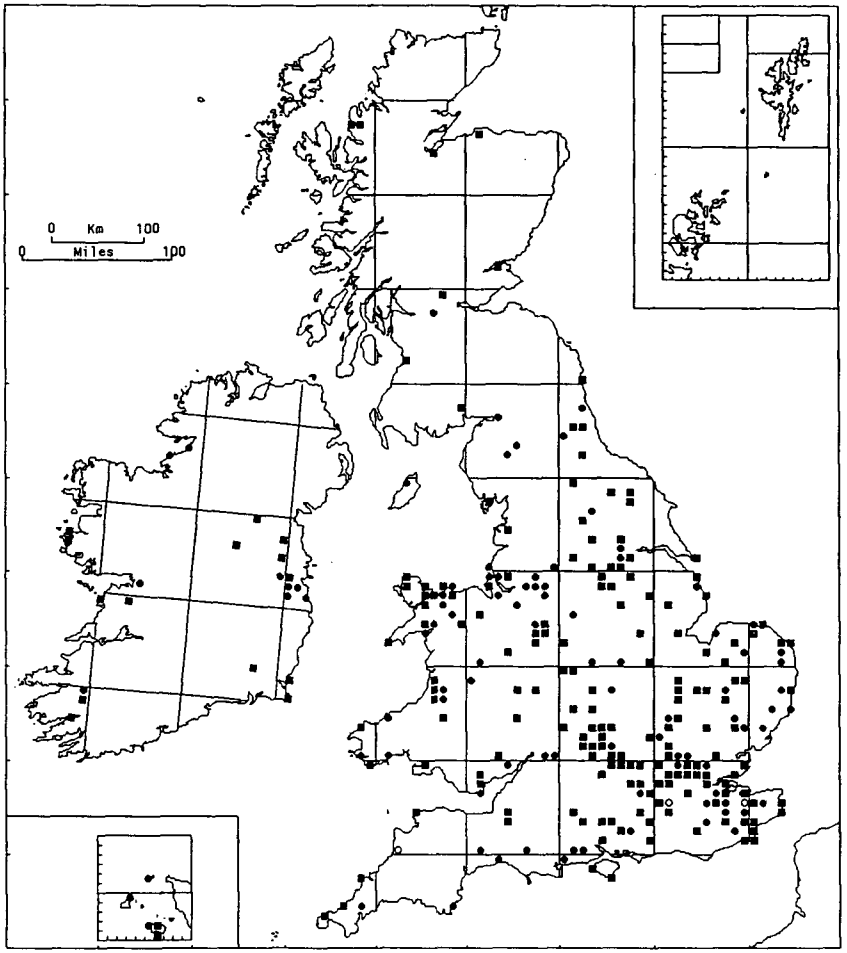
Collecting

Pitfall traps and water traps have been used effectively to catch *P. diptera*. A small number of records of macropterous specimens, of both sexes, have been from light traps. Hand searching the roots of grasses and other vegetation, using a pooter, has also been productive. A few examples, all micropterous females, have been taken by sweeping vegetation.

Season

The adult period is between June and September.

Map 27 *Micromus variegatus* (Fabricius 1793)



Micromus variegatus (Fabricius 1793)

Distribution and status

This species is widespread and common in England and Wales, becoming more rare and localised north to Scotland, but in Ireland it may be widespread. It also occurs in the Channel Islands.

Habitat

A eurytopic species, it is found in all the habitats listed for *M. paganus*. Newly emerged adults, still unable to fly, have been reported from gardens where there are no trees, suggesting that it is associated with herbaceous plants or grasses.

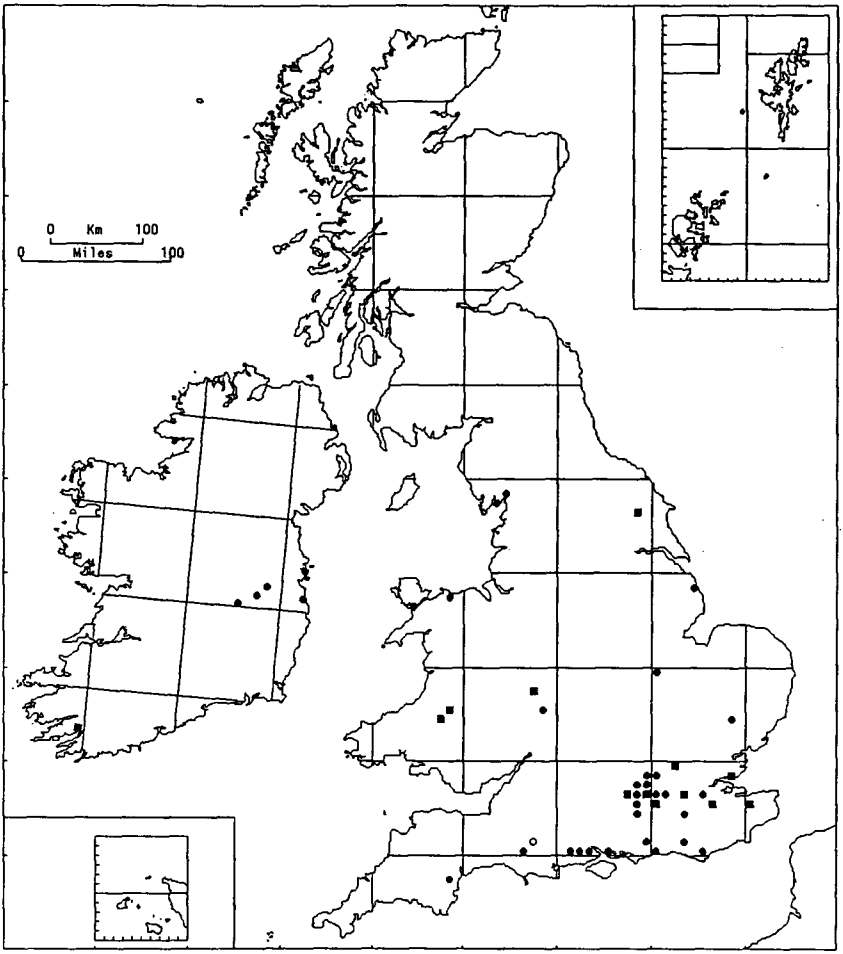
Collecting

It is regularly taken in pitfall traps, but is less often caught with light traps or in malaise traps. It has also been found when hand searching ground level vegetation for *Psectra diptera* and occasionally by sweep netting but only rarely by beating trees and bushes.

Season

There are two peaks in the adult flight period suggesting that there may be two generations. The earlier peak is small, running from mid-May to mid-June (weeks 20–25). The second peak runs from the end of July through to early September (weeks 30–36). There is also a scatter of early and late records from mid-April and mid-October.

Map 28 *Micromus angulatus* (Stephens 1836)



Micromus angulatus (Stephens 1836)

Distribution and status

Although it is widespread and generally uncommon, it is occasionally found to be common in localised areas. In England it has been recorded from as far north as Wharram Quarry LNR in South-east Yorkshire, but is not known from Scotland. It is also present in Wales and Ireland, but is clearly under-recorded.

Habitat

No clear habitat preference has yet emerged from data submitted to the Scheme. Records have been from unimproved chalk grassland, a limestone quarry, damp verges on arable land, suburban gardens, scrub and woodland. At many sites the soil is calcareous. Low herbage seems to be the only constant feature, and it may be that the requirements of *M. angulatus* are similar to those of *M. paganus*.

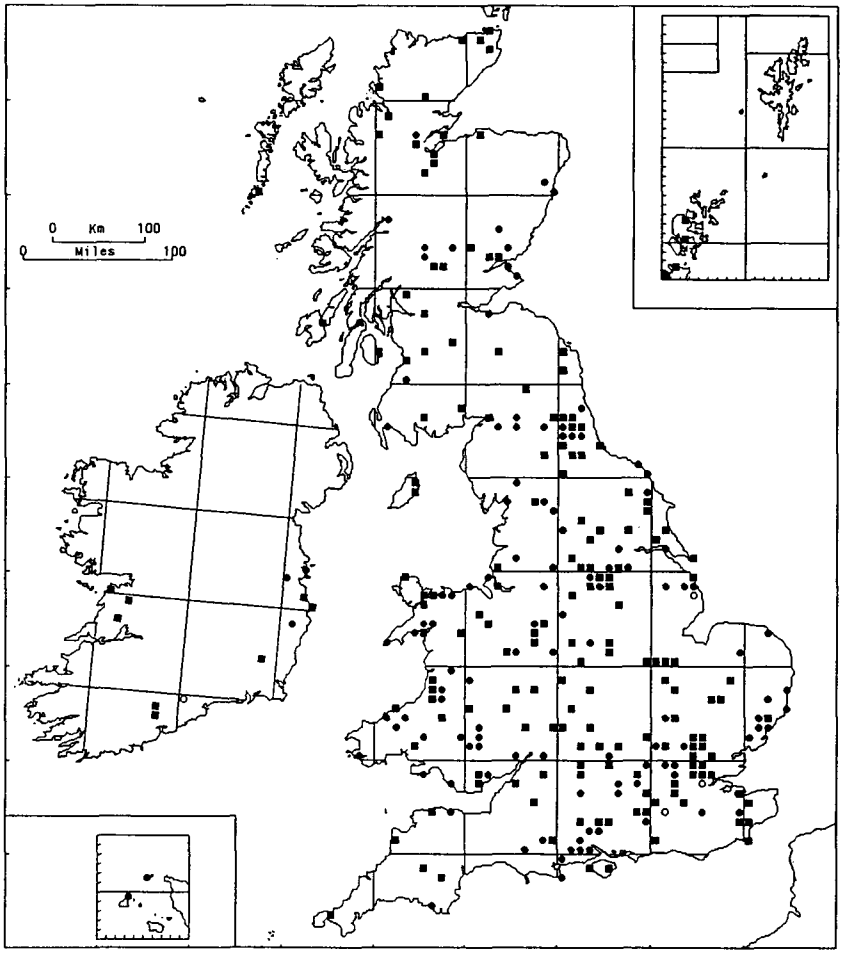
Collecting

During May 1990 several examples were taken in malaise traps at Silwood Park, Berkshire, as a result of which there are more records of individuals from this one locality than there are for the rest of Britain and Ireland. Clearly, malaise trapping is an effective collecting method. There are a few records from light traps, but most other records are from sweeping low-growing vegetation in a variety of habitats.

Season

The adult flight period extends from week 15 to week 42, with the majority of records in the period weeks 26–34.

Map 29 *Micromus paganus* (Linnaeus 1767)



Micromus paganus (Linnaeus 1767)

Distribution and status

This species is widespread and quite common throughout the whole of Britain and Ireland, from the extreme north of mainland Scotland to near Land's End, and also from the Channel Islands. It is under-recorded in Ireland.

Habitat

It is ubiquitous, occurring in woodland, scrubland, heathland, unimproved and semi-improved grassland (neutral, acidic and calcareous types), gardens, town parks and even in wasteland. Adults seems to be associated with low-growing herbage of a variety of types.

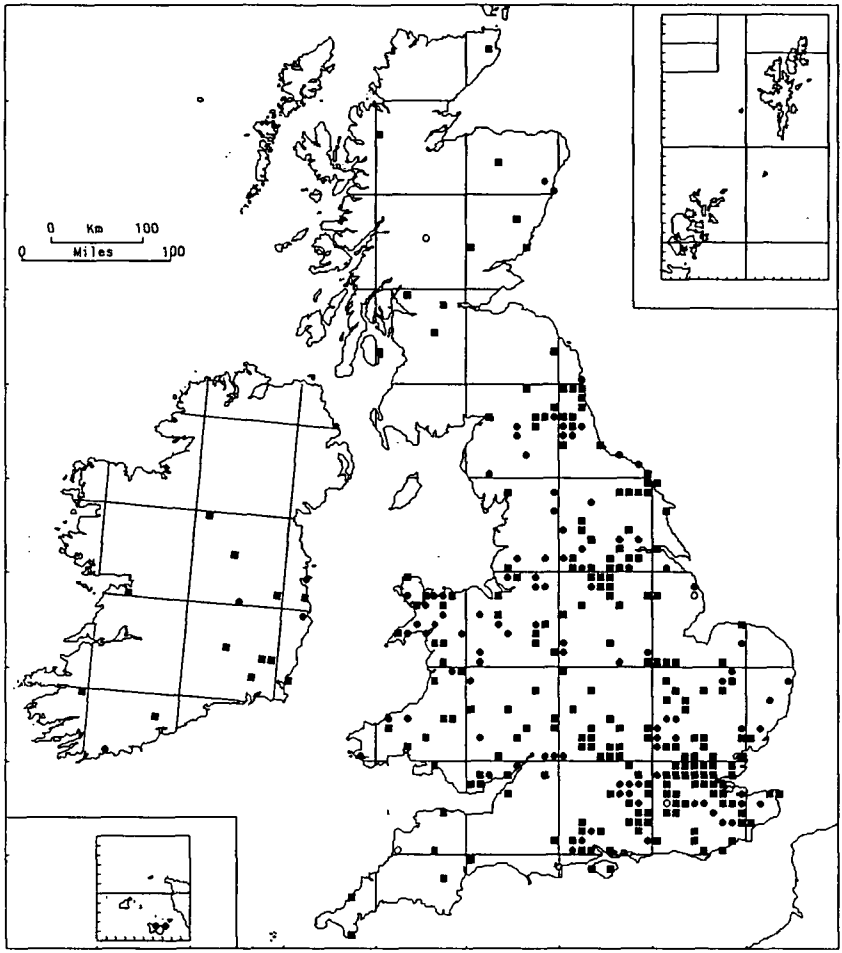
Collecting

It is taken regularly in light traps and malaise traps and is often the most common lacewing in light traps in Scotland. It has also been recorded by sweeping and beating vegetation. Unlike most lacewings, it is also frequent in pitfall traps, which suggests that it is not an arboreal species.

Season

Records are spread over a long season, from week 12 to week 37, with an isolated record in week 48. There is a distinct peak in June and a slight one in August.

Map 30 *Hemerobius humulinus* Linnaeus 1761



Hemerobius humulinus Linnaeus 1761

Distribution and status

H. humulinus is widely distributed and very common throughout much of Britain, Ireland and the Channel Islands, but it is more scarce in Scotland.

Habitat

It is a eurytopic species, having been recorded from woodlands, hedgerows, scrub, parks, gardens and most habitats where there are trees or bushes.

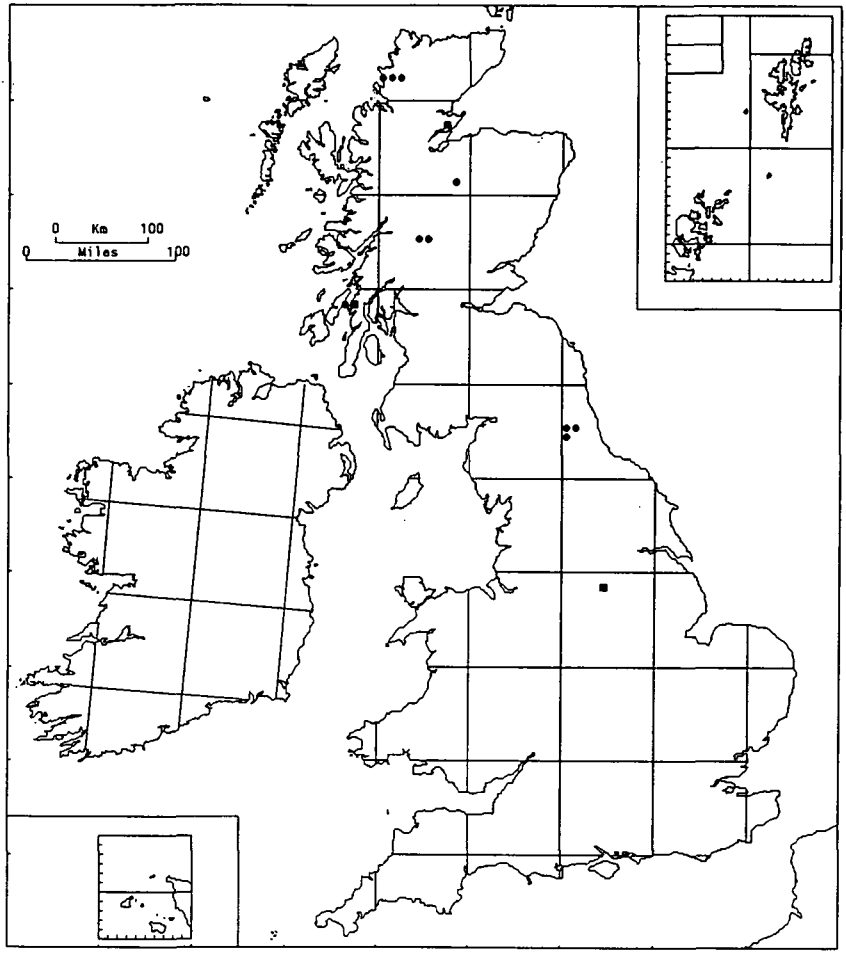
Collecting

It is easily recorded by beating and sweeping vegetation, and it has also been recorded in malaise traps, suction traps and light traps. It has not yet been taken in pitfall traps.

Season

Adults have been recorded from April to October, but the long season and two peaks (centred on May and June to August) suggest that there may be more than one generation per year.

Map 31 *Hemerobius perelegans* Stephens 1836



Hemerobius perelegans Stephens 1836

Distribution and status

This species is very local and rare. Stephens believed that the origin of his type specimen was the New Forest, but both Killington (1937) and Fraser (1959) expressed doubts that this was the true locality. Unfortunately, neither author gave reasons for their doubt, and it can only be assumed that doubt was inferred because the few other British records known at that time were all from Scotland. This doubt may well be unjustified; the current known distribution includes records from South Northumberland and South-west Yorkshire. However, in the interests of accuracy, the New Forest record is excluded from the distribution map.

Habitat

It is apparently confined to birch.

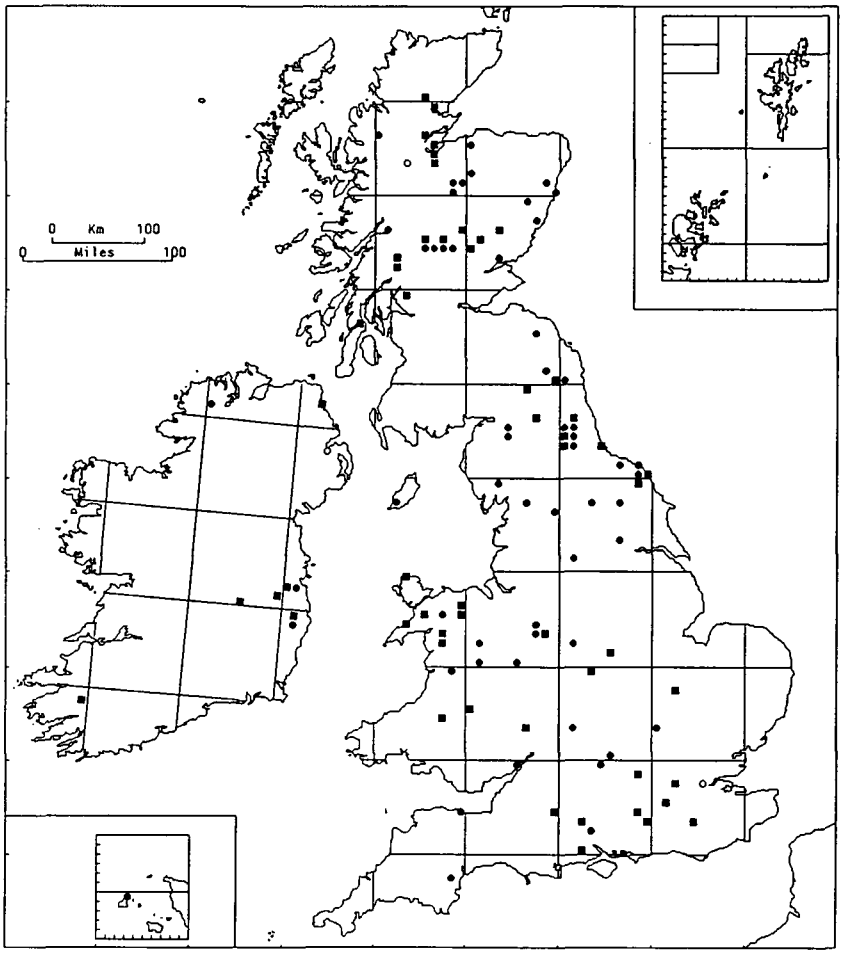
Collecting

All the specimens for which capture data are available were beaten from birch.

Season

There are records of adults in weeks 20, 22, 24 and 25.

Map 32 *Hemerobius simulans* Walker 1853



Hemerobius simulans Walker 1853

Distribution and status

This species is widespread and locally common throughout Britain and Ireland, but has not yet been recorded from the Channel Islands, the Hebrides, Orkney or Shetland. It is possibly under-recorded because it appears later in the year than other species. Records early in the season, by J J F X King and by G T Porritt, have been omitted as they possibly refer to *H. lutescens* (Killington 1937); however, King's collection at the National Museum of Ireland has not yet been re-examined.

Habitat

It is apparently confined to larch, but it may also occur on spruce (*Picea* spp.) and pine.

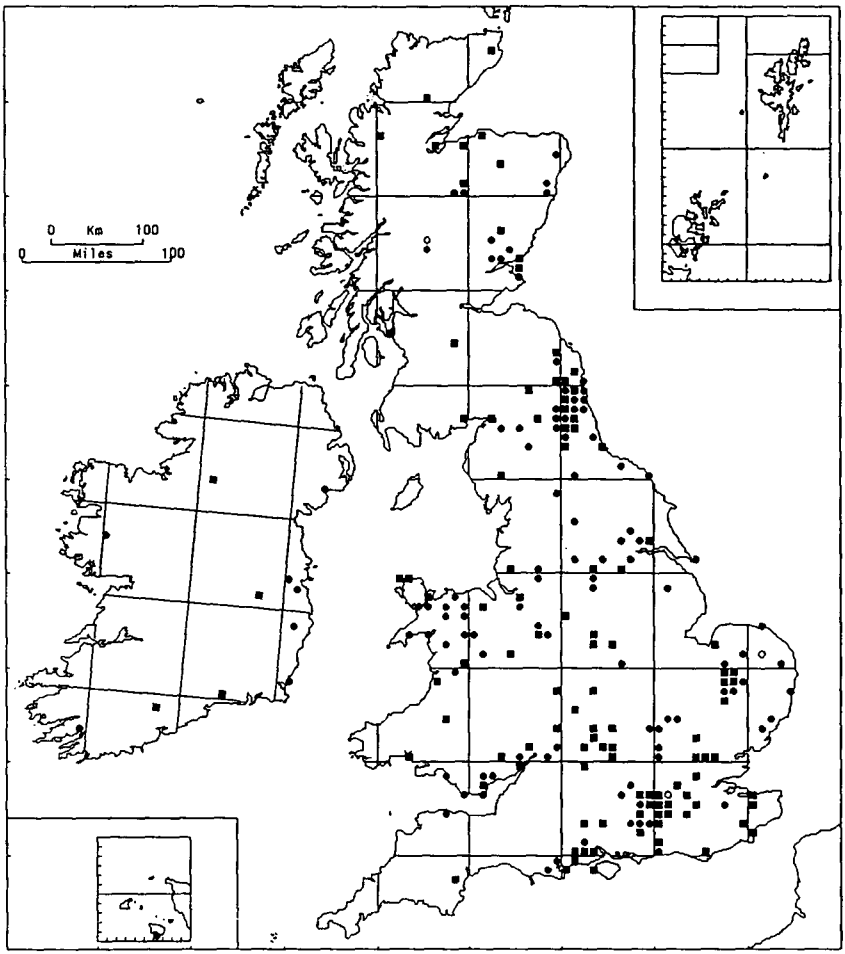
Collecting

Almost all the Scheme's records were from light trap captures. Beating the lower branches of larches, in late August or early September, has also produced specimens.

Season

There are some winter records (weeks 4, 13, 17, 19 and 46), but this is mainly a late summer/autumn species, with a peak of records in July to September.

Map 33 *Hemerobius stigma* Stephens 1836



Hemerobius stigma Stephens 1836

Distribution and status

This species is widespread and very common throughout Britain, but less so in Ireland. It has also been recorded from the Channel Islands, but not from the Hebrides, Orkney or Shetland.

Habitat

It is confined to pine, especially Scots pine.

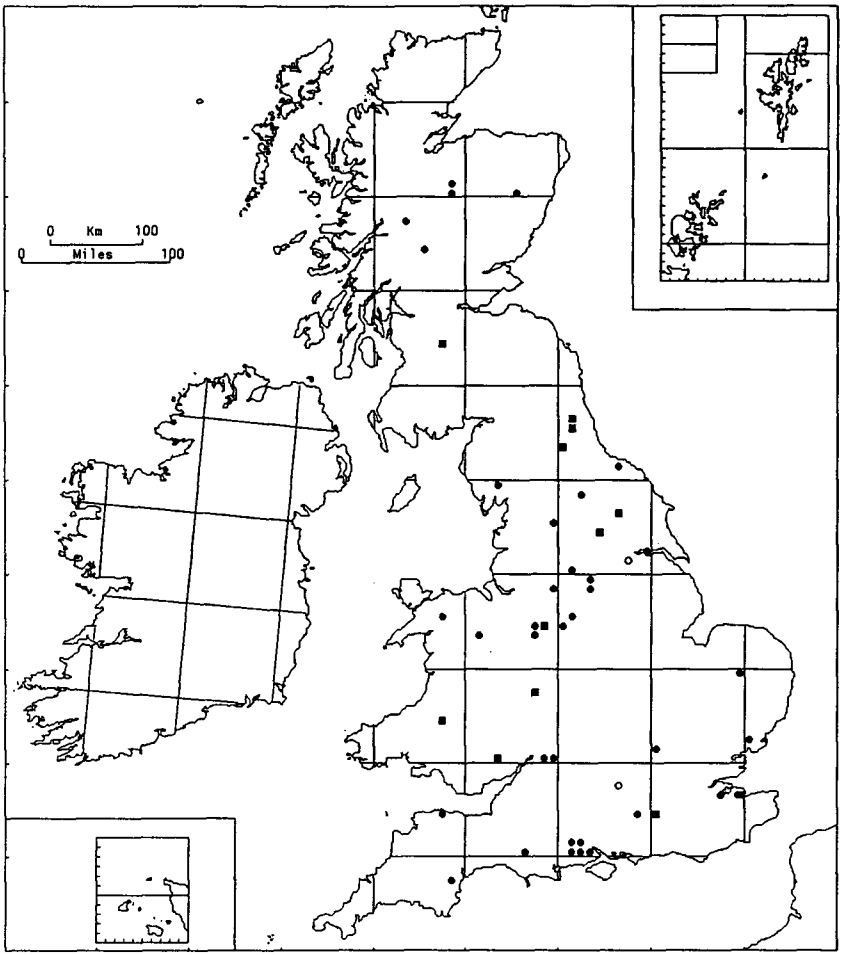
Collecting

Most records are from light traps, with a few from malaise traps and from beating pine foliage.

Season

It has a long season, suggesting that there may be more than one generation per year. There are isolated winter records in weeks 4, 44 and 46. Although there are records from March through to October, there are two distinct peaks of records in April and July.

Map 34 *Hemerobius atrifrons* McLachlan 1868



Hemerobius atrifrons McLachlan 1868

Distribution and status

This species is widespread but local throughout Britain, but has not yet been recorded from Ireland or the Channel Islands.

Habitat

It is apparently confined to larch. Records from other species of conifer have not been confirmed.

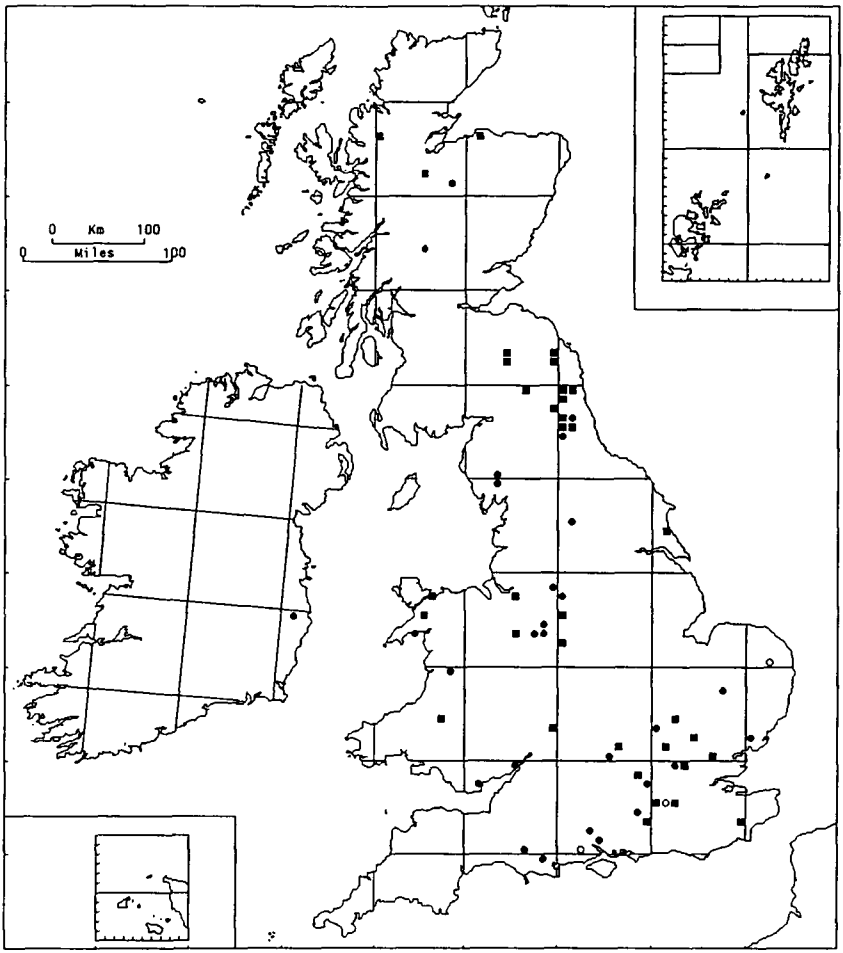
Collecting

It is easily beaten from branches of larches, especially those along the edges of rides in plantations.

Season

Although there are records from mid-April to early October, the majority are from May and June.

Map 35 *Hemerobius pini* Stephens 1836



Hemerobius pini Stephens 1836

Distribution and status

It is widespread and locally common wherever there are pine trees, but it is probably under-recorded in most areas. The only Irish record was in 1975, when a single specimen was collected in Co Wicklow (Speight 1979). This species may eventually prove to be common in the appropriate habitat.

Habitat

It appears to be confined to pines, especially Scots pine, and large numbers may be present on even isolated and solitary trees. It has been taken in association with other species of pine in plantations.

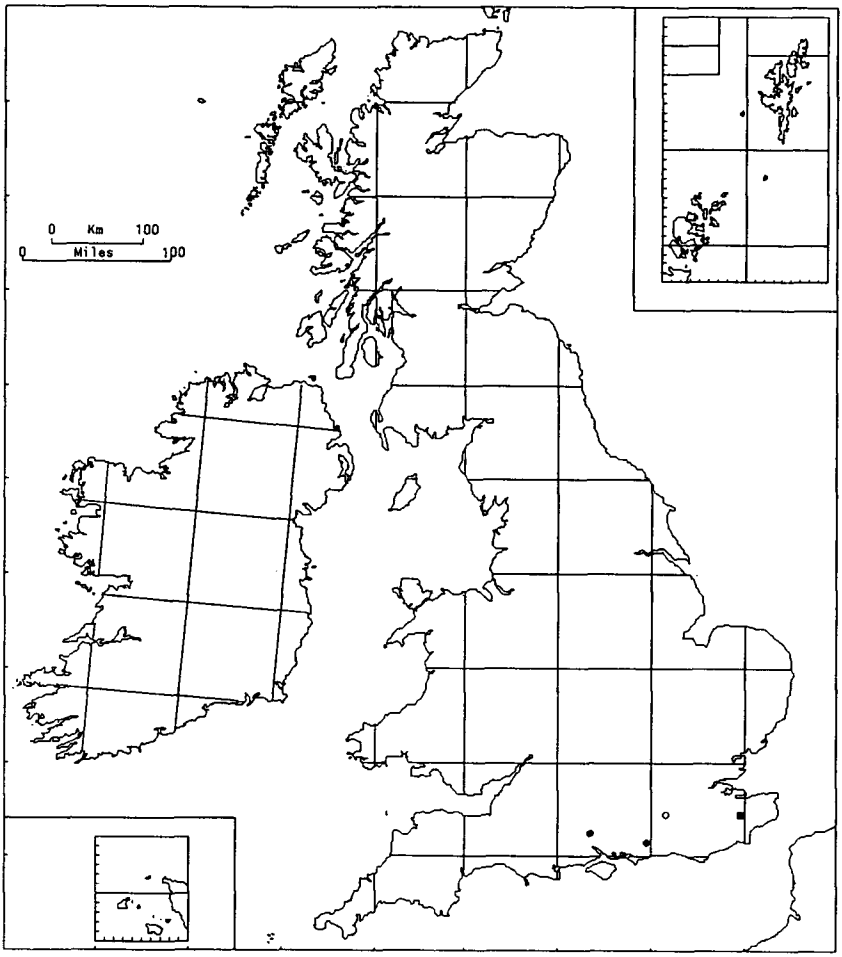
Collecting

This species is strictly arboreal and is most often recorded at light, but it can sometimes be beaten from pine branches.

Season

There is a long season from week 14 to week 35, suggesting that there may be more than one generation per year.

Map 36 *Hemerobius contumax* Tjeder 1932
Hemerobius fenestratus Tjeder 1932



■ *Hemerobius fenestratus* 1980–92
● *Hemerobius contumax* 1900–79
○ *Hemerobius contumax* pre-1900

Hemerobius contumax Tjeder 1932

Distribution and status

There are very few records of this species, most of which require confirmation. Much confusion has resulted from nomenclatural difficulties: the species referred to here as *H. contumax* was called *H. limbatellus* by McLachlan, Lucas and Killington, but the epithet *limbatellus* Zetterstedt has also been applied to *H. stigma* (which is common) and to *H. fenestratus* (which is rare). All published records require confirmation before acceptance for the Recording Scheme. Killington (1937) lists three records of *H. limbatellus*:

Leith Hill, Surrey, 6 June 1869 (P C Wormald)
Black Park, Buckinghamshire, 25 June 1873 (R McLachlan)
Buttercrambe Woods, Yorkshire, no date (J M Brown)

Only the first has been confirmed as *H. contumax* (Killington 1934) and there is a second specimen (a male), collected from the same locality July 1952, in the collection of the Natural History Museum, London. There is sufficient evidence to accept the Black Park record as *H. contumax*, but the Yorkshire specimen has not been located.

Since 1937, there are only two records in addition to the Leith Hill specimen: from Farley Down, South Hampshire, in 1938, and from Bignor, West Sussex, in 1945.

Habitat

It is reportedly confined to conifers.

Collecting

No data are available.

Season

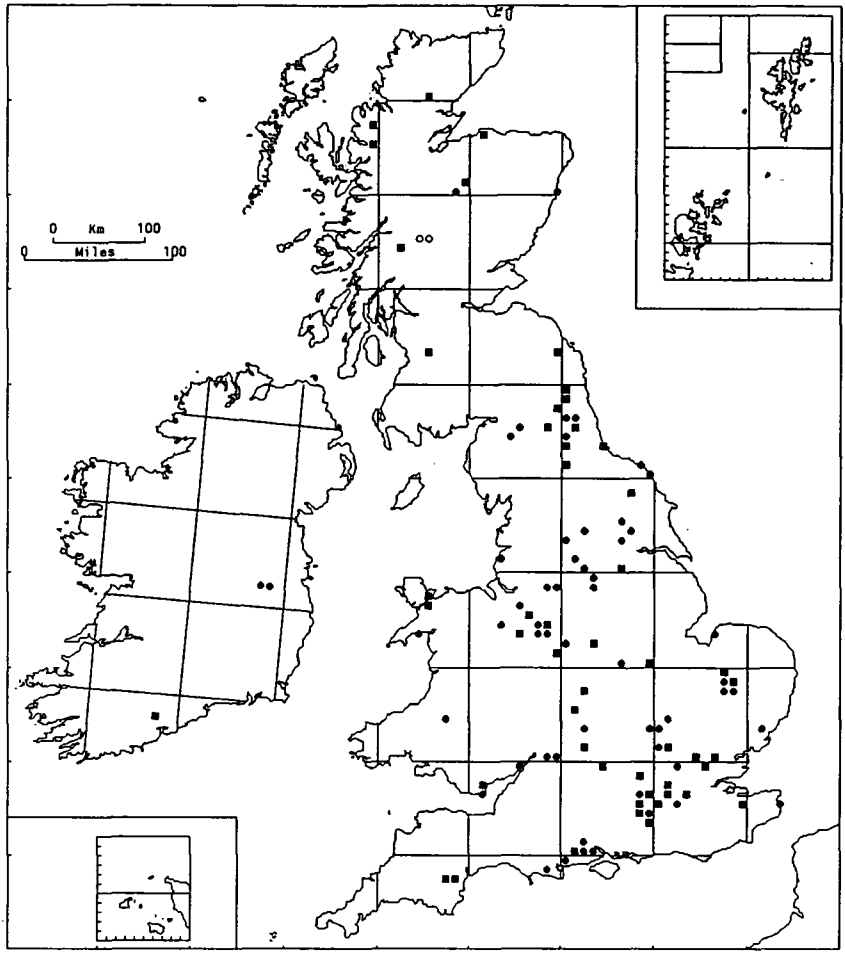
The records date from weeks 14, 16, 26 and 29.

Hemerobius fenestratus Tjeder 1932

Distribution and status

It is known in Britain from a single record, of a male netted in flight on 9 September 1986 at Etchden Wood, East Kent (Plant & Barnard 1988). It is probably confined to pines and may be a locally distributed species in Kent and elsewhere.

Map 37 *Hemerobius nitidulus* Fabricius 1777



Hemerobius nitidulus Fabricius 1777

Distribution and status

This species is widespread in Britain and is locally quite common in most of England, becoming scarcer in Wales and Scotland. It is known from two areas in Ireland. It is not known to occur on the Channel Islands.

Habitat

It is apparently confined to pines, and there are records from several habitats, including heathland and domestic gardens where pines are present.

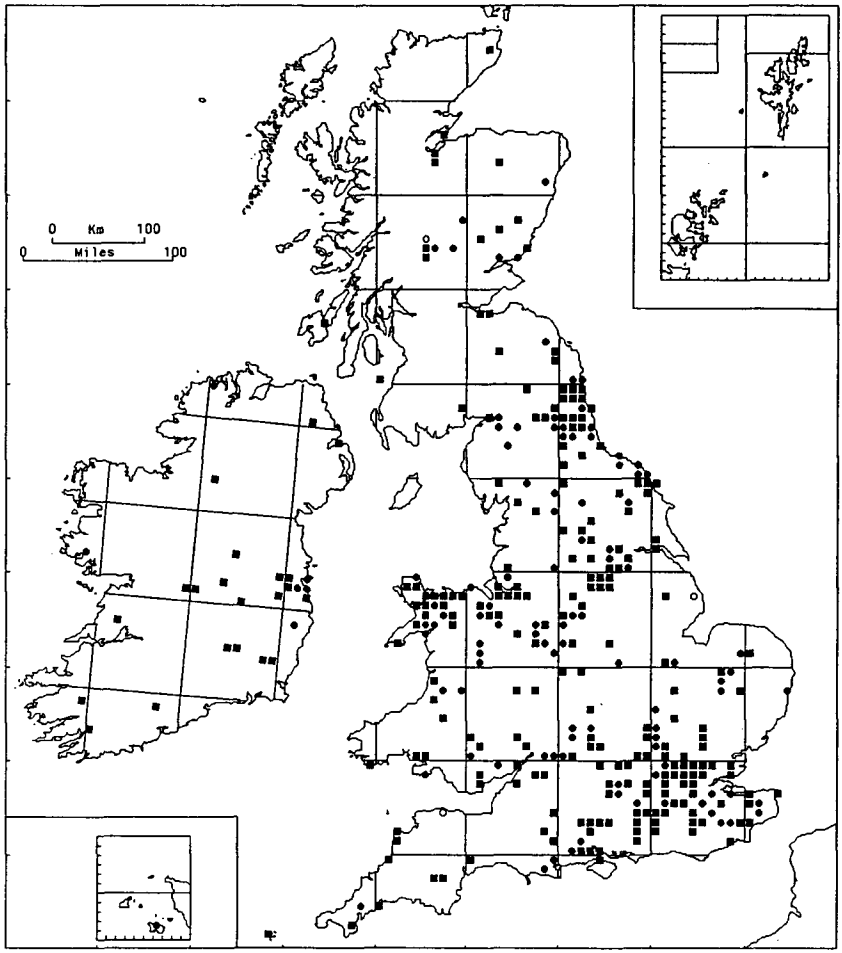
Collecting

Most records are from light traps. It has also been recorded from malaise traps and can be taken by beating the lower branches of pine trees in mixed coniferous/deciduous woodland during June.

Season

The season extends from April to October, with several peaks, suggesting that there is more than one generation per year. Highest numbers have been recorded in May/June (weeks 21–26), July/August (weeks 29–32) and September (weeks 35–38).

Map 38 *Hemerobius micans* Olivier 1792



Hemerobius micans Olivier 1792

Distribution and status

It is widespread and very common throughout Britain and Ireland, including the Scillies and the Channel Islands, but it has not been recorded from the Hebrides, Orkney or Shetland. It is frequently the most commonly recorded lacewing in woodland.

Habitat

It is probably obligatorily associated with oak trees. Most records relate to woodland, but it is also frequently recorded in town parks, gardens and other habitats when there are mature oak trees nearby.

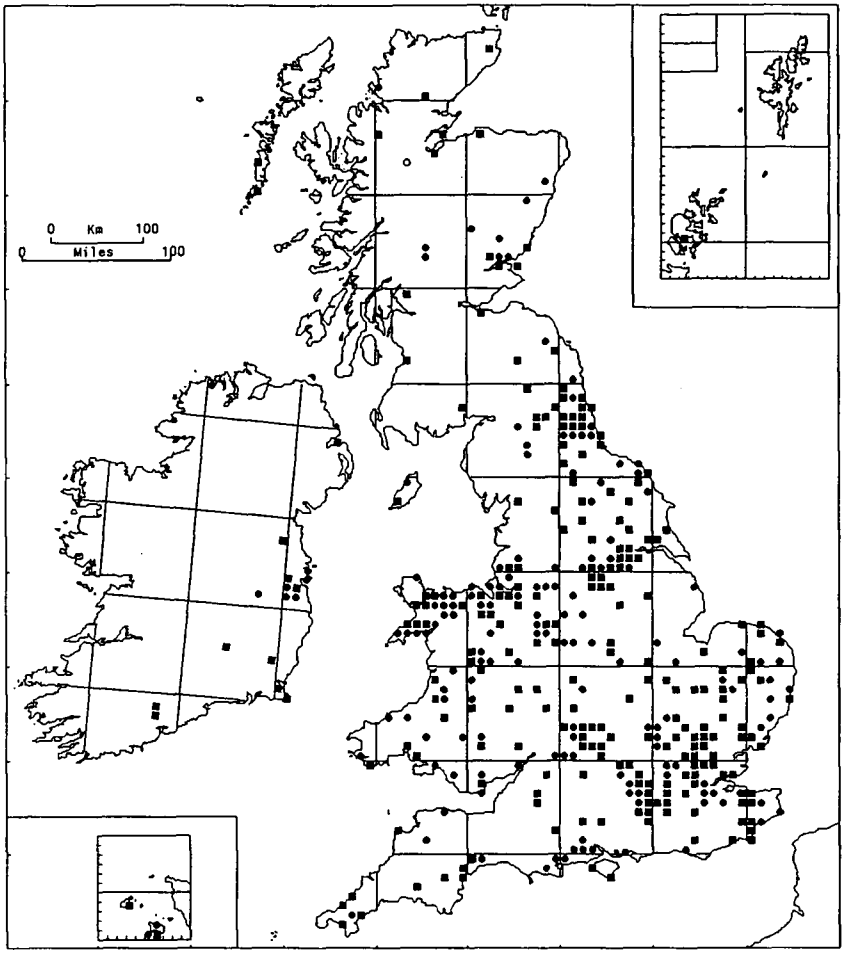
Collecting

Beating the foliage of oak trees, between May and August, is a reliable method of collection. It has also been taken at light, in malaise traps and in suction traps. Sweeping hedgerows and general herbage in the vicinity of oak trees has also produced specimens.

Season

The season extends from April to October, with an outlying record in December. There is a marked peak of records in week 20, part of a spring peak throughout May. Other distinct peaks of records are in July and in August.

Map 39 *Hemerobius lutescens* Fabricius 1793



Hemerobius lutescens Fabricius 1793

Distribution and status

This species is widespread and common throughout Britain and Ireland, including the Outer Hebrides and the Channel Islands, but it has not been recorded in Orkney or Shetland.

Habitat

It is eurytopic, occurring in the same habitats as *H. humulinus*. The two species are frequently taken together.

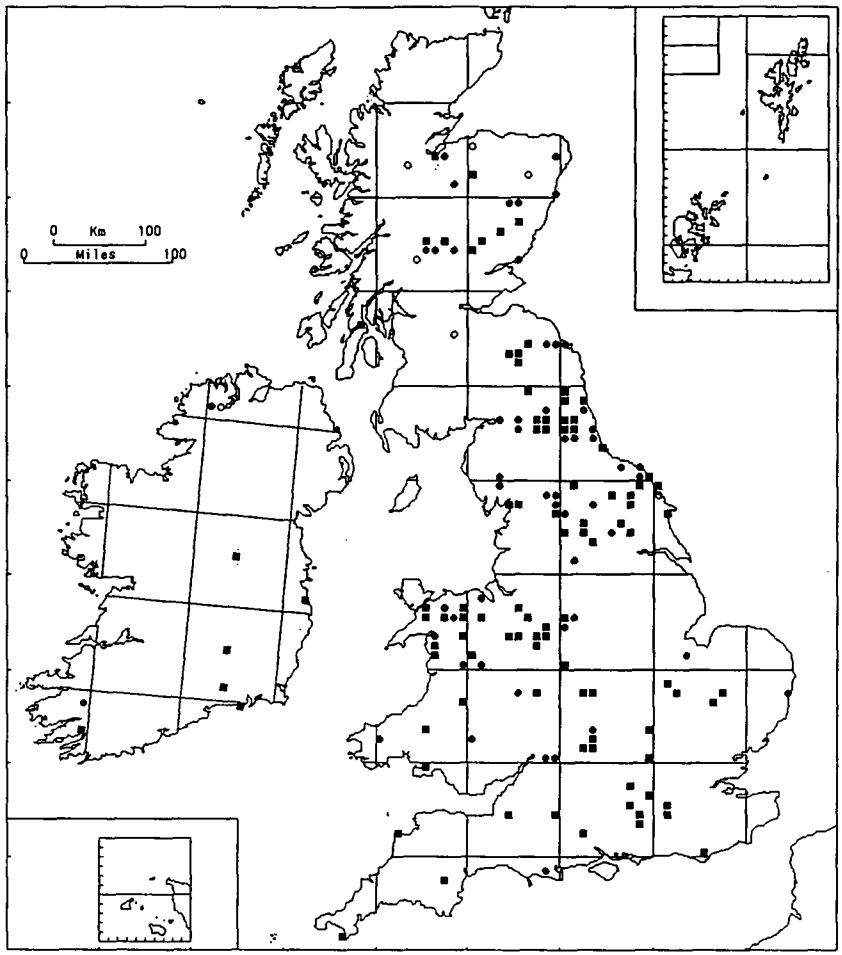
Collecting

It has been taken using most methods, except pitfall trapping.

Season

The season extends from April to October, with two slight peaks of abundance, in May/June and August/September.

Map 40 *Hemerobius marginatus* Stephens 1836



Hemerobius marginatus Stephens 1836

Distribution and status

It is widespread in Britain and Ireland, and locally is quite common, but it has not yet been recorded from western Scotland, Orkney, Shetland, or the Channel Islands.

Habitat

It is most frequently associated with birch trees in woodland, but has also been taken from hazel (*Corylus avellana*) and alder in woodland.

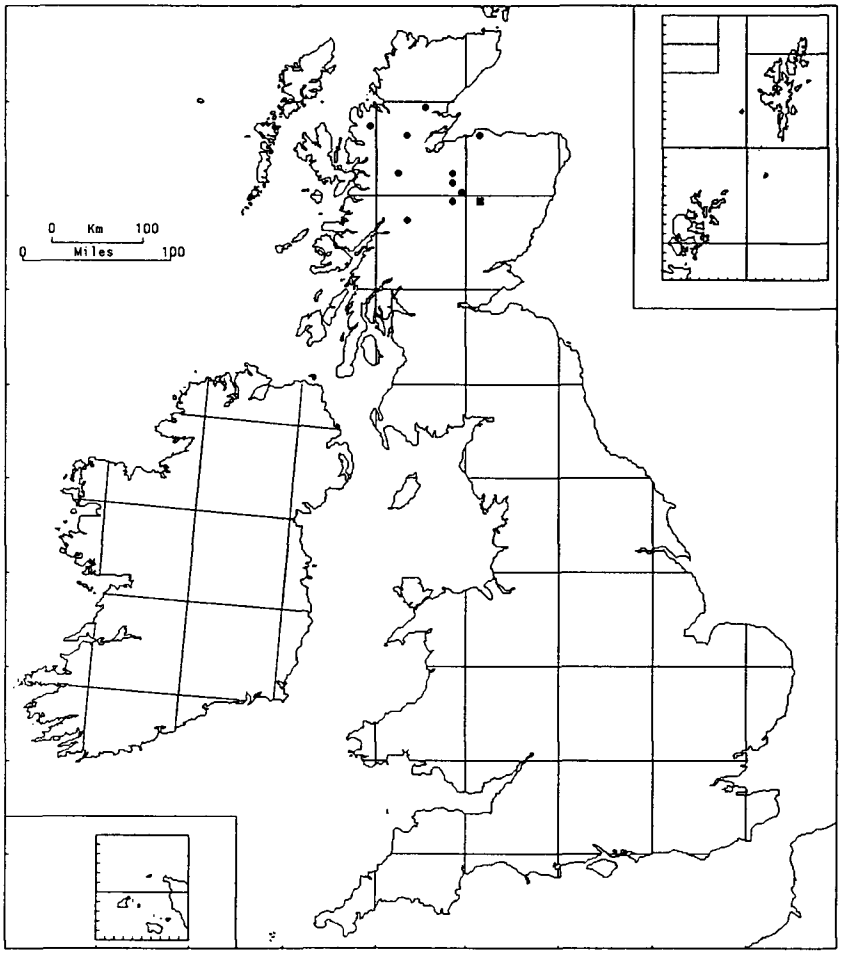
Collecting

Beating the foliage of birch trees is the most frequently recorded method of capture. It also comes to light traps and has been taken in malaise traps in mixed woodlands.

Season

This species has a later season than many others in the genus, with most records being from June (week 24) to early October (week 41). There are two discernible peaks – in July and in August/September.

Map 41 *Wesmaelius malladai* (Navás 1925)



Wesmaelius malladai (Navás 1925)

In the past, there has been confusion between this species and *W. mortoni*. The *W. malladai* referred to here is the species called *Boriomyia mortoni* in Killington's monograph (1937), whilst Fraser (1959) refers to it as *Kimminsia killingtoni*. Fraser's key is not reliable for separating the two species, but an up-to-date key to *Wesmaelius* species is given by Barnard (1990b). For a fuller discussion of *W. malladai* and *W. mortoni*, see Kimmins (1963).

Distribution and status

The species is restricted to the Scottish Highlands where it appears to be somewhat local, but occasionally common, although it is under-recorded within this area.

Habitat

It has been recorded in association with birch and Scots pine in recent years and Killington (1937) also records spruce, larch and poplar (*Populus* spp.). A specimen from South Aberdeenshire, taken in 1982, was from an area of regenerating birch, aspen (*Populus tremula*) and juniper, and a specimen from Inverness, in 1967, was beaten from bilberry (*Vaccinium myrtillus*).

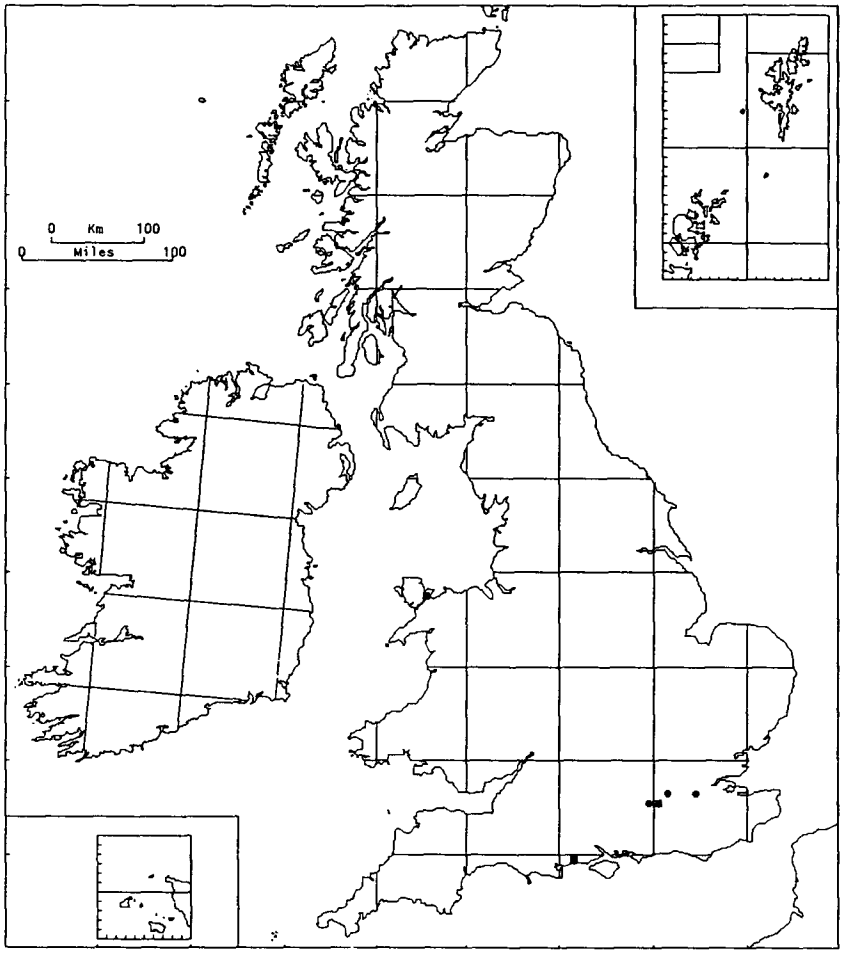
Collecting

It has been beaten from the foliage of all the above species and has also been taken in light traps and aerial suction traps.

Season

The adult flight period is in June and July.

Map 42 *Wesmaelius ravus* (Withycombe 1923)



Wesmaelius ravus (Withycombe 1923)

Distribution and status

This species is extremely local and rare. It was discovered new to science at Oxshott, Surrey, in 1922 and was taken there again in the following year (Withycombe 1923). There are only four other confirmed British localities:

Brookwood, Surrey, 28 May 1934 and 5 June 1934, in a small pine wood near the village (Kimmins 1935);

Keston Common, West Kent on 16 June 1936 and 10 and 11 May 1942 (F C Fraser's specimens in Hope Department, Oxford University Museum);

Bournemouth, South Hampshire, 12 May 1940, 10 May 1942 and 11 May 1943 (Fraser 1940, 1944), and a female in a malaise trap between 26 August and 2 September 1991 (R S George);

Bangor, Caernarvonshire, one specimen in a Rothamsted light trap in the town on 7 May 1980 (M J Morgan).

Three records remain unconfirmed and are not mapped. They are from Bedfordshire: Luton in 1946, and Ravensdell Wood and Sandy in 1973.

Habitat

It appears to be confined to Scots pine.

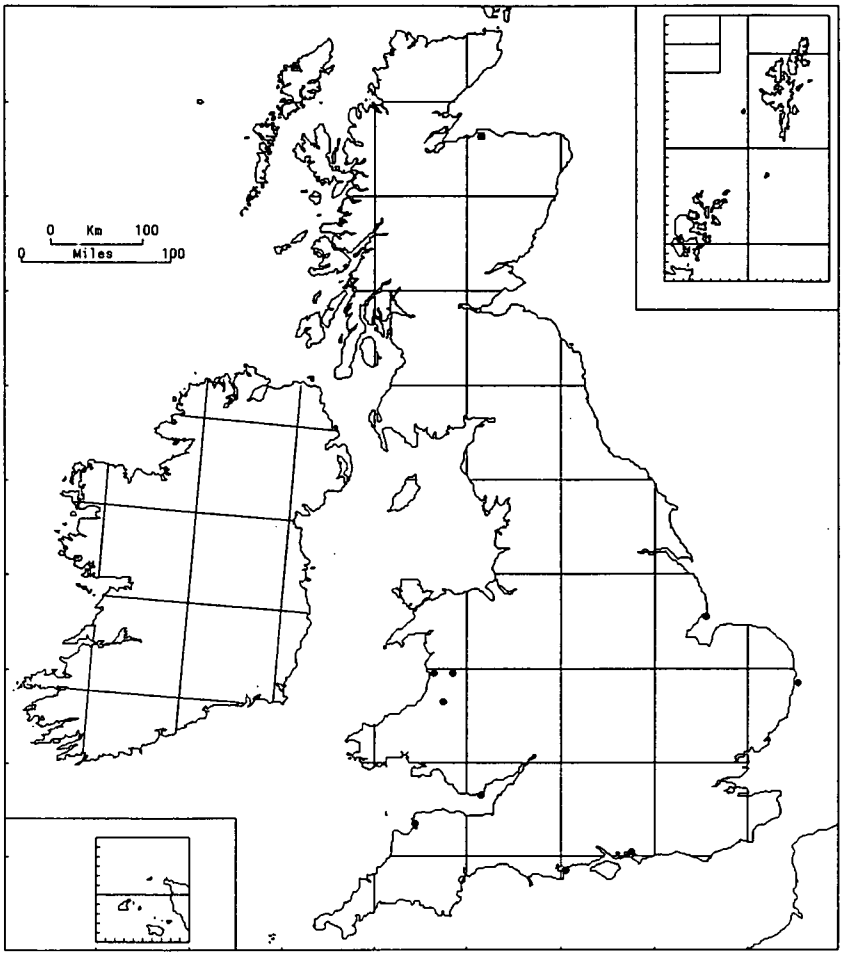
Collecting

It has been taken in a light trap (tungsten filament bulb) and in a malaise trap. There is no indication of how the earlier specimens were collected, but adults have been found on Scots pine trunks in the early morning.

Season

There are confirmed records from May, June and August/September.

Map 43 *Wesmaelius balticus* (Tjeder 1931)



Wesmaelius balticus (Tjeder 1931)

Distribution and status

This is a coastal species, having been recorded from 11 sites, from the Severn estuary north to Elgin. The two inland records, in central Wales, were taken at light traps during the exceptionally hot summer of 1976. A review of the British records and current status of this species is given in Plant (1991b).

W. balticus looks deceptively like *Hemerobius micans* and is easily passed over for this more common species. All examples of *H. micans*, taken on or near sand dunes, should be checked using the keys in Barnard (1990a).

Habitat

It is confined to stable sand dunes with marram (*Ammophila arenaria*). The larvae are believed to be associated with marram.

Collecting

It can be swept from marram, but when disturbed the adult folds its wings and drops to the ground. Most records are from light traps.

Season

There are records from weeks 24, 25, 29, 30 and 31.

Wesmaelius mortoni (McLachlan 1899)

(Not mapped)

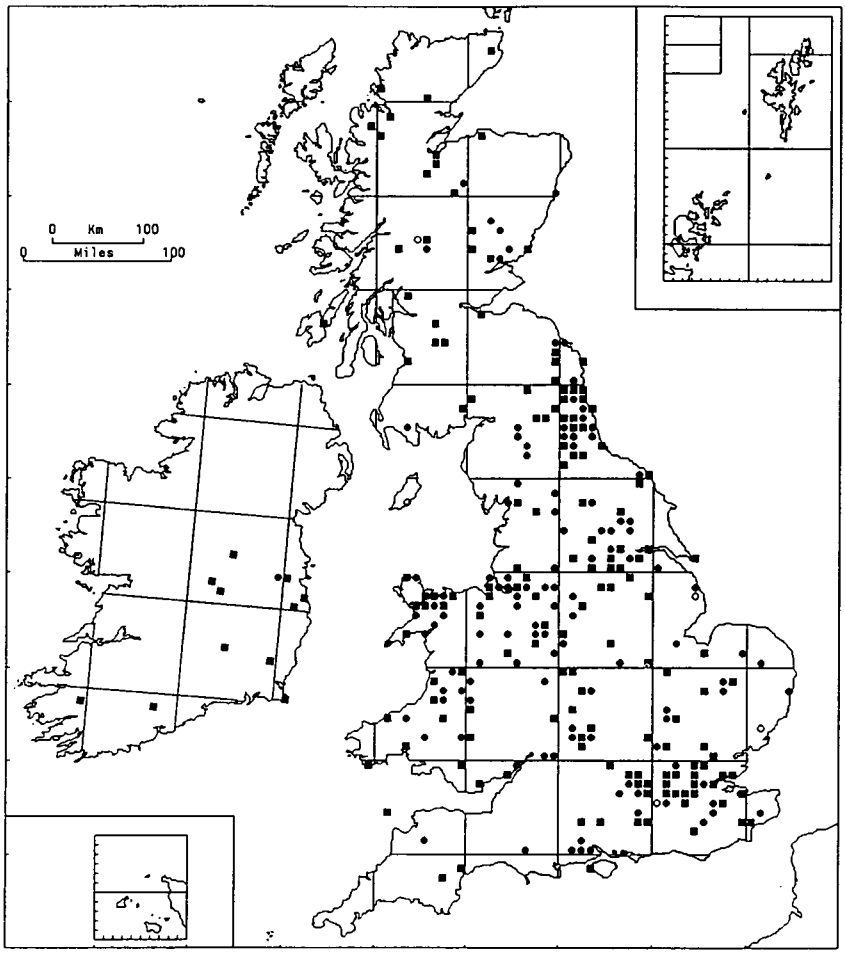
Distribution and status

This species is considered to be extinct in Britain. It is known from only three specimens, from the following localities:

1 male (lectotype) & 1 female (allotype), Rannoch, Mid Perthshire, 11–14 June, 1898. K J Morton;
1 female, Balerno, Midlothian, no date.

Both of the Rannoch specimens are in the K J Morton collection at the Royal Museum of Scotland. The collector of the Balerno specimen is not clear, but it was probably not Morton.

Map 44 *Wesmaelius betulinus* Strøm 1788



Wesmaelius betulinus Strøm 1788

Most European workers (eg Monserrat 1990) regard the epithet *betulinus* as a *nomen dubium*, and consider *nervosus* to be the correct name for this species. The type specimens are apparently missing, but Strøm's illustrations leave no doubt that he was describing this species and therefore the name *betulinus* has priority.

Distribution and status

This species is widespread and very common throughout Britain and Ireland, but has not yet been recorded from the Channel Islands, Orkney or Shetland. Because of the need to examine the genitalia (of both sexes) to separate this species from the equally common *W. subnebulosus*, all records of unsexed specimens are omitted from the map. The unicolorous, grey form *melancholica* Killington 1937 occurs as frequently as the typical form, with most populations containing both forms.

Habitat

It is eurytopic, having been recorded in almost every habitat, from gardens and parks to woodland, wherever there are trees or bushes. Larvae have been collected from a wide variety of deciduous trees and from stinging nettle (*Urtica dioica*) (Killington 1937). Despite its name, there is no apparent restriction to birches.

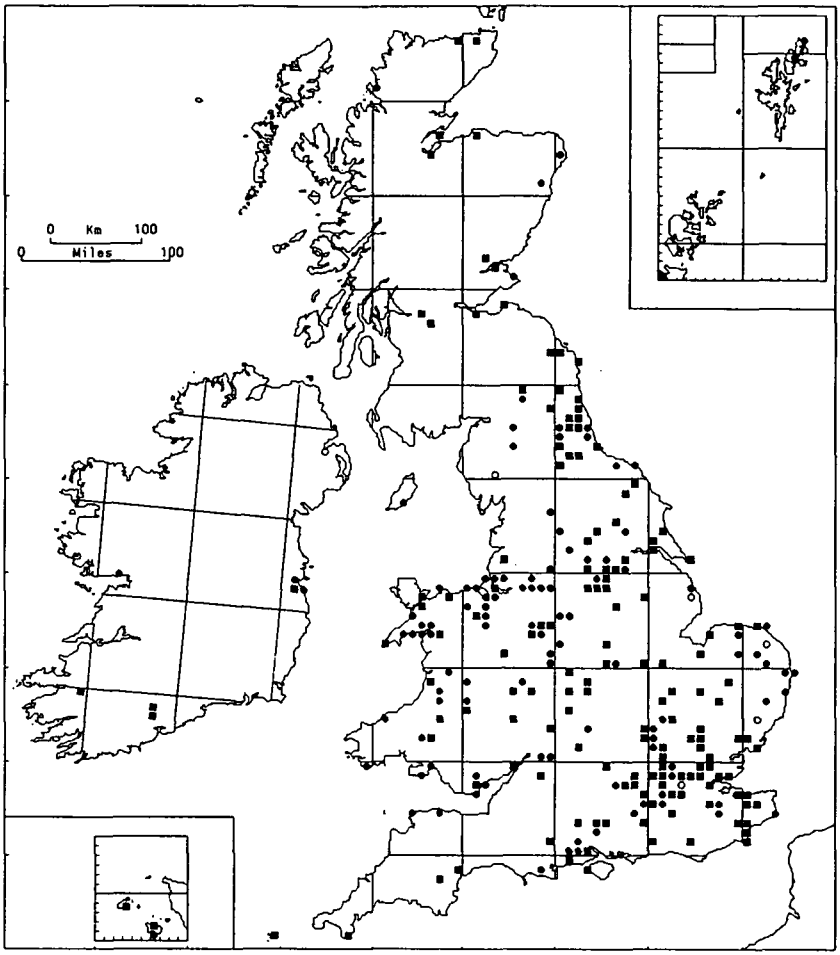
Collecting

It has been taken by beating the foliage of trees and bushes and sweep netting vegetation. It is readily attracted to light and has been taken regularly in malaise traps. It has twice been taken in pitfall traps, and occasionally from water traps at ground level.

Season

It has a long season, from March to October, with several apparent peaks which suggest that there are at least two generations, in spring and autumn, and with a possible third mid-summer generation.

Map 45 *Wesmaelius subnebulosus* (Stephens 1836)



Wesmaelius subnebulosus (Stephens 1836)

Distribution and status

This species is widespread and extremely common, even locally abundant, throughout most of Britain, from Shetland to the Channel Islands. However, it is only sparsely recorded from Ireland and has not been recorded from the Outer Hebrides. The form *melancholica* Killington 1937 is unmarked and grey, and in all aspects (except genitalia) is identical to f. *melancholica* of *W. betulinus*. This form and the typical *subnebulosus* occur with equal frequency, with both present at most localities.

Habitat

It is ubiquitous, having been recorded in all the habitats listed on the recording card, except for 'saltmarsh' and 'submerged aquatic'.

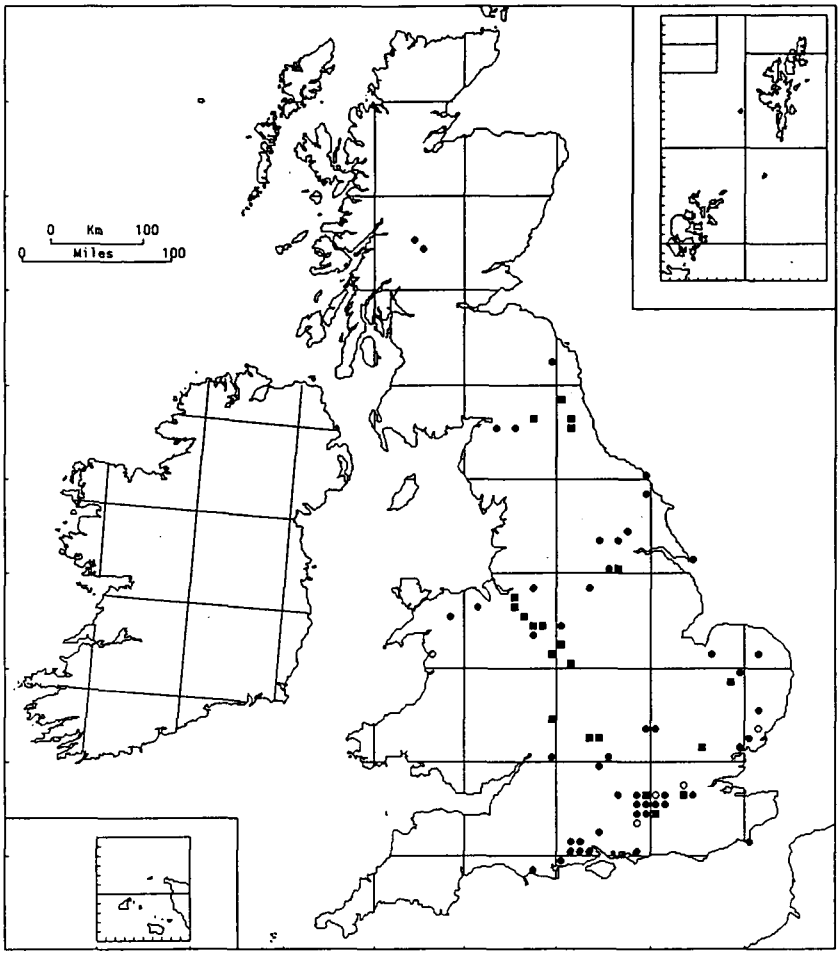
Collecting

It has been recorded frequently at light, is common in malaise traps and has occasionally been taken in both pitfall traps and water traps. It is easily obtained by beating trees, and sometimes by beating bushes, especially hedgerows, and by sweeping rough vegetation.

Season

This species has a long season occurring from late March to early November, but with a definite peak in July and August.

Map 46 *Wesmaelius concinnus* (Stephens 1836)



Wesmaelius concinnus (Stephens 1836)

Distribution and status

This species is apparently widespread in England and north Wales, but has, so far, not been recorded in central and southern Wales, the south-west peninsula, Ireland or the Channel Islands. There are only two Scottish records – Rannoch, 1903 and Glen Lyon, 1937, both in Mid Perthshire. It is usually recorded in only small numbers.

Habitat

It is associated with pine trees in woodland, although this need only be a single mature pine in a deciduous wood. In all cases where the species of tree has been recorded it was Scots pine.

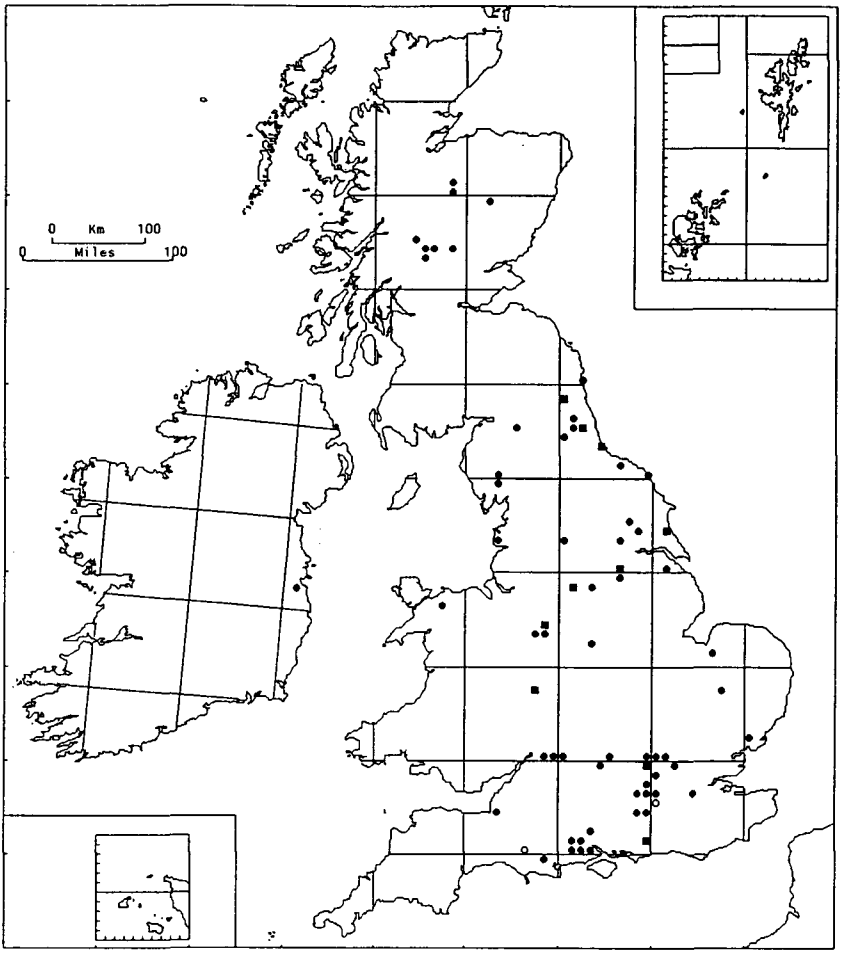
Collecting

It has been recorded only by beating pine trees and in light traps.

Season

The season for this species appears short, with a concentration of records in June and July.

Map 47 *Wesmaelius quadrifasciatus* (Reuter 1894)



Wesmaelius quadrifasciatus (Reuter 1894)

Distribution and status

W. quadrifasciatus frequently occurs with *W. concinnus* and in many ways is similar, although less abundant. It has been recorded from Ireland only once, as a single specimen from Co Wicklow in 1975 (Speight 1976).

Habitat

It is apparently strictly associated with larch, but in woodland it can sometimes be taken from adjacent trees of other species.

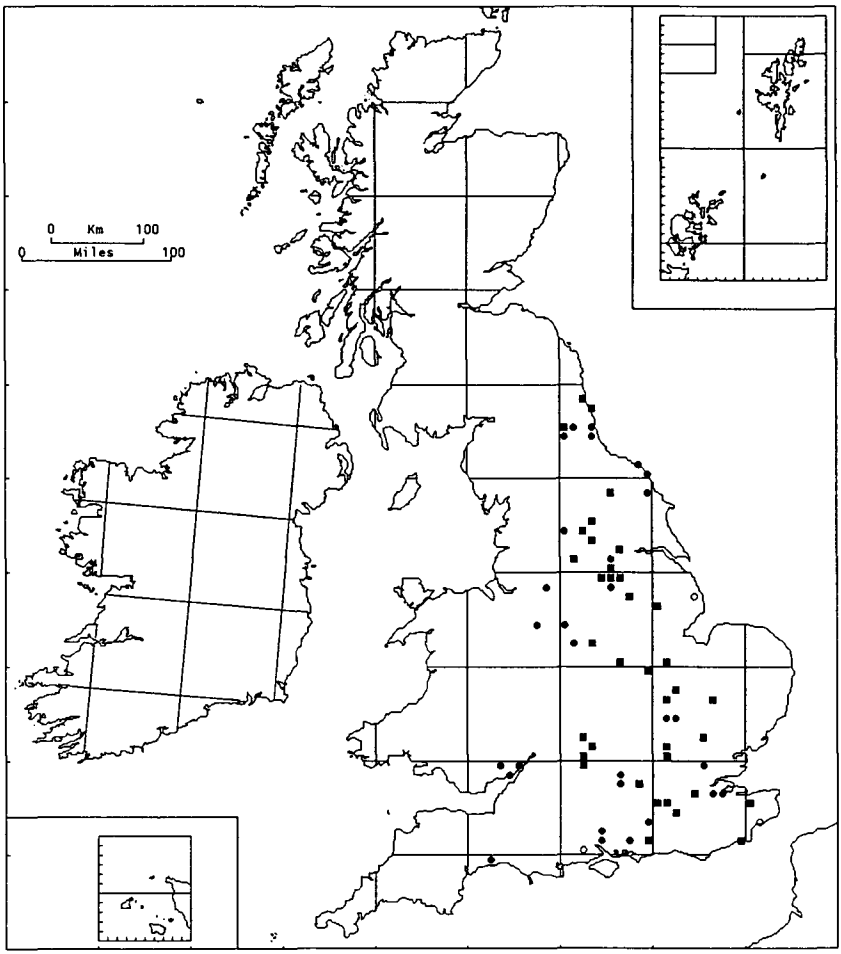
Collecting

Beating the foliage of larch and nearby trees in woodland has produced almost all the records for which there are data on collecting method. There are also a few records of it in light traps.

Season

The season for this species appears short, with a concentration of records in June to August and a few records in May and in October.

Map 48 *Sympherobius elegans* (Stephens 1836)



Sympherobius elegans (Stephens 1836)

Hagen (1858) erroneously placed *S. pygmaeus* (as *Mucropalpus pygmaeus* Rambur) in synonymy with *S. elegans*. This mistake was perpetuated by McLachlan (1868) and persisted in the literature until at least 1931. Therefore, early published records of *S. elegans* must be treated with caution and, if the original specimens cannot be examined, records should be disregarded.

Distribution and status

It is widely distributed, and locally common, in eastern and central England, but absent from Scotland. Apart from three isolated records in Monmouthshire, it is absent from Wales and there are no recent records from western England. It is also absent from Ireland, although a specimen in the collection at the Natural History Museum, London, has a data label giving 'Killarney, 1862'. Peter Barnard (pers. comm.) has confirmed that this specimen, from the McLachlan collection, is mis-labelled. According to McLachlan's diary, the data should read 'British Isles, J C Dale and others'. It has not been recorded from the Channel Islands.

Habitat

This species is strictly associated with deciduous trees. Most records are from deciduous woodland, both high forest and coppice-with-standards. A few records are from domestic gardens and hedgerows. One record was made by sweep netting in neutral grassland. Killington (1937) notes a possible association with beech (*Fagus sylvatica*), but this is not confirmed by the recent data.

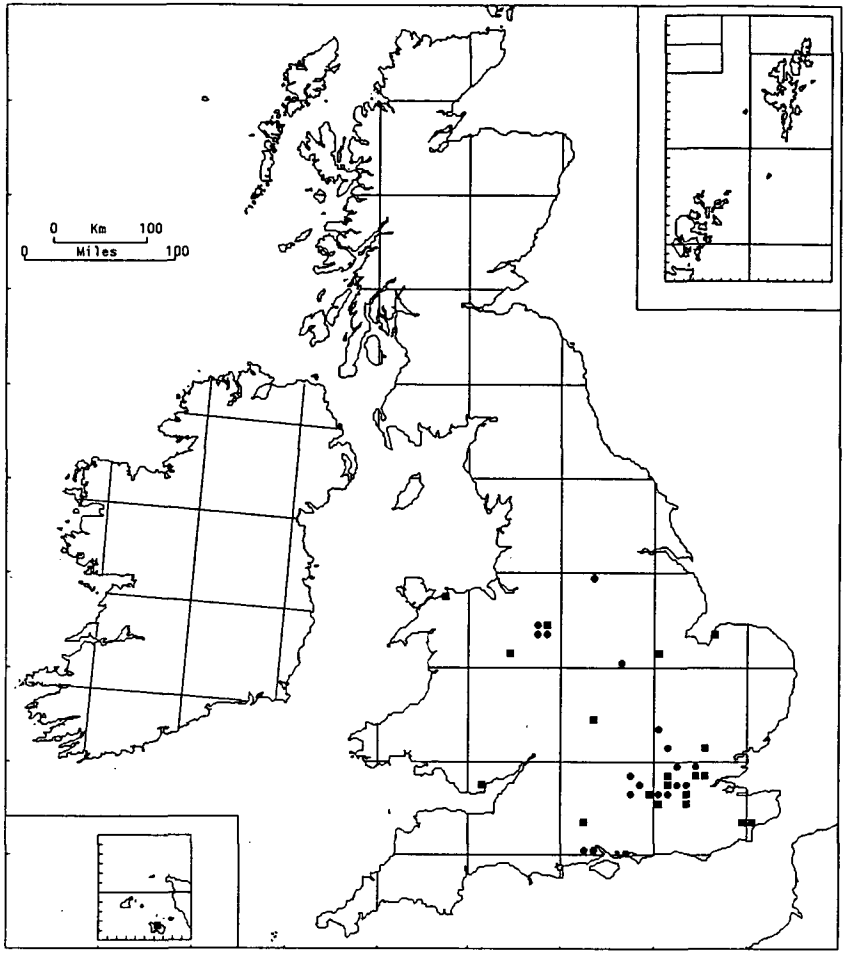
Collecting

Beating the branches of mature trees in woodland is the most frequently recorded collecting method. A few specimens were taken by sweeping and a few in light traps. There are no records from malaise traps.

Season

There are a couple of outlying records for weeks 9 and 38, but most are from June to August (weeks 23–35).

Map 49 *Sympherobius pygmaeus* (Rambur 1842)



Sympherobius pygmaeus (Rambur 1842)

Distribution and status

This species is widespread but local in England and Wales and is probably under-recorded. It has not been recorded from Scotland or Ireland, but is known from the Channel Islands.

Habitat

It is confined to mature oak trees, especially in high-forest woodland, but also on isolated trees such as in hedges, gardens and parks.

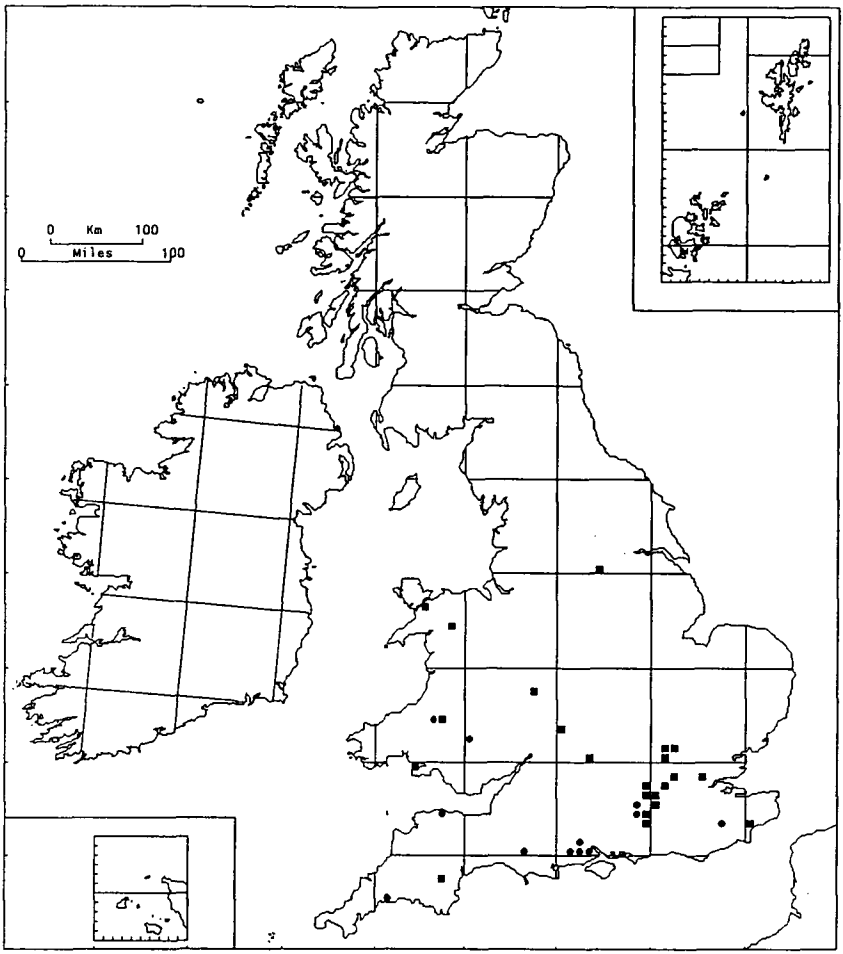
Collecting

Most records are from light traps, with a few from malaise traps and a very small number from beating the foliage of oaks.

Season

The adult flight period extends from early May to the end of September.

Map 50 *Sympherobius pellucidus* (Walker 1853)



Sympherobius pellucidus (Walker 1853)

Distribution and status

This species is widely distributed, but very local, in southern England and in Wales. It is absent from northern England, Scotland, Ireland and the Channel Islands.

Habitat

Few habitat data have been accumulated with the recent records, and such data are lacking from the labels of most museum specimens. It has been collected in deciduous woodland, mixed park woodland and beside a river. Large numbers were taken in Richmond Park, London, by fogging the canopy of oaks (Barnard *et al.* 1986). The suggestion that *S. pellucidus* is associated with conifers (Killington 1937) appears unlikely.

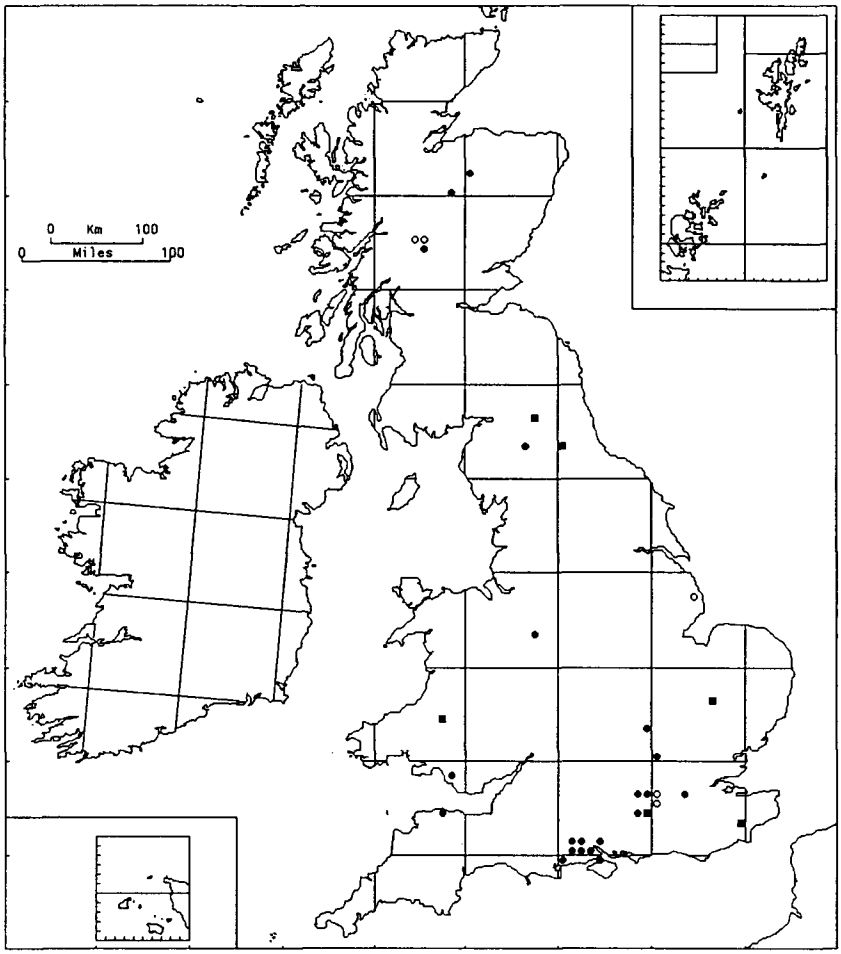
Collecting

Almost all records are from light traps or malaise traps. Killington (1937) took several by beating Scots pine and a female by beating ivy (*Hedera helix*) on an oak trunk.

Season

Most records are from late April to the end of June, with a peak in May, but there are a scatter of records in August and September.

Map 51 *Sympherobius fuscescens* (Wallengren 1863)



Sympherobius fuscescens (Wallengren 1863)

Distribution and status

This species is widespread but extremely local in England, Wales and Scotland. It is apparently absent from Ireland and has not been recorded from the Channel Islands. It is the only species of *Sympherobius* recorded in Scotland.

Habitat

It is strictly confined to Scots pine in Britain, although abroad it is associated with other species of pines.

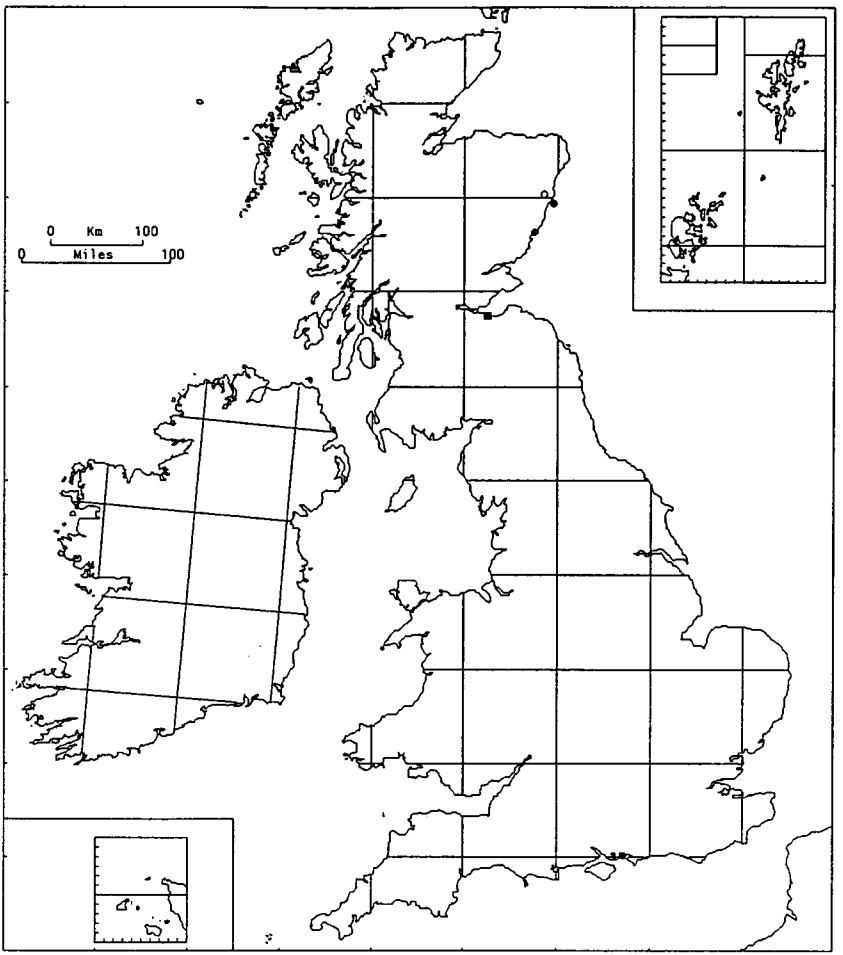
Collecting

Most records have come from light trapping, with some also from beating the foliage of Scots pine.

Season

The adult flight period is from the end of May to mid-July, with outlying records in weeks 15 and 32.

Map 52 *Megalomus hirtus* (Linnaeus 1761)



Megalomus hirtus (Linnaeus 1761)

Distribution and status

It was formerly known from several sites in Kincardineshire, but is now apparently confined to the Edinburgh area where it is quite numerous and under no apparent immediate threat, though it is clearly vulnerable to changes in land management. The record from Devon (Parfitt 1879), although included in European distribution maps (Aspöck *et al.* 1980), cannot be substantiated and is almost certainly an error. The record from Co Durham (Wingate & Robson 1905) is also considered unreliable. Although it is under-recorded, it may be genuinely restricted to a small area of the north-east, perhaps confined by a need for a continental type of climate (Kirby 1991).

Habitat

In Scotland, it is associated with wood sage (*Teucrium scorodonia*), typically on rocky, exposed slopes, but on the continent it may not be confined to this plant, and so other plants may also be involved in Scotland. However, until recently, there has been confusion, on the continent, between *M. hirtus* and *M. tortricoides* Rambur, and it is unclear whether all the continental data for *M. hirtus* truly refer to that species.

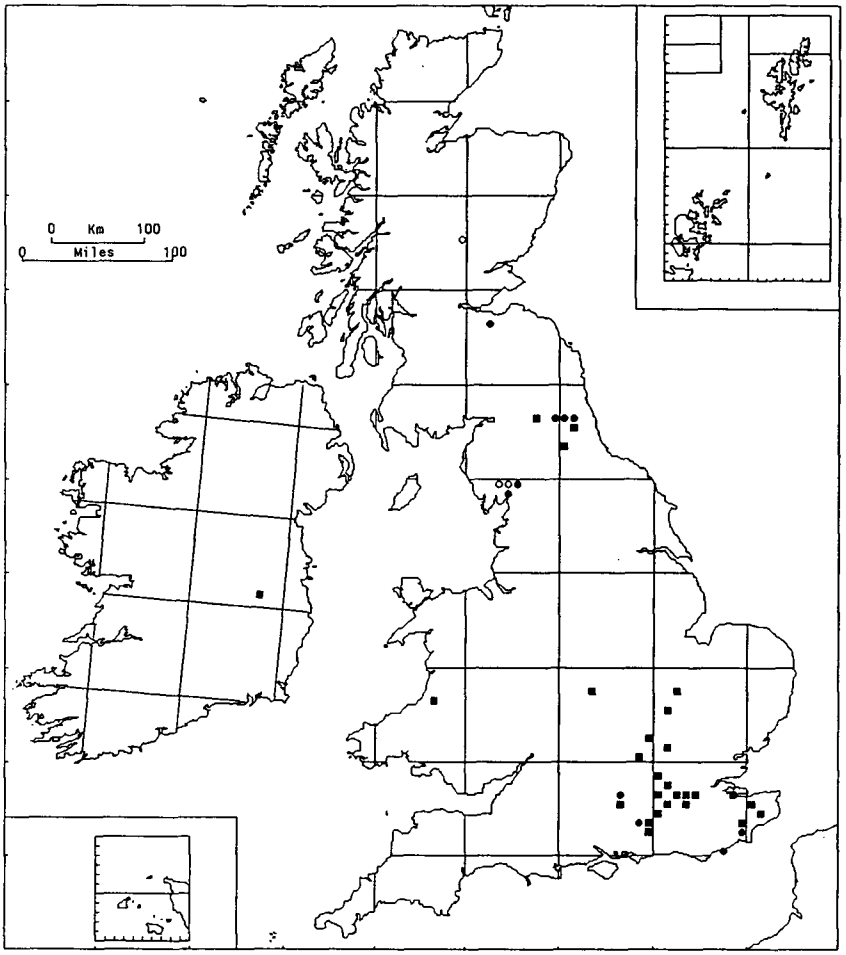
Collecting

There are few data on collecting methods, but sweeping wood sage (and other plants) on rocky hillsides, the tops of sea cliffs and similiar habitats, between mid-July and mid-August, may be rewarding. *M. hirtus* is inconspicuous and is very easily overlooked.

Season

There are records from weeks 25, 26 and 35.

Map 53 *Drepanepteryx phalaenoides* (Linnaeus 1758)



Drepanepteryx phalaenoides (Linnaeus 1758)

Distribution and status

The map shows two distinct groups of records – in south-east England and in the north of England. Collins (1990) suggests that it established only recently in the south-east, possibly as a result of immigration. This suggestion is supported by the fact that the only old record from the south-east (Bexhill, East Sussex, 1914) was made on a coastline known for insect immigration. There are recent records from Wales (Ty Coed, Cardiganshire, 1990) and Ireland (Newbridge Fen, Kildare, 1989) as well as several old ones from Scotland (Pitlochry, East Perthshire, 1892 (mapped) and Dumfriesshire, Lanarkshire and Midlothian (not mapped)). All this evidence suggests that under-recording may be responsible for the apparently disjunct distribution.

Habitat

There is a clear association with dense deciduous woodland containing mature oak trees, but there is a single record from semi-improved chalk grassland at Colekitchen Down, Surrey. Killington (1937) gives the habitat as 'dense undergrowth of hedges, from bushes and trees in woods and in more open spaces' and it is probable that dense undergrowth is an important resting site for adult insects.

Collecting

The majority of the records are from light-traps in woodland. There are also records from beating oak, beech and holly, and Leech (1962) beat an adult from hawthorn (*Crataegus* spp.). The sole Irish record was from a suction trap. Adults are very well camouflaged; specimens resemble bits of dead leaf and are easily overlooked. Larvae have been found on apple (*Malus* spp.), plum (*Prunus domestica*), beech, elm and oak trees (Killington 1937).

Season

Several authors (eg Killington 1937; Collins 1990) have suggested that *D. phalaenoides* may hibernate as an adult. There is no proof from the present data, but, from the few that are available, the abrupt end of the flight period in October and the early emergence of some individuals in the spring may support this idea.

6 CHRYSOPIDAE

Worldwide, the Chrysopidae (green lacewings) are one of the largest families of the Neuroptera, and one of the most important economically. Over 1200 species, in 86 genera and sub-genera, are now recognised (Brooks & Barnard 1990). There has been confusion in the classification of the species, due in no small part to lack of clarity in the original descriptions of many species.

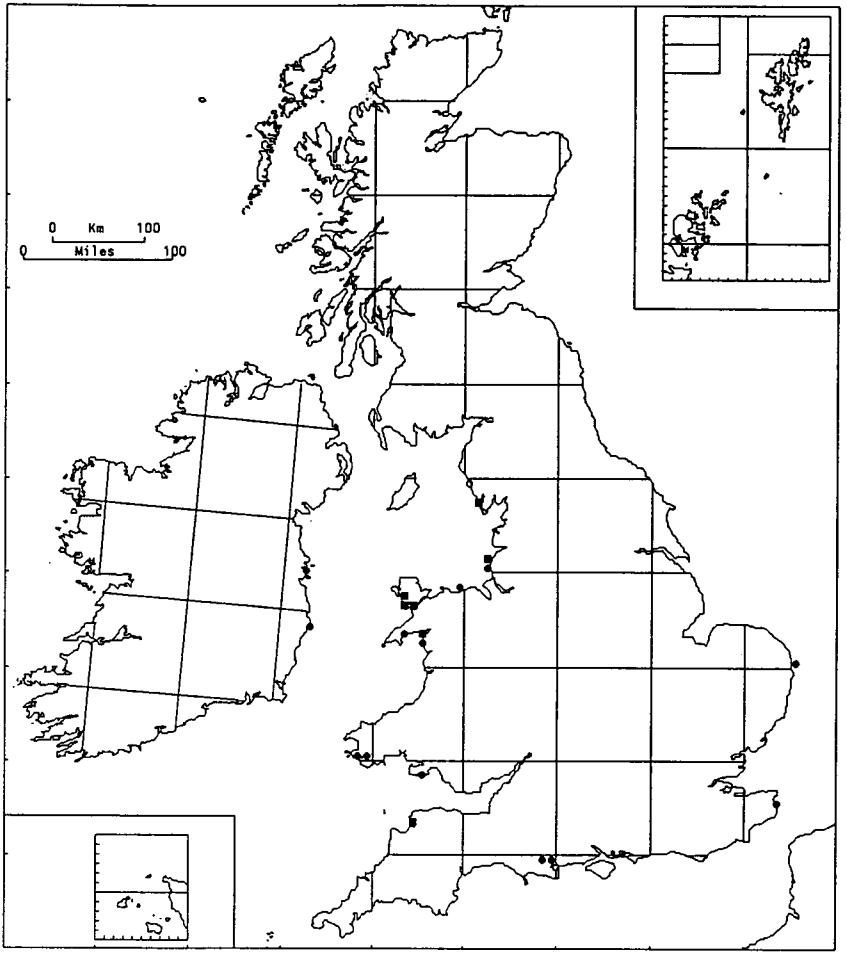
Killington (1937) retained the genus *Chrysopa* for all the British and Irish species, except for two species which he placed in *Nathanica*. He found it impossible to divide this very large genus in a satisfactory manner. The revision of the Chrysopidae on a worldwide basis (Brooks & Barnard 1990), although long overdue, means that some hitherto unfamiliar names have come into use. The family Chrysopidae of Britain and Ireland is now regarded as comprising seven genera: *Chrysopa*, *Chrysoperla*, *Chrysopidia*, *Cunctochrysa*, *Mallada*, *Nineta* and *Nothochrysa*.

At the time of writing, 16 species of chrysopid are recognised from Britain and Ireland. However, recent papers by Leraut (1991, 1992) suggest that *Chrysoperla carnea*, our commonest species, actually comprises four species: *C. renoni* (Lacroix), *C. lucasina* (Lacroix), *C. kolthoffi* Leraut and *C. carnea* (Stephens). All four taxa may occur in Britain, but it has not been possible, at this late stage, to segregate records. In this *Atlas*, therefore, records of *C. carnea* are of the aggregate species only.

Identification

Fraser (1959) contains a few errors and omits some species. The current texts for identification are Barnard (1990c) and the subsequent note by Plant (1991d).

Map 54 *Chrysopa abbreviata* Curtis 1834



Chrysopa abbreviata Curtis 1834

In the key to species of *Chrysopa* by Fraser (1959), the tarsal claw characters are reversed in the couplet which separates *C. abbreviata* from '*C. phyllochroma*'. Thus, it is *C. abbreviata* which has the tarsal claws dilated at the base, not *C. phyllochroma*. Killington (1937) has this couplet the correct way round.

Distribution and status

The species is very locally distributed around the western and southern coasts of England and Wales, from Ravenglass, Cumberland, in the north-west, to Great Yarmouth, East Norfolk, in the east. It has been recorded in Ireland twice, from Co Wicklow in 1926 (O'Connor 1983) and Co Dublin (Barnard *et al.* 1991). It is still present at Braunton Burrows, North Devon, at Ainsdale, South Lancashire and at several localities in North Wales, and it is often quite common in these places. However, it has not been reported at its Pembrokeshire locality since 1939, and it has not been seen on the Gower peninsula, Glamorganshire, since 1952. The last report from Dorset was in 1922 and it has not been noted in East Kent or East Norfolk since 1937. It is difficult to understand why it no longer appears to occur at any of these localities.

Habitat

It is a nocturnal insect occurring on stable sand dunes, where it is associated with marram.

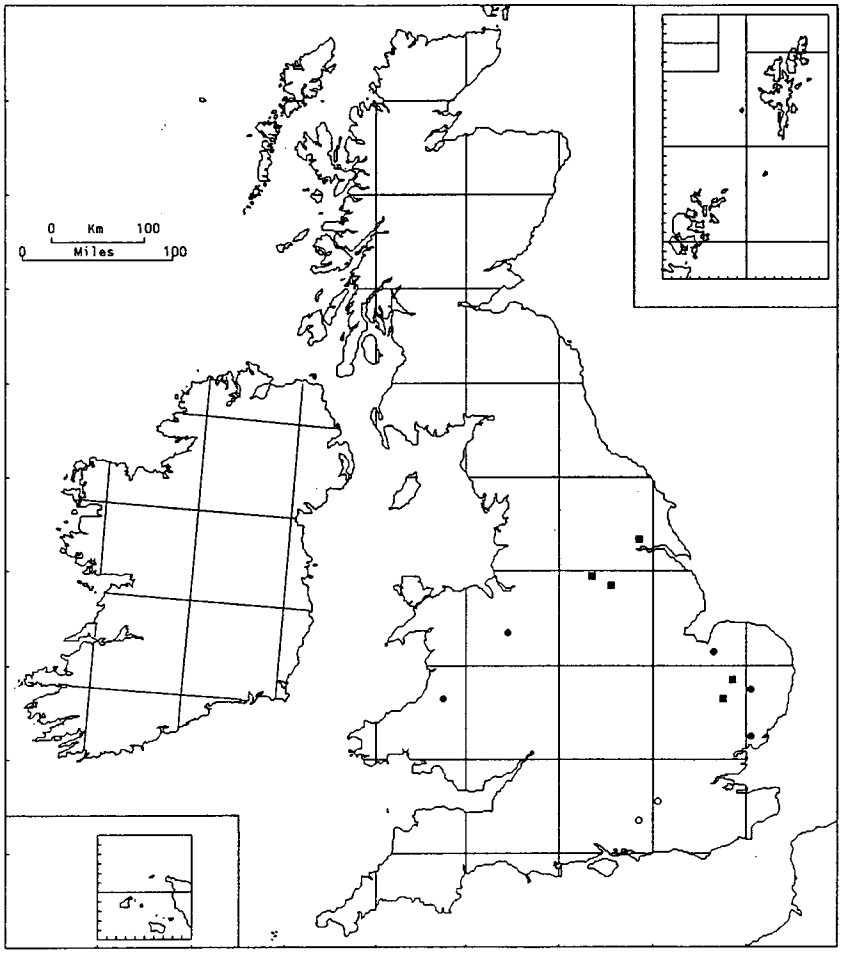
Collecting

Records have come from sweep netting marram and from light traps.

Season

The adult flight period is from late April to early September, possibly with a peak in June and July.

Map 55 *Chrysopa phyllochroma* Wesmael 1841



Chrysopa phyllochroma Wesmael 1841

Kis and Ujhelyi (1965) demonstrated that the species to which both Killington (1937) and Fraser (1959) had referred as *C. phyllochroma* comprised two species – *C. phyllochroma sensu stricto* and a new species, *C. commata*. It is not possible to say to which species either Killington and Fraser actually referred.

Distribution and status

It appears to be very local and rare in England and Wales and has not been recorded from Scotland or Ireland. Because of earlier confusion of this species with *C. commata*, old records have been omitted, except where it has been possible to re-examine voucher material.

Habitat

There is no information available.

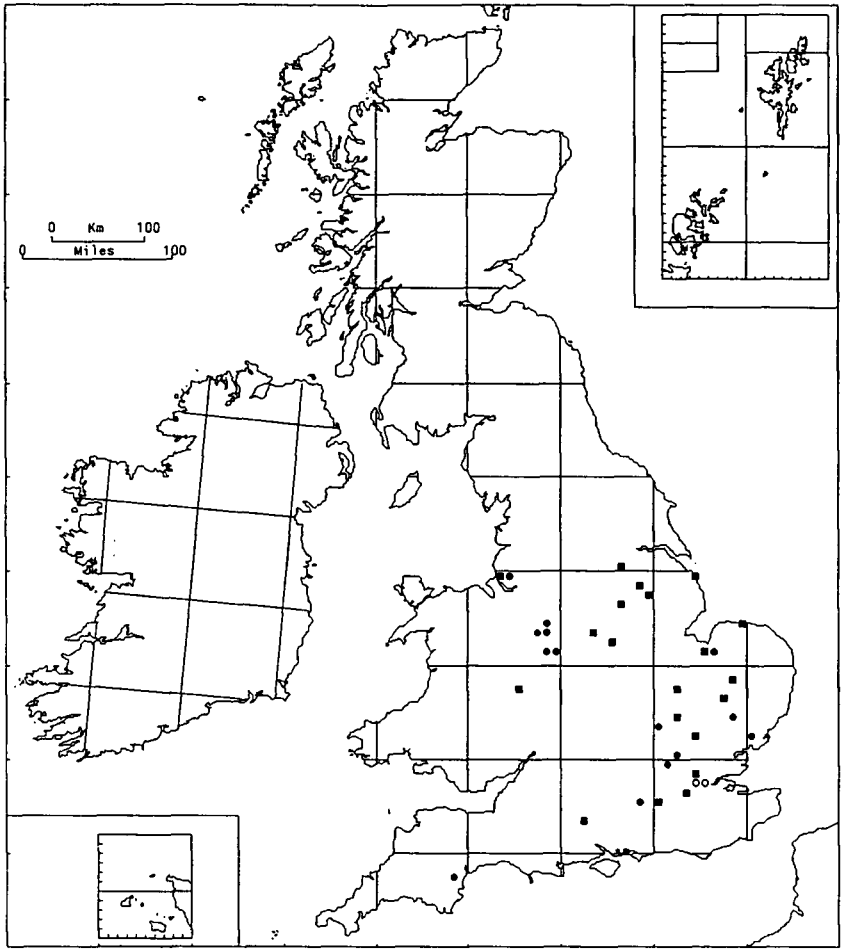
Collecting

The only recorded method of capture is in light traps.

Season

Only six records give detailed dates; these are in weeks 24, 25, 26 and 29.

Map 56 *Chrysopa commata* Kis & Ujhelyi 1965



Chrysopa commata Kis & Ujhelyi 1965

Distribution and status

It is widespread but local in eastern England and the Midlands, north to Lancashire and Lincolnshire, with a single old record from Devon. It has not been recorded from Wales, Scotland or Ireland. It is apparently more widespread and more common than *C. phyllochroma*.

Habitat

Specimens have been swept from rank grassland beside the River Thames in Essex, but there are no other data available.

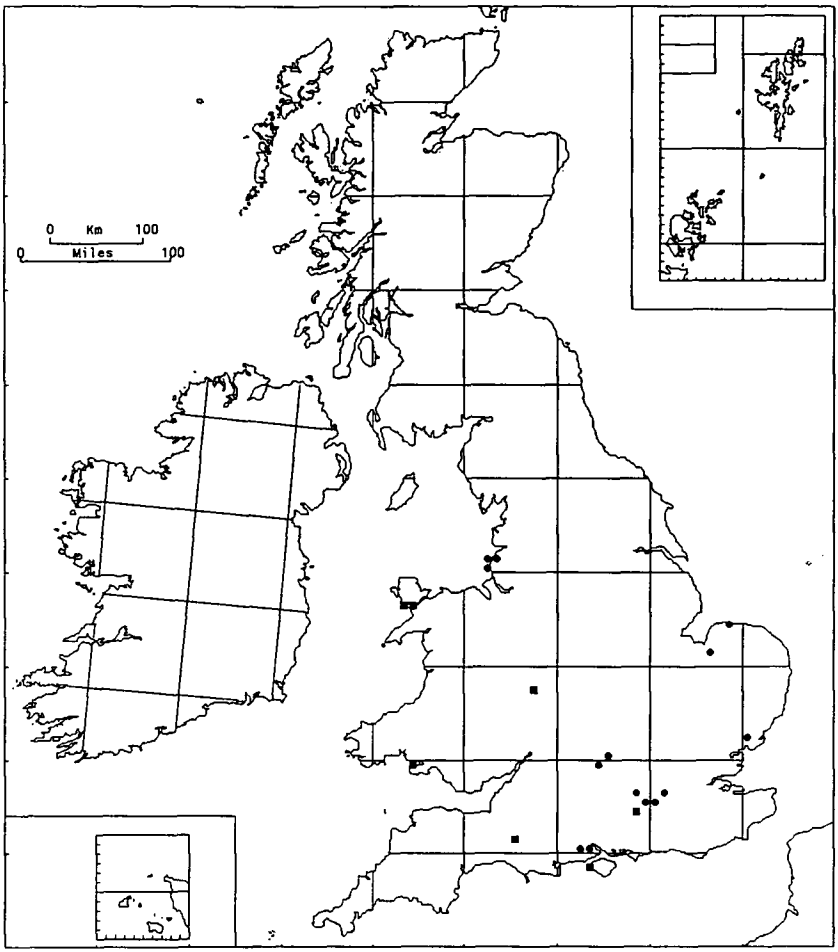
Collecting

Apart from the record by sweeping, most records are from tungsten filament light traps.

Season

The adult flight period appears to run from early June to the end of August, with a peak in July. There is one record in early May.

Map 57 *Chrysopa dorsalis* Burmeister 1839



Chrysopa dorsalis Burmeister 1839

Distribution and status

This species is extremely local and usually rare, but is numerically common at one or two sites. It is undoubtedly a rare insect in Britain, but may be more widespread than the map indicates.

Habitat

It is restricted to pine trees, especially Scots pine, but it has been recorded from other species which were not specified. It is not recorded from isolated trees and seems to be associated with large pine plantations.

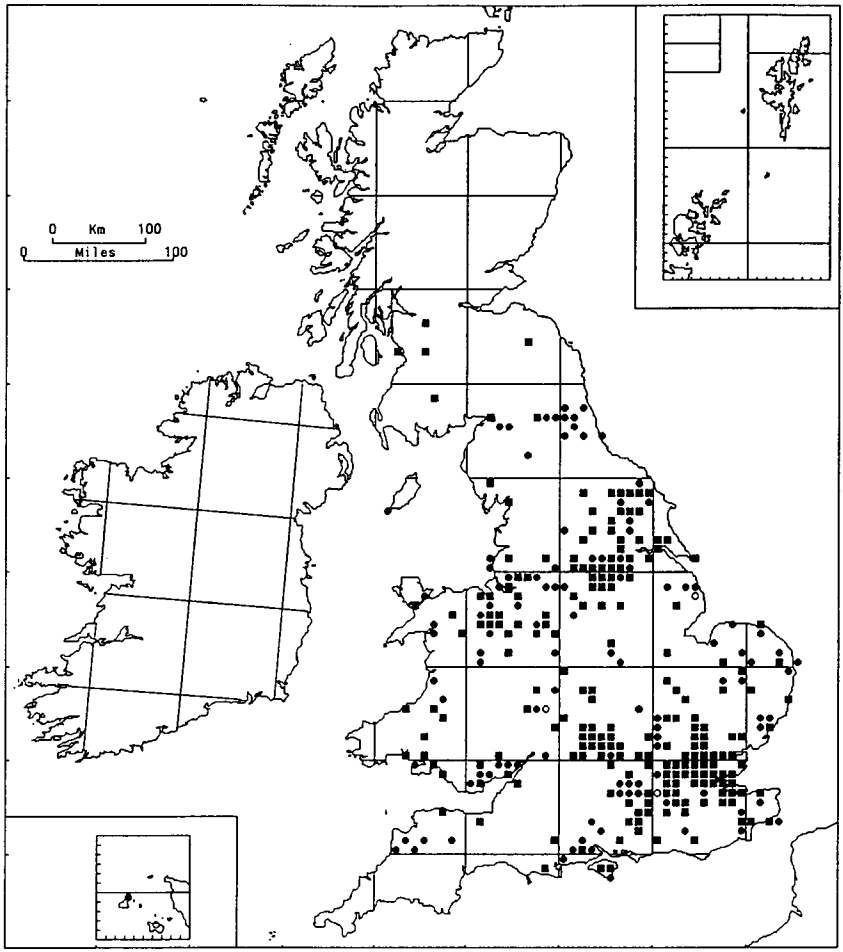
Collecting

Adults can be beaten from pine branches. In the Wyre Forest NNR, the single record was made in a malaise trap. Abroad, it is regularly taken in mercury vapour light traps.

Season

The present records suggest an adult flight period from May to August.

Map 58 *Chrysopa perla* (Linnaeus 1758)



Chrysopa perla (Linnaeus 1758)

Distribution and status

This species is widespread and very common in England, Wales and southern Scotland. It seems to be absent from central and northern Scotland. King and Halbert (1910) regarded this species as 'doubtfully Irish' and since that time there have been no Irish records. It has been recorded from the Channel Islands.

Habitat

It is known from a variety of habitats, especially scrub, hedgerows and other areas of rank herbage with bushes. Most woodland records are from woodland edge habitats rather than the interior of the woods. There are very few records from gardens and it is more common in rural areas than in urban ones.

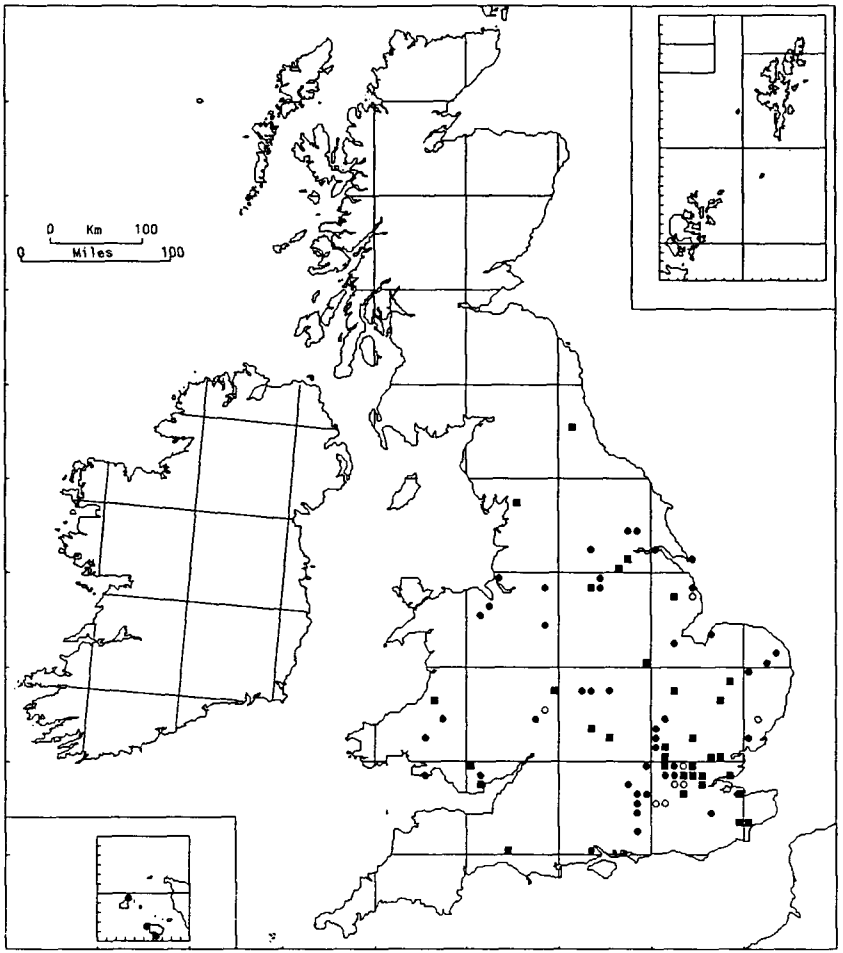
Collecting

It can be taken by sweeping and beating vegetation. Only a few records are from malaise traps, and even fewer from pitfall traps. It is not common in light traps, but sometimes comes to house lights at night.

Season

The records show a distinct single peak, from mid-May to mid-July, but a long season extending from late April (week 17) to late September (week 38).

Map 59 *Chrysopa pallens* (Rambur 1838) (= *septempunctata* Wesmael)



Chrysopa pallens (Rambur 1838)

Distribution and status

This species is widespread and fairly common in England and Wales, becoming rarer towards the north Midlands and with only a few records north of a line from the Dee to the Humber. It is apparently absent from Scotland and Ireland, but has been recorded in the Channel Islands.

Habitat

Many records are from domestic gardens and town parks where there are bushes and shrubs. There are also records from unimproved grassland, both neutral and calcareous, and a few from woodland, especially the edges of woods.

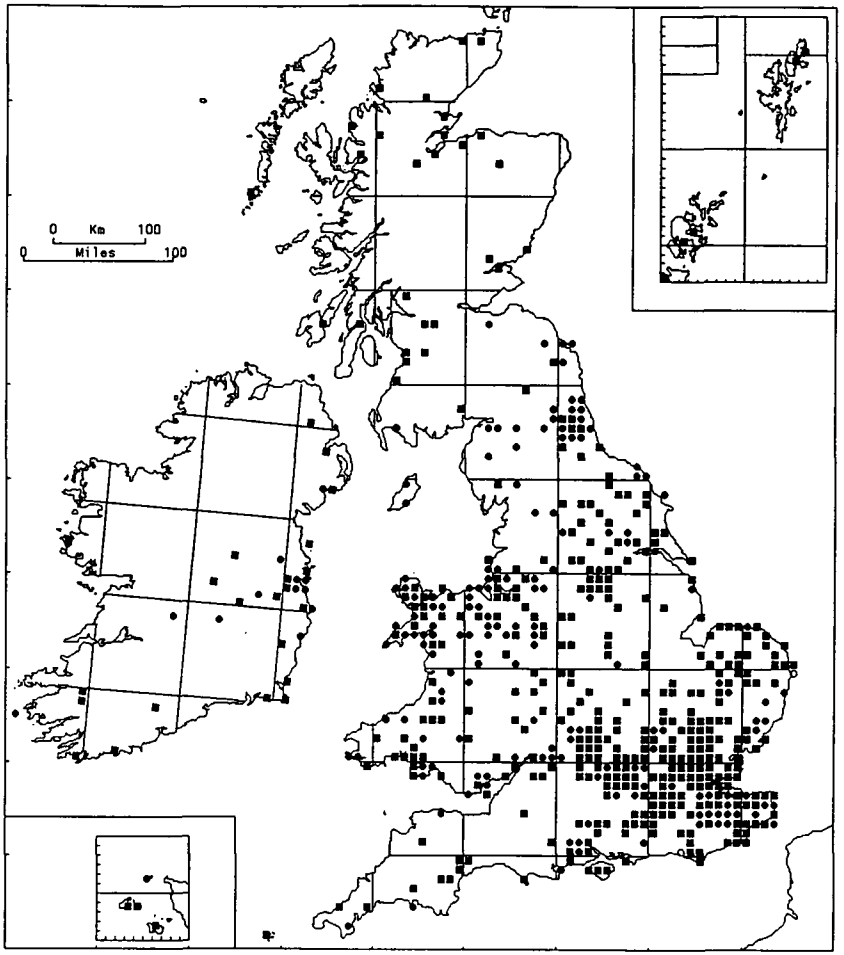
Collecting

Most records have come from light traps, with a few from malaise traps, but only a small number from general sweeping and beating.

Season

The adult flight period runs from late May to early October, with most records in June and July.

Map 60 *Chrysoperla carnea* (Stephens 1836)



Chrysoperla carnea (Stephens 1836)

Distribution and status

It is widespread and abundant throughout Britain and Ireland, from Shetland to the Channel Islands and including the Outer Hebrides. Within this range, it is markedly less frequent in areas where there are no trees.

Leraut (1991, 1992) split *C. carnea* into four taxa. It is possible that these taxa exist in Britain and Ireland. *C. carnea sensu stricto* certainly occurs, and an examination of specimens in the Passmore Edwards Museum and the author's collection indicates that most specimens are this taxon. Re-examination of collections of *C. carnea sensu lato* remains to be undertaken, so that the following map and text refer only to the aggregate taxon.

Habitat

It occurs almost everywhere, but the presence of trees, hedges or even isolated bushes is probably essential. Larvae have been recorded from almost every native species of deciduous tree and shrub, and they have also been swept in grasslands, wetlands, sand dunes and other habitats. *C. carnea* is often the only green lacewing reported in some urban areas.

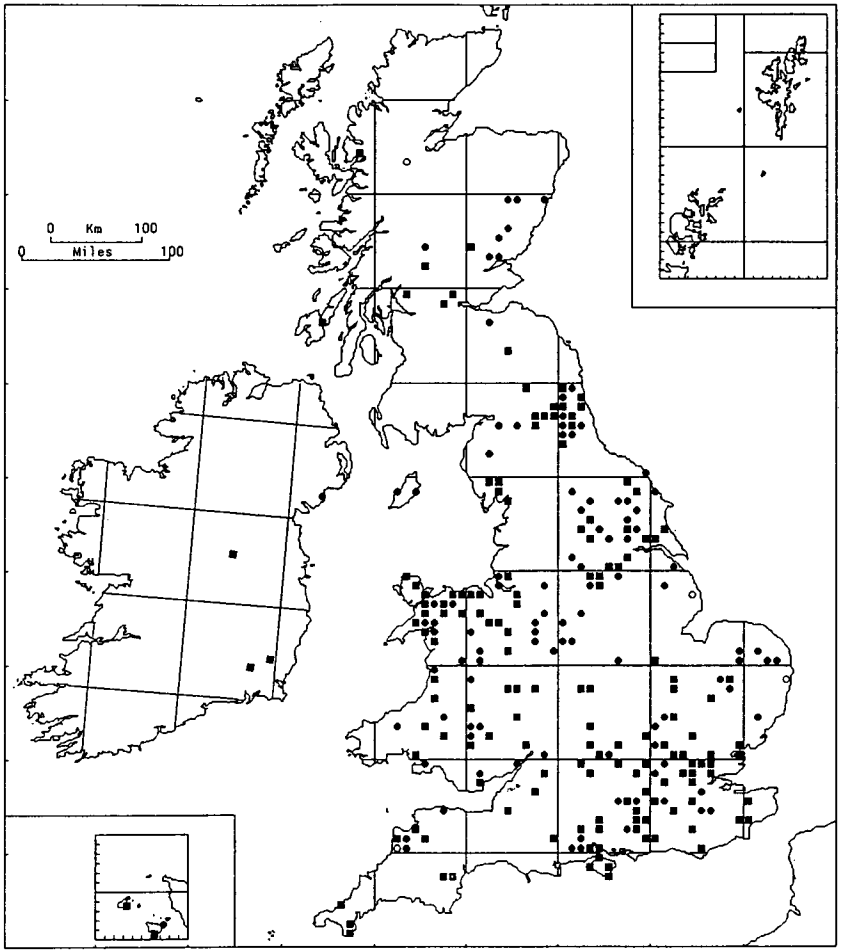
Collecting

This is the only green lacewing which hibernates as an adult, often entering buildings to do so. Examples collected in the field have been taken by sweep netting, beating trees and bushes, light traps, water traps, malaise traps and pitfall traps.

Season

There are records from almost every week in the year, but in the winter months these include records of overwintering adults from inside buildings. There are probably several generations, with peaks of records in May, July and August/September.

Map 61 *Chrysopidia ciliata* (Wesmael 1841)



Chrysopidia ciliata (Wesmael 1841)

Distribution and status

This species is widespread and locally quite common in England and Wales, but rather more local in Scotland and perhaps genuinely absent from much of the Highlands. It is widespread but rather local in Ireland, but some records could not be localised beyond the county level. It is also present in the Channel Islands.

Habitat

The records indicate a general agreement with Killington (1937) that *C. ciliata* is associated with deciduous woods and hedges. It is also found in suburban gardens, but it is apparently absent from truly urban areas.

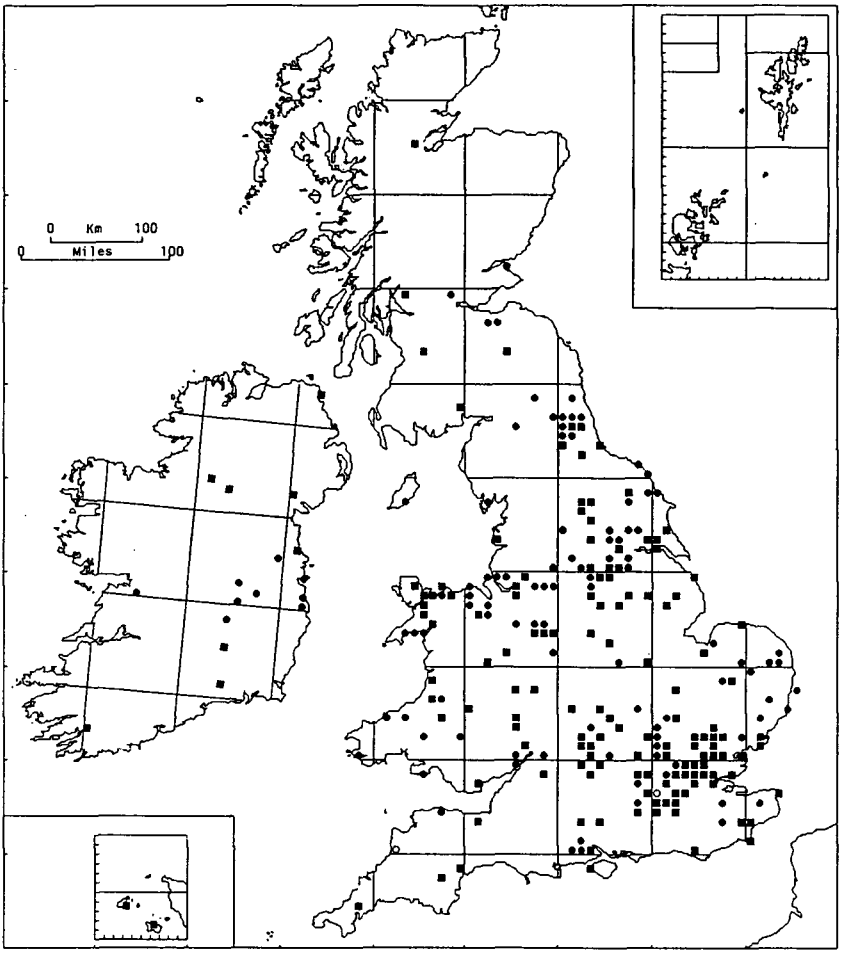
Collecting

It is regularly recorded at light traps and often attracted to house lights at night. It is easily beaten from the lower branches of deciduous trees, showing a slight preference for oak, and from hedges in rural areas.

Season

Most records are from June and July, but there is a scatter of records in late May and in August and September. There are also isolated records in weeks 16 and 40.

Map 62 *Cunctochrysa albolineata* (Killington 1935)



Cunctochrysa albolineata (Killington 1935)

Distribution and status

It is widespread and quite common in England and Wales, but local and scarce in Scotland and Ireland, and probably under-recorded. It is present in the Channel Islands.

Habitat

It is apparently associated with a wide range of deciduous trees and shrubs in both rural and suburban areas. In contrast to *C. ciliata*, *C. albolineata* has been recorded in towns.

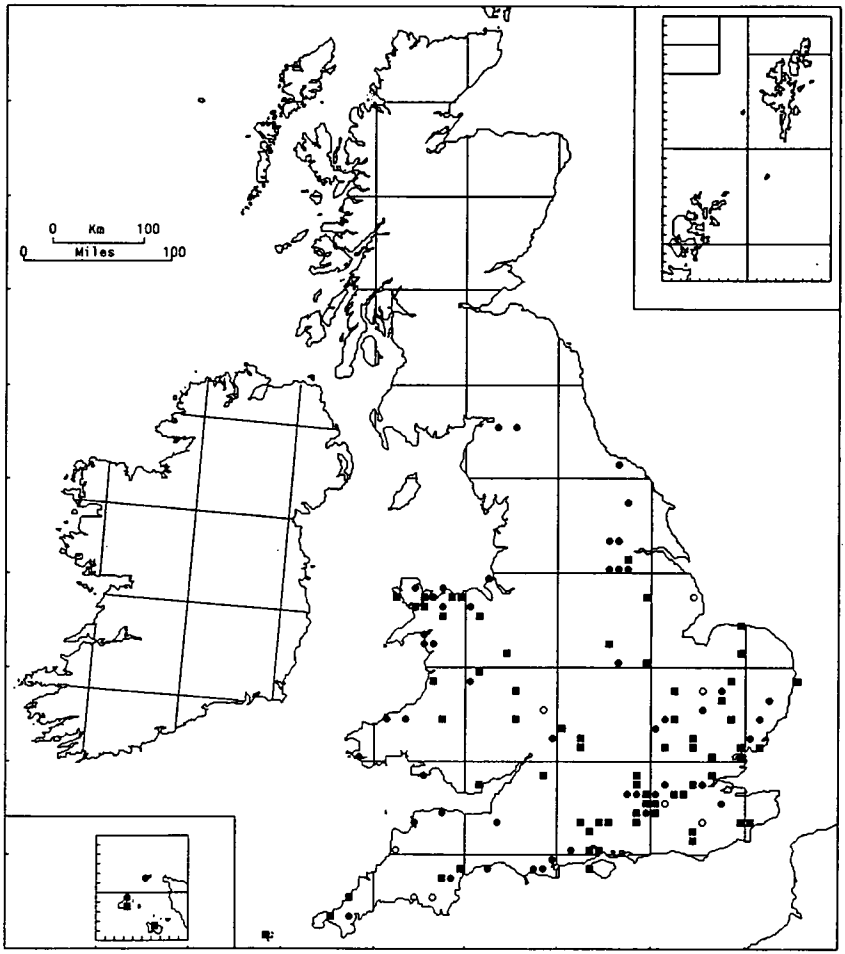
Collecting

It is most frequently recorded by beating trees and bushes and by sweep netting vegetation. It is also taken regularly in light traps and occasionally in malaise traps. It often comes into houses in summer.

Season

The adult flight period is similar to, but slightly later than, that of *C. ciliata*. There are isolated records in weeks 7, 16 and 41.

Map 63 *Mallada flavifrons* (Brauer 1850)



Mallada flavifrons (Brauer 1850)

Distribution and status

This species is widespread but rather locally distributed in Wales and England, south of a line from the Mersey to the Humber. It is known from the Channel Islands and from Ireland, but only in Co Mayo (Killington 1937). It is apparently absent from Scotland.

Habitat

The majority of the records are associated in some way with pine trees, thus supporting Killington's (1937) assertion that the insect shows a preference for coniferous trees. It has been recorded mainly from mixed and deciduous woodlands, with a few records from pure conifer woodlands. There are also records from freshwater marshes and from heather (*Calluna vulgaris* or *Erica* spp.) dominated heathland. It has only rarely been recorded from gardens and never in truly urban areas.

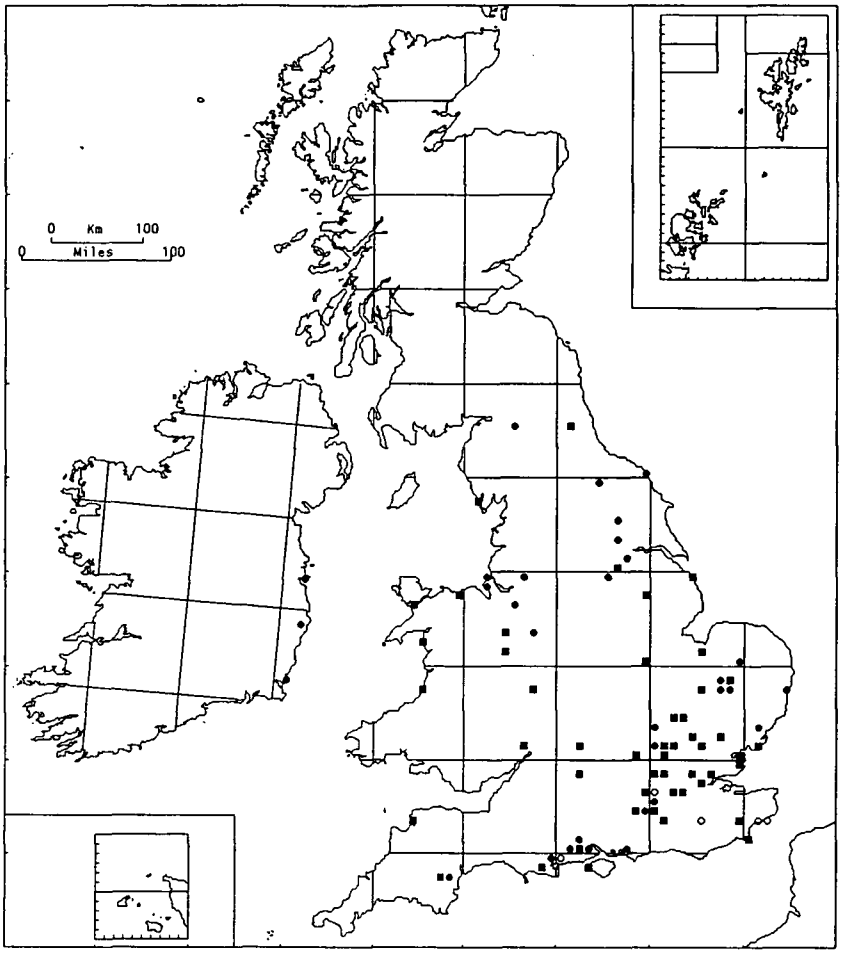
Collecting

Most records are from light traps, with some from beating the foliage of trees and a few from malaise traps.

Season

The main adult flight period is from June to September, with a peak in July and August and with a few records in weeks 20 and 43.

Map 64 *Mallada prasina* (Burmeister 1839)



Mallada prasina (Burmeister 1839)

Distribution and status

It is widespread but local in southern and central England, although it is usually common where it occurs. In northern England it is more local and scarce, and it is absent from Scotland. It is very local in Wales and Ireland, though almost certainly under-recorded.

Until recently, *M. prasina* was regarded in Britain as being only a subspecies of *M. ventralis*, even though, in Europe, it was considered to be a full species (eg Principi 1956). Due to this confusion, most earlier records cannot be used. Therefore, all literature records of *M. ventralis* have been omitted, except where there is clear reference to the subspecies or where a specimen has been traced and examined.

Habitat

This species is less dependent than *M. ventralis* on the presence of trees. It is found in unimproved and semi-improved grasslands, woodland edges, wetlands, sand dunes and hedgerows. It is also quite common in suburban gardens and town parks with shrubs.

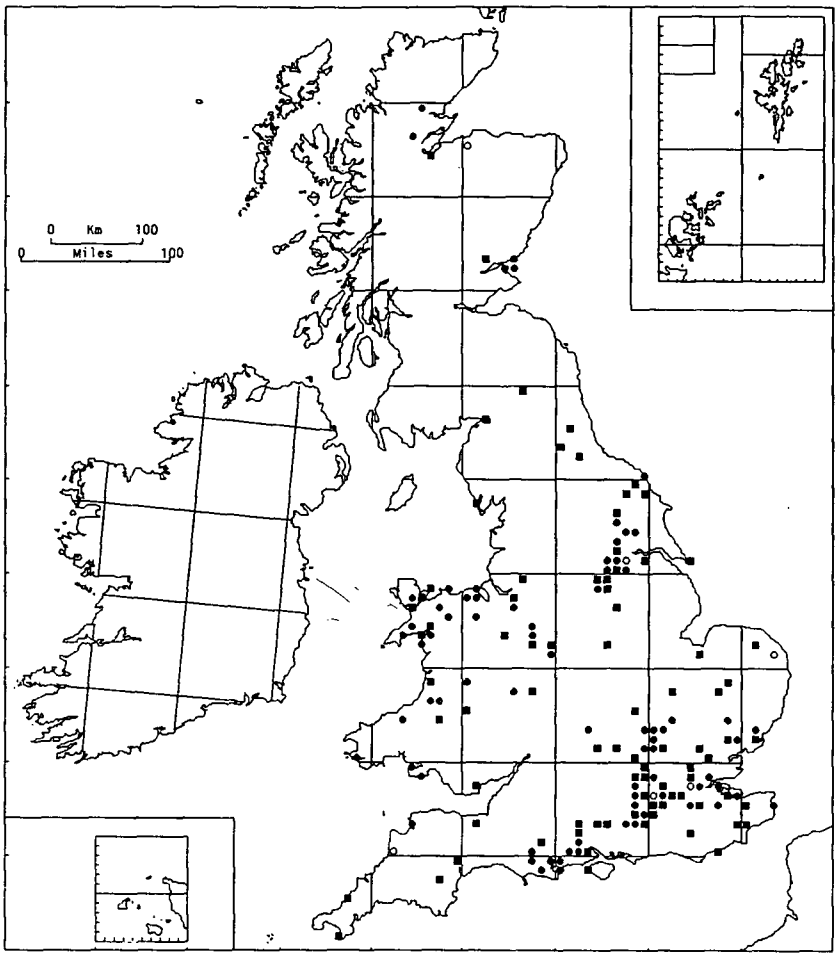
Collecting

Almost all the recent records are from light traps, with a few from sweep netting vegetation. Older museum specimens typically lack collecting data.

Season

The adult flight period is concentrated in the summer months (weeks 23–35), with outlying records in weeks 18 and 40.

Map 65 *Mallada ventralis* (Curtis 1834)



Mallada ventralis (Curtis 1834)

Distribution and status

It is widespread and fairly common in England and Wales, although less frequent in the north of England, but present along the eastern sea-board of Scotland. In Ireland, it is known from a single, old record from Co Armagh, and from two more recent records from Wexford in 1976 and Wicklow in 1979. An old record from Wexford (King & Halbert 1910) has not been verified. It has not been recorded from the Channel Islands. [See the comments under *M. prasina* regarding the earlier nomenclatural confusion with that species.]

Habitat

It is found in woodland more often than *M. prasina*, but it also occurs regularly in hedgerows and gardens.

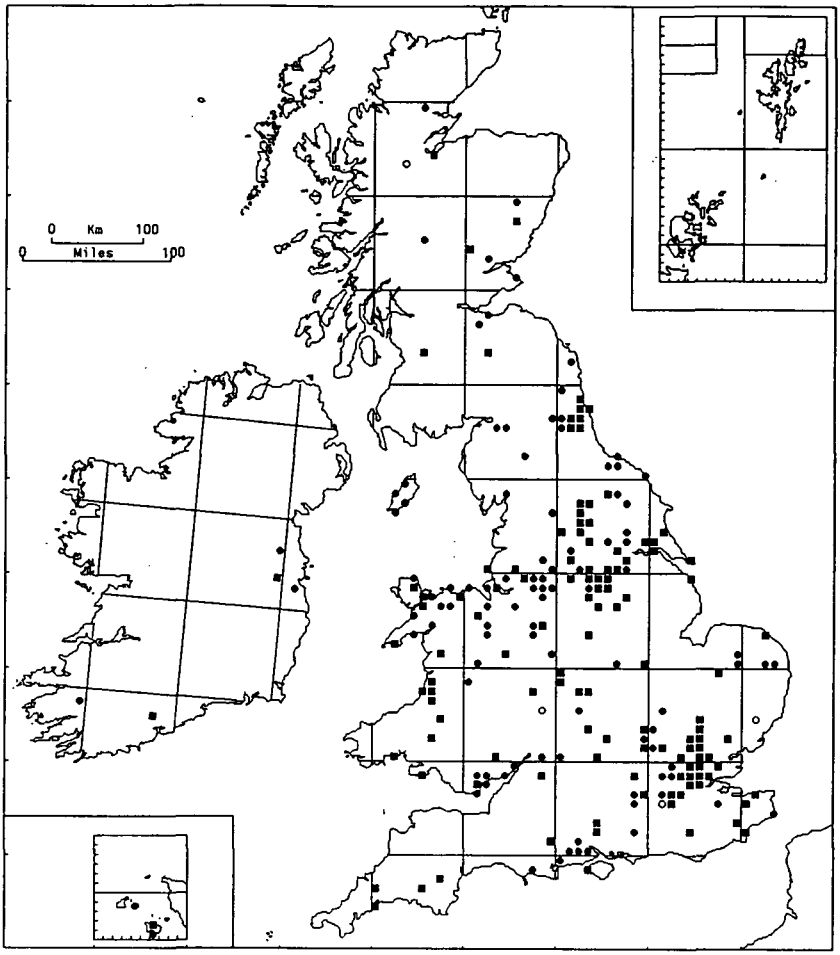
Collecting

M. ventralis has been recorded from several light traps, but it is less frequently taken than *M. prasina*. Unlike *M. prasina*, it is easily beaten from trees, especially birch and sallow.

Season

The adult flight period shows a single peak in early July, with the entire seasonal range in the months of May through to August.

Map 66 *Nineta flava* (Scopoli 1763)



Nineta flava (Scopoli 1763)

Distribution and status

This species is widespread and common in England and Wales, but rather more local in Scotland and Ireland, perhaps because of under-recording. It has not been recorded in Orkney, Shetland, the Outer Hebrides or on the west coast of Scotland. It is known from the Channel Islands.

Habitat

It is associated with trees, typically in a woodland setting, but has also been recorded from isolated trees in towns, especially in gardens and parks. Killington (1937) recorded taking adults by beating hazel, lime (*Tilia* spp.), oak and beech, but the more recent data, together with the author's experience in the field, suggest a strong association with oak. Many of the other species of tree from which the author has beaten adults were growing near to oaks.

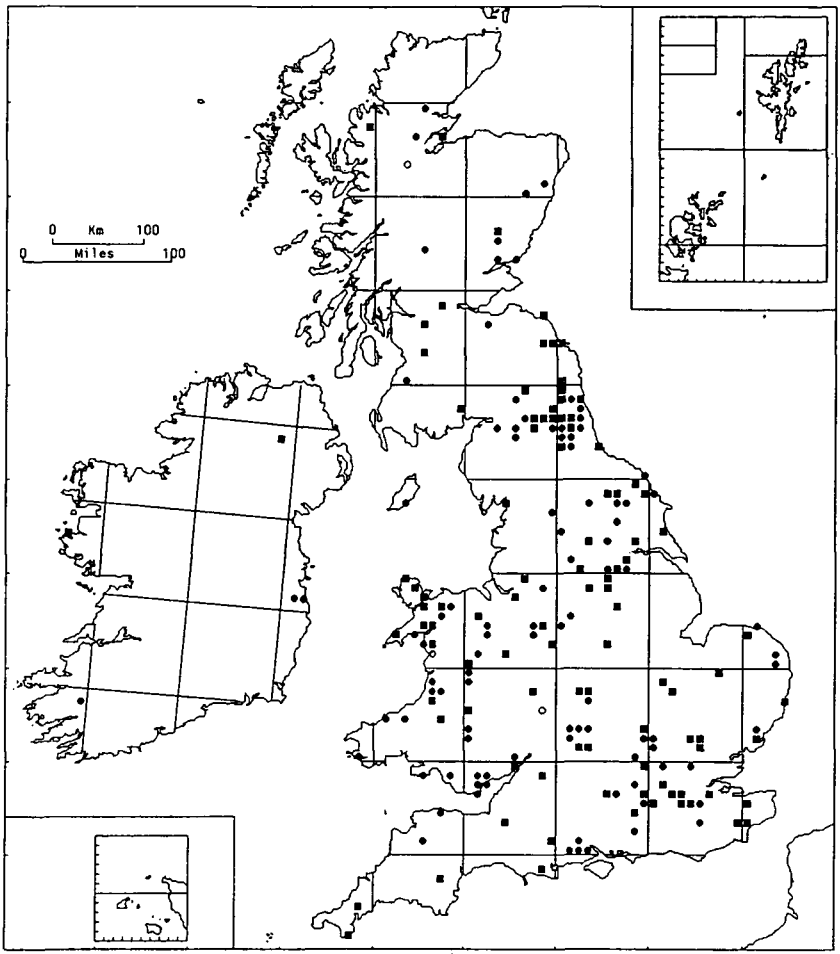
Collecting

Beating the foliage of trees has been the main source of records, and there are a few records from light traps and malaise traps.

Season

It is a typical high-summer species, occurring in numbers in June to August and with just a few records in May and in September/October.

Map 67 *Nineta vittata* (Wesmael 1841)



Nineta vittata (Wesmael 1841)

Distribution and status

It is widespread and common in most of Britain, but is more local in Scotland. It has not yet been recorded from Orkney, Shetland or the Outer Hebrides, but it is present on the adjacent north-west coast of the Scottish mainland. It is present in Ireland, with post-1960 records from both the extreme west and the extreme east coasts, suggesting that it is considerably under-recorded. It has not yet been recorded from the Channel Islands. Killington's (1937) statement that this species is less common than *N. flava* no longer seems to hold true. It is interesting that even earlier (Withycombe 1924) it was described as an uncommon species. It may, therefore, have increased its range and abundance over the last 70 years.

Habitat

Like *N. flava*, this seems to be an arboreal species. Larvae have been taken from oak, lime and hazel, but it is probable that it also occurs on other species of deciduous tree.

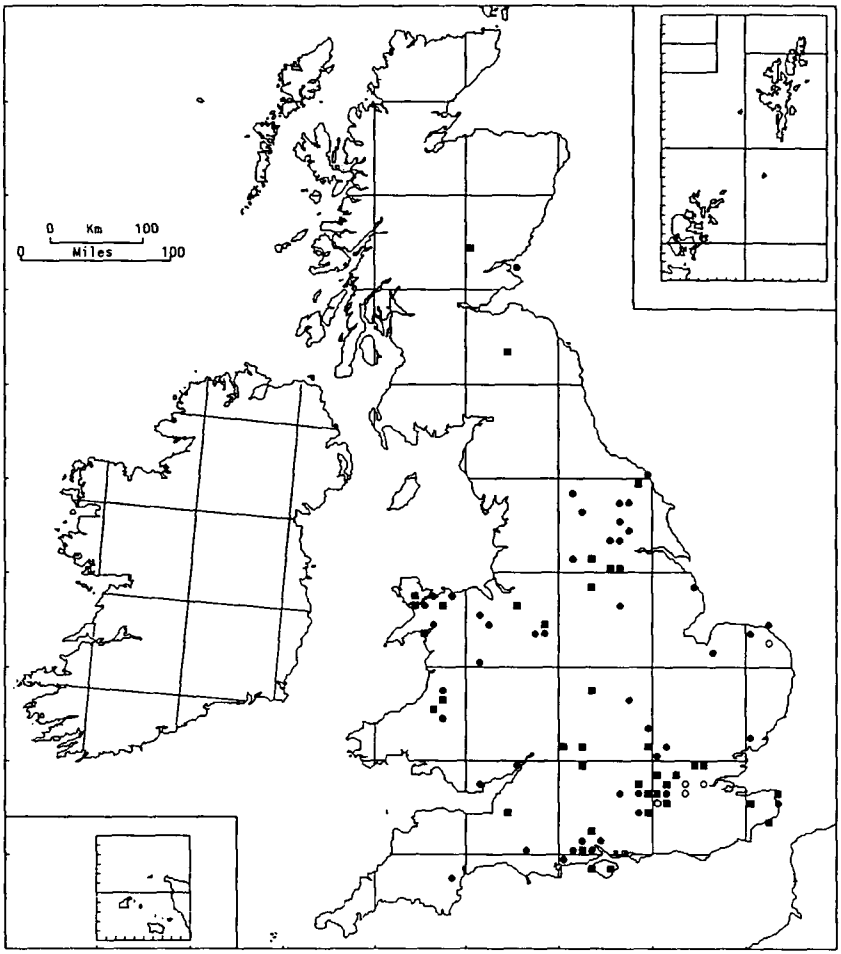
Collecting

It is most often recorded in light traps, and less frequently in malaise traps. Like *N. flava*, it has also been beaten from deciduous trees, especially in woodlands.

Season

It is a typical high-summer species, occurring from late May to August and with a few records in September/October.

Map 68 *Nothochrysa capitata* (Fabricius 1793)



Nothochrysa capitata (Fabricius 1793)

Distribution and status

This species is widespread and locally common in England and Wales. There are only two Scottish records: Tentsmuir Point, Fifeshire, and Loch of Lowes, East Perthshire. It has not been recorded from Ireland.

Habitat

Most records support Killington's (1937) assertion that the insect is exclusively associated with conifers, but some are from deciduous woodland. At Richmond Park, Surrey, many examples were taken from oak canopy (Barnard *et al.* 1986).

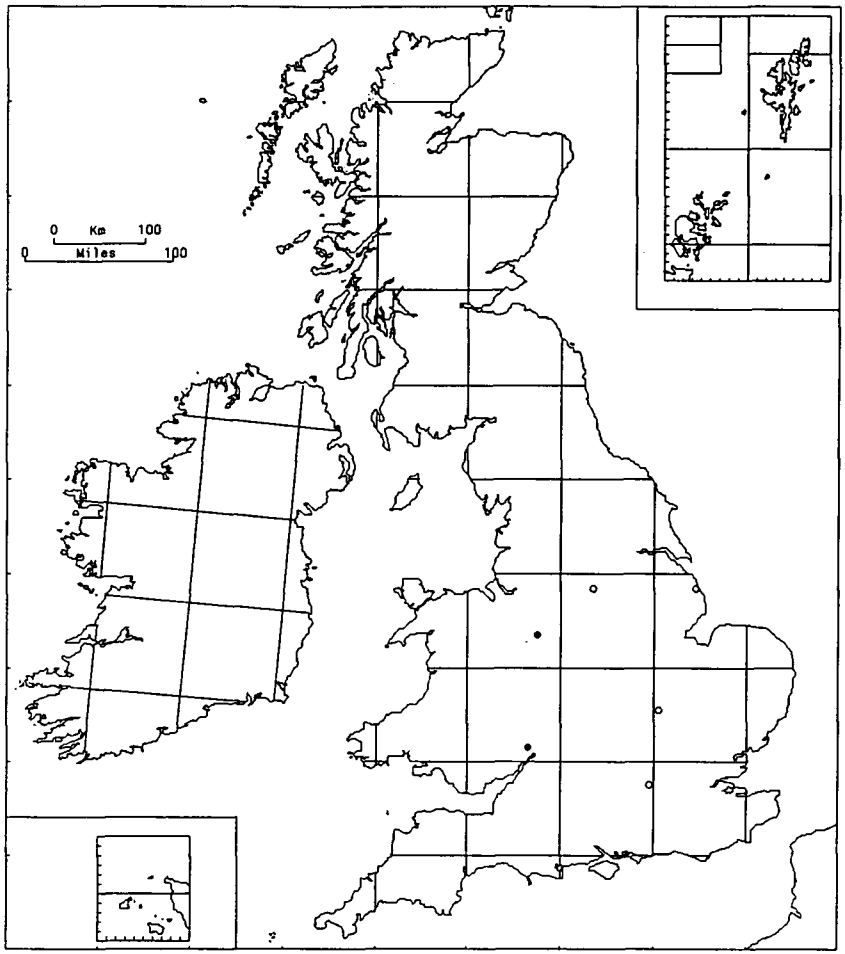
Collecting

Beating pine trees and light trapping are the most frequently recorded methods of capture. Occasionally specimens have been collected by sweeping low vegetation near trees soon after high winds. The Richmond Park specimens were collected by insecticidal fogging of the oak canopy.

Season

Most records are from June and July (weeks 23–28), but with a slight second peak of records in late July/early August and isolated records in weeks 20 and 36.

Map 69 *Nothochrysa fulviceps* (Stephens 1836)



Nothochrysa fulviceps (Stephens 1836)

Distribution and status

This species is extremely local and rare, and has not been recorded since 1958. Killington (1937) records it from Bedfordshire, Berkshire, Devonshire, Durham, Gloucestershire, Hampshire, Kent, Lincolnshire, Shropshire, Staffordshire and Yorkshire. Several of these occurrences cannot be mapped because it has not been possible to localise the records beyond county level. Several old museum specimens have proved to be mis-identified examples of *N. capitata* and so, in the absence of specimens, it is not possible to accept Killington's records without further investigation.

Habitat

According to Killington (1937), it is confined to the tops of oak trees, but because of the uncertainty about Killington's records (see above), this statement is unconfirmed. In Europe it has been taken in light traps at the edge of mature conifer plantations, though oaks were also present.

Collecting

Killington (1937) recommended beating oak trees using a net on a long pole. In eastern Europe, it comes readily, and in large numbers, to mercury vapour light traps.

Season

It has been recorded only in June (weeks 22, 24, 25 and 26).

MECOPTERA

The order Mecoptera is represented in Britain by only four species in two families, each containing a single genus. There is a published record of only one species from Ireland.

The Boreidae are represented by the snow flea, *Boreus hyemalis*, a small flightless insect that is mature and active only in the winter.

The Panorpidae are represented by three species of *Panorpa* – the scorpionflies. The vernacular name for this group derives from the appearance of males, the tip of the abdomen of which bears a swollen external genital capsule which is held forwards over the body in a manner similar to the way in which a scorpion carries its sting. The abdomen of female Panorpidae is simple, being tapered to the tip. In both sexes the last few segments of the abdomen are usually a chestnut/ orange colour, which contrasts with the darker body. The wings are hyaline with black spots in varying positions, but there is a spotless form of *P. germanica* which occurs in Scotland and Ireland. All three *Panorpa* species frequently evade capture by dropping from their resting position to the ground. One of the most effective methods of collecting them is to hold a net below the insect and touch the adjacent vegetation so that they fall into the net.

Identification

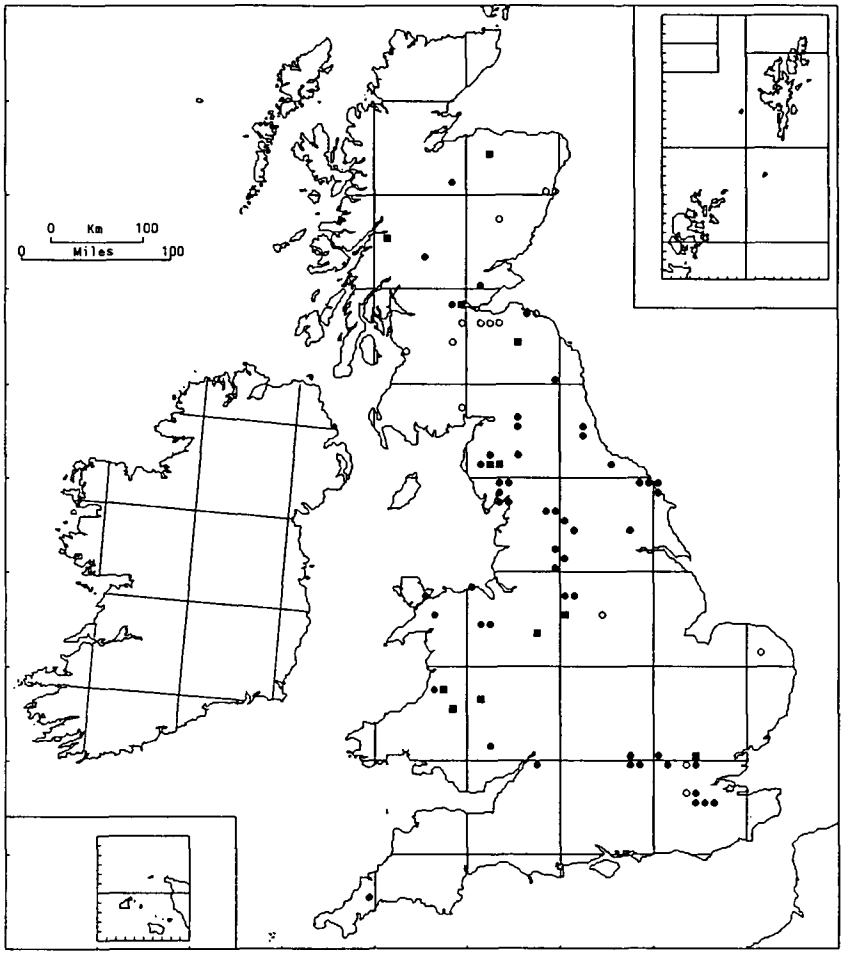
Boreus hyemalis is quite unmistakable, see Fraser (1959).

Panorpa spp. males can only be reliably separated by the shape of the 'calipers' on the ventral face of the genital capsule. This feature is easily viewed with a x10 hand lens. The illustrations in Fraser (1959) are adequate for the identification of males.

Panorpa spp. females can be reliably identified by examination of their ovipositor which are illustrated by Plant (1991c). The key to females in Fraser (1959) is unreliable, as are other traditional methods of separating females (see Plant 1991c).

All three *Panorpa* species may fly together at the same locality.

Map 70 *Boreus hyemalis* Linnaeus (1767) – the snow flea



This species is strongly sexually dimorphic; females have vestigial wings whilst those of the male are modified into stout spines held over the body. These spines are serrated on the inner edge and play a role in mating, which takes place with the female resting on the back of the male.

Distribution and status

First recorded in Britain by Curtis (1829), the snow flea was for long considered a great rarity, but, as the distribution map shows, there is a wide

scatter of old records. Most of these earlier records were summarised by Aubrook (1939). This is one of the few British insects to mature during the winter, and its apparent rarity is possibly a reflection on the habits of entomologists. Although most records are from the uplands of Wales, Scotland and the Pennines, there are several records from the lowlands, particularly in the south-east.

It is probable that diligent searching will prove this species to be widespread and even common across much of Britain, although it is conspicously absent from the south-west peninsula of England. There are apparently no records from Ireland or the Channel Islands.

The species is flightless, which may limit its ability to disperse in areas where suitable habitat is fragmented, such as many heathlands in the lowlands.

Habitat

It is found chiefly on heaths and moors. The eggs are laid in moss on the ground, on walls or on logs, and the larvae live in tunnels constructed between the moss and the substrate. In spite of many literature references to larvae, pupae and adults found in moss, only one (Fraser 1959) names the moss species (*Polytrichum commune*). Other species of moss may be utilised. Voucher specimens of moss are requested with all records of *B. hyemalis*, from entomologists who are not familiar with bryophytes. There are more records from high altitudes, but the insect is also recorded from lowland localities.

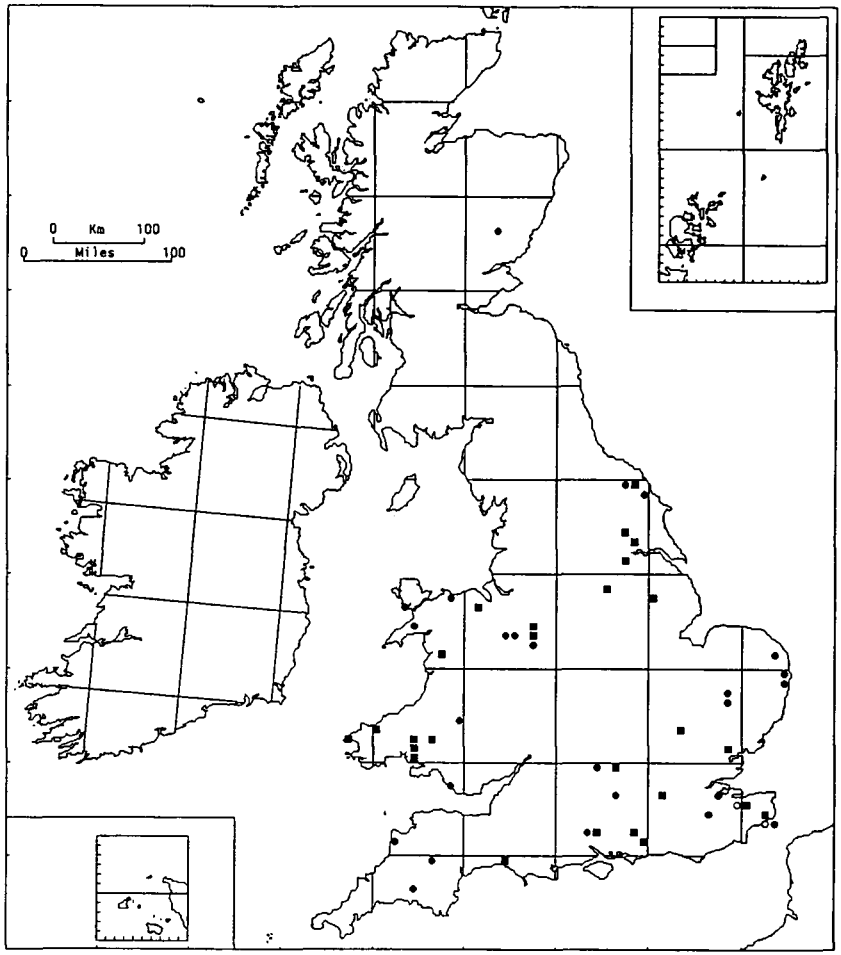
Collecting

Almost all recent records, where the capture method was stated, were made from pitfall traps, which is predictable for a flightless, ground-dwelling insect. Many of the other records are of adults sitting or moving around on snow, usually in an exposed situation. A few records are of adults, larvae and pupae found by sorting through moss.

Season

The earliest record available is 20 October and the latest is 5 April. Emergence appears to take place later at higher altitudes, with adult insects remaining active until later in the spring than those in lowland areas. Nethersole-Thompson and Watson (1981) mention that adults are sometimes active in early June in the Cairngorms. The larvae overwinter, pupating the following August or September.

Map 71 *Panorpa cognata* Rambur 1842



Panorpa cognata Rambur 1842

Distribution and status

This is the least frequently recorded of the three British scorpionflies. *P. cognata* is widespread but localised and is probably not common. It has been recorded as far north as Glen Cally in Angus, but has not been found in Ireland or the Channel Islands.

Habitat

It appears to be associated with calcareous soils where it is most frequently encountered among brambles (*Rubus* spp.). The difficulties of collecting among brambles may be a contributory factor in the apparent scarcity of this species. It has also been recorded from wet woodland and meadows with tall vegetation.

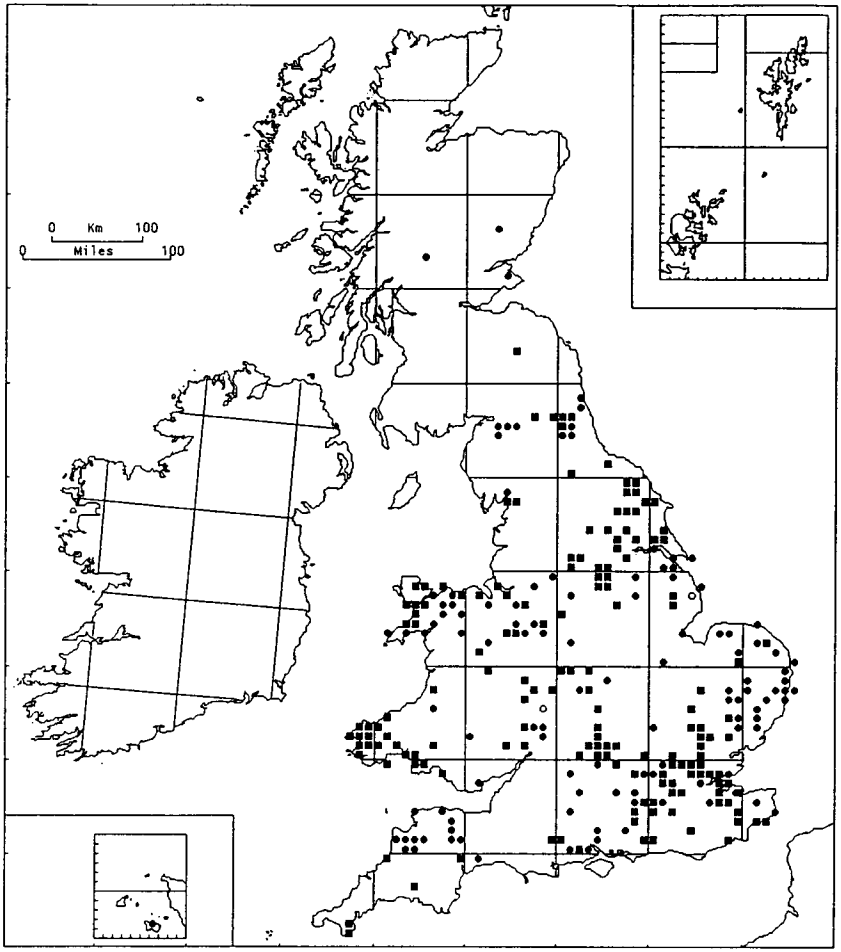
Collecting

General beating and sweeping are the most frequently recorded methods. There are records from malaise traps, but not, as yet, from light traps.

Season

The adult flight period is the same as for both *P. communis* and *P. germanica*, making it possible to find all three species in the same sweep net! However, numbers of adults peak in July/August, a full two months after the other two species, and at a time when numbers of the other species are declining. In spite of this, it seems to have a short season which is over before that of *P. germanica*, so that time of year is not a guide to identification.

Map 72 *Panorpa communis* Linnaeus 1758



Panorpa communis Linnaeus 1758

Distribution and status

It is widespread and common in England and Wales, but is apparently much less frequent in Scotland. It has been recorded from the Channel Islands, but there are no records from Ireland.

Habitat

P. communis has been recorded from hedgebanks, verges, woodland margins, rough grassland and flower-rich meadows, and adults have been beaten from a variety of deciduous trees. It is frequently recorded at bramble flowers.

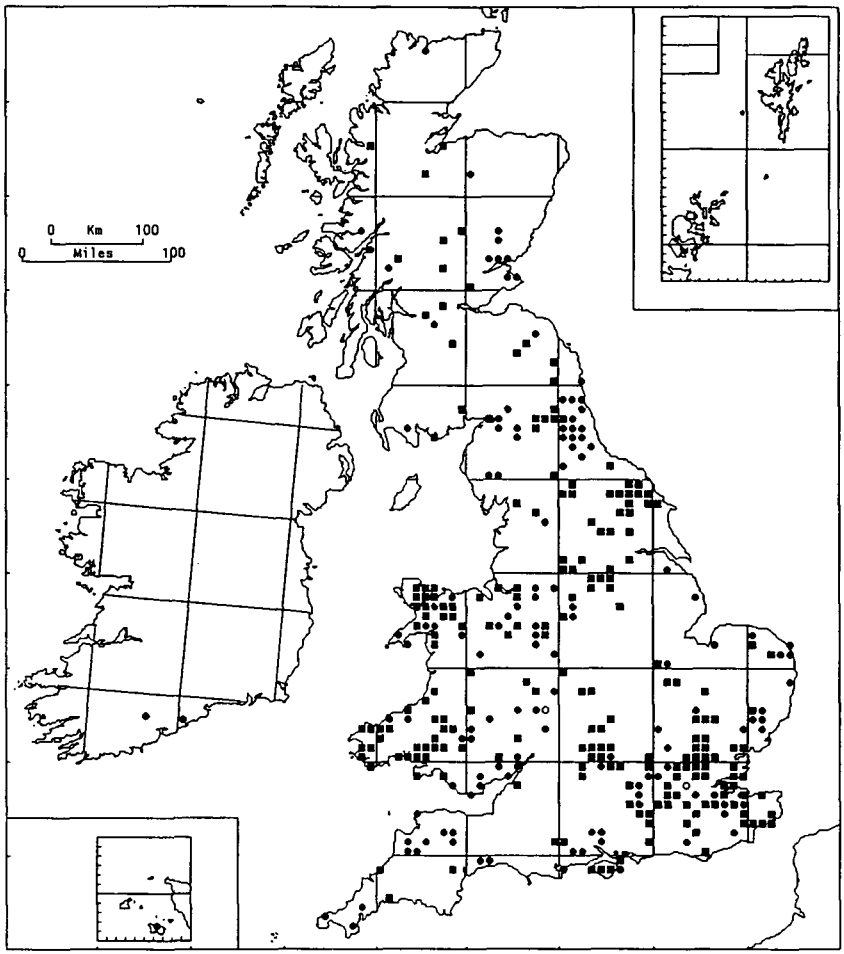
Collecting

General sweeping and beating of vegetation are the most frequently reported methods of capture. There are also records from malaise traps, but very few from mercury vapour light traps.

Season

Adults have been recorded from May to September, but with a peak in late May to the end of July.

Map 73 *Panorpa germanica* Linnaeus 1758



Panorpa germanica Linnaeus 1758

Distribution and status

This species is widespread and extremely common in England and Wales, becoming less frequent in Scotland where it is recorded north to West Ross. It is also recorded from the Channel Islands, and there are two records from Co Cork in Ireland (Halbert 1907). In Scotland, a form with unmarked wings occurs (f. *borealis* Stephens), but not all Scottish specimens of *P. germanica* take this form. One of the two Irish records of this species is of this form.

Habitat

It is recorded in the same habitats as *P. communis*.

Collecting

The methods used are identical to those for *P. communis*, except that *P. germanica* is much more frequently taken in light traps.

Season

The adult flight period is very similar to that of *P. communis* (mid-May to mid-July), but with a scatter of later records, through to mid-October (week 42).

ASSESSMENT OF STATUS AND RED DATA LIST

Peter Kirby provided a valuable review of the British Neuroptera (and allied orders) based on data available to him in 1989 (Kirby 1991). Although distribution maps were not then available, none of the species was estimated to occur in fewer than 16 10 km squares of the National Grid in Britain, this being the threshold for consideration for inclusion in one of the *Red Data Book* categories as defined by Shirt (1987). However, ten species – *Sialis nigripes*, *Sisyra dalii*, *Sisyra terminalis*, *Hemerobius perelegans*, *Wesmaelius malladai*, *W. mortoni*, *W. balticus*, *Megalomus hirtus*, *Chrysopa abbreviata* and *Nothochrysa fulviceps* – were assigned to the category 'Nationally Notable'. This category was defined by Kirby (1991) as 'Taxa which do not fall within RDB categories 1 to 3 but which are, none the less, uncommon in Great Britain and thought to occur in fewer than 100 10 km squares of the National Grid'. Remaining species were categorised as being 'Common', 'Local', 'Naturalised' or 'Unknown' (the last being insufficiently known to be placed in any category).

Inevitably, the results from the Lacewing Recording Scheme, since 1989, have overtaken Kirby's work. It is now possible to make recommendations for a number of changes to Kirby's allocation of status assessments of species and to subdivide the Nationally Notable category into Notable A and Notable B, which are defined by Ball (1986) as follows:

Nationally Notable category A (Na)
Nationally Notable species (as defined above) estimated to occur in more than 15 but less than 31 10 km squares of the National Grid

Nationally Notable category B (Nb)
Nationally Notable species (as defined above), estimated to occur in more than 30 but less than 100 10 km squares of the National Grid

However, it is important to stress that these suggested changes are nothing more than recommendations. Any official change of category would need to be made formally by the statutory nature conservation agencies.

List of British lacewings and allies with national status as given by Kirby (1991) and suggested changes of status where appropriate (see Note)

Key to categories and sources of terminology:

RDB3	Red Data Book category 3 – Rare (Shirt 1987)
RDB3*	Too recently discovered to be certain of placing (Shirt 1987)
N	Nationally Notable (Ball 1986)
Na	Nationally Notable A (Ball 1986)
Nb	Nationally Notable B (Ball 1986)
L	Local (Kirby 1991)
C	Common (Kirby 1991)
U	Unknown (Kirby 1991)
Nat	Naturalised (Kirby 1991)
A	Omitted from Kirby (1991) (this *Atlas*)
**	See Justification for change, 7

	Kirby (1991)	Proposed
RAPHIDIOPTERA		
Raphidiidae		
Subilla confinis	L	L
Atlantoraphidia maculicollis	L	C
Phaeostigma notata	L	C
Xanthostigma xanthostigma	C	C
MEGALOPTERA		
Sialidae		
Sialis lutaria	C	C
fuliginosa	L	C
nigripes	N	L
NEUROPTERA		
Coniopterygidae		
Conwentzia psociformis	C	C
pineticola	C	C
Coniopteryx tineiformis	C	C
borealis	L	C

	Kirby (1991)	Proposed
parthenia	C	L
esbenpeterseni	U	L
lentiae	U	L
Semidalis aleyrodiformis	L	C
pseudouncinata	A	U
Parasemidalis fuscipennis	L	L
Aleuropteryx juniperi	Nat	Na
Helicoconis lutea	U	not British
Osmylidae		
Osmylus fulvicephalus	L	C
Sisyridae		
Sisyra fuscata	L	C
dalii	N	Nb
terminalis	N	Nb
Myrmeleontidae		
Euroleon nostras	A	Channel Is. only
Myrmeleon formicarius	A	U
Hemerobiidae		
Psectra diptera	L	C
Micromus variegatus	C	C
angulatus	L	L
paganus	C	C
Hemerobius humulinus	C	C
perelegans	N	Na
simulans	L	C
stigma	C	C
atrifrons	L	L
pini	L	C
contumax	L	**
fenestratus	U	RDB3*
nitidulus	C	C
micans	C	C
lutescens	C	C
marginatus	C	C
Wesmaelius malladai	N	Na
mortoni	N	Extinct

	Kirby (1991)	Proposed
ravus	L	**
balticus	N	Na
betulinus	C	C
subnebulosus	C	C
concinnus	L	C
quadrifasciatus	C	C
Sympherobius elegans	L	C
pygmaeus	C	C
pellucidus	L	L
fuscescens	L	L
Megalomus hirtus	N	RDB3
Drepanepteryx phalaenoides	L	L
Chrysopidae		
Chrysopa abbreviata	N	Na
phyllochroma	L	L
commata	L	C
perla	C	C
dorsalis	L	Na
pallens	C	C
Chrysoperla carnea	C	C
Chrysopidia ciliata	C	C
Cunctochrysa albolineata	C	C
Mallada flavifrons	L	C
prasina	C	C
ventralis	C	C
Nineta flava	C	C
vittata	C	C
Nothochrysa capitata	L	C
fulviceps	N	**
MECOPTERA		
Boreidae		
Boreus hyemalis	L	L
Panorpidae		
Panorpa cognata	L	L
communis	C	C
germanica	C	C

Note: The *Red Data Book* and Notable categories are derived solely from present knowledge of the status of the species in Britain. There are insufficient data to make any suggestions regarding the status of species in Ireland or the Channel Islands.

Justification of suggested changes

1 Downgraded species

Fifteen species given as Local by Kirby have proved, as a result of recent recording, to be quite common. The additional records of *Sialis nigripes* suggest that it does not fit the criteria for Nationally Notable, although it will probably prove to be a local species.

2 Grading of formerly insufficiently known species

When *Coniopteryx esbenpeterseni* and *C. lentiae* were first recorded as British their actual status was unclear. It has been shown (Plant 1991a) that both species are native, but have been overlooked and, as researches continue, they are likely to be discovered at additional sites. They do not warrant Nationally Notable status, but having critically examined many hundred *Coniopteryx* specimens, covering the period from 1858 to 1991, there is no doubt that both will prove to be only locally distributed.

3 Regrading of Nationally Notable species

Wesmaelius mortoni is apparently extinct as a British species. *Sisyra dalii* and *Sisyra terminalis* are likely to prove far more widespread than the present maps indicate, though their range is limited by their habitat requirements; they qualify for the Notable B category.

A further six species listed by Kirby as being Nationally Notable now justify placement in the Nationally Notable A category. *Aleuropteryx juniperi* may have a requirement for native juniper, although the Silwood Park record may indicate that exotic species and cultivated forms could support it. *Hemerobius perelegans* and *Wesmaelius malladai* are restricted to small areas in the north and their habitat requirements are poorly understood. Both *W. balticus* and *C. abbreviata* are confined to stable sand dune systems with marram grass. This is not a common habitat in Britain, and in many areas where suitable dunes do occur they are heavily eroded. The British status of *W. balticus* has been reviewed in detail by Plant (1991b). There are only nine breeding localities known, from which the insect has been recorded at only four since 1960. *C. abbreviata* is known from 17 10 km squares, two more than the threshold for RDB 3 category, but

in only eight of these has it been recorded since 1960. Of these eight 10 km squares, its presence in one is artificial as two squares cover the same site; thus there are only seven recent breeding sites suggesting that the species may have genuinely declined. The recent discovery of *W. balticus* in Scotland (Plant 1991b) suggests that both species are under-recorded, but neither seems likely to exist in more than 30 10 km squares of the National Grid. *C. dorsalis* is an insect of coniferous woodland, but it does not yet seem to have colonised the many even-aged stands of conifers in southern Britain. It is almost certainly under-recorded, but will probably prove to be restricted to relatively few sites.

4 Upgrading from Common to Local

Present evidence suggests that *Coniopteryx parthenia* does not warrant Common status, but it is unlikely to warrant inclusion in the Notable category.

5 Species upgraded to *Red Data Book* status.

Hemerobius fenestratus is recommended for RDB3* status because it is known from only one recent record. *Megalomus hirtus* is found in a single 10 km square in the vicinity of Edinburgh. Its habitat requirements make it a 'taxon which is localised within a restricted geographical area'. It has been searched for at its former sites in Kincardineshire and elsewhere, but is apparently now absent there. It is not under any immediate threat and therefore does not qualify for RDB2, but any alteration in site management could make it vulnerable to extinction in Britain.

6 Deleted species

Helicoconis lutea is now considered not to be a British species. It was listed by Kirby (1991) as having Unknown status.

7 Rare presumed recent natural colonists or introductions

Three species, *Hemerobius contumax*, *Wesmaelius ravus* and *Nothochrysa fulviceps* are very localised and rare in Britain. *H. contumax* was last recorded in 1952 and *N. fulviceps* in 1958, so that both species may now be extinct in Britain. All three species are strictly confined to Scots pine, but occur on that tree out of its current native range in Britain, where it is presumed to be an introduction. Therefore, by implication, these three species may be either natural colonists or accidental introductions. Because Scots pine has been planted in England for several centuries, these lacewings may possibly have been established in England for many years. The three species have not been allocated to a Red Date Book category although

had they been clearly 'native' they would qualify for RDB3. The nativeness, and therefore the RDB status, of species such as these remains unclear, but existing criteria for the consideration of species for RDB status normally exclude species which are known not to be native.

ACKNOWLEDGEMENTS

The author is grateful to the many entomologists whose records have made this *Provisional atlas* possible. In particular, thanks are due to Joan Morgan, University College of North Wales, Bangor, whose own meticulously kept record cards account for about 95% of the Welsh records, and to Jim O'Connor, National Museum of Ireland, Dublin, for access to most of the Irish records. I am also grateful to the trustees, curators and keepers of the museums listed in Appendix 1 for allowing me to examine the collections in their care. Adrian Riley, at the Rothamsted Experimental Station, Harpenden, deserves special thanks: he organised the collecting of lacewings from the many Rothamsted Insect Survey light traps throughout the country and he sorted (and continues to sort) most of the lacewing material from the bulk samples of Lepidoptera and other orders sent to the Survey. Adrian was also responsible for sorting the lacewings from each nightly catch at the light trap in his own garden, a feat which has elucidated much valuable information on *Coniopteryx esbenpeterseni* and *C. lentiae* in particular.

For assistance with validation of records, as print-out from the BRC database, my thanks are due to Bill Ely (south-west Yorkshire), Graham Collins (Surrey), Neil Redgate (northern Highlands), Joan Morgan (Wales) and Jim O'Connor (Ireland).

My thanks are also due to Stephen Brooks and Peter Barnard at the Natural History Museum, London, for valuable discussions, help with validation of records, constructive criticism of some of my wilder ideas, and for reading and critically appraising a draft of this *Atlas*. I am particularly grateful to Peter for assistance with preparation of the checklist.

Thanks are due also to the staff of the Biological Records Centre, Monks Wood: Val Burton for rapid and accurate computerisation of data, Julian Dring and Henry Arnold for responding most efficiently to my frequent requests for data analysis in a variety of formats, and Brian Eversham and Paul Harding for overseeing the recording scheme and for suggesting it in the first place. I am particularly grateful to Paul for his considerable efforts in editing my original text, for pointing out a number of anomalies and for suggesting improved methods of presenting the data in a readable form. This presentation is as much a result of his endeavours as of mine.

Finally, thanks go to Karen Threlfall and Penny Ward for design and printing.

BIBLIOGRAPHY

Aspöck, H., Aspöck, U. & Hölzel, H. 1980. *Die Neuropteren Europas.* Krefeld: Goecke & Evers.

Aspöck, H., Aspöck, U. & Rausch, H. 1991. *Die Raphidiopteren der Erde.* Krefeld: Goecke & Evers.

Aubrook, E.W. 1939. A contribution to the biology and distribution in Great Britain of *Boreus hyemalis* (L.) (Mecoptera: Boreidae). *Journal of the Society for British Entomology*, **2**, 13–21.

Ball, S.G. 1986. *Terrestrial and freshwater invertebrates with Red Data Book, notable or habitat indicator status.* Invertebrate Site Register report no. 66. CSD Report no. 637. Peterborough: Nature Conservancy Council. Unpublished.

Barbut, J. 1781. *The Genera Insectorum of Linnaeus, exemplified by various specimens of English insects drawn from nature.* London: privately published.

Barnard, P.C. 1977. *Sialis nigripes* Pictet (Megaloptera: Sialidae), an alder fly new to Britain and Ireland. *Entomologist's Gazette*, **28**, 269–274.

Barnard, P.C. 1978. A check-list of the British Neuroptera with taxonomic notes. *Entomologist's Gazette*, **29**, 165–176.

Barnard, P.C. 1990a. A revised key to the genera and subgenera of British Hemerobiidae. *Neuro News*, **5**, 3–5.

Barnard, P.C. 1990b. A revised key to the British species of *Wesmaelius*. *Neuro News*, **6**, 6–8.

Barnard, P.C. 1990c. A revised key to the British *Chrysopidae*. *Neuro News*, **7**, 14–17.

Barnard, P.C., Brooks, S.J. & Stork, N.E. 1986. The seasonality and distribution of Neuroptera, Raphidioptera and Mecoptera on oaks in Richmond Park, Surrey, as revealed by insecticide knock-down sampling. *Journal of Natural History*, **20**, 1321–1331.

Barnard, P.C., O'Connor, J.P. & Speight, M.C.D. 1991. A review of published distribution data for Irish Neuroptera (Insecta), together with additional records and a check-list of the Irish species. *Bulletin of the Irish Biogeographical Society*, **14**, 109–123.

Brooks, S.J. 1991. Is *Helicoconis lutea* (Wallengren) a British species? *Neuro News*, **8**, 5–6.

Brooks, S.J. & Barnard, P.C. 1990. The green lacewings of the world: a generic review (Neuroptera: Chrysopidae). *Bulletin of the British Museum (Natural History), (Entomology)*, **59**, 117–286.

Collins, G. 1990. *Drepanepteryx phalaenoides* in Surrey. *Neuro News*, **5**, 10–11.

Curtis, J. 1829. *British Entomology.* London: privately published.

Doughty, G.C. 1931. Ant-lion in Suffolk. *Transactions of the Suffolk Naturalists' Society*, **1**, 228.

Elliott, J.M. 1977. A key to British freshwater Megaloptera and Neuroptera. *Scientific Publications of the Freshwater Biological Association* No. 35. Windermere: Freshwater Biological Association.

Elliott, J.M., O'Connor, J.P. & O'Connor, M.A. 1979. A key to the larvae of Sialidae (Insecta: Megaloptera) occuring in the British Isles. *Freshwater Biology*, **9**, 511–514.

Enderlein, G. 1905. *Conwentzia pineticola* nov. gen. nov. spec. Eine neue

Neuroptere aus Westpreussen. *Bericht des Westpreussichen Botanisch-Zoologischen Vereins*, **26–27**, 10–12.

Fassnidge, W. 1931. *Osmylus fulvicephalus* Scop. (Neur.) taken at 'sugar'. *Journal of the Entomological Society of the South of England*, **1**, 21.

Fozzard, I. & Clelland, B.E. 1981. The occurrence of *Sialis nigripes* Pictet (Megaloptera: Sialidae) in central Scotland. *Entomologist's Gazette*, **32**, 268–270.

Fraser, F.C. 1940. *Kimminsia rava* (Withy.) in Hampshire. *Entomologist*, **73**, 166.

Fraser, F.C. 1944. *Kimminsia rava* (Withycombe) (Neur.) at Bournemouth. *Journal of the Society for British Entomology*, **2**, 182–183.

Fraser, F.C. 1959. Mecoptera, Megaloptera and Neuroptera. *Handbooks for the Identification of British Insects*, I (12 & 13). London: Royal Entomological Society.

Greve, L. 1971. Notes on Norwegian Coniopterygidae (Neuroptera) III. *Coniopteryx esbenpeterseni* Tjeder and *Conwentzia psociformis* Curt. in Norway. *Norsk entomologisk Tidsskrift*, **18**, 15–16.

Hagen, H.A. 1858. Synopsis of the British Planipennes. *Entomologists Annual*, (1858), 17–33.

Halbert, J.N. 1907. Irish Field Club Union. Cork Conference. Neuroptera. *Irish Naturalist*, **16**, 189–190.

Heslop-Harrison, J.W. 1916. *Aleuropteryx lutea* (Wallengren) a Neuropteran new to Britain. *Naturalist*, 1916, 97–98.

Hynd, W.R.B. 1989. *Coniopteryx lentiae* Aspöck & Aspöck (Neuroptera: Coniopterygidae) new to Britain. *Entomologist's Gazette*, **40**, 149–150.

Hynd, W.R.B. & Plant, C.W. 1991. *Coniopteryx esbenpeterseni* Tjeder, 1930 (Neuroptera: Coniopterygidae) new to Britain with a comment on the subgenus *Metaconiopteryx* in Britain. *Entomologist's Gazette*, **42**, 104–106.

Kaiser, E.W. 1950. *Sialis nigripes* Ed. Pict., new to Denmark and the distribution of *S. lutaria* and *S. fuliginosa* in Denmark. *Flora og Fauna Silkeborg*, **56**, 17–36.

Killington, F.J. 1932. Ant lion, *Myrmeleon formicarius* Linn. (Neur.) in Britain. *Journal of the Entomological Society of the South of England*, **1**, 22.

Killington, F.J. 1934. On the identity of *Hemerobius limbatellus* of British authors; with a revised key to British species of *Hemerobius*. *Transactions of the Society for British Entomology*, **1**, 33–38.

Killington, F.J. 1936 & 1937. *A monograph of the British Neuroptera*, 2 vols. London: Ray Society.

Kimmins, D.E. 1935. A new locality for *Boriomyia rava* Withyc. (Neur.). *Journal of the Society for British Entomology*, **1**, 63–64.

Kimmins, D.E. 1963. Notes on two British species of Neuroptera (*Boriomyia mortoni* (McL) and *B. killingtoni* (Morton)), with a description of a new species in the *mortoni* group of *Boriomyia*. *Entomologist's Gazette*, **14**, 140–149.

King, J.J.F.X. & Halbert, J.N. 1910. A list of the Neuroptera of Ireland. *Proceedings of the Royal Irish Academy*, B, **28** (2), 29–112.

Kirby, P. & Welch, R.C. 1990. Notes on the habits and habitats of *Psectra diptera*. *Neuro News*, **7**, 4–10.

Kirby, P. 1991. *A review of the scarcer Neuroptera of Great Britain*. Research and Survey in Nature Conservation, No. 34. Peterborough: Nature Conservancy Council.

Kis, B. & Ujhelyi, S. 1965. *Chrysopa commata* sp. n. and some remarks on the

species *Chrysopa phyllochroma* Wesm. *Acta Zoologica Hungarica*, **11**, 347–352.

Leech, M.J. 1962. *Drepanepteryx phalaenoides* L. (Neuroptera) at Witherslack. *Entomologist's Record and Journal of Variation*, **74**, 20.

Leraut, P. 1991. Les *Chrysoperla* de la faune de France. *Entomologica Gallica*, **2**, 75–81.

Leraut, P. 1992. Névroptères des Alpes centrales Françaises (Neur.) *Entomologica Gallica*, **3**, 59–65.

Mansel, M.W. & Aspöck, H., eds. 1990. *Advances in neuropterology* (Proceedings of the third International Symposium on Neuropterology). Pretoria: Department of Agricultural Development.

McLachlan, R. 1868. A monograph of the British Neuroptera: Planipennia. *Transactions of the Entomological Society of London*, (1868), 145–224.

Meinander, M. 1972. A Revision of the Family Coniopterygidae (Planipennia). *Acta Zoologica Fennica*, **136**, 1–357.

Meinander, M. 1990. The Coniopterygidae (Neuroptera: Planipennia). A checklist of the species of the world, with descriptions of new species and other new data. *Acta Zoologica Fennica*, **189**, 1–95.

Monserrat, V. 1990. A systematic checklist of the Hemerobiidae of the world. In: *Advances in neuropterology* (Proceedings of the third International Symposium on Neuropterology), edited by M W Mansel and H Aspöck, 215–262. Pretoria: Department of Agricultural Development.

Morgan, M.J. 1976. Neuroptera and Mecoptera in North Wales. *Entomologist's Gazette*, **27**, 229–242.

Nethersole-Thompson, D. & Watson, A. 1981. *The Cairngorms*. Perth: Melven.

New, T.R. 1967. A second British record of *Helicoconis lutea* (Wall.) (Neuroptera: Coniopterygidae). *Entomologist*, **100**, 145.

O'Connor, J.P. 1983. *Chrysopa abbreviata* (Neuroptera) confirmed as an Irish insect. *Irish Naturalists' Journal*, **21**, 140.

O'Connor, J.P. & O'Grady, M.F. 1990. Observations on the distribution of *Sialis nigripes* Pictet (Megaloptera) in Ireland. *Entomologist's Gazette*, **41**, 109.

Parfitt, E. 1879. The fauna of Devon: Neuroptera. *Report and Transactions of the Devonshire Association for the Advancement of Science, Literature and Art*, **11**, 368–421.

Plant, C.W. 1989. *Hemerobius fenestratus* – a brown lacewing new to Britain. *Neuro News*, **3**, 4–6.

Plant, C.W. 1991a. An introduction to the British wax-flies (Neuroptera: Coniopterygidae) with a revised key to British species. *British Journal of Entomology and Natural History*, **4**, 99–117.

Plant, C.W. 1991b. *Wesmaelius balticus* (Tjeder) (Neuroptera: Hemerobiidae) new to Scotland, with a review of British records. *Entomologist's Gazette*, **42**, 171–174.

Plant, C.W. 1991c. The separation of females of the British species of *Panorpa* (Mecoptera: Panorpidae). *British Journal of Entomology and Natural History*, **4**, 157–162.

Plant, C.W. 1991d. Note on separating problem *Chrysopa* species. *Neuro News*, **8**, 6–7.

Plant, C.W. 1992. *Semidalis pseudouncinata* Meinander 1963 (Neuroptera: Coniopterygidae) new to Britain with a note on its separation from *S. aleyrodiformis* (Stephens). *Entomologist's Gazette*, **43**, 292–296.

Plant, C.W. & Barnard, P.C. 1988. *Hemerobius fenestratus* Tjeder (Neuroptera: Hemerobiidae) new to Britain. *Entomologist's Gazette*, **39**, 292.

Principi, M.M. 1956. Contributo allo studio dei Neurotteri Italiani, XIII. *Bolletino del'Instituto di Entomologia della Universita degli Studi di Bologna*, **21**, 319–410.

Richards, O.W. 1928. A new English record of *Parasemidalis annae* Enderlein (Neuroptera: Planipennia). *Entomologist's Monthly Magazine*, **64**, 14.

Séméria, Y. & Berland, L. 1988. *Névroptères de France et d'Europe*. Paris: Boubée.

Shirt, D.B. 1987. *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.

Speight, M.C.D. 1976. *Badister meridionalis*, *Megasyrphus annulipes* and *Wesmaelius quadrifasciatus*: insects new to Ireland. *Irish Naturalists' Journal*, **18**, 303–304.

Speight, M.C.D. 1979. *Anoplonyx destructor*, *Hemerobius pini* and *Pamphilius hortorum*: insects new to Ireland. *Irish Naturalists' Journal*, **19**, 302–303.

Stange, L.A. & Miller, R.B. 1990. Classification of the Myrmeleontidae based on larvae (Insecta: Neuroptera). In: *Advances in neuropterology* (Proceedings of the third International Symposium on Neuropterology), edited by M W Mansel and H Aspöck, 151–169. Pretoria: Department of Agricultural Development.

Stephens, J.F. 1829. *Illustrations of British entomology*, **3**. London: privately published.

Veenstra, C., Feichter, F. & Gepp, J. 1990. Larval diagnosis of the European genera of Hemerobiidae. In: *Advances in neuropterology* (Proceedings of the third International Symposium on Neuropterology), edited by M W Mansel and H Aspöck, 211–213. Pretoria: Department of Agricultural Development.

Ward, L.K. 1970. *Aleuropteryx juniperi* Ohm (Neur., Coniopterygidae) new to Britain feeding on *Carulaspis juniperi* Bouche (Hem., Diaspididae). *Entomologist's Monthly Magazine*, **106**, 74–78.

Wingate, W.J. & Robson, J.E. 1905. Insects. *Victoria County History of Durham*, **1**, 93–140.

Withycombe, C.L. 1923. A new British Hemerobiid (Order Neuroptera). *Entomologist*, **56**, 202–204.

Withycombe, C.L. 1924. Further notes of the biology of some British Neuroptera. *Entomologist*, **57**, 145–152.

APPENDIX 1: LIST OF MUSEUM COLLECTIONS RESEARCHED

National Museums

Natural History Museum, London
National Museum of Wales, Cardiff
National Museums on Merseyside, Liverpool

County and Regional Museums

Baldock Museum
Colchester Museum
Hancock Museum, Newcastle upon Tyne
Luton Museum
Maidstone Museum
Manx Museum
Oxford County Museum, Woodstock
Museum Service, Newham
Plumstead Museum
Rotherham Museum
Southend Museum
Stoke on Trent Museum

APPENDIX 2: LIST OF LITERATURE RESEARCHED

British Journal of Entomology and Natural History – all years
Bulletin of the Irish Biogeographical Society – partial search only
Bulletin of the Kent Field Club – partial search only
Bulletin of the Société Jersiaise – all years
Entomologist – all years
Entomologists Annual – all years
Entomologist's Gazette – all years
Entomologist's Monthly Magazine – all years
Entomologist's Records and Journal of Variation – all years
Entomologist's Weekly Intelligencer – all years
Essex Naturalist – all years
Irish Naturalists' Journal – post 1970 volumes only
Journal of the Entomological Society of the South of England – all years
Journal of the Society for British Entomology – all years
London Naturalist – all years
Naturalist – partial search only
Proceedings and Transactions of the British Entomological and Natural History Society – all years
Transactions of the Norfolk and Norwich Naturalists Society – partial search only
Transactions of the Society for British Entomology – all years

SPECIES INDEX

Species	Species account	Map page	Map no.
Nathanica – see *Nothochrysa*			
Nesomicromus – see *Micromus*			
Nineta flava	171	170	66
vittata	173	172	67
Nothochrysa capitata	175	174	68
fulviceps	177	176	69
Osmylus fulvicephalus	73	72	21
Panorpa cognata	183	182	71
communis	185	184	72
germanica	187	186	73
Parasemidalis fuscipennis	67	66	19
annae – see *P. fuscipennis*			
Phaeostigma notata	35	34	5
Psectra diptera	89	88	26
Raphidia cognata – see *Subilla confinis*			
confinis – see *Subilla confinis*			
maculicollis – see *Atlantoraphidia maculicollis*			
notata – see *Phaeostigma notata*			
xanthostigma – see *Xanthostigma xanthostigma*			
Semidalis aleyrodiformis	63	62	17
pseudouncinata	65	64	18
Sialis fuliginosa	41	40	7
lutaria	43	42	8
nigripes	45	44	9
Sisyra dalii	79	78	23
fuscata	77	76	22
terminalis	81	80	24
Subilla confinis	31	30	3
Sympherobius elegans	133	132	48
fuscescens	139	138	51
pellucidus	137	136	50
pygmaeus	135	134	49
Wesmaelius balticus	123	122	43
betulinus	125	124	44
concinnus	129	128	46
killingtoni – see *W. malladai*			
malladai	119	118	41
mortoni	123	–	–
nervosus – see *W. betulinus*			
quadrifasciatus	131	130	47
ravus	121	120	42
subnebulosus	127	126	45
Xanthostigma xanthostigma	37	36	6

Natural
Environment
Research
Council