

EUROPEAN INVERTEBRATE SURVEY

PROVISIONAL ATLAS
OF THE
INSECTS OF THE BRITISH ISLES

Part 9

HYMENOPTERA: VESPIDAE

Social Wasps

Edited by M.E. ARCHER

SECOND EDITION

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FOREWORD

The first edition of the Provisional Atlas of the Social Wasps (Vespidae) of the British Isles was compiled with data available up to 1977. We are grateful to Dr Archer for providing and editing the additional data included in this, the second edition of the Provisional Atlas.

The maps included in this Atlas were prepared under contract to the Nature Conservancy Council as part of its programme of research into nature conservation.

Monks Wood
November 1979

Paul T Harding
John Heath
General Editors

PREFACE TO THE SECOND EDITION

Since the first edition a large number of records covering Ireland have been received from J Breen. G M Spooner has also continued to forward literature and specimen records. At present at least one record has been received from 74% of the 10 km. squares from England and the Channel Islands, 70% of those from Wales, 31% of those from Scotland and 24% of those from Ireland.

Despite the new records, *Vespula germanica* continues to be unrecorded from north-west Scotland and north-west Ireland. *V. vulgaris* has now been recorded from Orkney Islands.

The College of Ripon & York
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November 1979

M E Archer

INTRODUCTION

The aim of the social wasp and hornet mapping scheme was to produce maps showing the occurrence of each of the six species of social wasp and one species of hornet in each of the 10 km squares of the British Isles including the Channel Islands. The mapping scheme was started by J P Spradbery who published preliminary maps (Spradbery 1973). The present scheme ran from 1973 to 1977 and sufficient records have been collected to publish provisional maps.

The maps have been prepared from records obtained from collectors who sent me specimens for identification; from recorders who identified specimens and forwarded their records, and from abstractors who collected data from the museums collections at Leicester, Liverpool, Manchester, Reading, Rotherham and Sunderland. In addition, I have scanned much of the national and regional literature and visited the museums at Cambridge, Cardiff, Carlisle, Edinburgh, Keighley, Newcastle and the British Museum (Natural History) for additional records. Specimens collected in the light and suction traps used in the Rothamsted Insect Survey (1972-1977) and in the malaise trap operated by D F Owen at Leicester have also been used as sources of records. An outstanding event of the scheme happened in 1974 when with the aid of radio and television a national appeal brought some 10,000 specimens from over 2,000 collectors through the post.

A newsletter giving details of collecting and killing techniques, of how to find and identify wasps with a short reading list was published in 1975 and sent to many collectors and recorders. A few copies of this newsletter are still available, and will be sent to interested persons on receipt of a large stamped addressed envelope.

At least one record has been received from 73% of the 10 km squares from England and the Channel Islands, 68% of those from Wales, 28% of those from Scotland and 15% of those from Ireland. Thus many more records are needed from Scotland and Ireland, and I would very much appreciate records and specimens from these countries.

The records have been divided into two date classes:— 1900-1949 and 1950 onwards. Records previous to 1900 have not been used. Most of the records from 1950 onwards were collected in the 1970s.

DISTRIBUTION NOTES

Vespa crabro Linnaeus. The hornet has a southern distribution in England and Wales. Occasionally specimens are taken as far north as Yorkshire and a nest was found in south Derbyshire (Archer 1976b). Within the south of England it is noticeably absent or rare in Kent and East Sussex and seems to have largely disappeared from an area enclosed by Oxfordshire, north-west Essex, Cambridgeshire and Northamptonshire where it was formerly found. It has not been recorded from the Scilly Isles or the Channel Islands.

Vespula vulgaris (Linnaeus). The common wasp is found throughout the British Isles including the Scilly Isles, Channel Islands, Isle of Man and the Outer Hebrides, but it has not been found on the Orkney and Shetland Islands.

Vespula germanica (Fabricius). The German wasp is found throughout the British Isles except for the Orkney and Shetland Islands, north-west Scotland and north-west Ireland. It has been found on the Scilly Isles and the Channel Islands, but not on the Isle of Man.

Vespula rufa (Linnaeus). The red wasp is found throughout Great Britain and probably Ireland, although more records are needed from Ireland. It is found on the Isle of Man and the Outer Hebrides, but not on the Orkney and Shetland Islands, Scilly Isles or the Channel Islands.

Vespula austriaca (Panzer). Very few records are available for the relatively rare cuckoo wasp which is a social parasite in *V. rufa* colonies (Archer 1977). Thus it could be found wherever *V. rufa* is present but most records come from Ireland, Scotland, North Wales, northern England as far south as Yorkshire, Lancashire and Devon.

Dolichovespula sylvestris (Fabricius). The tree wasp is found throughout the British Isles including the Outer Hebrides, Isle of Man, Scilly Isles and the Channel Islands but has not been found on the Orkney and Shetland Islands.

Dolichovespula norwegica (Fabricius). The Norwegian wasp is found throughout Great Britain and probably Ireland, although more records are needed from Ireland. It seems to be more plentiful to the north and west of Great Britain. It has not been recorded from the Scilly Isles or the Channel Islands but it has been found on the Isle of Man and the Outer Hebrides. It is the only social wasp species to be recorded on Orkney, but has not been found on the Shetland Islands.

WHERE, WHEN AND HOW TO COLLECT WASPS AND HORNETS

The colony of a wasp or hornet is started in the spring by a queen which starts to build a nest and rears the first workers. After the first workers appear, the queen remains in the nest and the workers enlarge the nest and rear further workers. Workers are really small unfertilized queens. At the height of the colony's existence males and queens are reared. These sexuals leave the nest, mate and then the males die and the queens enter hibernation. The founder queen and workers also die and the nest normally disintegrates.

The founder queens emerge during April, except for the cuckoo wasp, whose queens emerge later in May. By June the first workers have emerged and the founder queens cannot normally be seen on the wing. The colonies of the hornet, common and German wasps reach their peak size in August and September, and normally the colonies become dead during October, although some do survive until November. By contrast the red, tree and Norwegian wasp colonies reach their peak size during July and August, and are usually dead by the end of August although some colonies survive into September. Colonies of the red wasp invaded by the cuckoo wasp become dead by the middle of August (Archer 1977). Thus, apart from the spring queens, males and queens are available from August to October for the hornet, common and German wasps and from July to August for the other wasp species.

The following notes indicate where the nest of the hornet and the wasps may be found.

The hornet — Typically the hornet nests in a hollow dead tree — nests have been found in willows, elms and oaks. Aerial nests have also been found in the roofs of thatched cottages; in barns, garages, attics and disused huts; in bird boxes, abandoned bee hives and holes in walls. Sometimes underground nests are found.

Common wasp — Typically the common wasp nests underground at a mean depth of 12.7 cm (range 0-45 cm). The nest is started in a cavity in the ground, *e.g.* a small mammal burrow, in a rockery, in rubbish and manure heaps. Underground sites tend to be associated with banks rather than flat ground. About 17% of nests are aerial, being found in a wide variety of places, but always in an enclosed space — in cavity walls, attics, inside outhouses, beehives and hollow trees, under an abandoned armchair, in a very dense bush, *etc.*

German wasp — Typically, like the common wasp, the German wasp nests underground at a mean depth of 9.9 cm (range 3-22 cm) but unlike the common wasp is equally associated with banks and flat ground and is less likely to be found in aerial situations (12% of nests). Aerial nests are found in similar places to those of the common wasp.

Red wasp — Typically the red wasp nests underground, but often near to the surface at a mean depth of 5.2 cm (range 0-17 cm), tending to use cavities under leaf litter, tufts of grass or under planks of wood. Aerial nests in enclosed spaces are also found (18% of nests), *e.g.* in bird boxes, old tree stumps, cavity walls and inside outhouses.

Tree wasp — Despite its name, the tree wasp is often found underground (20% of nests), although usually at or near the surface of the ground in a pre-existing cavity. However, records of workers excavating soil have been made (Archer 1976b). Aerial nests are found at a mean height of 263 cm (range 50-830 cm), and usually in an enclosed space such as a bird box, outhouse, attic, beehive, hollow tree or cavity wall, although exposed nests are also found. However, even nests in more exposed situations, *e.g.* under the eaves or porches of houses or on a covered bird table, have at least partial cover.

Norwegian wasp — Typically the Norwegian wasp builds an aerial nest at a mean height of 130 cm (range 30-700 cm) which is rather lower than that of the tree wasp. Usually the aerial nest is in an exposed site, *e.g.* attached to the branch of a tree (spruce, yew, cypress, larch, apple, horse chestnut recorded) or a shrub (red currant, privet, gooseberry, holly, bramble, hawthorn, gorse, laurel recorded); the eaves of houses and on walls or large stones. Enclosed aerial sites such as bird boxes, inside a disused chicken hut and a storage water tank are only rarely used (7% of aerial nests). Nests at or just below ground level are rarely found (4% of nests).

Nests may be taken, in order to collect both sexes and the workers, as follows. Underground colonies are best taken after dusk by introducing some cotton wool soaked in chloroform into the burrow entrance of the nest and then digging up the colony. If the colony is not very large it may be taken during the day by again plugging up the entrance of the burrow with cotton wool soaked in chloroform. However, before the nest can be dug up, the returning foragers must first be collected in a net; a procedure that usually takes about half an hour. Aerial nests are also best taken after dark. If the nest is accessible a polythene bag, containing a piece of cotton wool soaked in chloroform, may be placed around the nest and the supports of the nest cut so that the nest falls into the polythene bag: a procedure that requires a little courage. If the aerial nest is not accessible, then chloroform should be poured over the surface of the nest to kill the inmates before attempting to remove the obstructions that surround the nest; a procedure that can take up to two hours. Special protective clothing is not required for the above procedures. The table gives an indication of the mature nest size and the peak worker number that might be expected in the average nest for each species found in the British Isles. Of course, some nests are much larger.

Species	Sample Size	Number cells in mature nest	Total number adults produced			Peak worker number in nest
			Workers	Queens	Males	
Hornet	11	1703	947	288	312	unknown
Common	115	9700	10298	962	1011	2238
German	11	7872	7999	1261	1366	1531
Red	9	1037	270	244	264	161
Red-cuckoo	5	533	unknown	unknown	unknown	unknown
Tree	16	940	329	252	282	177
Norwegian	14	1627	515	504	546	226

Rather more easily adults may be captured when foraging away from the nest with a net. Foragers may be found searching for pulp to build their nests, for prey and sweet fluids as food materials and for water which might be needed to cool the nest or to moisten the soil around the nest to aid soil excavation. Occasionally the sexuals may be collected on their mating-flight circuits during the late summer and autumn or hibernating queens may be found.

Most pulp is collected from dead wood. The hornet and the common wasp produce a light brown pulp as they forage from decayed wood while the other wasps produce a grey pulp as they forage from sound wood. Fences, posts and dead trees should be inspected; sometimes pulp collection from a dead tree can be so active that I have thought that a nest might be present in the tree. Fibres from non-woody plants, *e.g.* dead brambles, stems of umbellifers; bark from living trees and shrubs — hornets may damage lilac and ash by ringing; and other materials such as paper, clothing and peat may be used as pulp.

Wasps take a wide variety of insects as prey, but in particular, flies and the caterpillars of butterflies, moths and sawflies are captured. Thus damp places with willowherb and plenty of flies often yield wasps. Hornets may be collected at beehives where they sometimes become a serious pest by preying on the honeybees. Some species of wasps also scavenge from the dead bodies of mammals and birds and may be found foraging in the butcher's shop.

Sweet substances are collected from the nectaries of flowers, 'honey-dew' excretions of aphids, the sap from damaged trees, ripe fruit, *e.g.* blackberries, apples, plums, and from sweet products made by man, *e.g.* on cakes and sweets in shops and factories. Spring flowering Cotoneaster shrubs are very good for spring queens, and autumn flowering ivy and wild balsam for late season foragers. The flowers of figwort and the exposed nectaries of the Umbelliferae and bramble are also good collecting places. I have taken the workers of all six species of wasps on figwort in Yorkshire and figwort is particularly good for the tree and Norwegian wasps in August and the common wasp in September.

The common, German and red wasps can also be readily collected in baited traps containing fermenting jam. Wasps and hornets have also been successfully collected in light, suction and malaise or tent traps.

KEY TO THE SPECIES OF THE BRITISH SOCIAL VESPIDAE

The following key has been prepared to enable the collector to identify most specimens of British social wasps he might come across with the minimum number of characters. Keys giving fuller details

are available in Guiglia (1972) and Spradbery (1973). I am also grateful for the opportunity of studying unpublished keys by Richards and Edwards. Females (*i.e.* queens and workers) may be separated from males as follows:—

- Females — Antennae relatively short, consisting of 12 segments; gaster with six visible segments and with a sting
- Males — Antennae relatively long, consisting of 13 segments; gaster with seven visible segments and without a sting (Fig. 1)
- 1 — Head with an extended vertex; distance between the lateral ocelli and the posterior margin of the head 4-6 times greater than between the lateral ocelli (Fig. 2). Body dominantly yellow and brown. Larger, body lengths: queen 25-35 mm, worker 17-24 mm, male 21-28 mm. *Vespa crabro*
- Head with a short vertex; distance between the lateral ocelli and the posterior margin of the head less than twice the distance between the lateral ocelli (Fig. 3). Body dominantly yellow and black. Smaller, body lengths: queen 15-20 mm, worker 9-15 mm, male 11-19 mm. 2
- 2 (1) Malar space short; as short as or shorter than the terminal diameter of the scape (Fig. 4) *Vespula* 3
- Malar space long; considerably longer than the terminal diameter of the scape (Fig. 5). *Dolichovespula* 6
- 3 (2) Long hairs on the first gastral tergite black 4
- Long hairs on the first gastral tergite pale 5
- 4 (3) Hind tibiae bearing long black hairs (Fig. 13). Apical angles of the clypeus sharply pointed in the queen (Fig. 10). Clypeus usually with two or three black spots in the queen. Scape sometimes yellow in the front in queens. No worker caste present. Body lengths: queen 16-19 mm, male 12-16 mm *V. austriaca*
- Hind tibiae without long black hairs. Apical angles of the clypeus rounded in the female (Fig. 9). Clypeus usually with a broad central black line in the female. Scape of the female black. Workers present. Body lengths: queen 16-19 mm, worker 10-14 mm, male 12-16 mm. *V. rufa*
- 5 (3) Margin of the mandible behind the innermost tooth straight in females (Fig. 16). Yellow gena usually interrupted centrally by a black marking in females. The black basal band on the first gastral tergite of the queen apically bearing a central black point (Fig. 14). The male with yellow patches or spots extending below the antennal sockets (Fig. 7). Aedeagus of male with a small backwardly directed barb on each side below the apical "spoon" which is rounded at its apex (Fig. 11). Body lengths: queen 16-18 mm, worker 9-14 mm, male 13-18 mm. The propodeum of the queen is black, while that of the worker bears two large yellow spots. The scape of the female is black but yellow in front in the male *V. vulgaris*
- Margin of the mandible behind the innermost tooth concave in females (Fig. 17). Gena entirely yellow. Basally the first gastral tergite of the queen bears a central diamond-shaped black spot (Fig. 15). The male with no yellow patches or spots extending below the antennal sockets (Fig. 8). Aedeagus of male with a small semicircular process on each side below the apical "spoon" which is emarginate apically (Fig. 12). Body lengths: queen 16-20 mm, worker 12-15mm, male 12-19 mm. The propodeum of the queen is black, while that of the worker bears two large yellow spots. The scape of the female is black but yellow in front in the male . . . *V. germanica*
- 6 (2) Clypeus entirely yellow or with a central black spot (Fig. 5). Gaster with no reddish-brown marks on the tergites. Body lengths: queen 16-19 mm, worker 12-15mm, male 11-16 mm *D. sylvestris*
- Clypeus with a broad central black line usually widened in the centre (Fig. 6). Gaster usually with reddish-brown marks on tergite one and two. Body lengths: queen 15-18 mm, worker 10-14 mm, male 11-16 mm. *D. norwegica*

Acknowledgements

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Finally I am grateful to J Heath of the Biological Records Centre for his help and guidance.

M E Archer, February 1978
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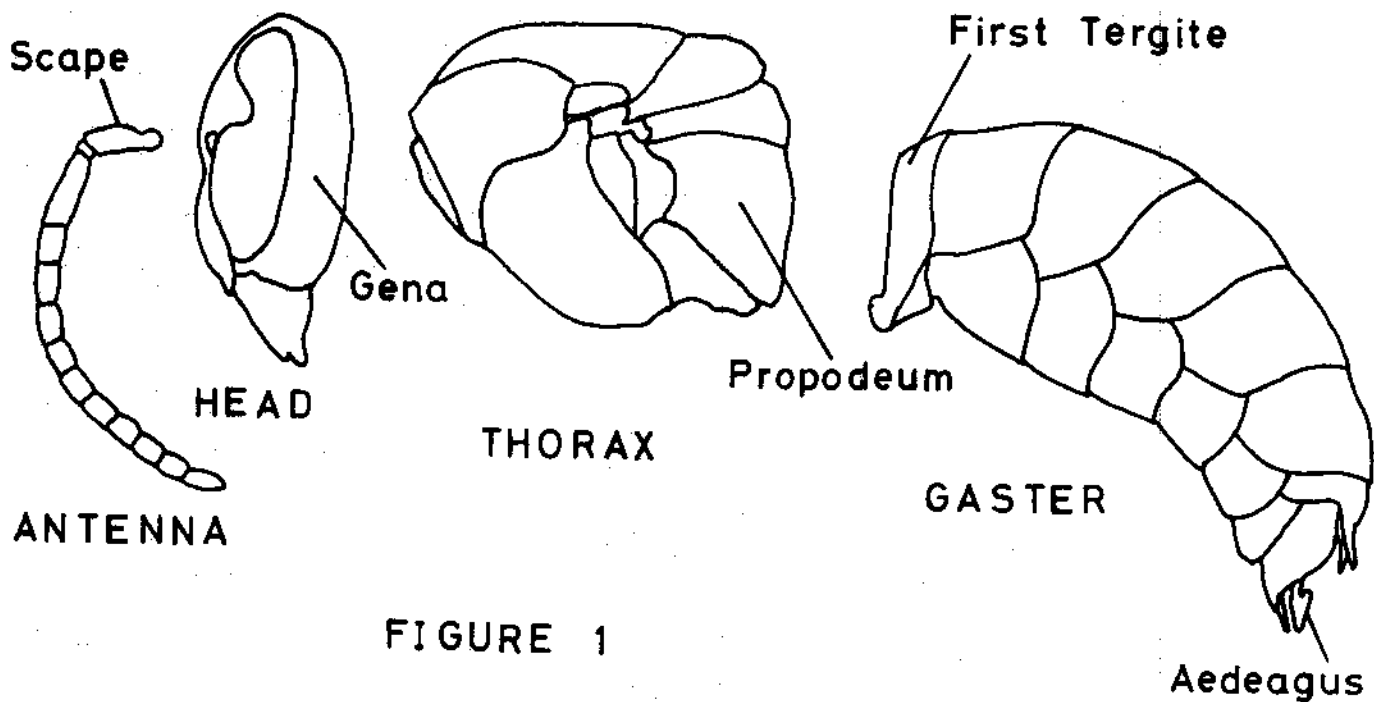


FIGURE 1

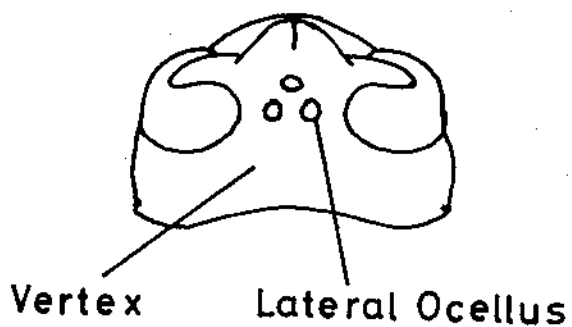


Fig 2



Fig 3

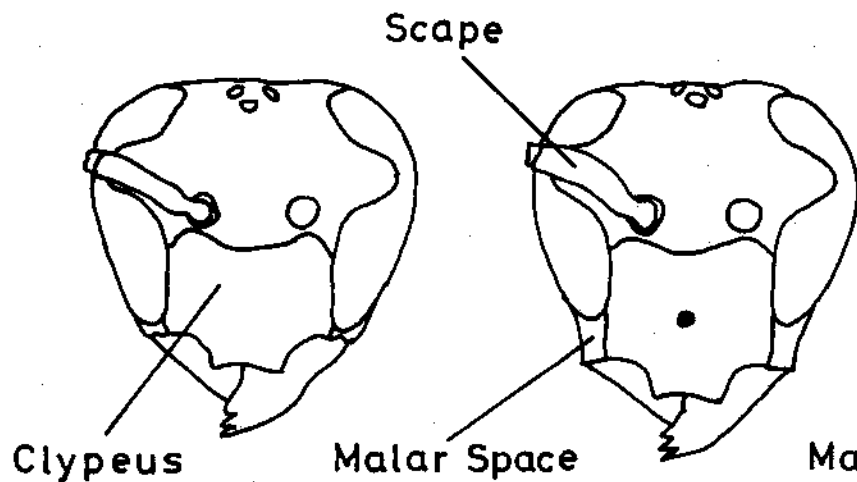


Fig 4

Fig 5

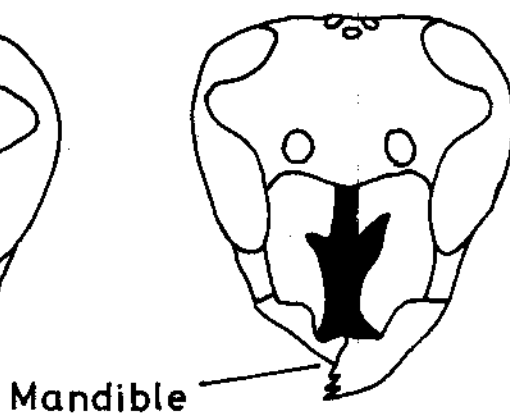
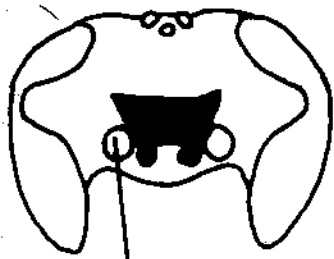


Fig 6



Antennal Socket

Fig 7

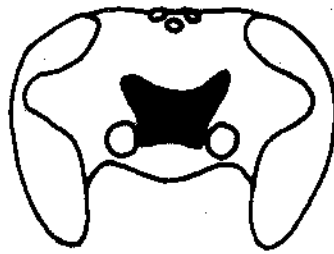
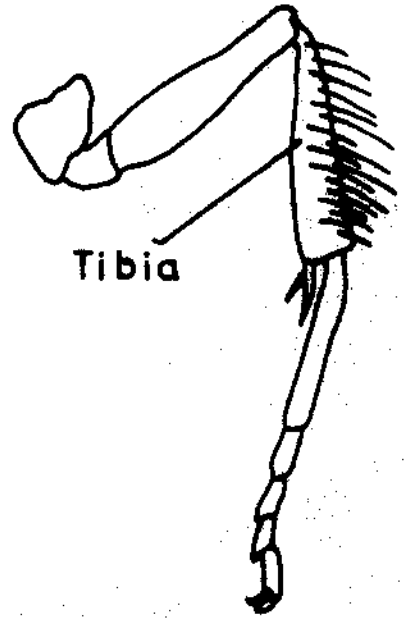


Fig 8



Tibia

Fig 13

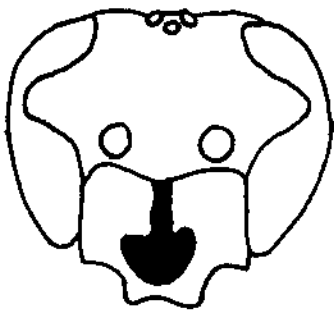


Fig 9

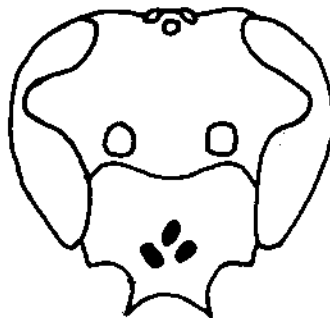


Fig 10

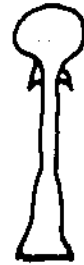


Fig 11



Fig 12

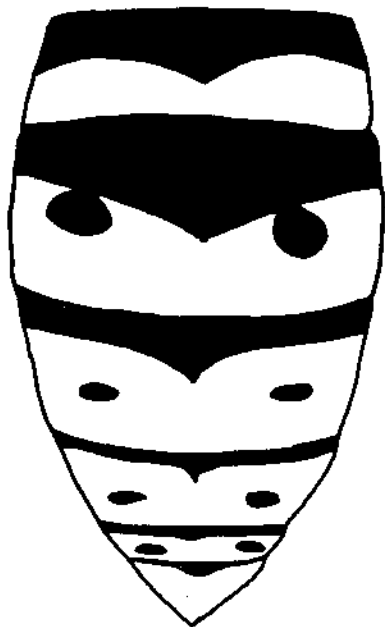


Fig 14



Fig 15



Fig 16

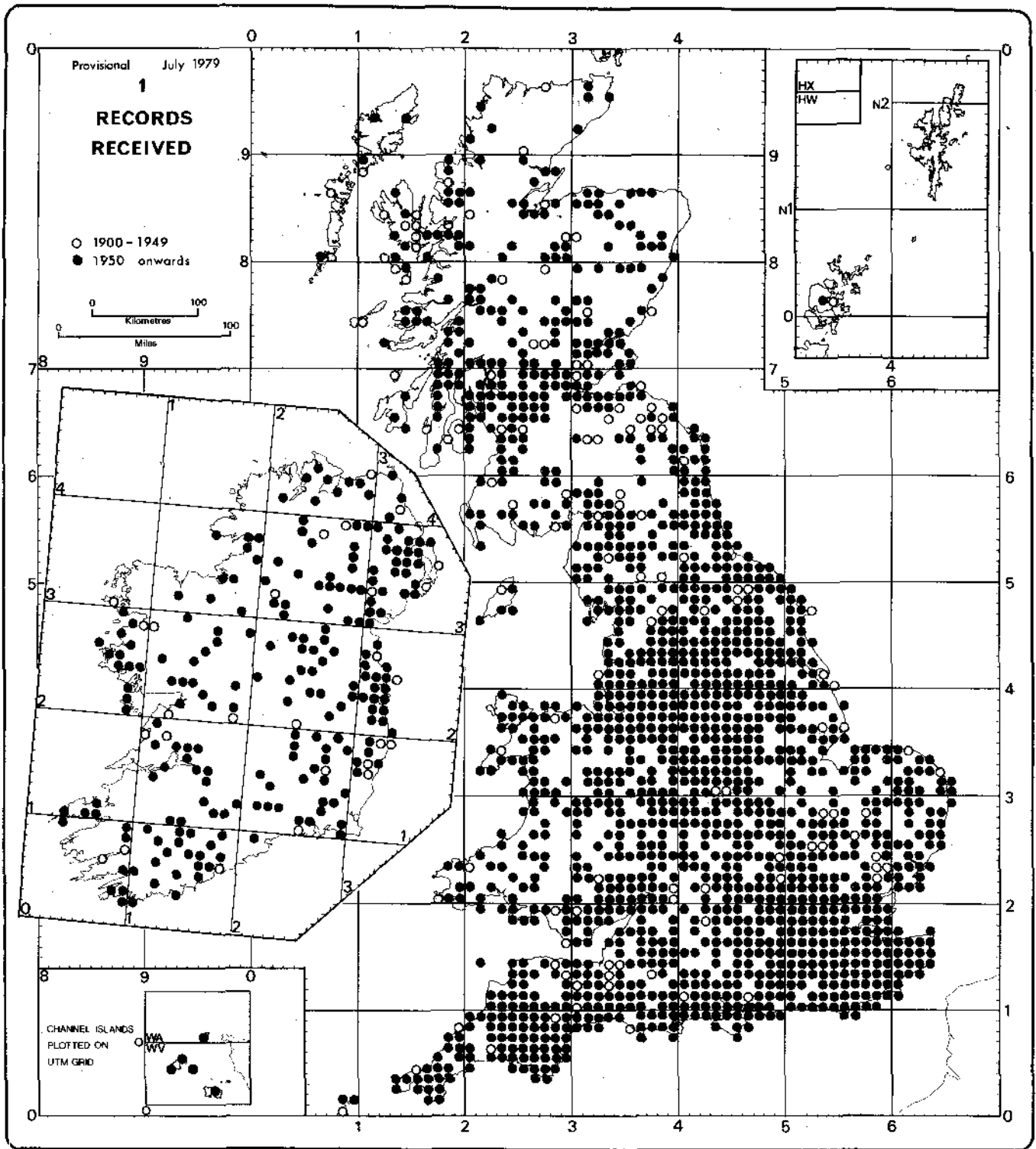


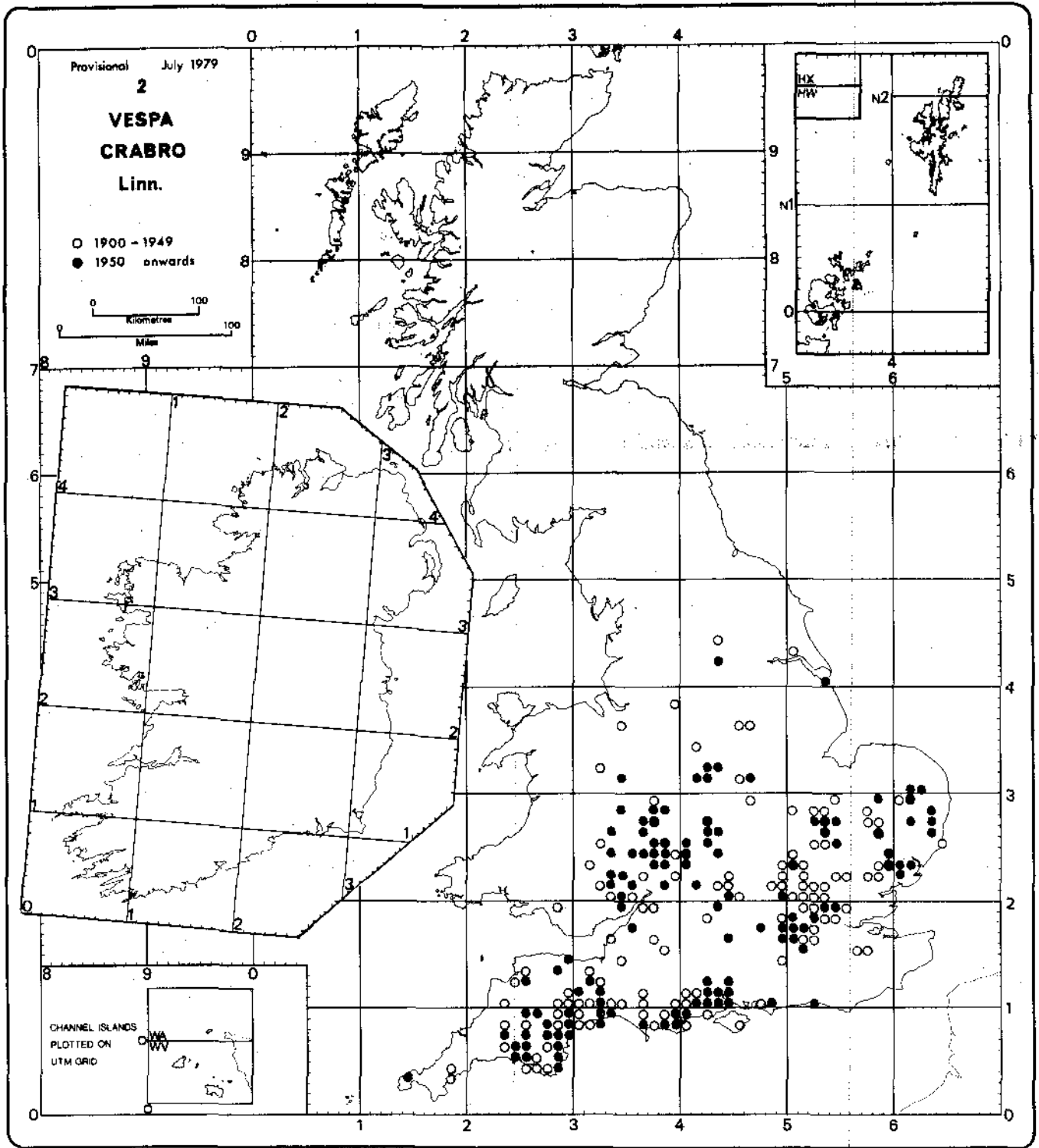
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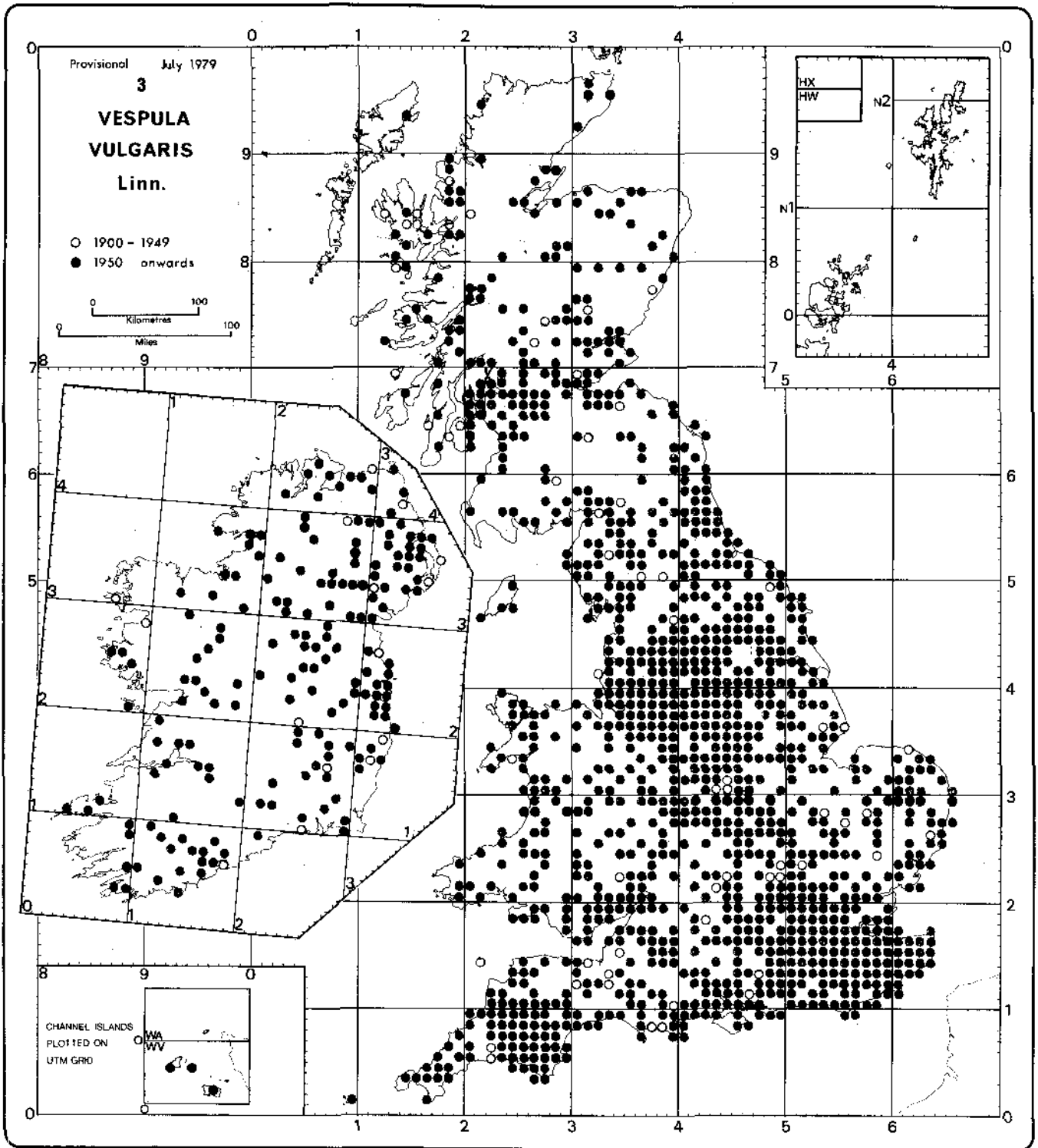
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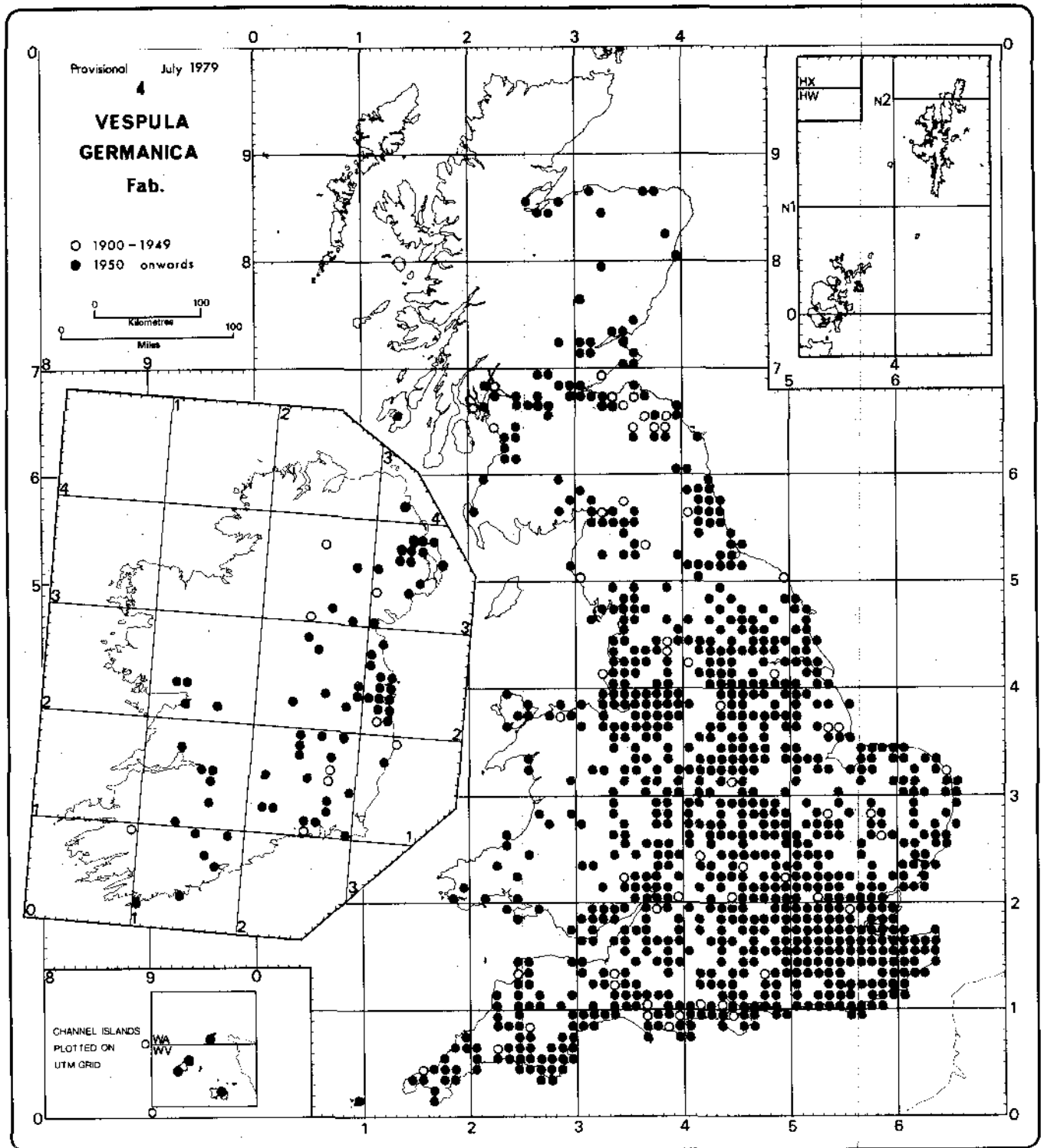
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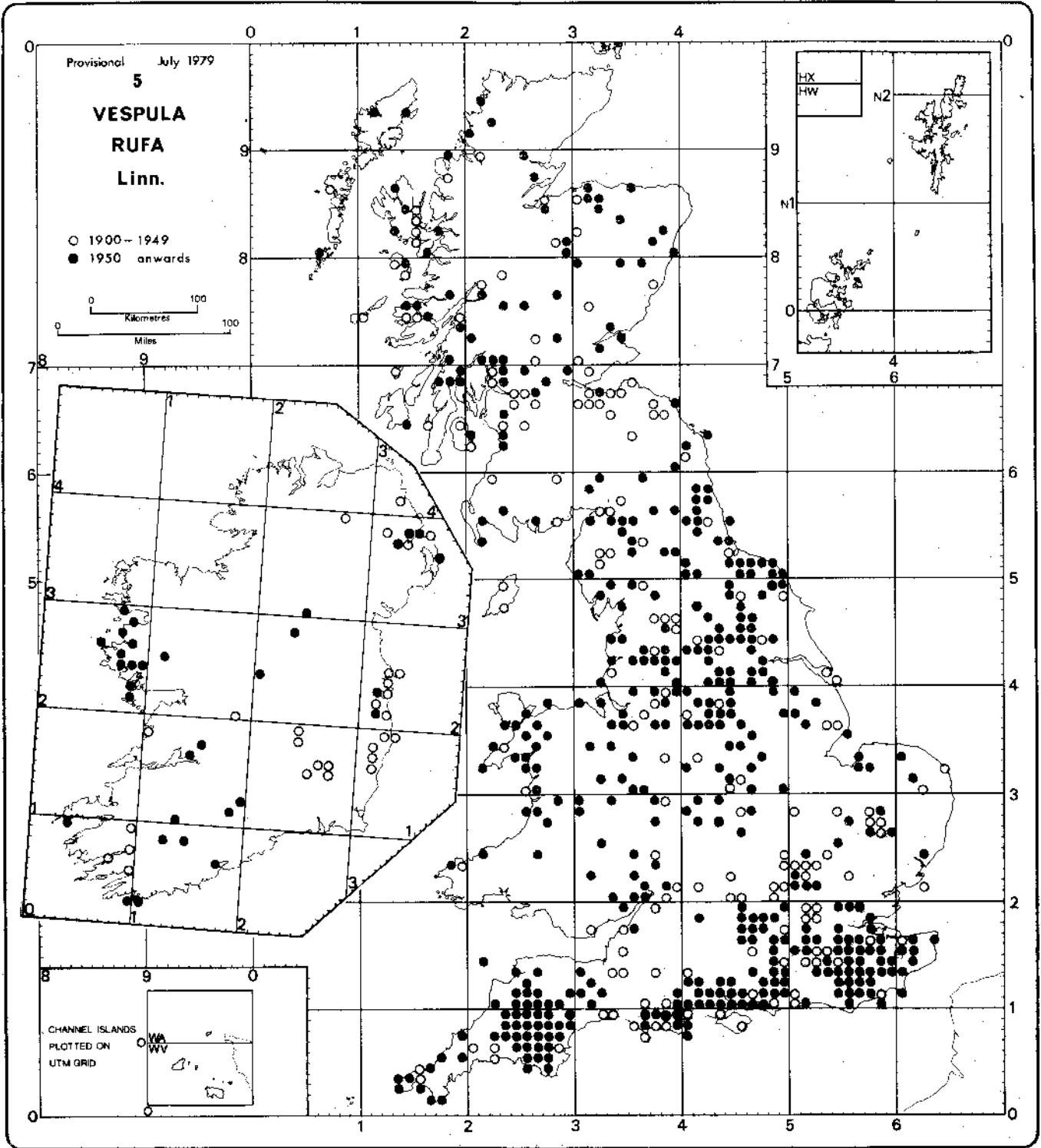
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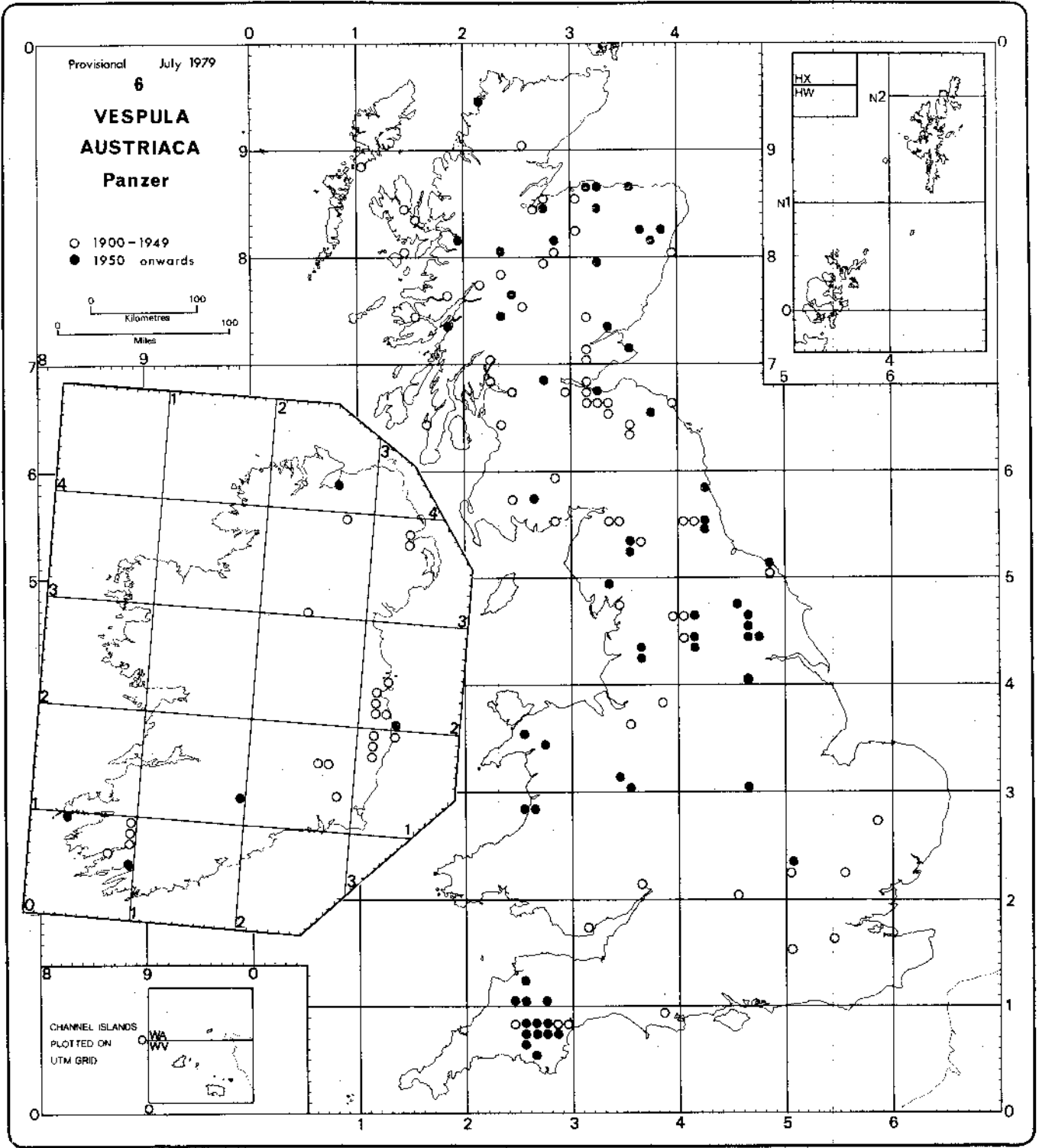










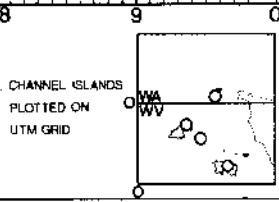
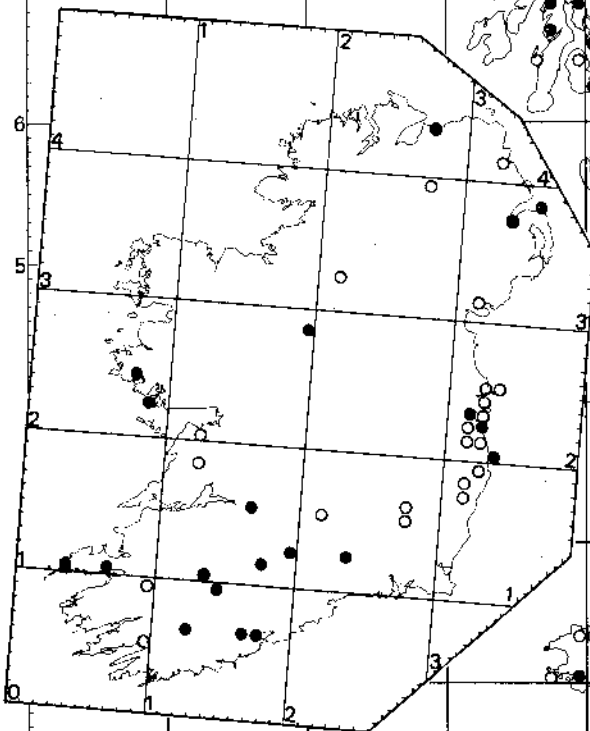
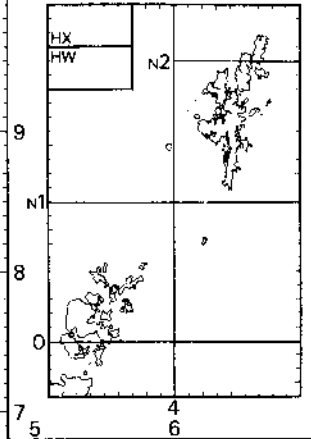
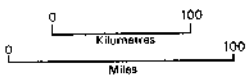


Provisional July 1979

7

**DOLICHOVESPULA
SYLVESTRIS**
Scopoli

○ 1900-1949
● 1950 onwards



CHANNEL ISLANDS
PLOTTED ON
UTM GRID

