PROVISIONAL ATLAS of the MARINE ALGAE of BRITAIN & IRELAND

Edited for the
British Phycological Society
by
Professor T.A. NORTON
(University of Liverpool)

1985

BIOLOGICAL RECORDS CENTRE
Monks Wood Experimental Station

Institute of Terrestrial Ecology,
Monks Wood Experimental Station,
Huntingdon.

Nature Conservancy Council,
Northminster House,
Peterborough

NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF TERRESTRIAL ECOLOGY

PROVISIONAL ATLAS OF THE MARINE ALGAE OF BRITAIN AND IRELAND

Edited for the

British Phycological Society

by

Professor T A Norton
(University of Liverpool)

1985

Institute of Terrestrial Ecology
Biological Records Centre
Monks Wood Experimental Station
Abbots Ripton
HUNTINGDON PE17 2LS

Nature Conservancy Council
Northminster House
PETERBOROUGH
PE1 1UA

Printed in Great Britain by
NERC Reprographics

C NERC Copyright 1985

Published in 1985 by
Institute of Terrestrial Ecology
Administrative Headquarters
Monks Wood Experimental Station
Abbots Ripton
HUNTINGDON
PE17 2LS

ISBN 0 904282 89 9

The **Institute of Terrestrial Ecology (ITE)** was established in 1973, from the former Nature Conservancy's research stations and staff, joined later by the Institute of Tree Biology and the Culture Centre of Algae and Protozoa. ITE contributes to, and draws upon, the collective knowledge of the 13 sister institutes which make up the **Natural Environment Research Council,** spanning all the environmental sciences.

The Institute studies the factors determining the structure, composition and processes of land and freshwater systems, and of individual plant and animal species. It is developing a sounder scientific basis for predicting and modelling environmental trends arising from natural or man-made change. The results of this research are available to those responsible for the protection, management and wise use of our natural resources.

One quarter of ITE's work is research commissioned by customers, such as the Department of Environment, the European Economic Community, the Nature Conservancy Council and the Overseas Development Administration. The remainder is fundamental research supported by NERC.

ITE's expertise is widely used by international organizations in overseas projects and programmes of research.

> The Biological Records Centre is operated by ITE, and receives financial support from the Nature Conservancy Council. It seeks to help naturalists and research biologists to coordinate 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 Experimental Station
Abbots Ripton
HUNTINGDON
PE17 2LS

048 73 (Abbots Ripton) 381

CONTENTS

This Provisional Atlas of the Marine Algae of Britain and Ireland is the result of the dedicated efforts of many people. Whilst part of those efforts was directed specifically at providing data for the British Phycological Society's Marine Algal Recording Scheme, a substantial amount of the data used was extracted from information assembled for other purposes. Nevertheless, all the distributional records, from whatever source, have been assessed and validated before their incorporation into the data base summarized in this Atlas. Most of the recorders, both professional and amateur, have given their time and data freely. The true economic cost of collecting and collating this information by any other means would have been prohibitive.

As indicated in the Introduction, the BPS Marine Algal Recording Scheme is to continue until it is reckoned that there are sufficient species distribution data to prepare a definitive Atlas. An additional objective is to record the location of species with more precision, together with some indication of the habitat type, so that the information base for the final Atlas is of even greater use than this provisional atlas. In particular, such information will be of considerable use to the Nature Conservancy Council in preparing the proposed Marine Nature Conservation Review of Great Britain. As with its terrestrial counterpart, the purpose of this review will be to classify and describe the range of marine habitats, communities and species and identify those sites considered to be of the highest importance and which should be conserved ie as Sites of Special Scientific Interest, National Nature Reserves or, especially, Marine Nature Reserves. This Review will also act as a basis for advice on the wider marine environment. For many habitats, the marine algal communities will be the prime attributes used in classifying and assessing sites. We therefore hope that this extra and important requirement in field recording will provide a new interest and, indeed, a stimulus to the next phase of marine algal recording to achieve the final Atlas.

We record our particular thanks to the Biological Records Centre at Monks Wood for applying their experience and expertise to the collation and presentation of the data and the publication of this Atlas. However, without the considerable effort of Professor Trevor Norton and the recorders of the British Phycological Society, this Atlas could not have been produced; we are indebted to them.

Dr Roger Mitchell
Sarah Fowler

Chief Scientist Directorate
Nature Conservancy Council

A Marine Algae Recording Scheme was launched by the British Phycological Society (BPS), in conjunction with the Biological Records Centre (BRC), in 1971. The aim of the scheme, organised by Professor T A Norton, is to map the distribution of the British seaweeds. It covers all the benthic members of the Chlorophyta, Phaeophyta and Rhodophyta, plus the genus Vaucheria (Xanthophyta). Only attached seaweeds are recorded, drift plants being ignored as their provenance is unknown. A Preliminary Atlas of fifteen species was published by BRC in 1978; since then recording has progressed steadily and a Provisional Atlas of 155 taxa can now be published.

Methods

The seaweeds, limited by their requirements for both light and secure attachment, are largely confined to shallow waters close inshore. Therefore their distribution, like that of terrestrial organisms, can be recorded and mapped using the Ordnance Survey National Grid Reference System for Great Britain, the Suirbheireacht Ordonais/ Ordnance Survey National Grid for Ireland and the Universal Transverse Mercator Grid (Channel Islands).

A standard recording card was produced at the start of the scheme, and was used for field recording by an enthusiastic group including both professional phycologists and amateur collectors. In addition, records have been extracted from the herbarium of the Department of Botany, University College, Galway (GALW), and from papers published since 1950.

The accumulated record cards were passed over to BRC towards the end of 1982, and put on to computer file in 1983-84. The following data (if provided by the original recorder) were included for each record: species code number, site name, grid reference (in full), date of record, code number of recorder, source of record. In addition, records made during Nature Conservancy Council (NCC) surveys and held by NCC on computer file were made available to BRC and incorporated into the data bank. Most of the data processing at BRC was carried out by Francesca Griffith and Mrs D M Greene.

Maps of all species were plotted from the resulting data. These maps were examined by T A Norton and R Mitchell (NCC) and 155 were selected for inclusion in a Provisional Atlas. The presence of a dot on the map indicates that there is at least one record from that 10 km grid square. Only records dating from 1950 onwards have been mapped, although some older records are included in the data bank.

Geographical coverage

Records have now been received for about 80% of the approximately 1120 squares covering the coastline of the British Isles (map 1). Ireland is the most poorly covered region, especially the north-west although this area offers some of the most promising collecting grounds in the British Isles.

For a frequently encountered species that is readily identifiable, up to 1000 independent records have been received. However, as there is often more than one record from a given 10 km square, there may be only 500-600 dots on the map.

Selection of species

The 155 species mapped in this Atlas were selected to indicate the progress of the scheme and to stimulate collecting in areas where records are sparse or completely lacking. The maps are also intended to draw attention to the distribution patterns that are emerging so that they may be verified or challenged by collectors deliberately searching for species beyond their recorded limits.

Some poorly recorded species have been included to draw attention to the neglect that befalls species that are critical or are laborious to identify, eg the calcareous crustose Rhodophyta Dermatolithon corallinae (map 99) and Phymatolithon lenormandii (map 135). Species that produce small, inconspicuous plants, eg Myrionema strangulans (map 58), or that inhabit cryptic habitats, eg Tellamia intricata (map 21) and parasitic plants, eg Choreocolax polysiphoniae (map 139) are rarely noted in passing but are usually present if looked for.

A remarkable feature of the maps is the number of species which appear to reach their geographical limits in the British Isles, a region which occupies a latitudinal range of little more than 10°. In the captions to the maps, the terms 'northern' and 'southern' refer to the distribution of the species outside the British Isles.

Uses of the data bank

It is clear that we now have a more detailed knowledge of the distribution of seaweeds around the British Isles than in any other comparable region.

Detailed records, such as those now available in the data bank, are an essential prerequisite if we are to monitor the changes that occur in coastal waters. Some species have retreated in the face of industrial pollution: many species no longer grow far into the Firth of Forth or the Tees estuary where once they thrived. On the other hand, introduced invasive species are expanding their ranges. A striking recent example is Sargassum muticum, a japanese species first found in Britain in 1971 but now firmly established all along the south coast of England and on the coast of continental Europe from The Netherlands to Brittany.

There are other indications that our coastal vegetation may be changing faster than we appreciate. In recent years diving phycologists have added dozens of species to the British flora. Usually, however, it is difficult to be sure that these additions are really newcomers to our shores rather than long established residents that awaited discovery in rarely visited sites. The maps in this Atlas are merely a manifestation of a large and growing repository of distributional data that will serve as the reference against which all future records can be compared.

Future recording

The BPS recording scheme will continue, with a view to the enlargement of the data bank and the publication of a final Atlas containing maps of all species. It is hoped that all future records will include full details of locality, grid reference, recorder and date so as to enhance the quality of the data in the data bank. Further details can be obtained from Professor T A Norton, Department of Marine Biology, Port Erin, Isle of Man.

ACKNOWLEDGEMENTS

First and foremost I would like to thank the British Phycological Society under whose auspices the scheme was inaugurated. Although I am most grateful for every record received, it would be remiss not to mention those who as regular recorders, referees, or advisers have contributed so much to the scheme. I am particularly indebted to the following: D. Ballantine, G.T. Boalch, the late M.C.H. Blackler, E.M. Burrows, H.L. Caldwell, Y.M. Chamberlain, O.F. Conran, J. Cremona, I.C. Cross, F. Dipper, P.S. Dixon, W.F. Farnham, M.D. Guiry, N. Hammond, F.G. Hardy, R. Harvey, J. Hayward, C.G.L. Hepton, S. Hiscock, D.E.G. Irvine, L.M. Irvine, J.M. Jones, S.J.T. Knight, K. Kozicki, C.A. Maggs, R. Merritt, O. Morton, E. Pickervance, C. Pybus, C. Roden, M. Scannell, M.McL. Smith, D.A. Strand, I. Tittley, S.M. Turk, M. de Valera, A. Wallace. Finally my sincerest thanks are extended to the the members of the Biological Records Centre and the Nature Conservancy Council whose advice and help made this Atlas possible; in particular Christopher D. Preston and Roger Mitchell, and Frank Perring, now of the Royal Society for Nature Conservation.

REFERENCES

Adey, W.H. & Adey, P.J. 1973. Studies on the biosystematics and ecology of the epilithic crustose Corallinaceae of the British Isles. Br. phycol. J., 8, 343-408.

Critchley, A.T., Farnham, W.F. & Morrell, S.L.A. 1983. A chronology of new European sites of attachment for the invasive brown alga, Sargassum muticum 1973-1981. J. mar. biol. Ass. U.K., 63, 799-812.

Cullinane, J.P. & Whelan, P.M. 1981. The ecology and distribution of Stenogramme interrupta (C. Agardh) Montague ex Harvey on the coast of Ireland. Proc. R. Ir. Acad. B, 81, 111-116.

Guiry, M.D. 1975. An assessment of Palmaria palmata forma mollis (S. et G.) comb. nov. (= Rhodymenia palmata forma mollis S. et G.) in the eastern North Pacific. Syesis, 8, 245-261.

Guiry, M.D. 1977. Studies on marine algae of the British Isles 10. The genus Rhodymenia. Br. phycol. J., 12, 385-425.

Guiry, M.D. & Hollenberg, G.J. 1975. Schottera gen. nov. and Schottera nicaeensis (Lamour. ex Duby) comb. nov. (= Petroglossum nicaeense (Lamour. ex Duby) Shotter) in the British Isles. Br. phycol. J., 10, 149-164.

Hiscock, S. & Maggs, C.A. 1982. Notes on Irish marine algae - 6. Zanardinia prototypus (Nardo) Nardo. Ir. Nat. J., 30, 414-416.

Hiscock, S. & Maggs, C.A. 1984. Notes on the distribution and ecology of some new and interesting seaweeds from south-west Britain. Br. phycol. J., 19, 73-87.

Irvine, D.E.G., Guiry, M.D., Tittley, I. & Russell, G. 1975. New and interesting marine algae from the Shetland Isles. Br. phycol. J., 10, 57-71.

Jephson, N.A., Fletcher, R.L. & Berryman, J. 1975. The occurrence of Zanardinia prototypus on the south coast of England. Br. phycol. J., 10, 253-255.

McLachlan, J., Chen, L.C.-M. & Edelstein, T. 1969. Distribution and life history of Bonnemaisonia hamifera Hariot. Proc. Int. Seaweed Symp., 6th, Santiago de Compostela, 1968, 245-249.

Maggs, C.A. & Guiry, M.D. 1982a. Notes on Irish marine algae - 5. Preliminary observations on deep water vegetation off west Donegal. Ir. Nat. J., 20, 357-361.

Maggs, C.A. & Guiry, M.D. 1982b. The taxonomy, morphology and distribution of species of Scinaia Biv.-Bern. (Nemaliales, Rhodophyta) in north-western Europe. Nord. J. bot., 2, 517-523.

Magne, R. 1980. Laurencia platycephala Kütz. (Rhodophycée) espèce méconnue des côtes de la Manche. Cah. Biol. Mar., 21, 227-237.

Mitchell, R., Earll, R.C. & Dipper, F.A. 1983. Shallow sublittoral ecosystems in the Inner Hebrides. Proc. R. Soc. Edinb. B, 83, 161-184.

Norton, T.A. 1977. Experiments on the factors influencing the geographical distributions of Saccorhiza polyschides and Saccorhiza dermatodea. New Phytol., **78**, 625-635.

Norton, T.A. 1978. Mapping species distributions as a tool in marine ecology. Proc. R. Soc. Edinb. B, **76**, 201-213.

Norton, T.A. & Mathieson, A.C. 1983. The biology of unattached seaweeds. In: Progress in phycological research, vol. 2, edited by F.E. Round & D. Chapman, 333-386. Amsterdam: Elsevier Biomedical Press.

Norton, T.A. & Parkes, H.M. 1972. The distribution and reproduction of Pterosiphonia complanata. Br. phycol. J., **7**, 13-19.

Powell, H.T. 1957. Studies in the genus Fucus L. II. Distribution and ecology of forms of Fucus distichus L. emend. Powell in Britain and Ireland. J. mar. biol. Ass. U.K., **36**, 663-693.

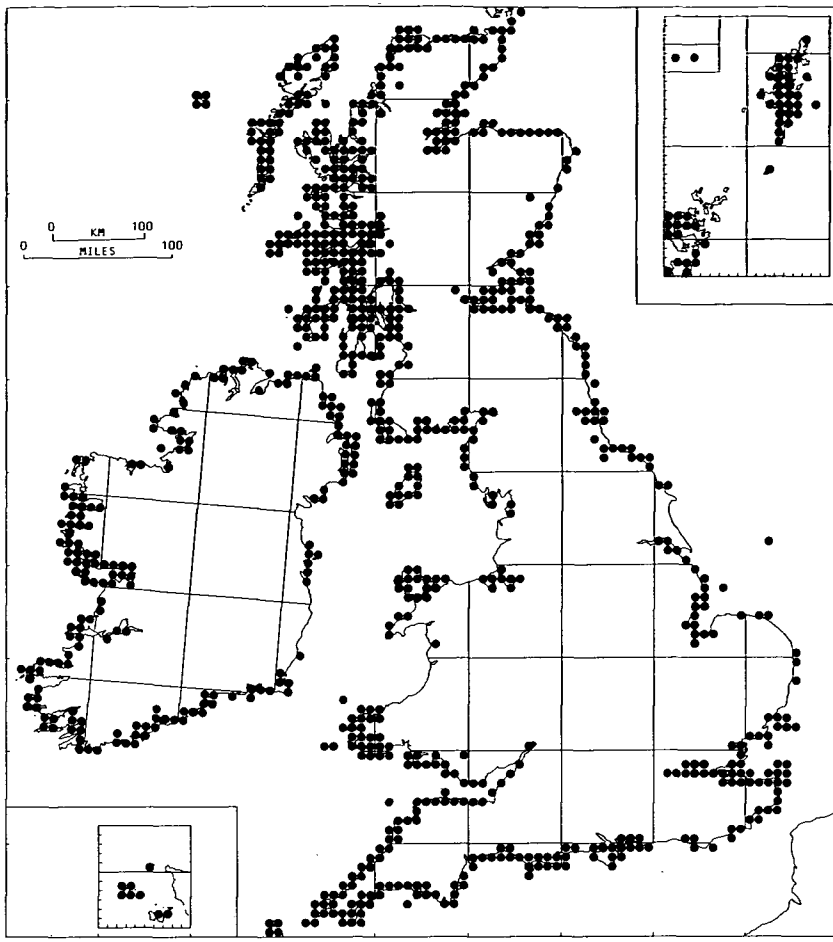
Price, J.H., Tittley, I. & Richardson, W.D. 1979. The distribution of Padina pavonica (L.) Lamour. (Phaeophyta, Dictyotales) on British and adjacent European shores. Bull. Br. Mus. Nat. Hist., **7**, 1-67.

Prud'Homme van Reine, W.F. 1982. A taxonomic revision of the European Sphacelariaceae (Sphacelariales, Phaeophyceae). Leiden: E.J. Brill/Leiden University Press.

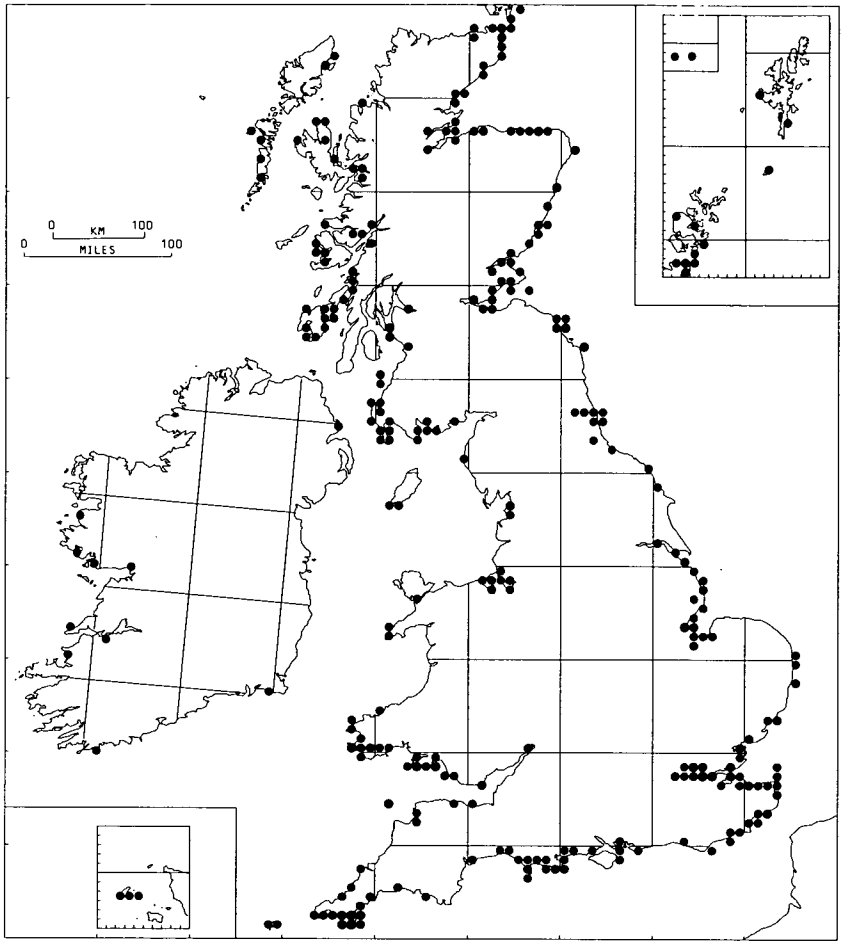
Van den Hoek, C. 1979. The phytogeography of Cladophora (Chlorophyceae) in the northern Atlantic Ocean, in comparison to that of other benthic algal species. Helgoländer wiss. Meeresunters., **32**, 374-393.

Van den Hoek, C. 1982a. Phytogeographic distribution groups of marine algae in the North Atlantic Ocean. A review of experimental evidence from life history studies. Helgoländer wiss. Meeresunters., **35**, 153-214.

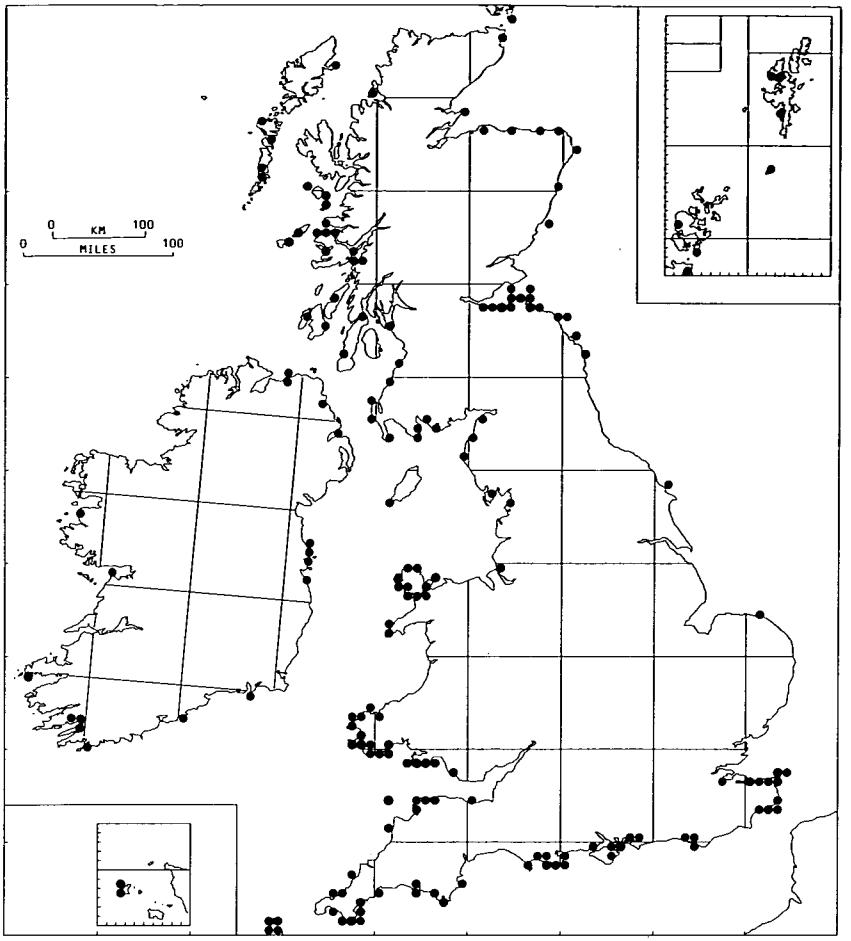
Van den Hoek, C. 1982b. The distribution of benthic marine algae in relation to the temperature regulation of their life histories. Biol. J. Linnean Soc. Lond., **18**, 81-144.



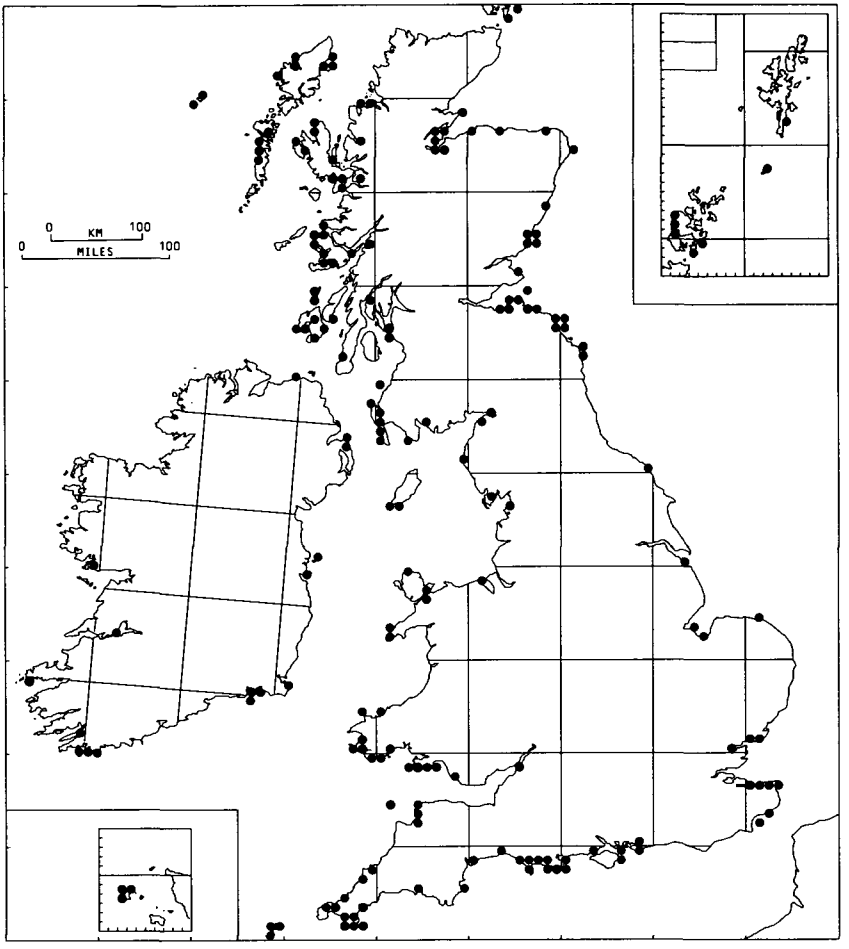
Map 1 **Coverage map** The map shows all squares from which at least one record has been received.



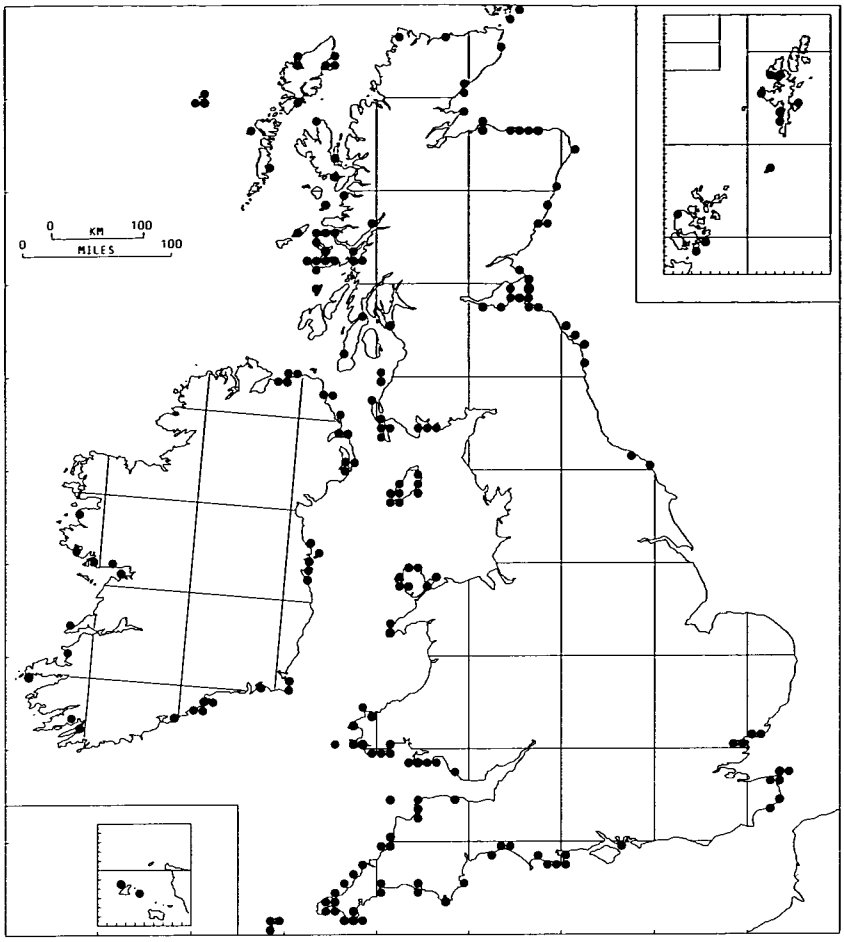
Map 2 **Blidingia minima** (Näg. ex Kütz.) Kylin Quite a common species especially on the upper shore, but often overlooked owing to its superficial resemblance to a small Enteromorpha.



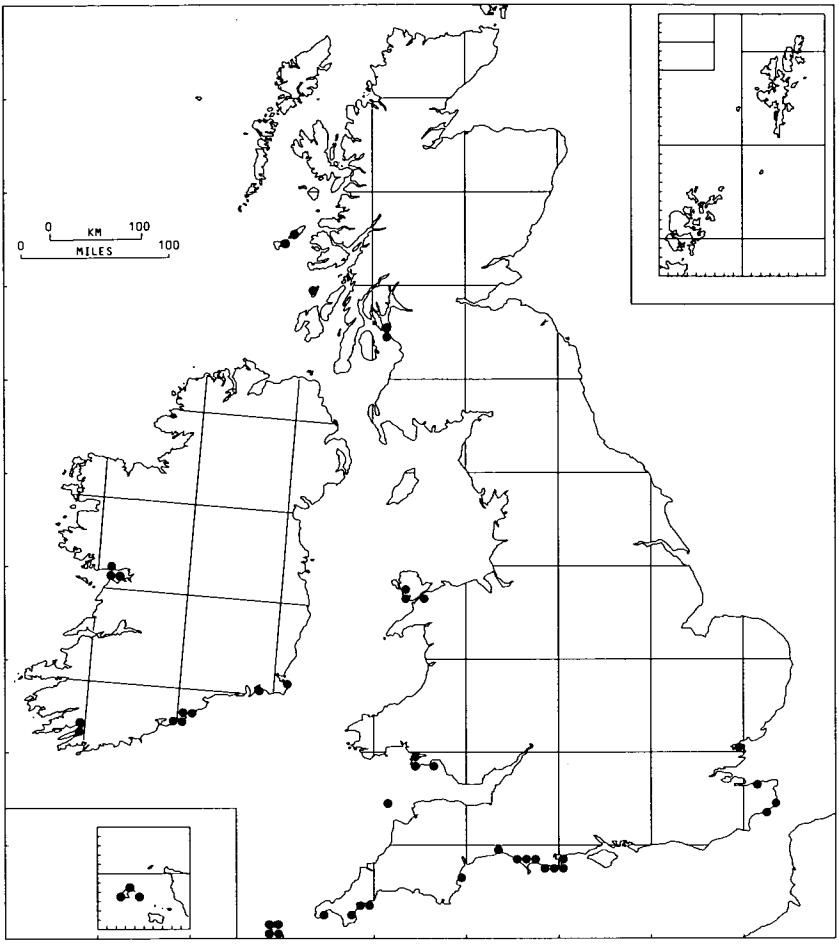
Map 3 **Bryopsis plumosa** (Huds.) C. Ag. A distinctive species but under-recorded because, living on the sides of deep pools and under overhanging ledges, it is easily overlooked.



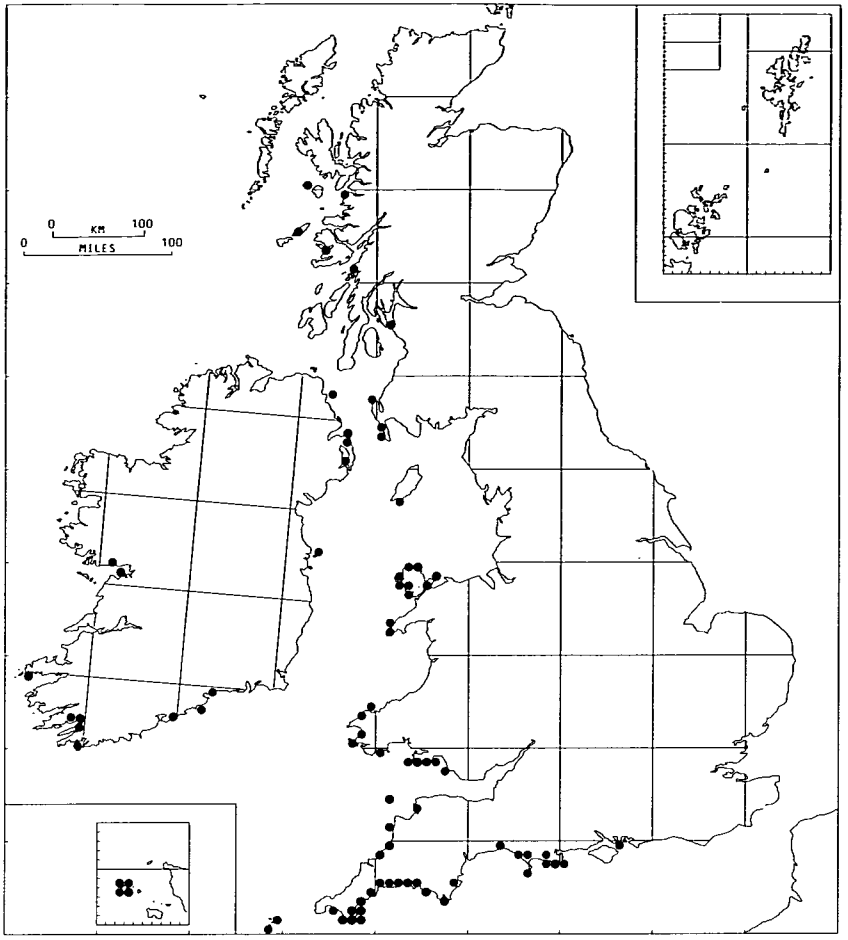
Map 4 **Chaetomorpha linum** (O.F. Müll.) Kütz. A widespread pool-dweller, probably under-recorded because of a spurious belief that it is difficult to differentiate from other species in the genus.



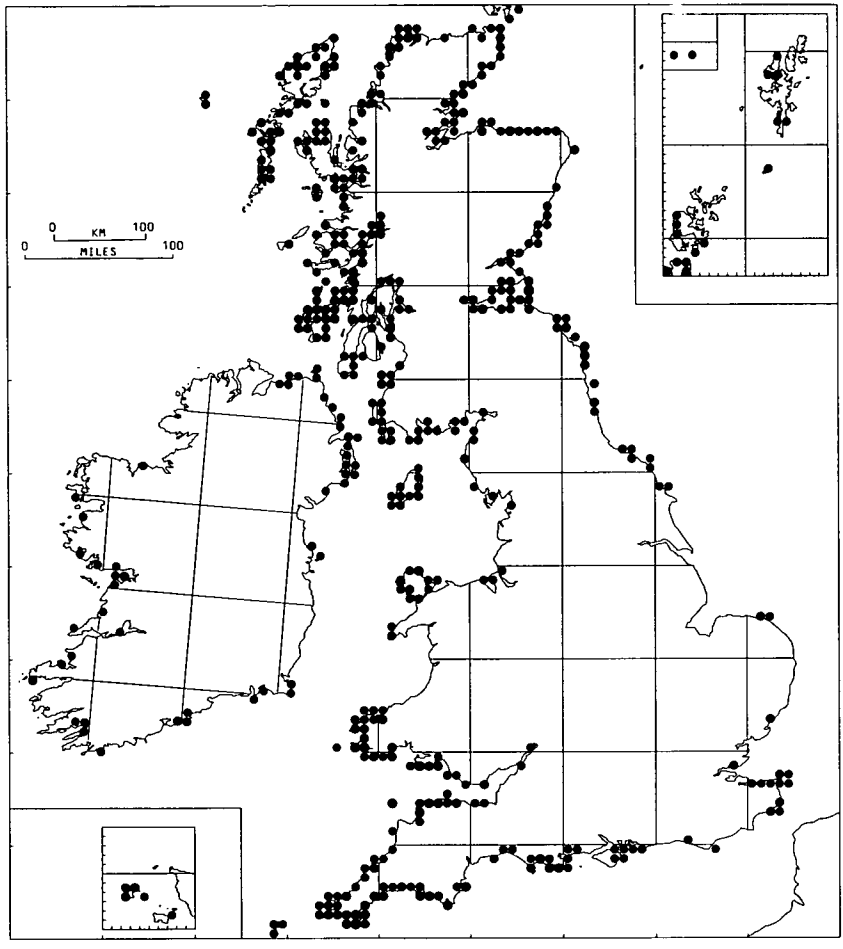
Map 5 **Chaetomorpha melagonium** (Web. et Mohr) Kütz. A distinctive large-celled species frequently overlooked because it tends to occur as scattered individual filaments.



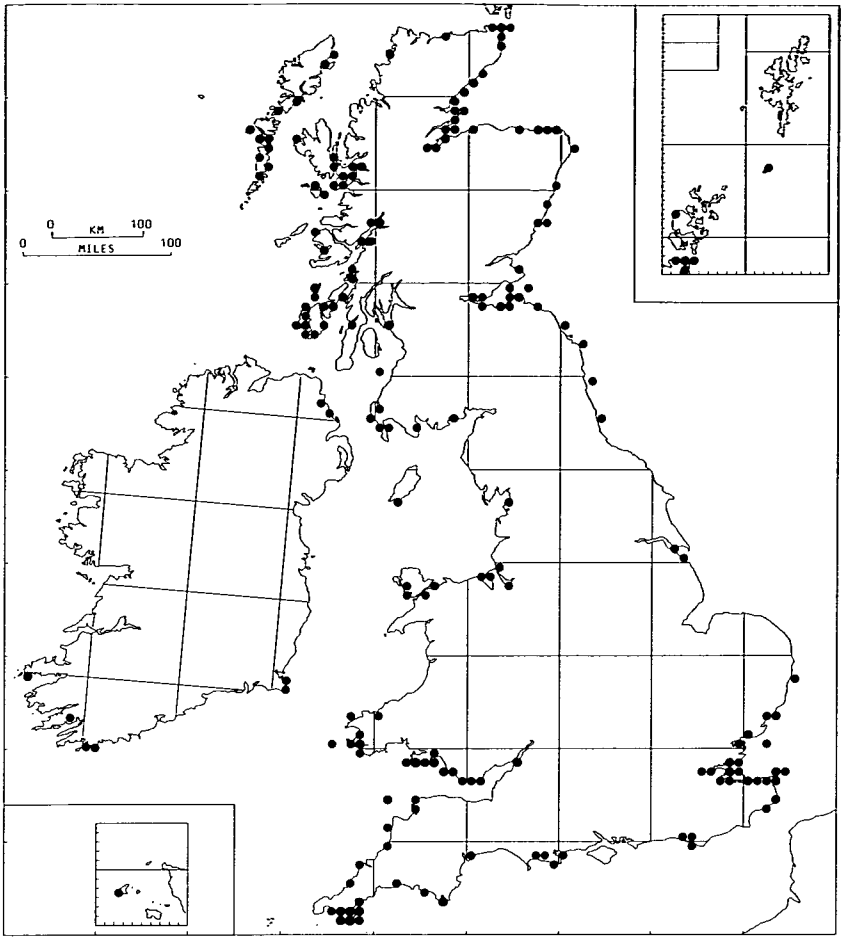
Map 6 **Cladophora hutchinsiae** (Dillw.) Kütz. One of the more distinctive, but rarer, subtidal species of Cladophora. Locally abundant in the south. See van den Hoek (1979).



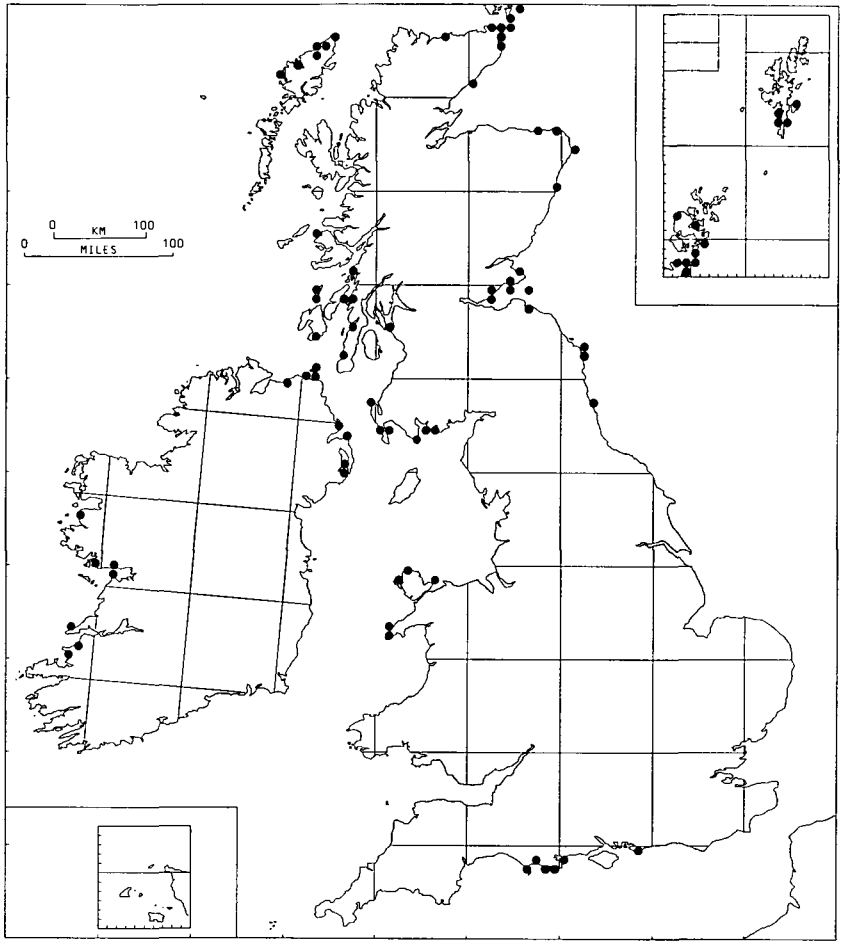
Map 7 **Cladophora pellucida** (Huds.) Kütz. A very distinctive species usually inhabiting the shallow subtidal zone or lower shore pools. Far more common than formerly thought, especially in the south west. See van den Hoek (1979).



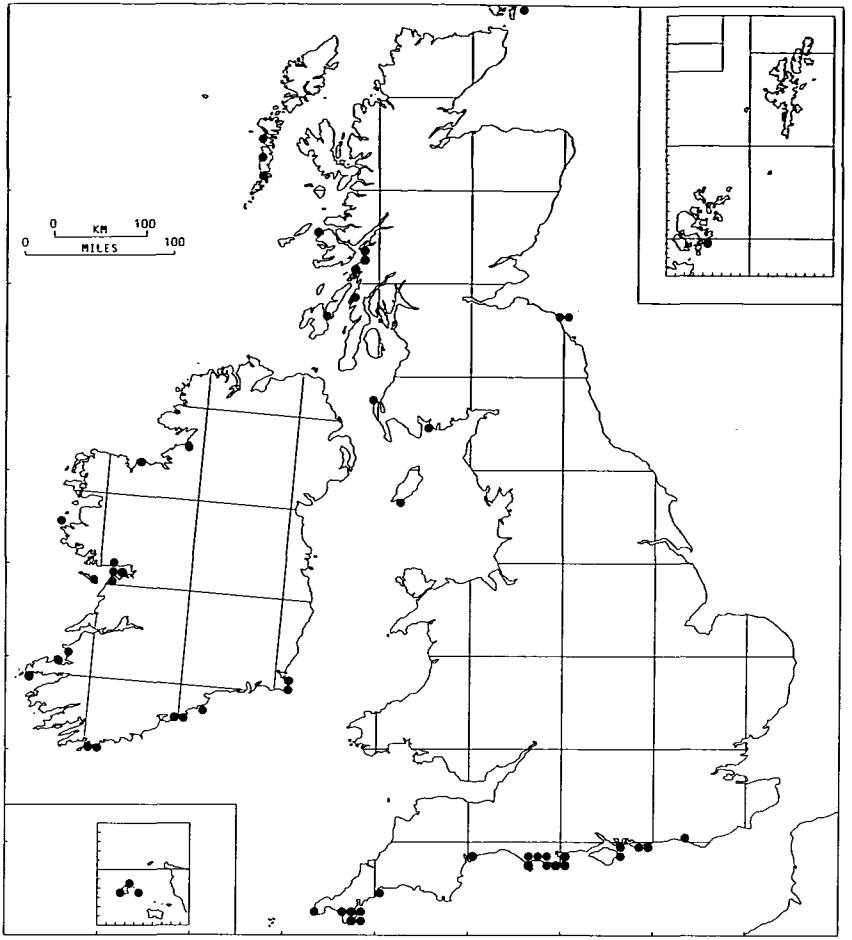
Map 8 **Cladophora rupestris** (L.) Kütz. One of the commonest green algae found around our shores, but woefully under-recorded in Ireland. See van den Hoek (1979, 1982a). The map illustrates the unsuitability for a rock-dwelling seaweed of the sandy and muddy beaches on the east coast of England and bordering the Irish Sea.



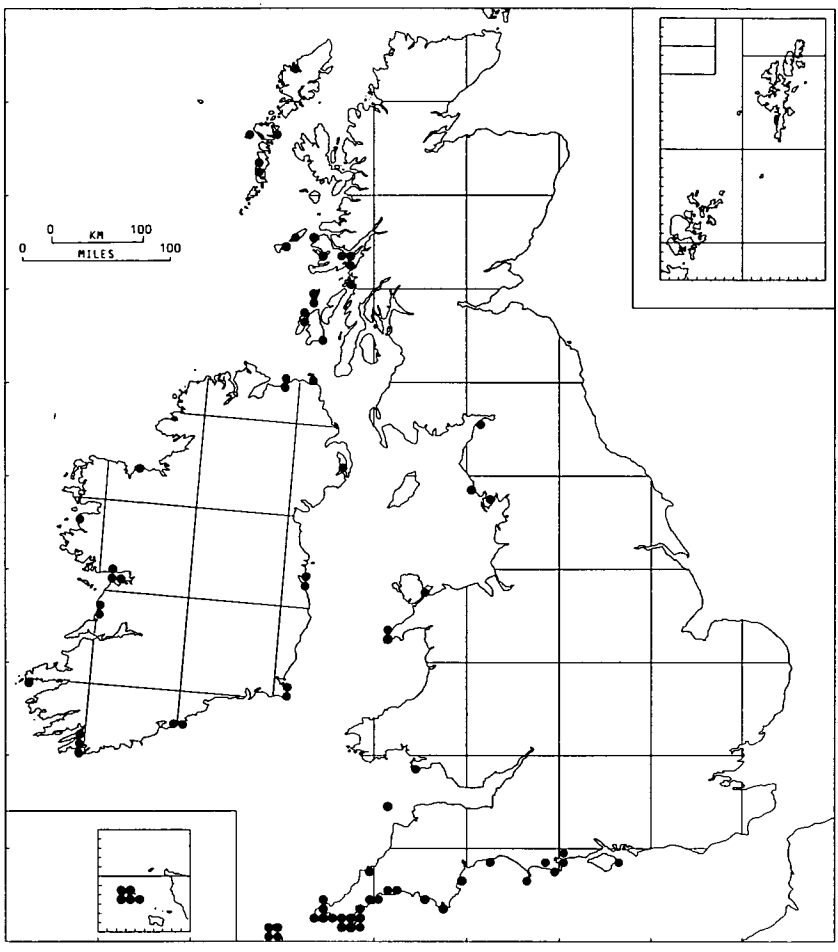
Map 9 **Cladophora sericea** (Huds.) Kütz. A common species, under-recorded because it is difficult to distinguish from other species of Cladophora with confidence. See van den Hoek (1979, 1982a).



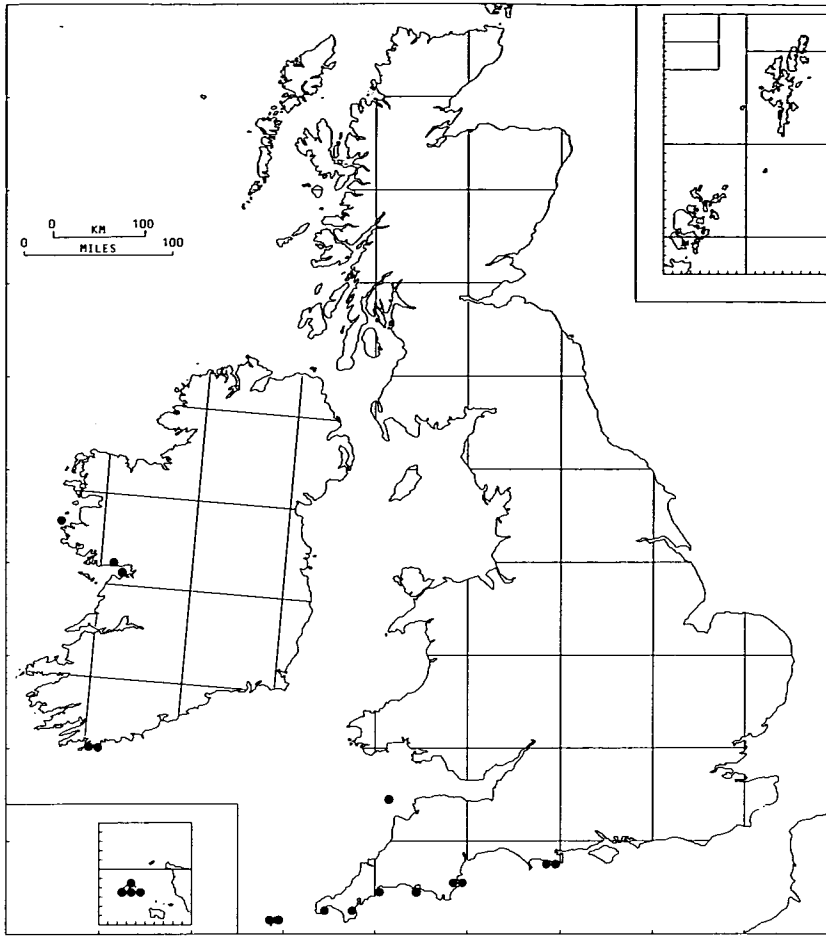
Map 10 **Codium fragile** (Sur.) Hariot subsp. **atlanticum** (Cotton) Silva A widespread subspecies being steadily displaced from the south by Codium fragile subsp. tomentosoides (map 11).



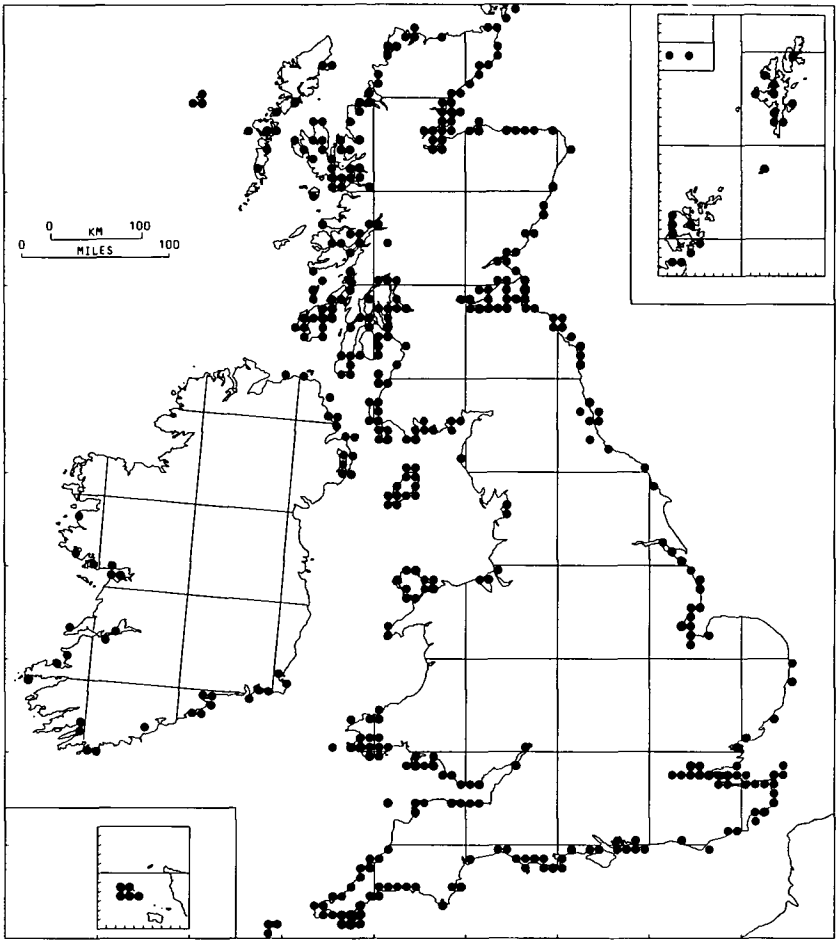
Map 11 **Codium fragile** (Sur.) Hariot subsp. **tomentosoides** (Goor) Silva An introduced taxon that probably came to Britain in the 1940s. It seems to have spread progressively northwards and is now locally abundant, especially in the south. To some extent its invasion was overlooked because of the plant's superficial similarity to the other Codium species that it displaced. See Norton (1978).



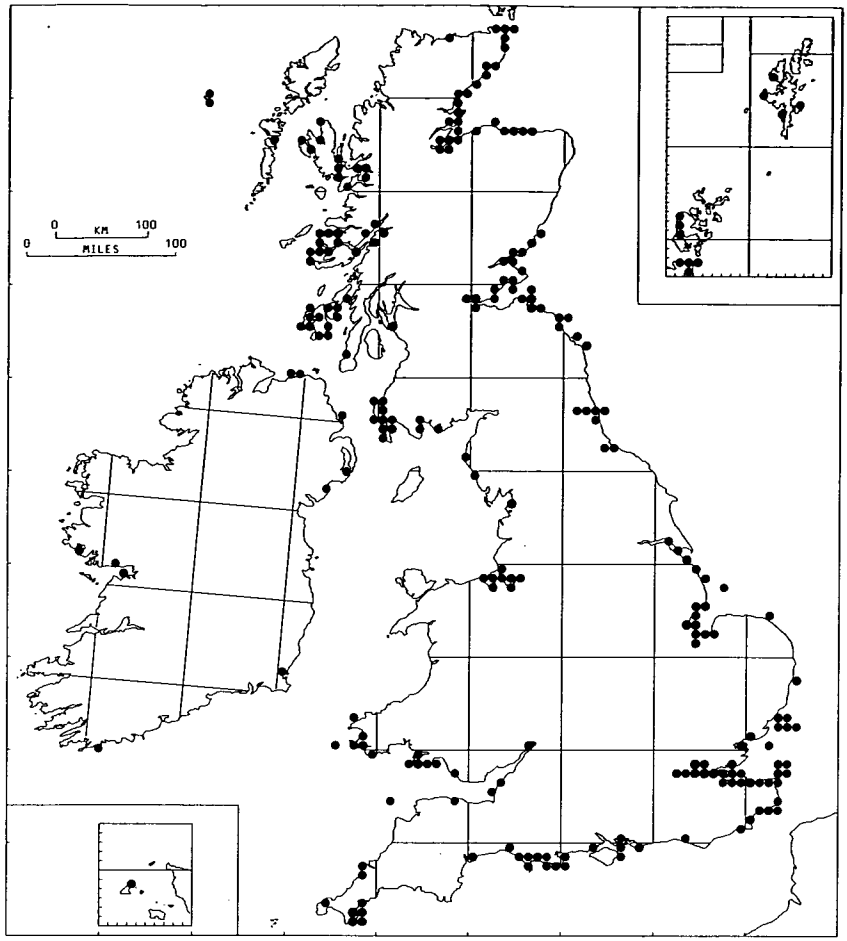
Map 12 **Codium tomentosum** Stackh. Generally less common than C. fragile and only distinguishable from it under the microscope.



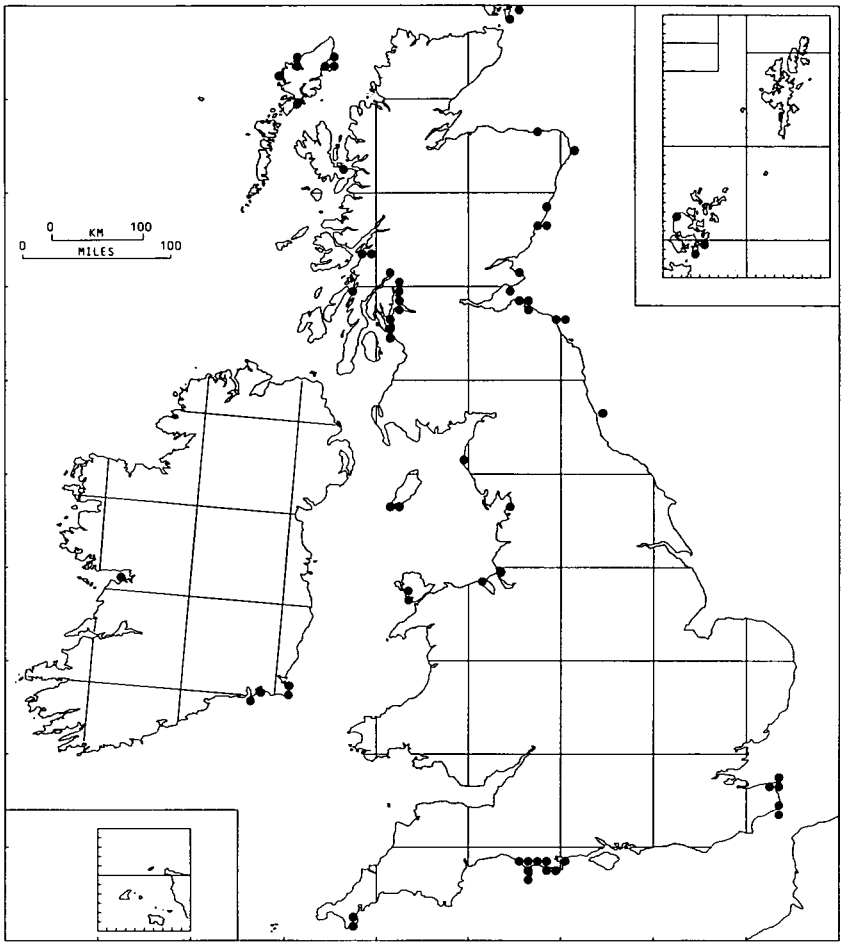
Map 13 **Codium vermilara** (Olivi) Chiaje Another species superficially similar to those preceding, but is is distinct under the microscope and seems to have a more restricted distribution.



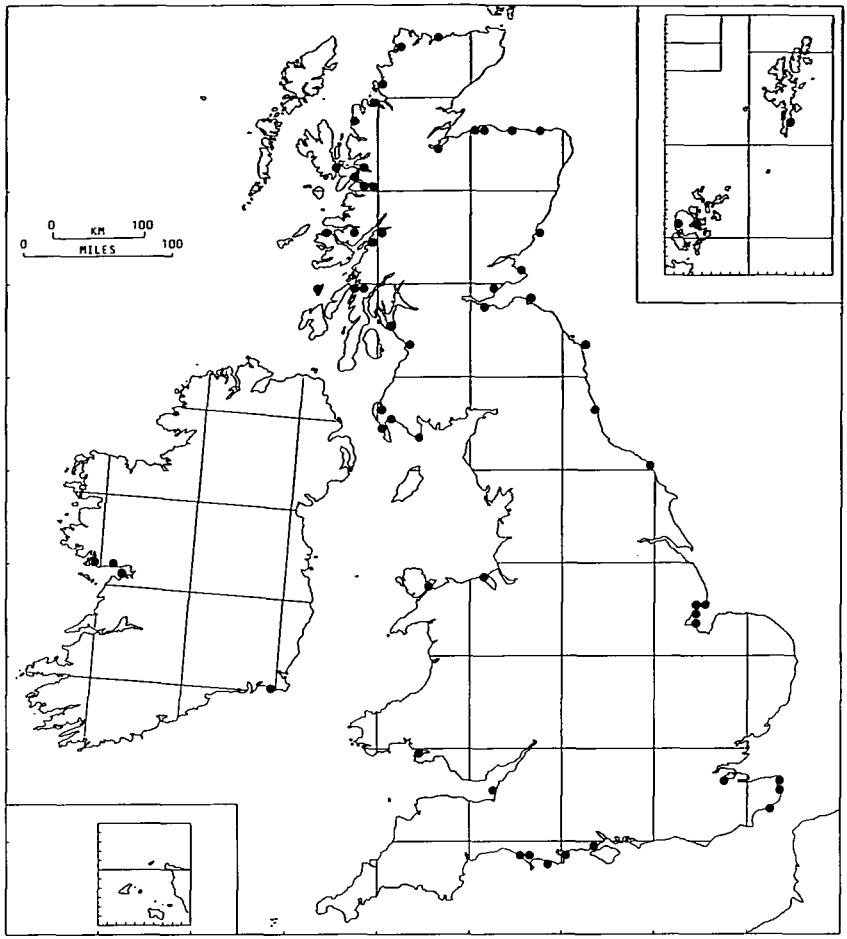
Map 14 **Enteromorpha intestinalis** (L.) Link A ubiquitous species that now includes E. compressa. Very under-recorded in Ireland.



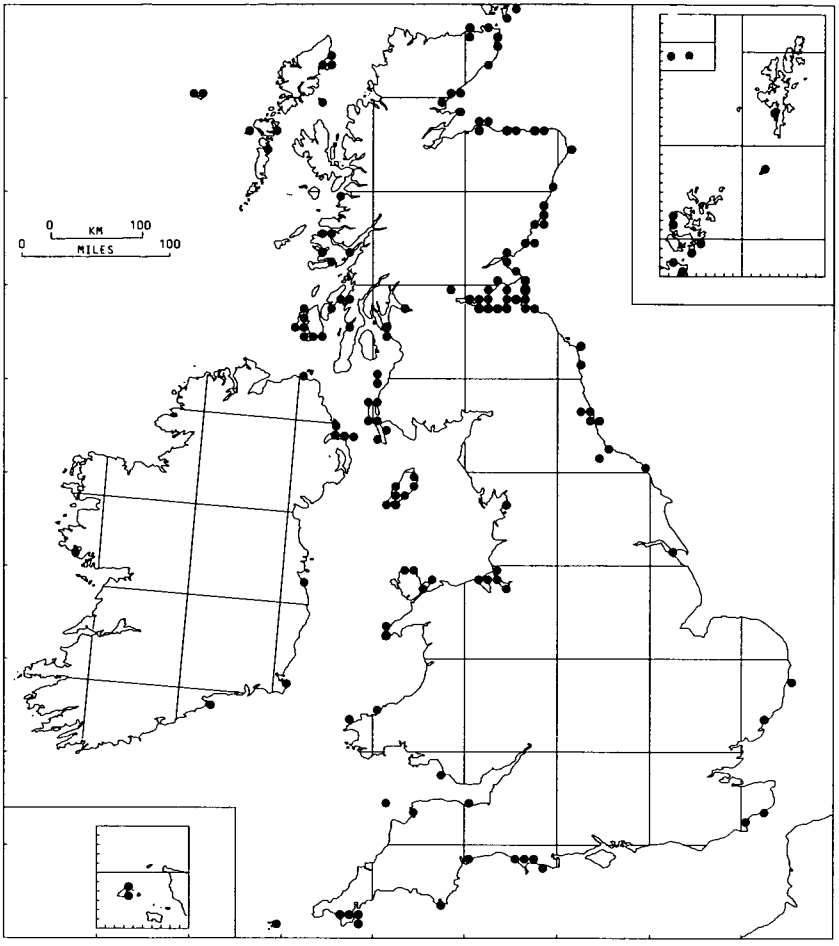
Map 15 **Enteromorpha prolifera** (O.F. Müll.) J. Ag. A fairly common species which is under-recorded, especially in Ireland, perhaps because it is often intermingled with other species of Enteromorpha and therefore overlooked.



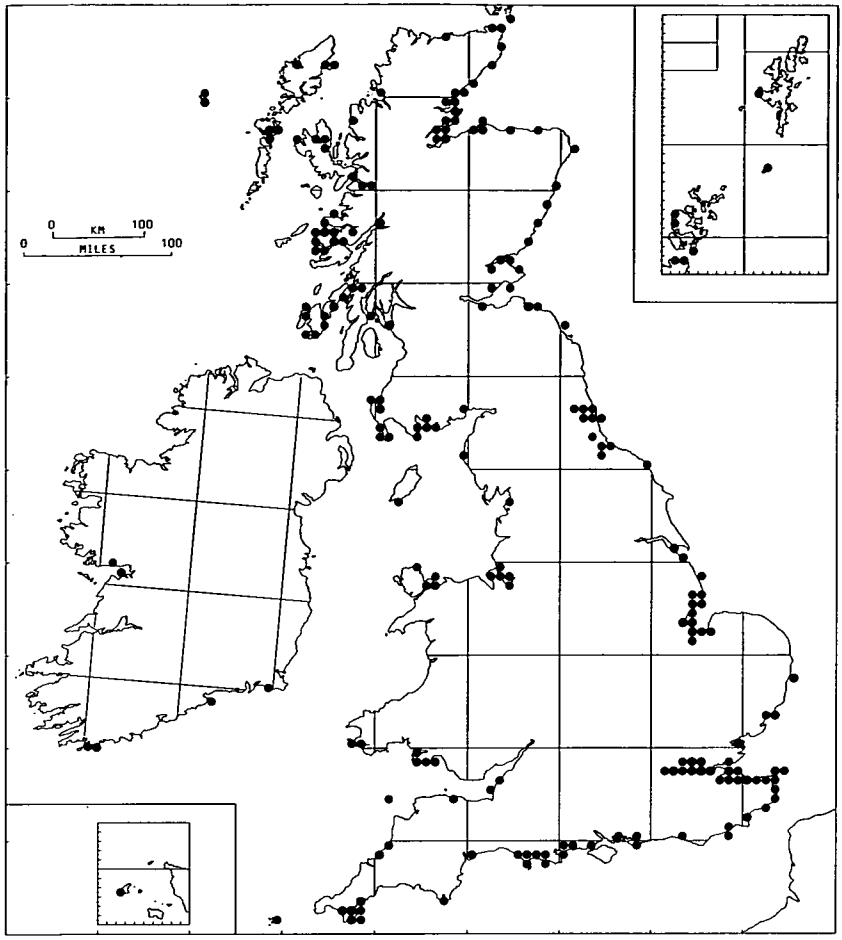
Map 16 **Epicladia perforans** (Huber) R. Nielsen A tiny plant which forms inconspicuous patches in shells, especially those of periwinkles, Littorina spp. It is therefore not surprising that it is rarely recorded.



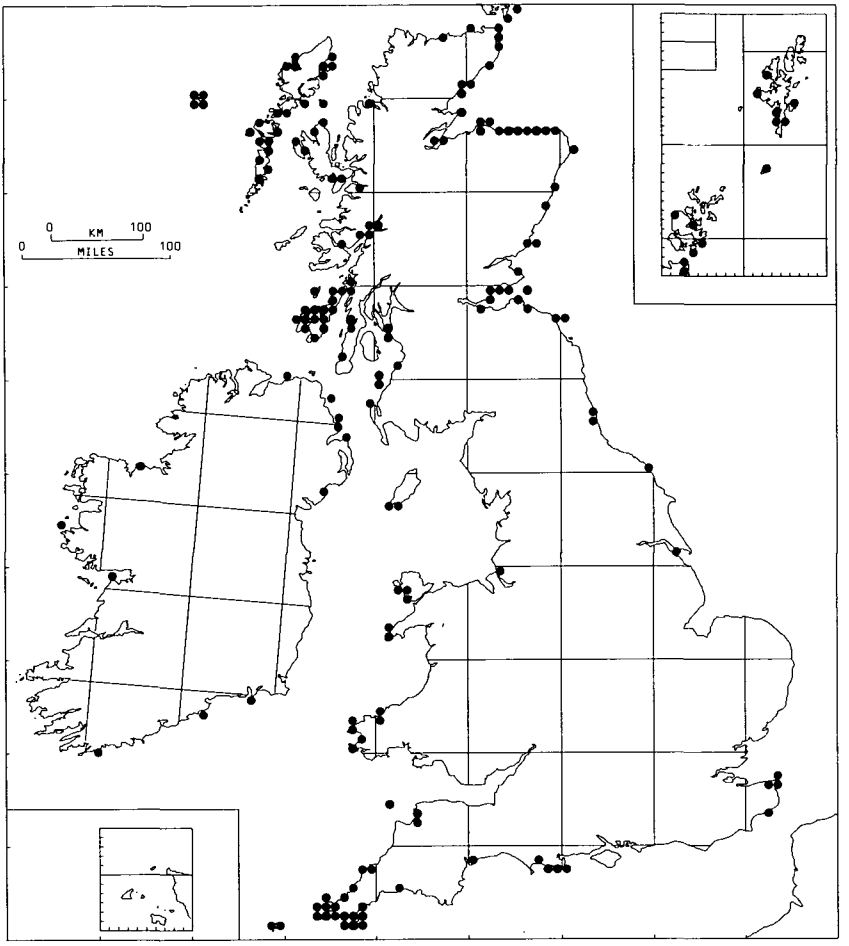
Map 17 **Percursaria percursa** (C. Ag.) Rosenv. Inconspicuous filaments only distinctive under the microscope, therefore probably very under-recorded.



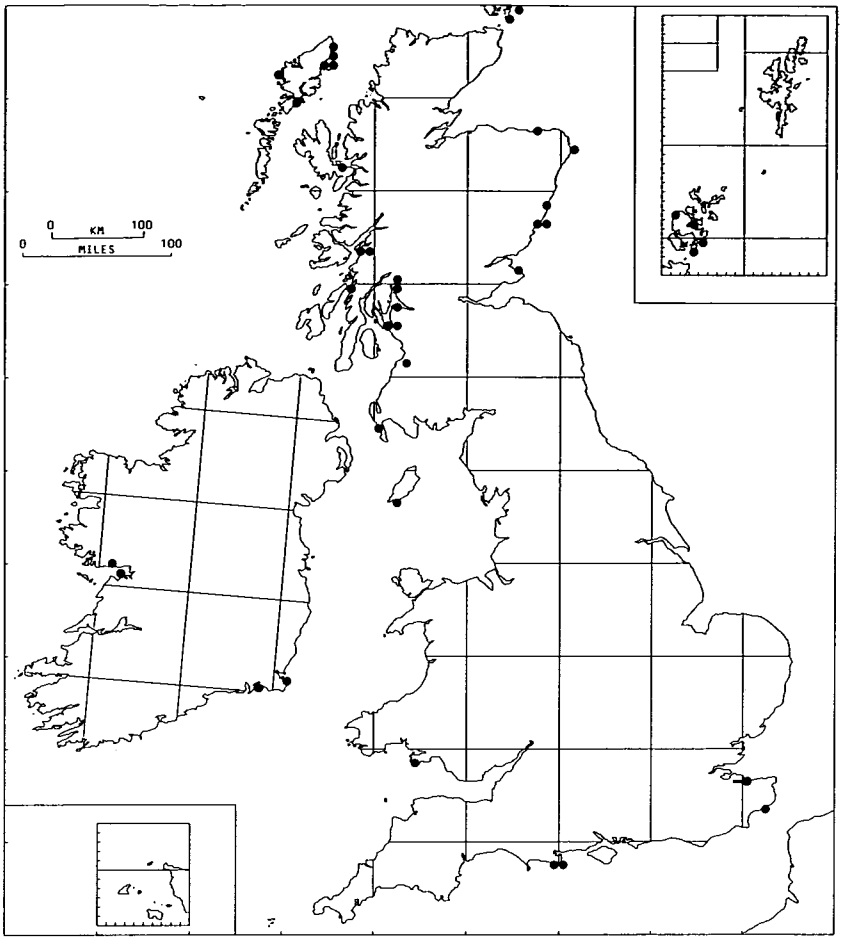
Map 18 **Prasiola stipitata** Suhr Although unmistakable under the microscope and forming a distinctive band at the top of the shore, the species is an ephemeral and therefore under-recorded.



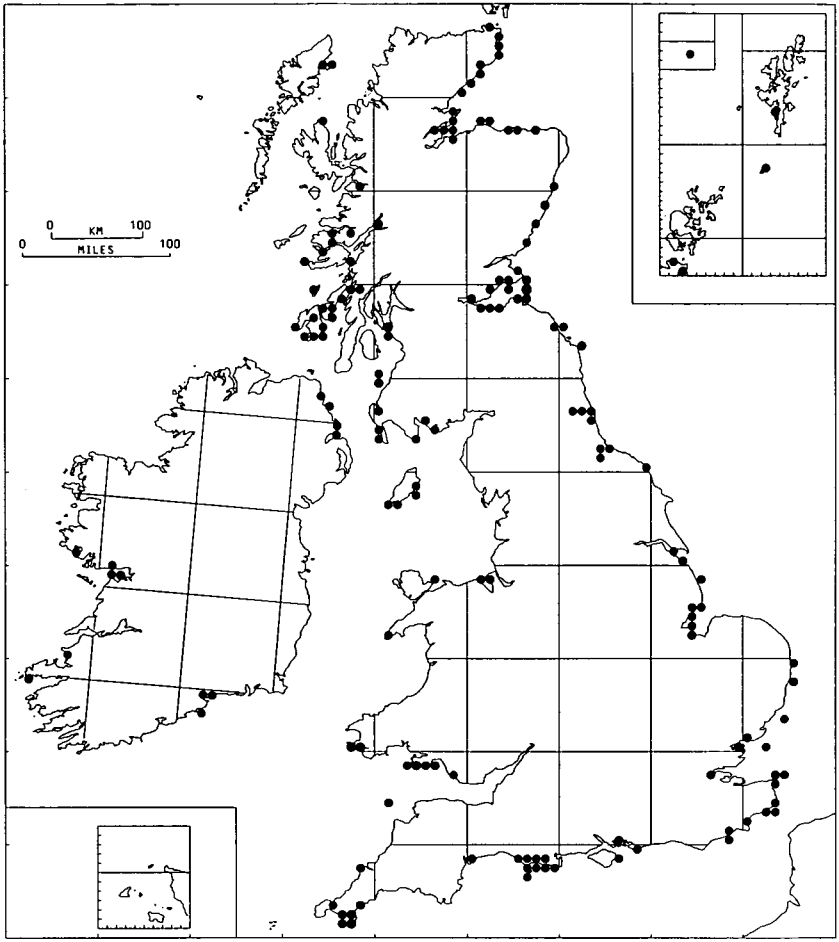
Map 19 **Rhizoclonium riparium** (Roth) Harv. A very under-recorded plant, especially in Ireland, although with the aid of a microscope it is readily identified.



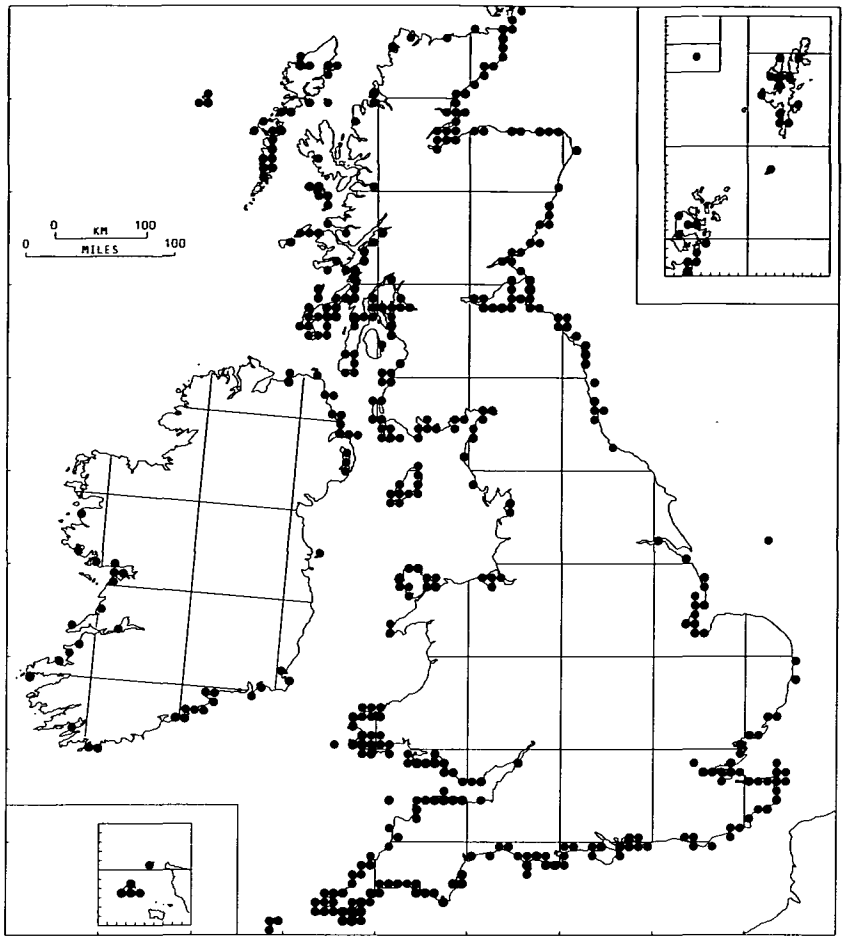
Map 20 **Spongomorpha arcta** (Dillw.) Kütz. This species is so frequently encountered in Scotland and in south west England that the sparsity of records in between is inexplicable, although it could be limited to clean water and exposed shores. See van den Hoek (1982a).



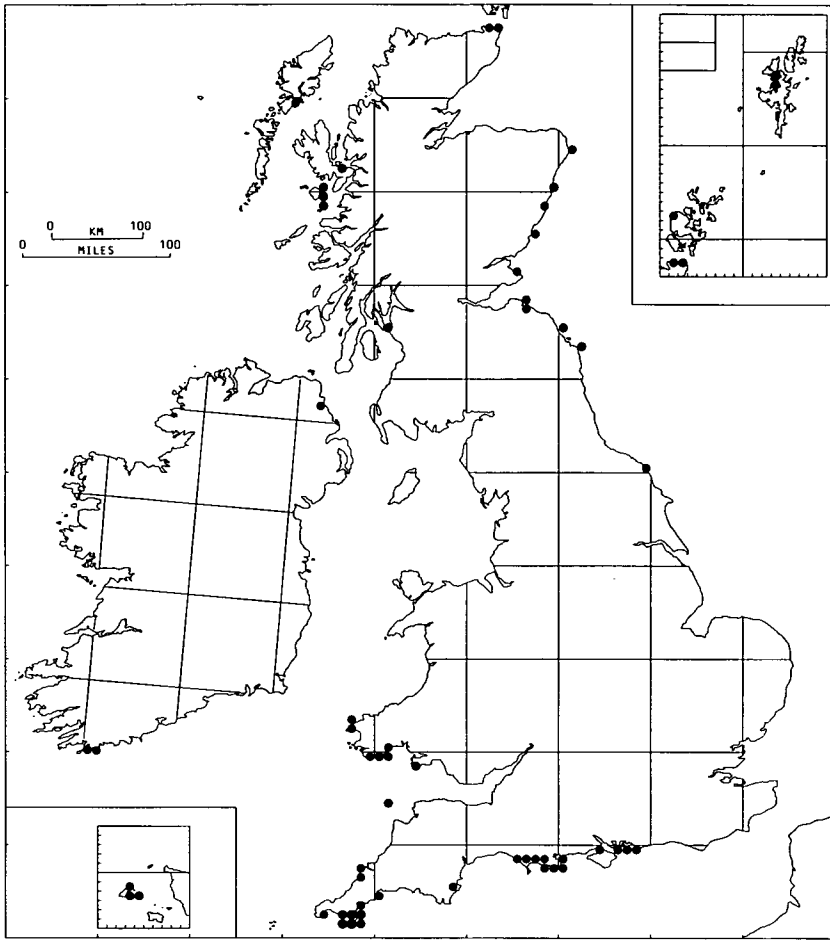
Map 21 **Tellamia intricata** Batt. A distinctive and probably common plant but rarely recorded because it is only found beneath the superficial membrane covering the shells of flat periwinkles of the genus Littorina.



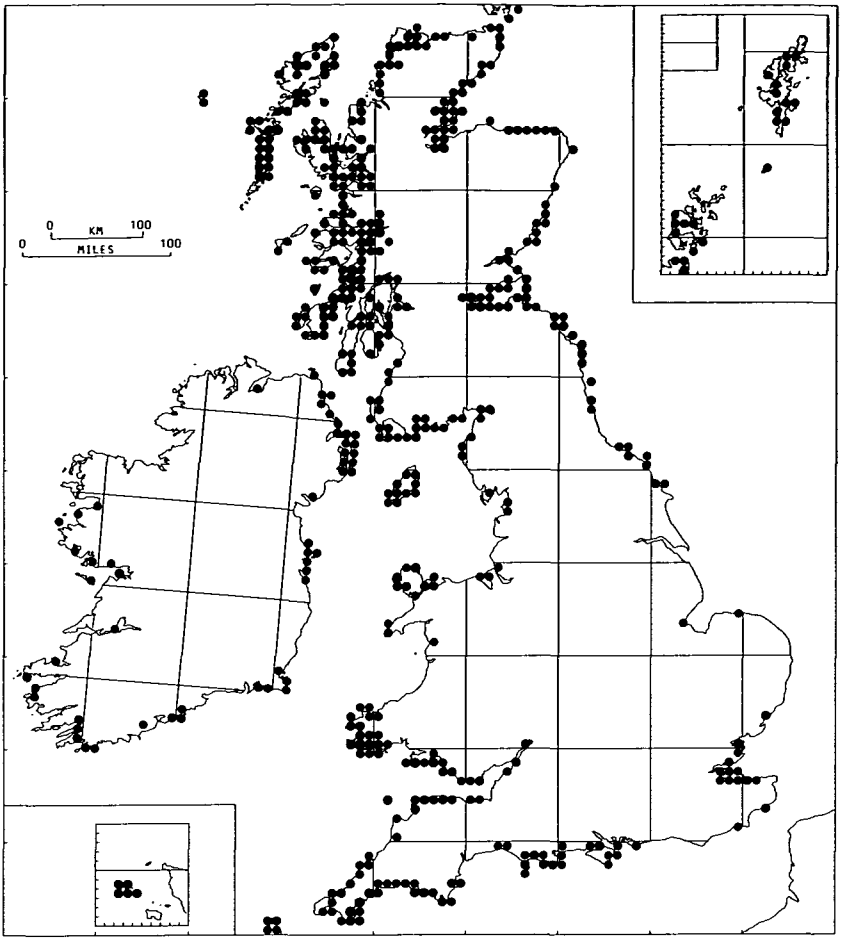
Map 22 **Ulothrix flacca** (Dillw.) Thur. A common intertidal alga, under-recorded because it is recognisable only under the microscope and is often mixed with larger plants of other species.



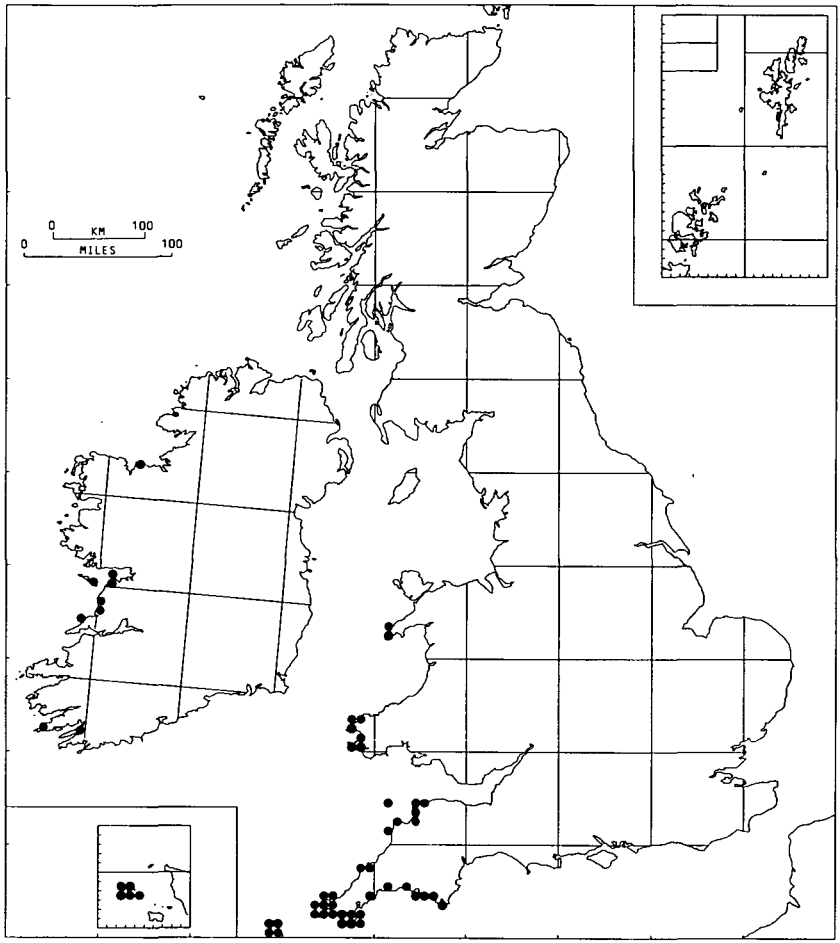
Map 23 **Ulva lactuca** L. The records for this nearly ubiquitous species clearly illustrate how under-recorded much of Ireland is for the green seaweeds.



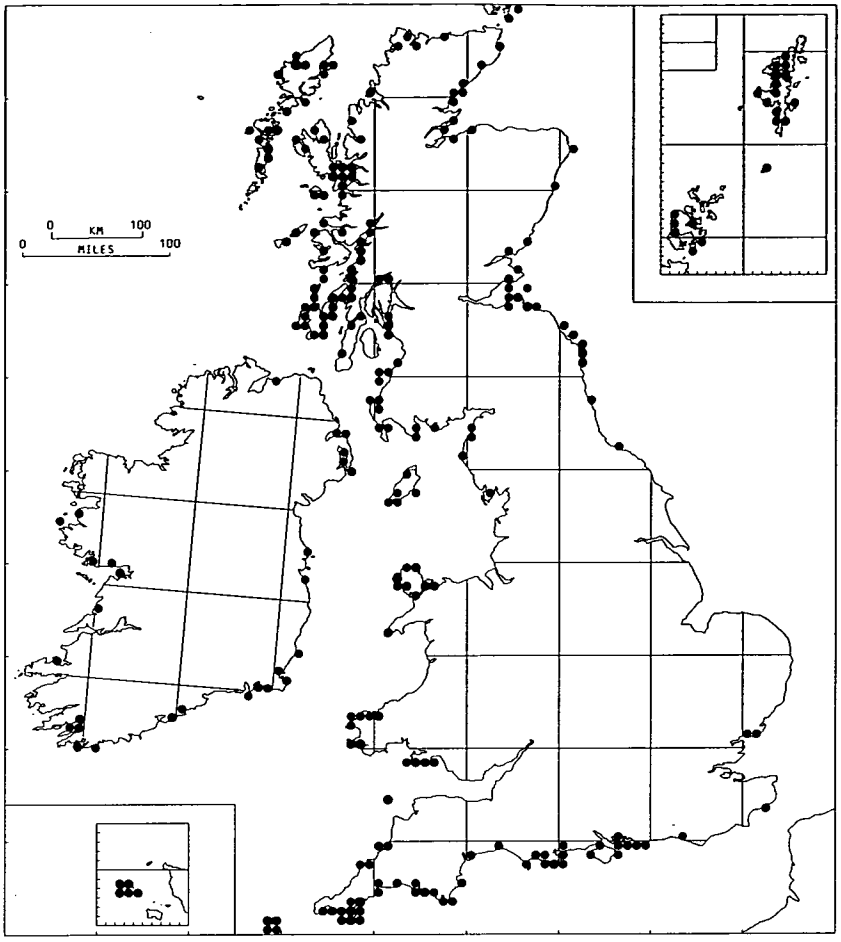
Map 24 **Ulva rigida** C. Ag. This species of often overlooked because only under the microscope can it be distinguished from U. lactuca. It is neither rare nor confined to the extreme south of Britain as formerly thought.



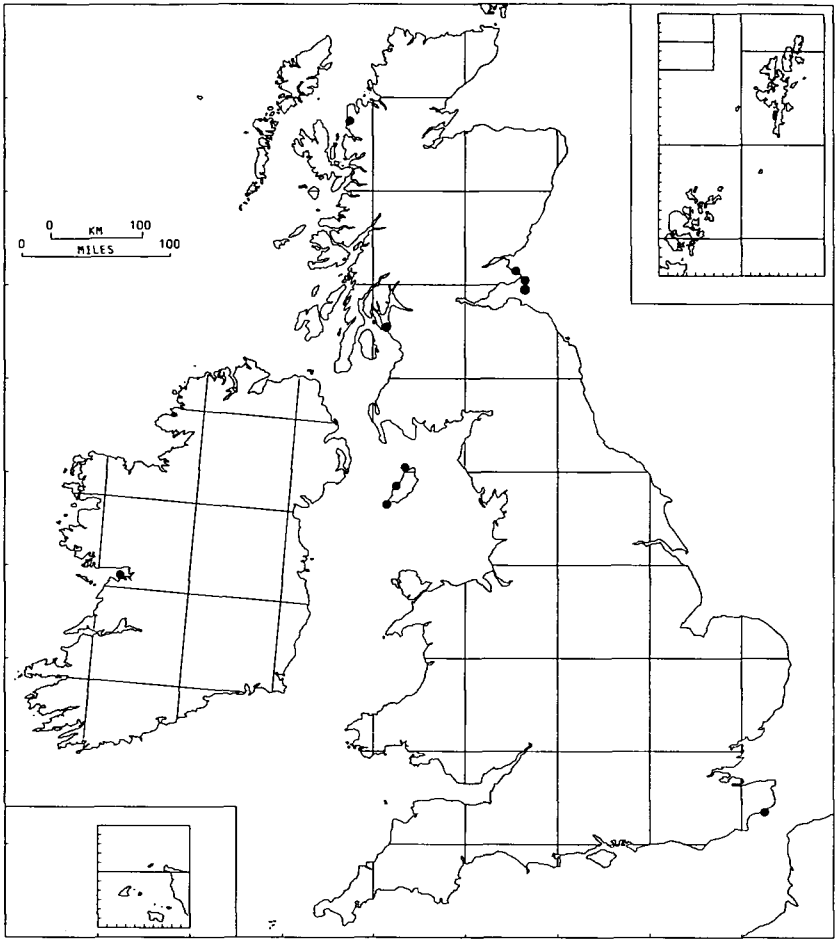
Map 25 **Ascophyllum nodosum** (L.) Le Jol. Except on exposed coasts this is one of the dominant and most easily recognised of the intertidal brown seaweeds. The map illustrates the unsuitability for a rock-dwelling plant of stretches of sandy or muddy coast.



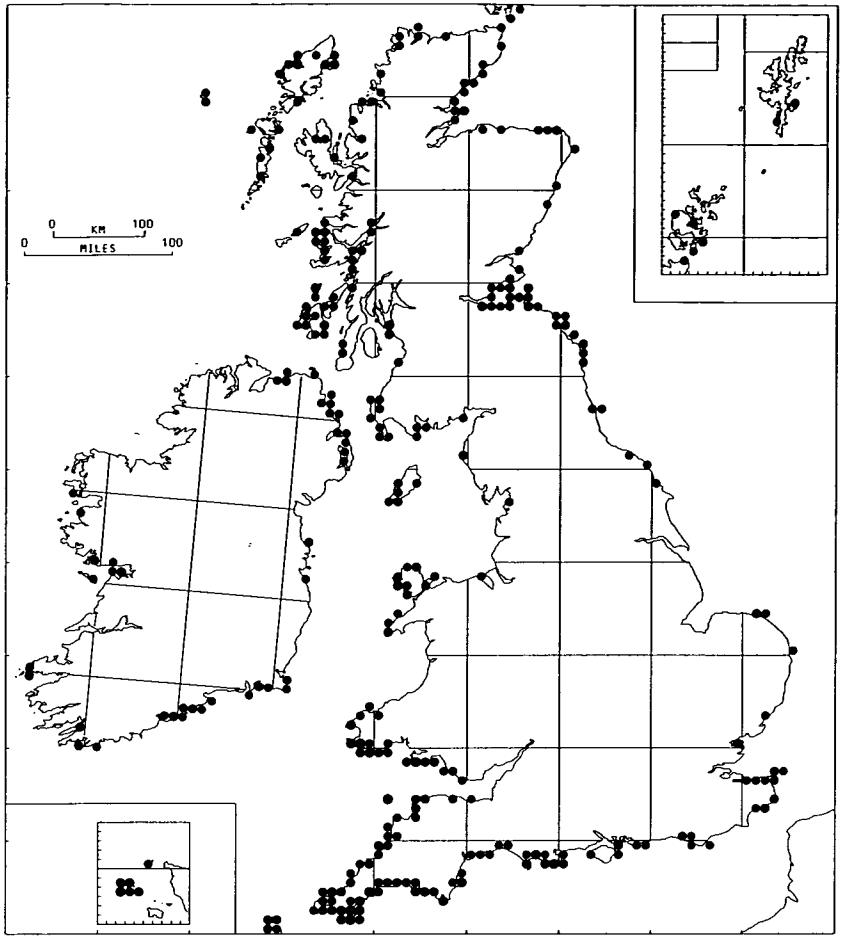
Map 26 **Bifurcaria bifurcata** Ross A pool-dwelling 'southern' species of sheltered shores. It penetrates further north on the Welsh coast than was previously known.



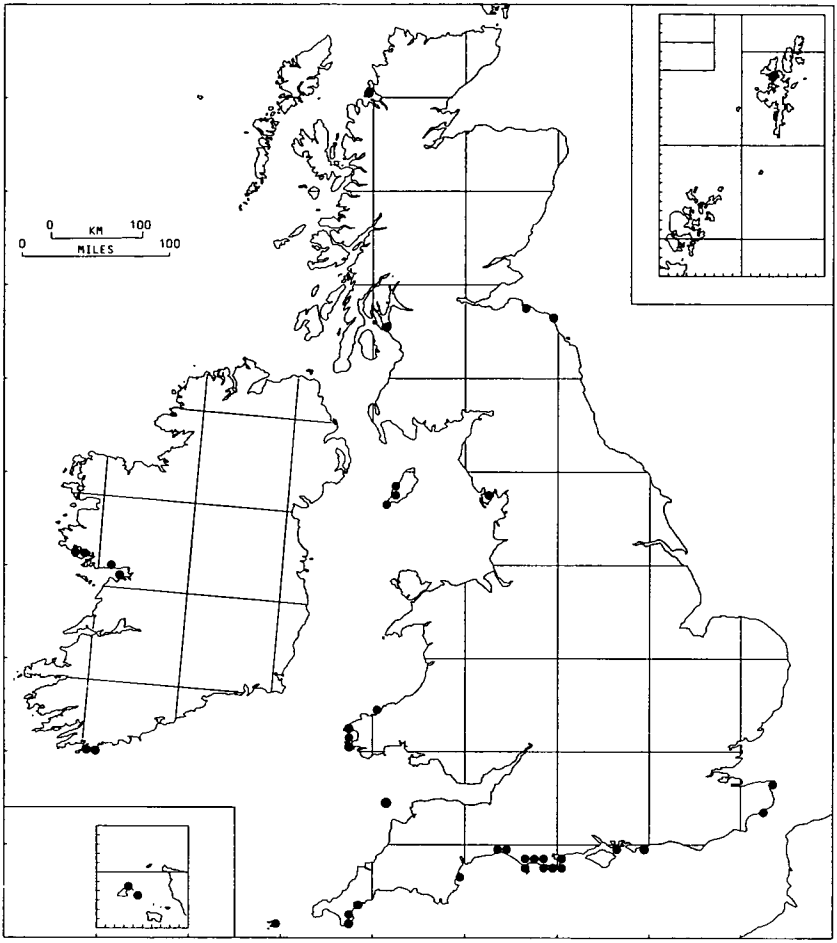
Map 27 **Chorda filum** (L.) Stackh. A distinctive widespread and locally abundant species, but its distribution is restricted by a propensity to grow only on pebbles and shell fragments in sheltered localities.



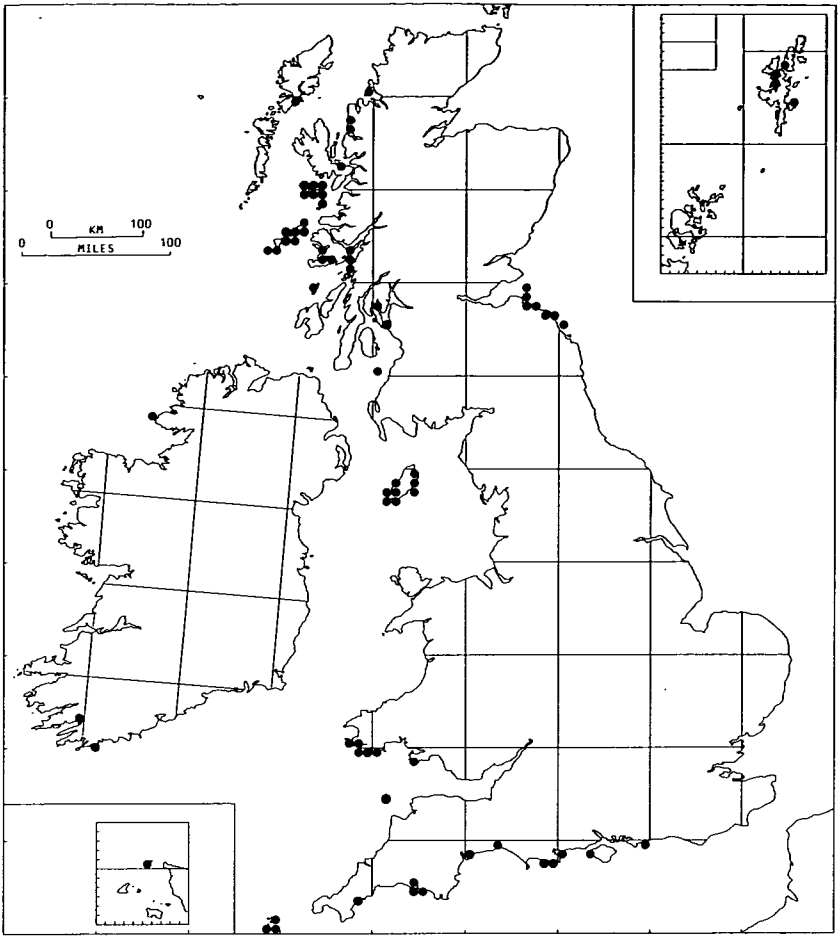
Map 28 **Chorda tomentosa** Lyngb. Probably a fairly uncommon species. No doubt it is often overlooked because it resembles a young C. filum, although its halo of hairs is distinctly golden.



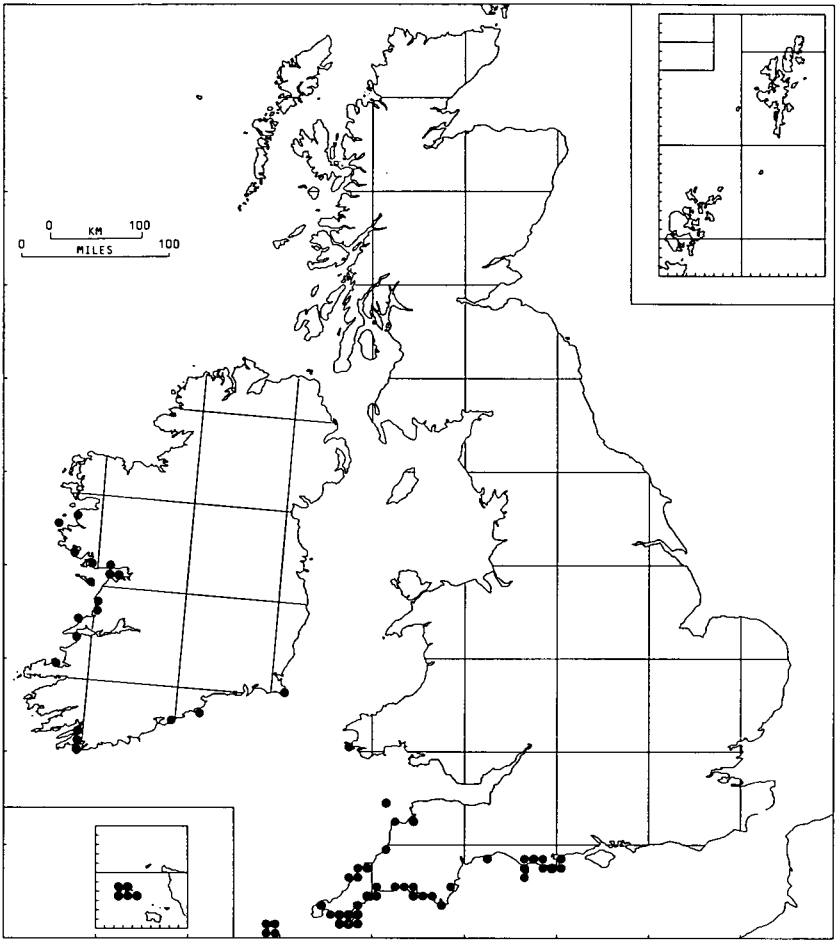
Map 29 **Cladostephus spongiosus** (Huds.) C. Ag. This species now includes C. verticillatus (Lightf.) C.Ag. A fairly common plant, especially in tide pools and channels.



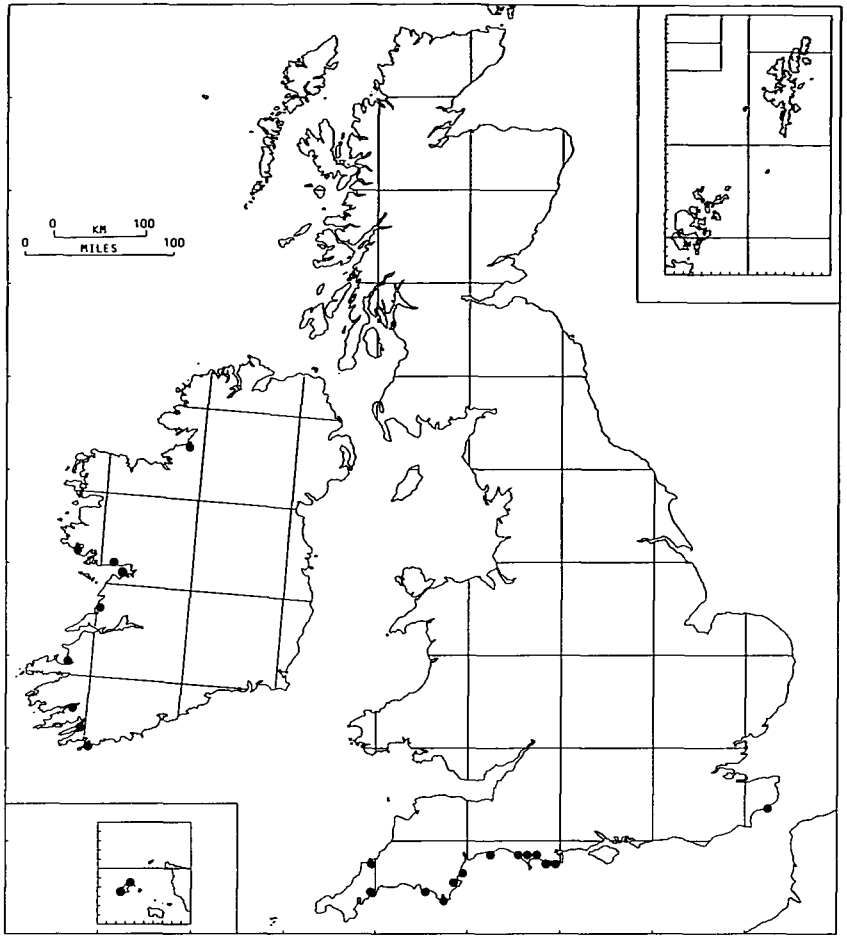
Map 30 **Cutleria multifida** (Sm.) Grev. Although found throughout the length of the British Isles, this species is very rare in the north. It usually occurs on sublittoral stones.



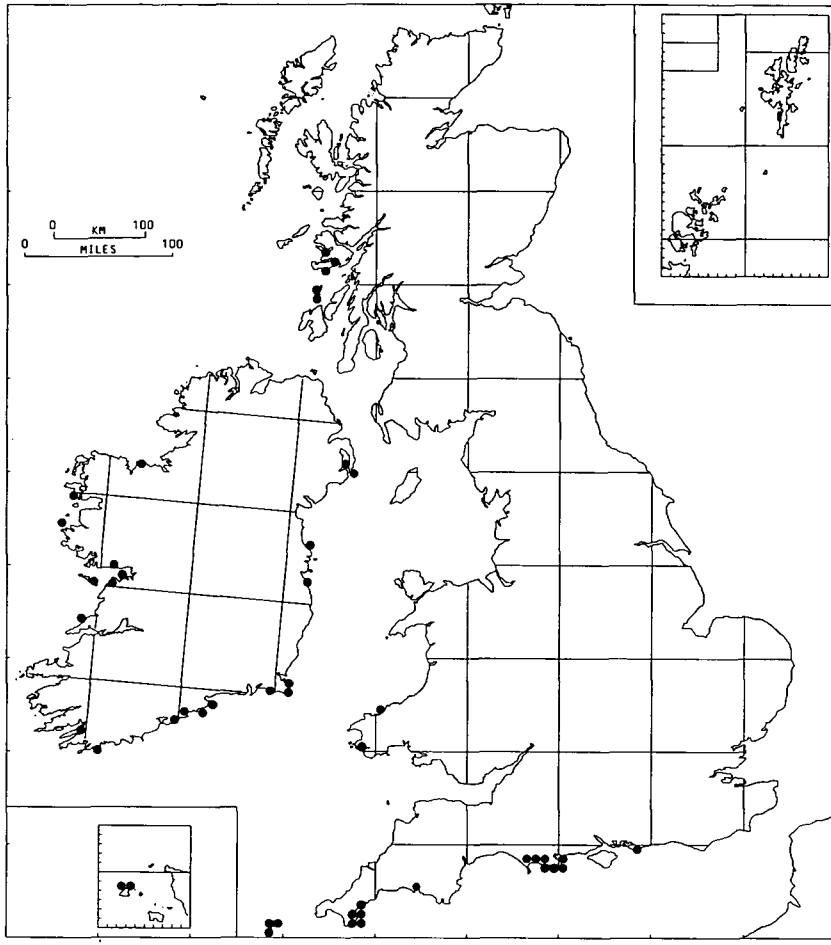
Map 31 **Aglaozonia parvula** (Grev.) Zanard. Not a true species, but merely a distinct diploid phase in the life history of Cutleria multifida (map 30). Unlike Cutleria is it probably quite common all around the British Isles, but as it forms fairly inconspicuous prostrate membranes creeping on subtidal rock it is frequently overlooked.



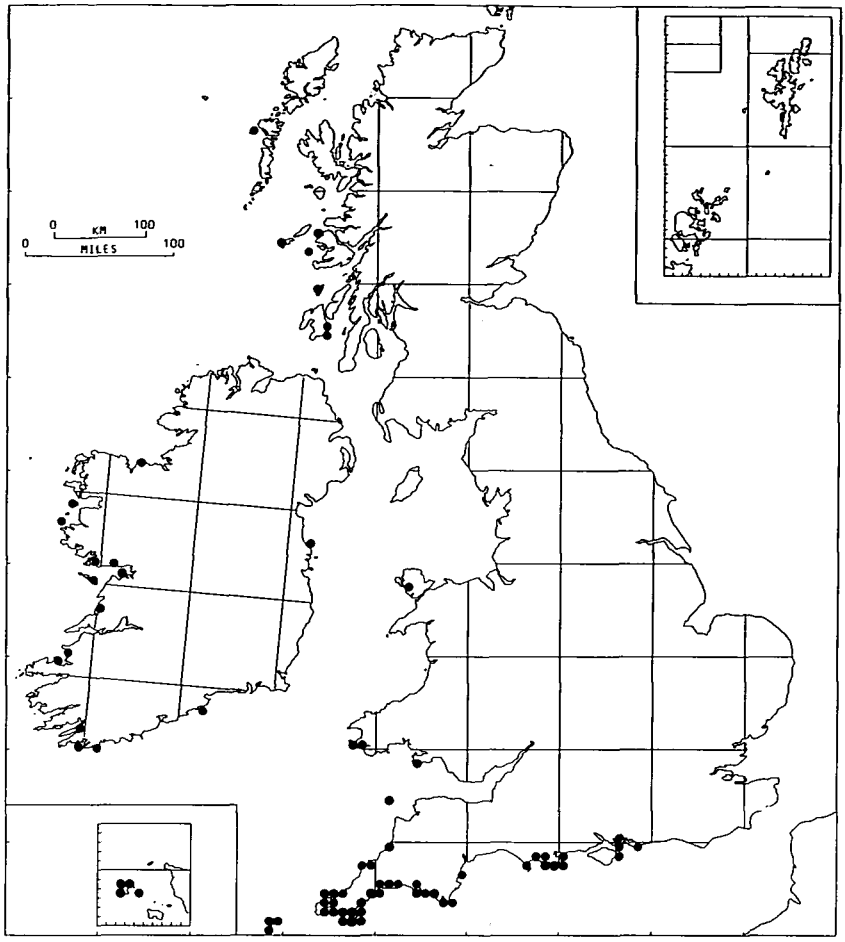
Map 32 **Cystoseira baccata** (Gmel.) Silva A 'southern' species of limited distribution, but locally abundant subtidally or in pools. The most striking and readily identified of our Cystoseira species.



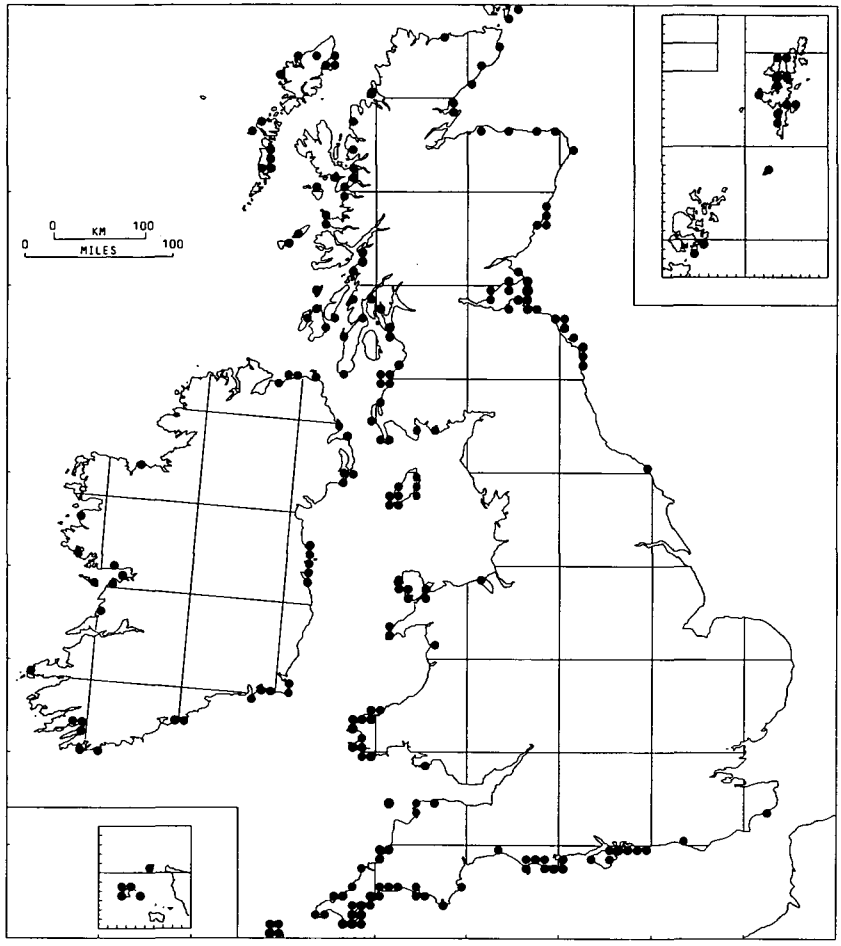
Map 33 **Cystoseira foeniculacea** (L.) Grev. A fairly rare species in the British Isles and with a restricted distribution. Usually found in pools low on the shore.



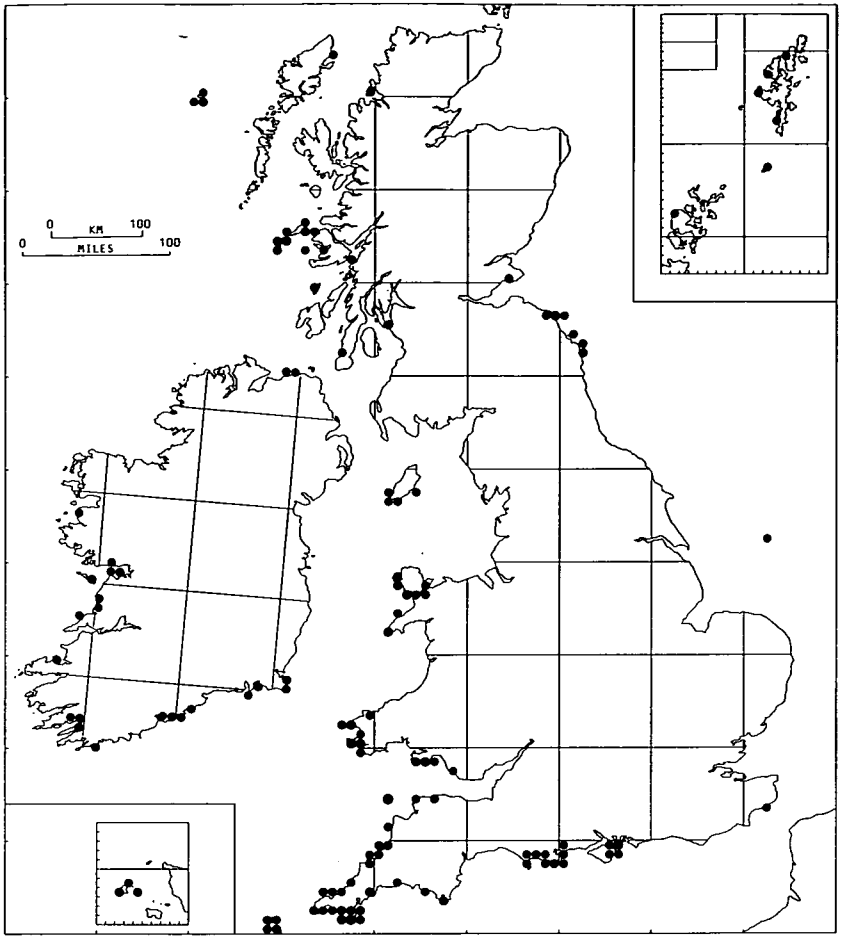
Map 34 **Cystoseira nodicaulis** (With.) M. Roberts An uncommon species with a restricted distribution. Usually subtidal, but occasionally in tide pools.



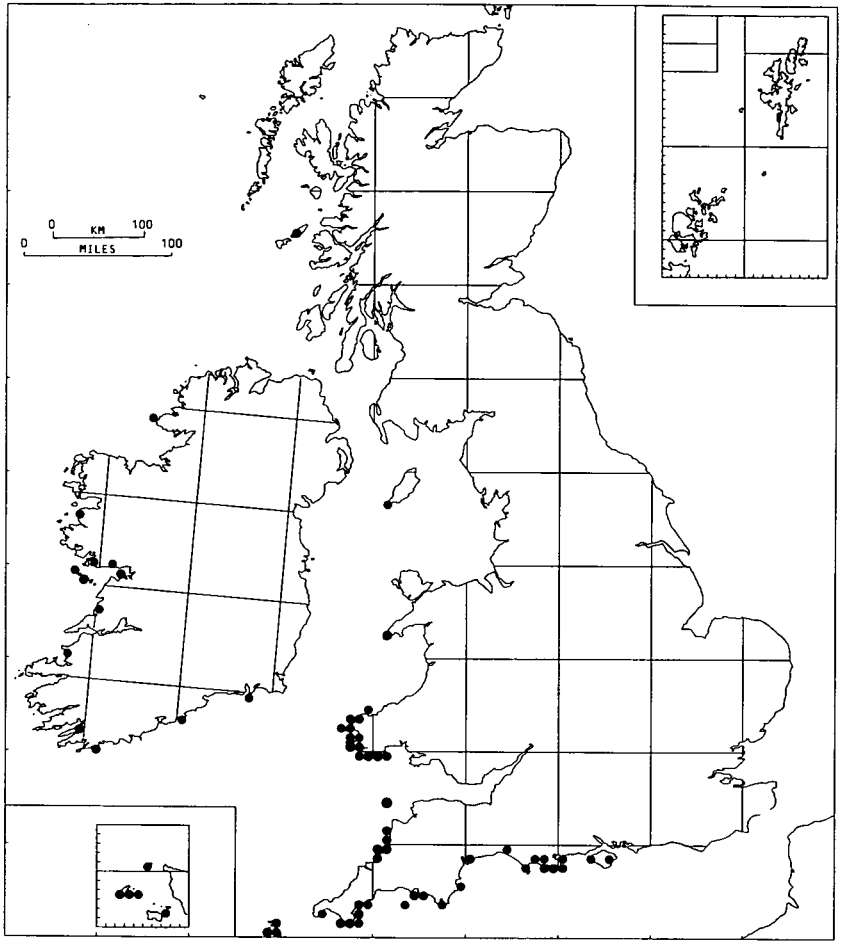
Map 35 **Cystoseira tamariscifolia** (Huds.) Papenf. The most widely distributed of the Cystoseira species found in Britain. Locally abundant in the south.



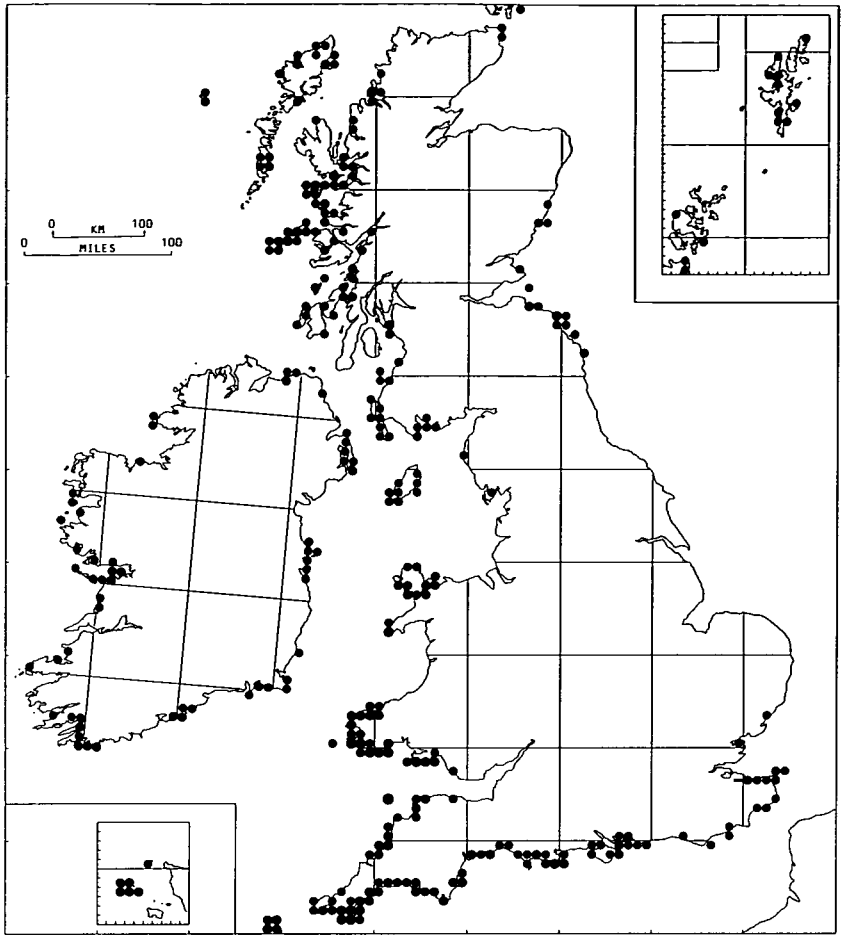
Map 36 **Desmarestia aculeata** (L.) Lamour. One of the commonest and most distinctive of the larger subtidal brown algae. It is particularly abundant in areas of boulders with intermittent sand scour.



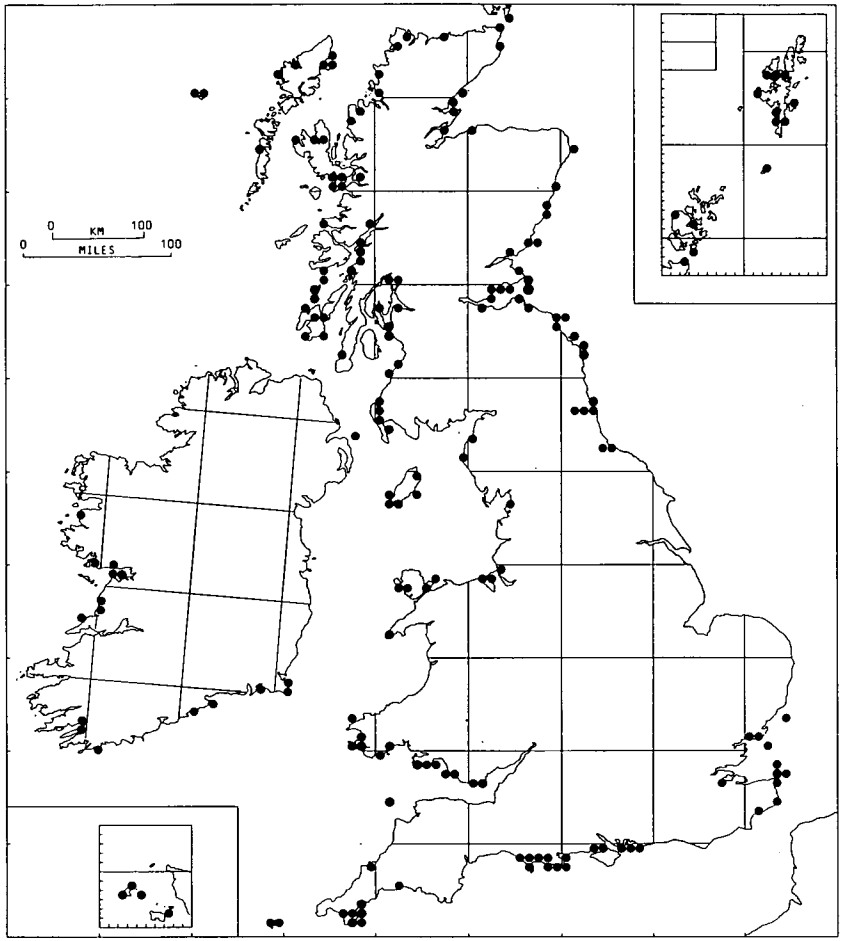
Map 37 **Desmarestia ligulata** (Lightf.) Lamour. A very distinctive subtidal plant of widespread occurrence, but far less common than D. aculeata (map 36). See van den Hoek (1982a).



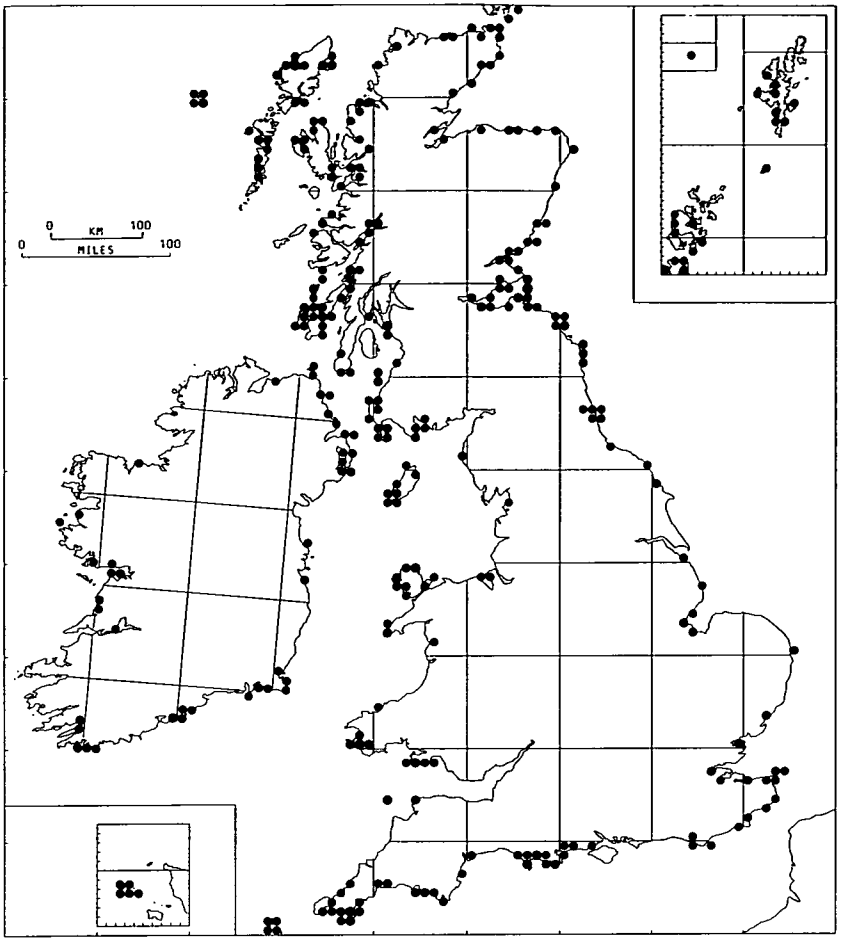
Map 38 **Dictyopteris membranacea** (Stackh.) Batt. This species is locally abundant in the south, especially in deep water in the kelp forest and just beyond the lower limits of the Laminaria forest. The northernmost record is for the Hebridean island of Coll which seems to support an outlying enclave of southern species (see Mitchell et al. 1983).



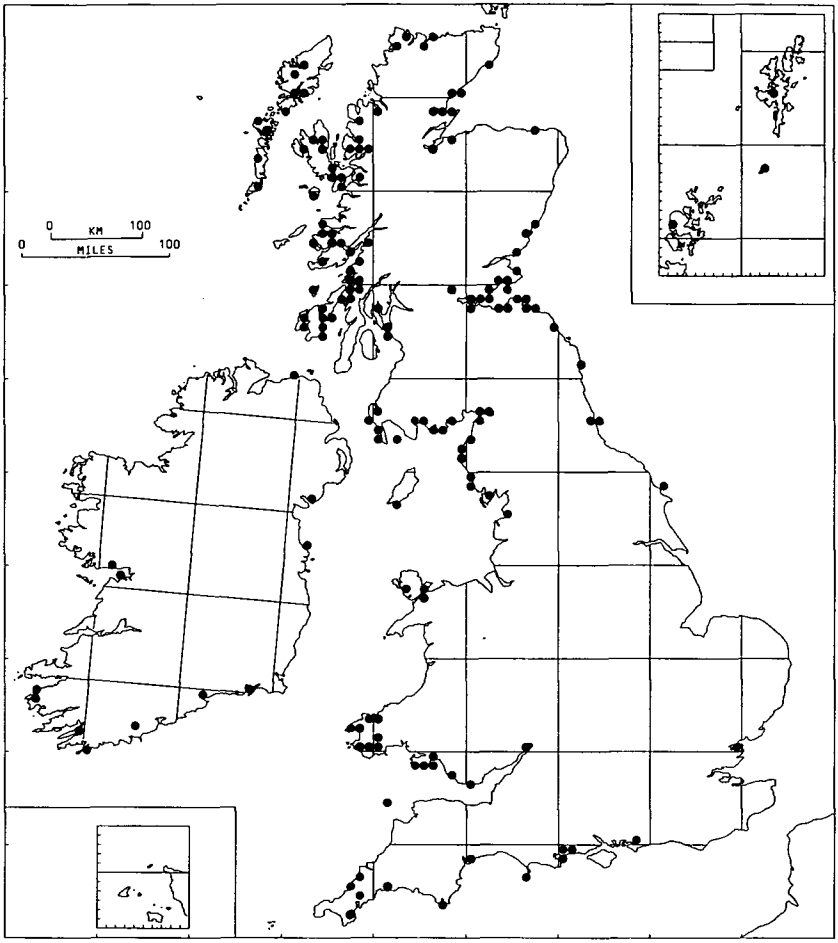
Map 39 **Dictyota dichotoma** (Huds.) Lamour. A widespread and common species thriving in tide pools and throughout the subtidal zone. Its apparent absence from much of the east coast of England requires verification. See van den Hoek (1982a).



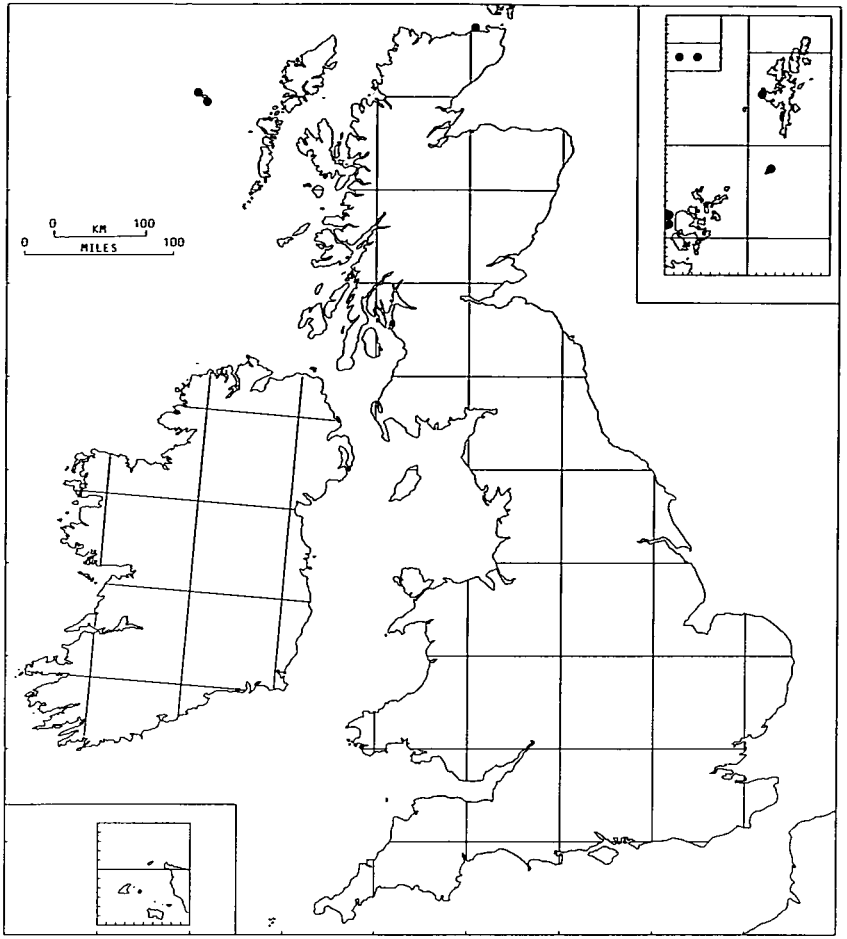
Map 40 **Ectocarpus siliculosus** (Dillw.) Lyngb. One of the commonest of the small brown algae, but often difficult to distinguish from E. fasciculatus and therefore not always recorded.



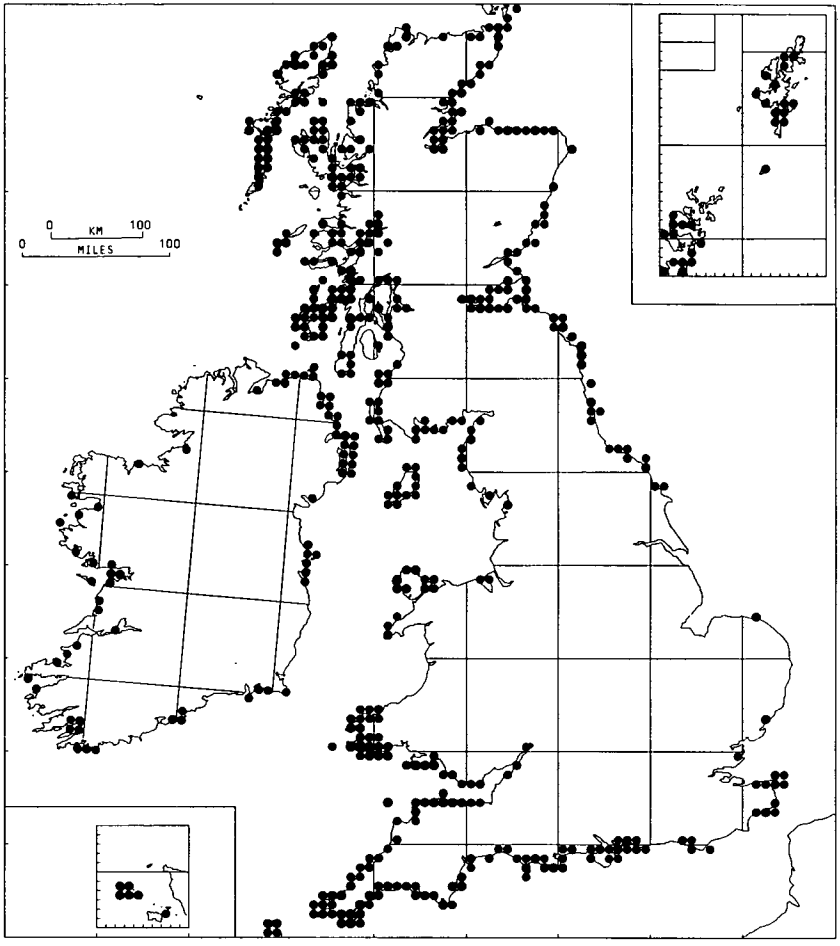
Map 41 **Elachista fucicola** (Vell.) Aresch. Probably the commonest epiphyte infesting Fucus plants. It is conspicuous in summer, but not so in winter.



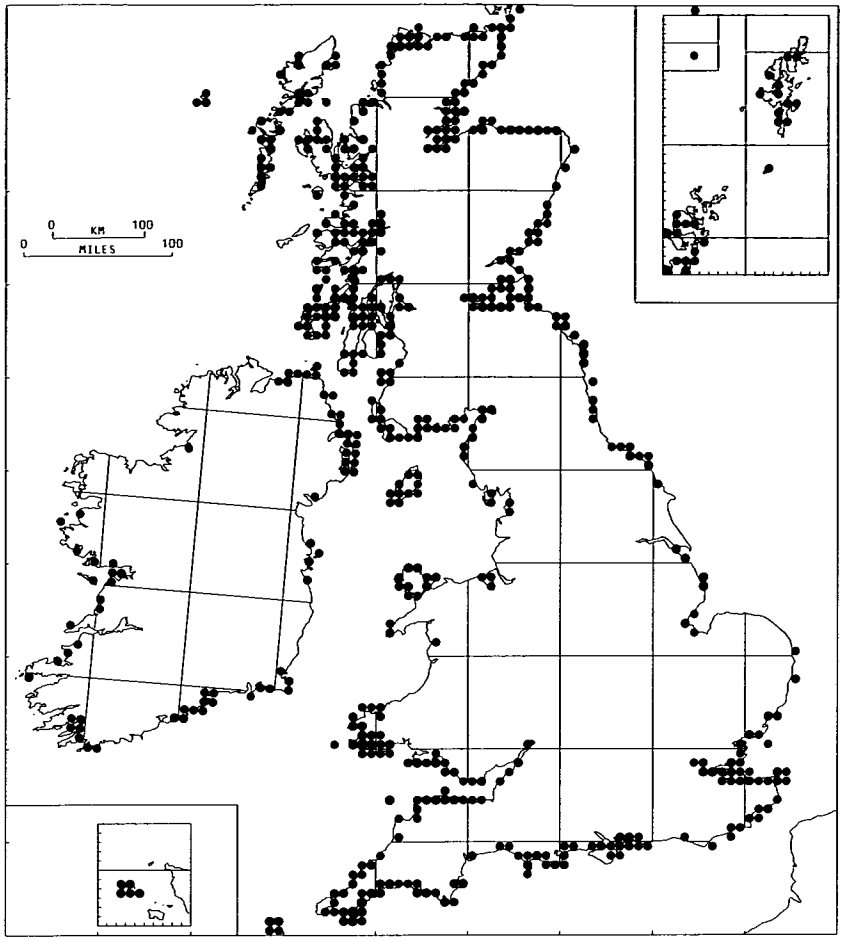
Map 42 **Fucus ceranoides** L. A distinctive species confined to estuaries, places where freshwater runs over the shore and other brackish-water habitats. Irregular swellings on the thallus, caused by exposure to freshwater, may give it a very superficial resemblance to Fucus vesiculosus.



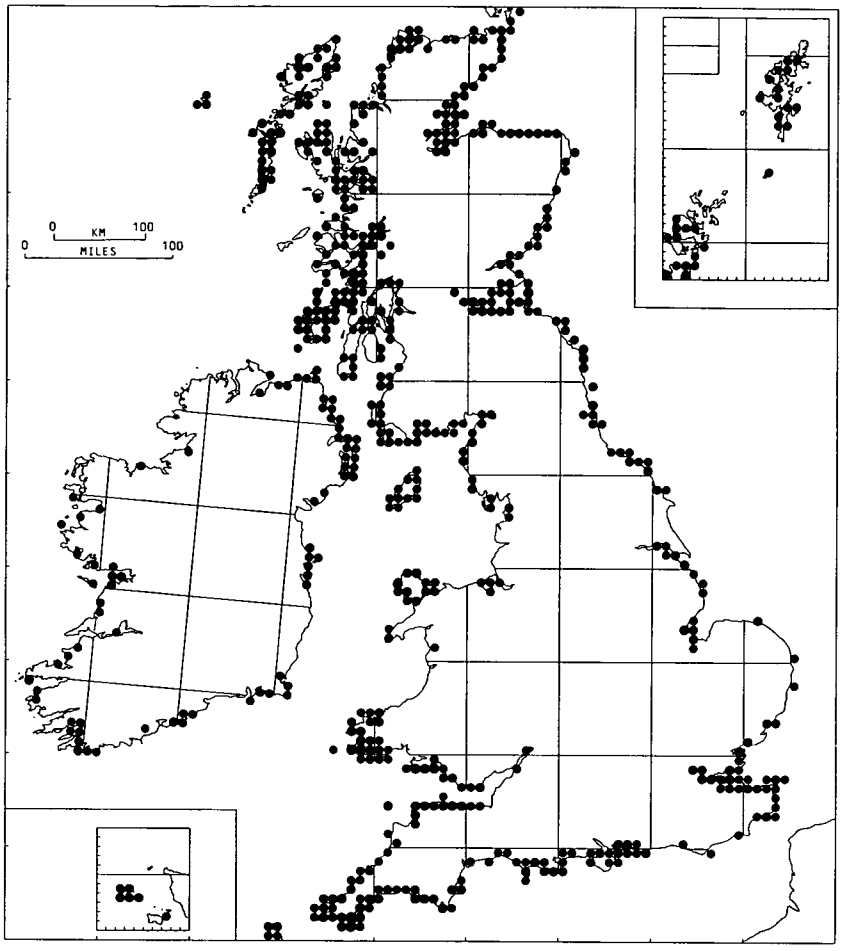
Map 43 **Fucus distichus** L. subsp. **anceps** (Harv. et Ward ex Carr.) Powell A 'northern' taxon confined to very exposed and wave-battered shores (see Powell, 1957). It superficially resembles Pelvetia canaliculata (map 60) when seen on the shore, but is quite distinctive if examined closely.



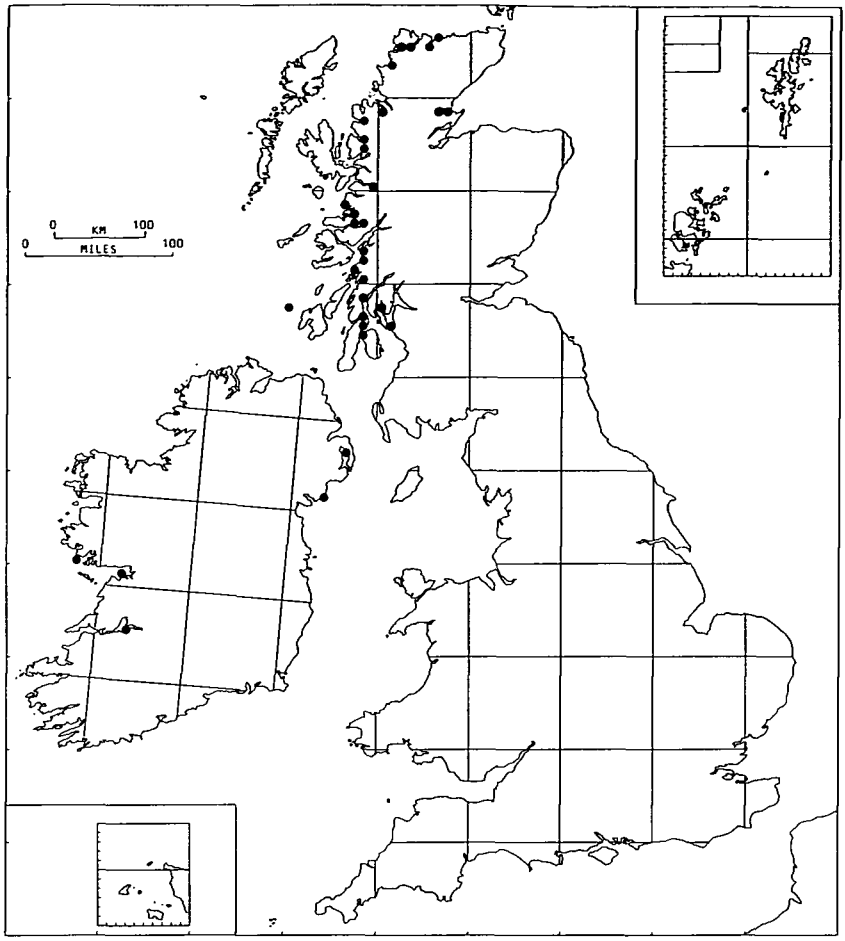
Map 44 **Fucus serratus** L. An easily recognised species that usually dominates the lower intertidal on all but the most exposed and most sheltered shores.



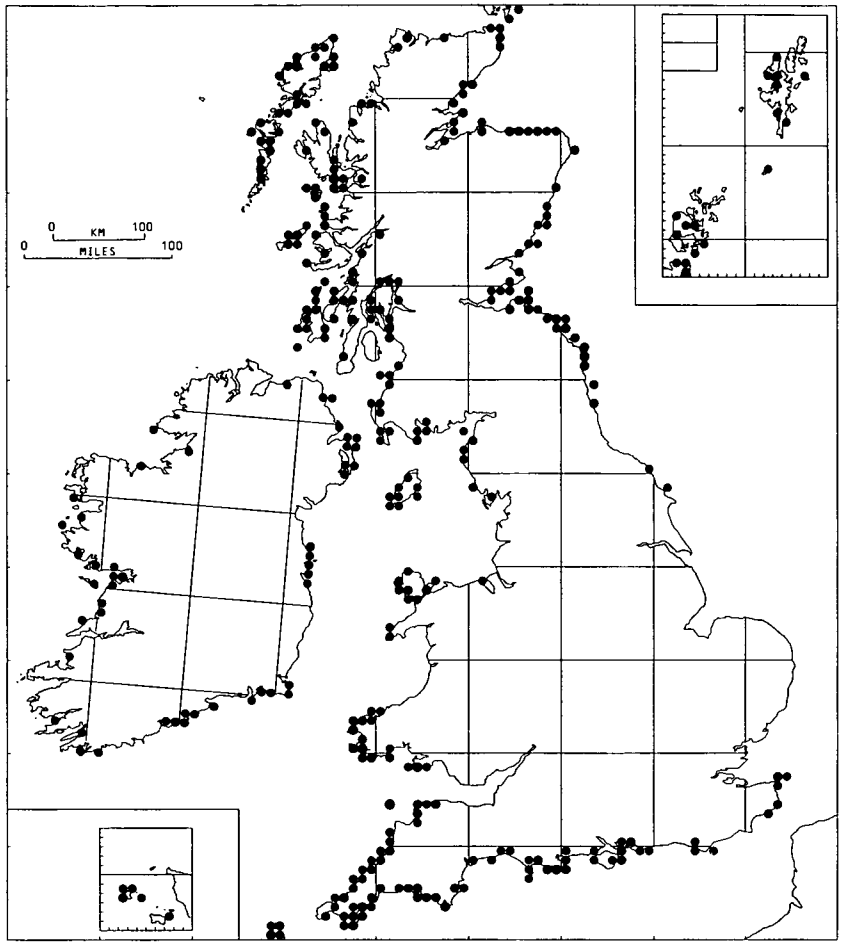
Map 45 **Fucus spiralis** L. One of the commonest high-shore dwelling brown algae, but probably somewhat under-recorded as it is not always easy to identify with certainty unless fertile.



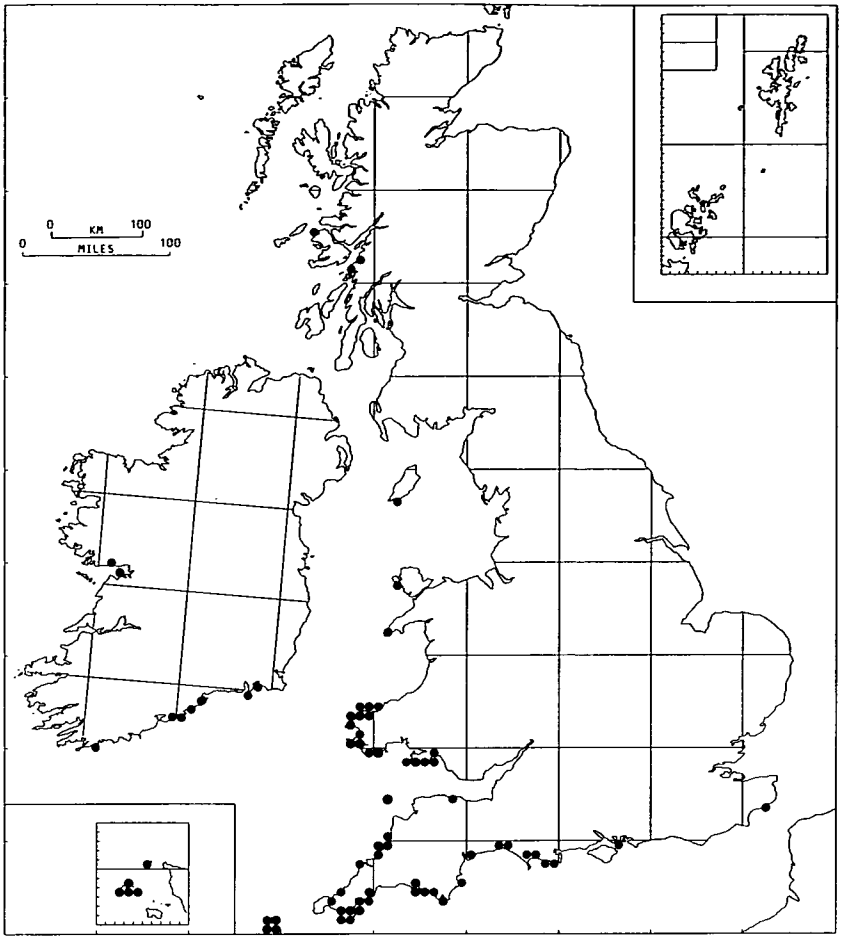
Map 46 **Fucus vesiculosus** L. One of the commonest of the large intertidal brown algae. Its characteristic bladders are, however, not developed in wave-exposed situations and therefore it is sometimes overlooked or misidentified.



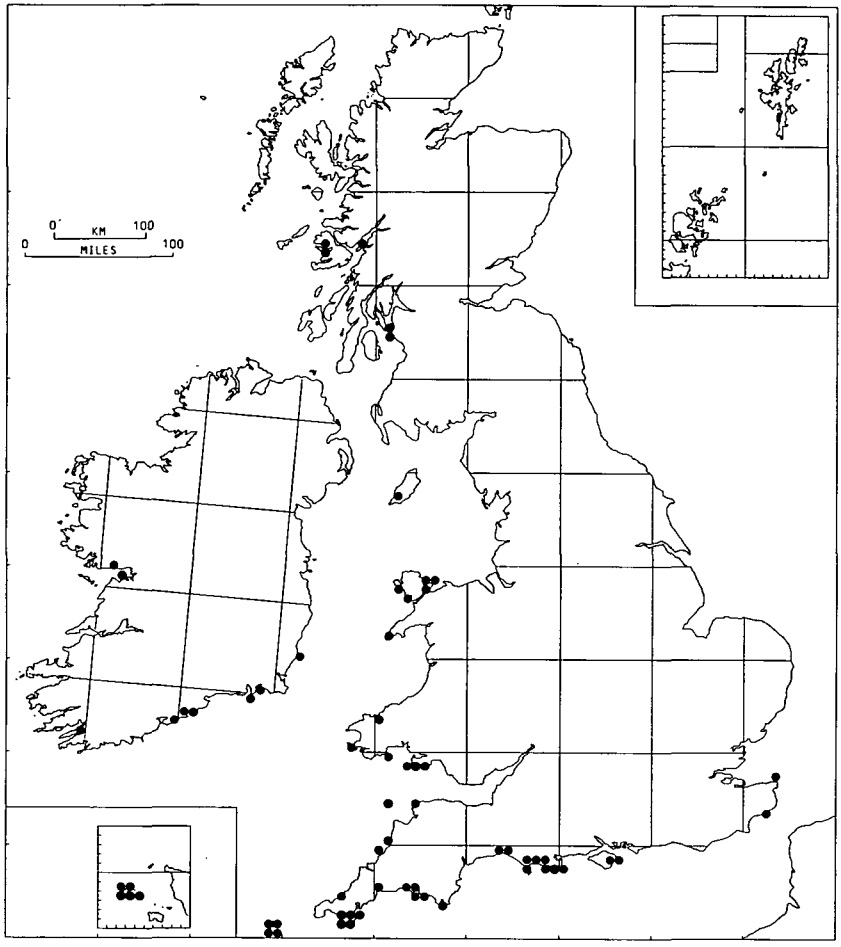
Map 47 **Fucus muscoides** (Cotton) Feldm. et Magne Small sterile plants forming a moss-like cushion on salt marshes. It is not known whether it is really a distinct species or just a stunted growth form of a 'normal' Fucus. See Norton & Mathieson (1983).



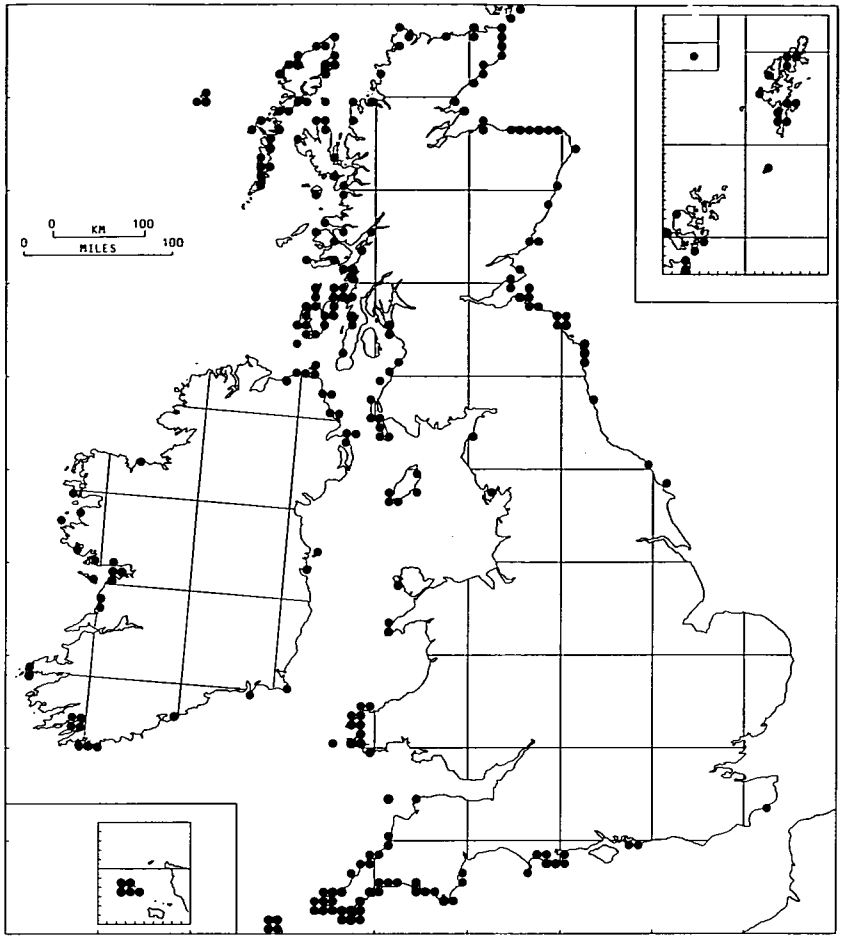
Map 48 **Halidrys siliquosa** (L.) Lyngb. A distinctive and common pool-dweller. It also forms a zone in the sublittoral below the lower limit of Laminaria hyperborea in many places. The common name 'Sea Oak' is very misleading, but the plant is easily recognised by its seedpod-like gas bladders.



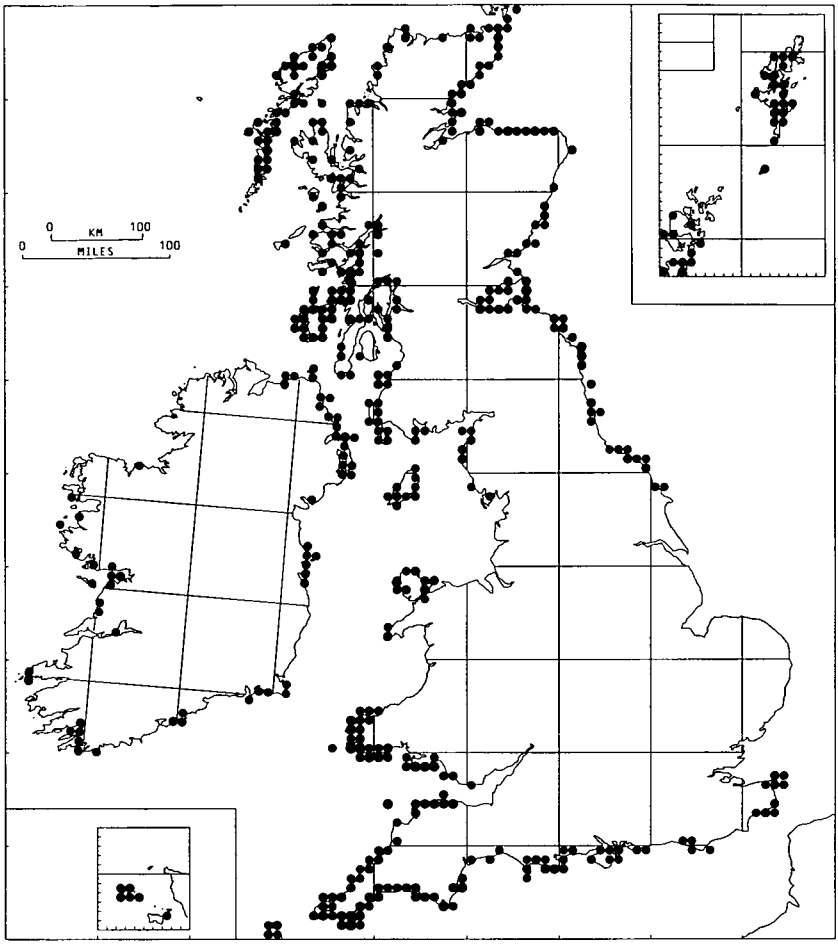
Map 49 **Halopteris filicina** (Grat.) Kütz. This small, but attractive, plant is an inconspicuous and often overlooked component of the under-flora beneath the Laminaria forest.



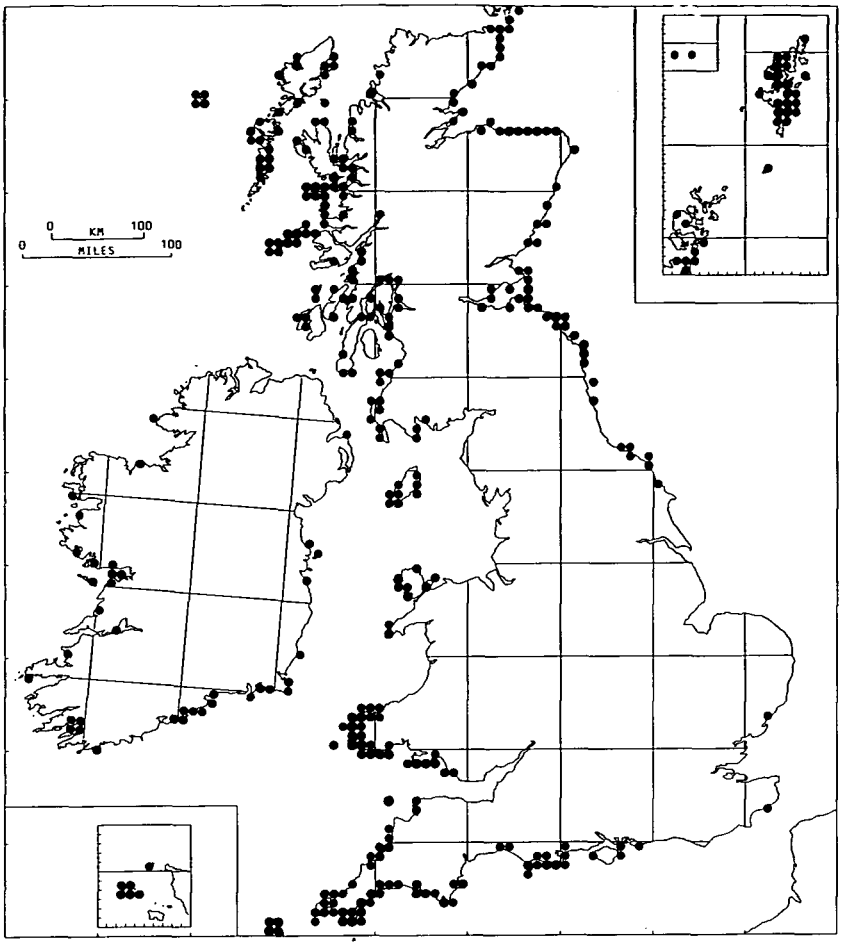
Map 50 **Halopteris scoparia** (L.) Sauv. This species is found in the subtidal and in sandy pools on the lower shore. It is fairly common in the south, but much rarer further north.



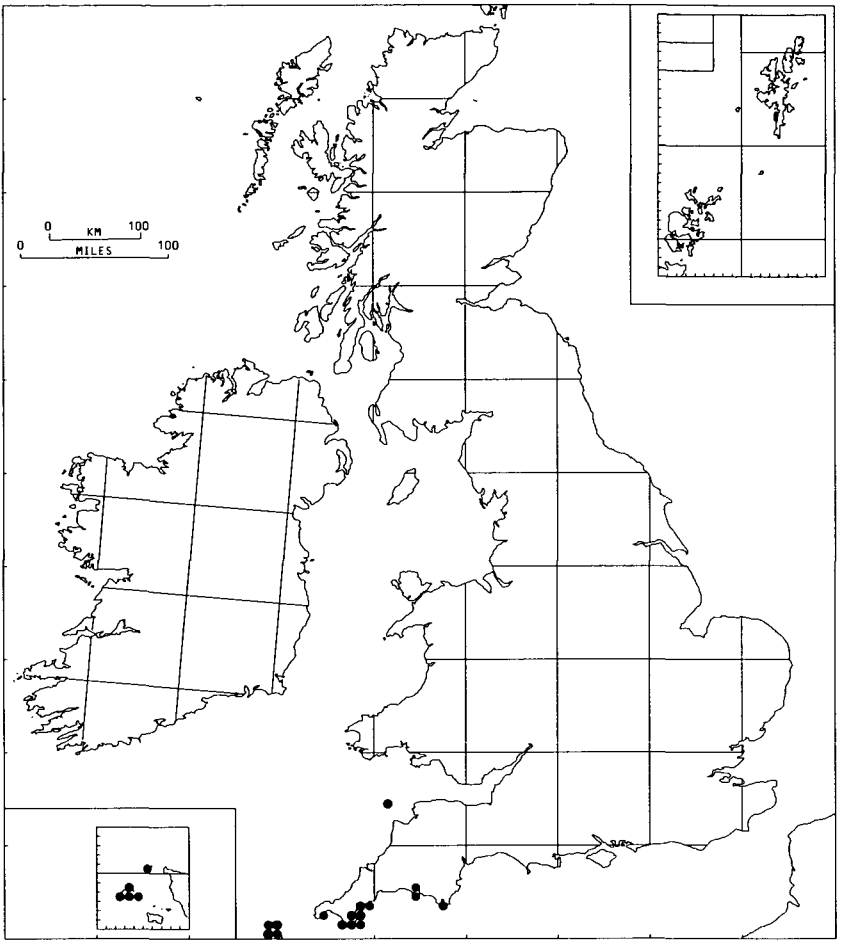
Map 51 **Himanthalia elongata** (L.) S.F. Gray Probably the most distinctive of all brown algae. It seems to be much less common on the east coast of England than elsewhere, but this needs verification.



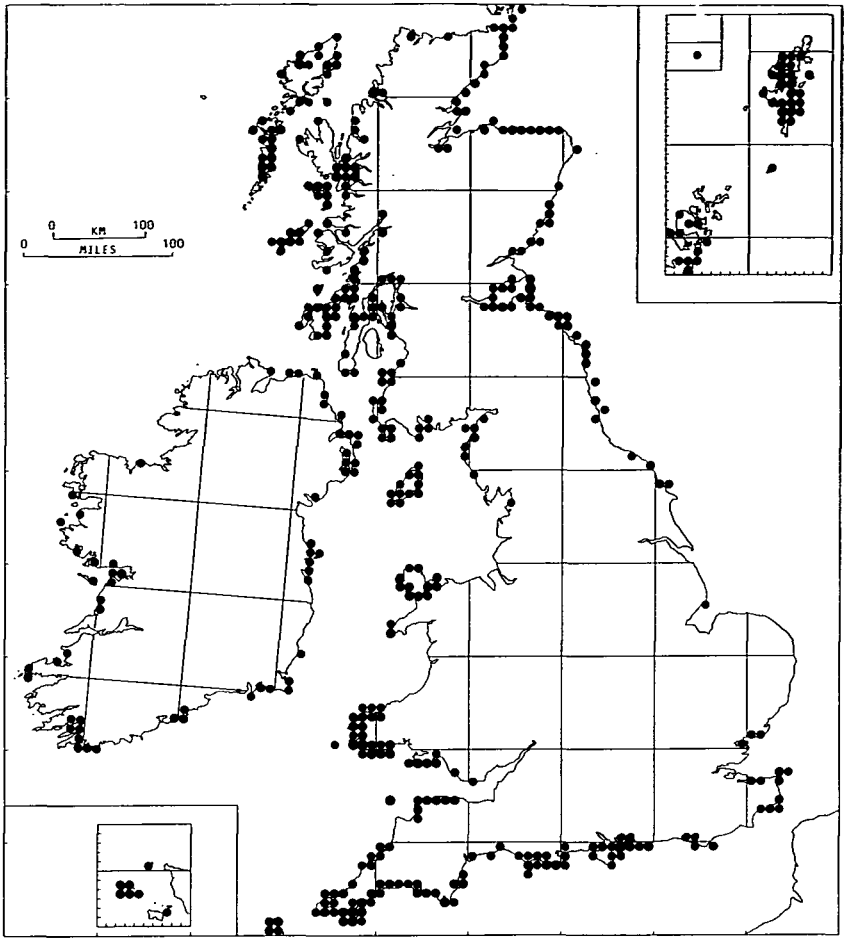
Map 52 **Laminaria digitata** (Huds.) Lamour. Usually the dominant alga at, and just below, low water mark. Absent from stretches of coast which consist of muddy and sandy shores unsuitable for rock-dwelling seaweeds. See van den Hoek (1982b).



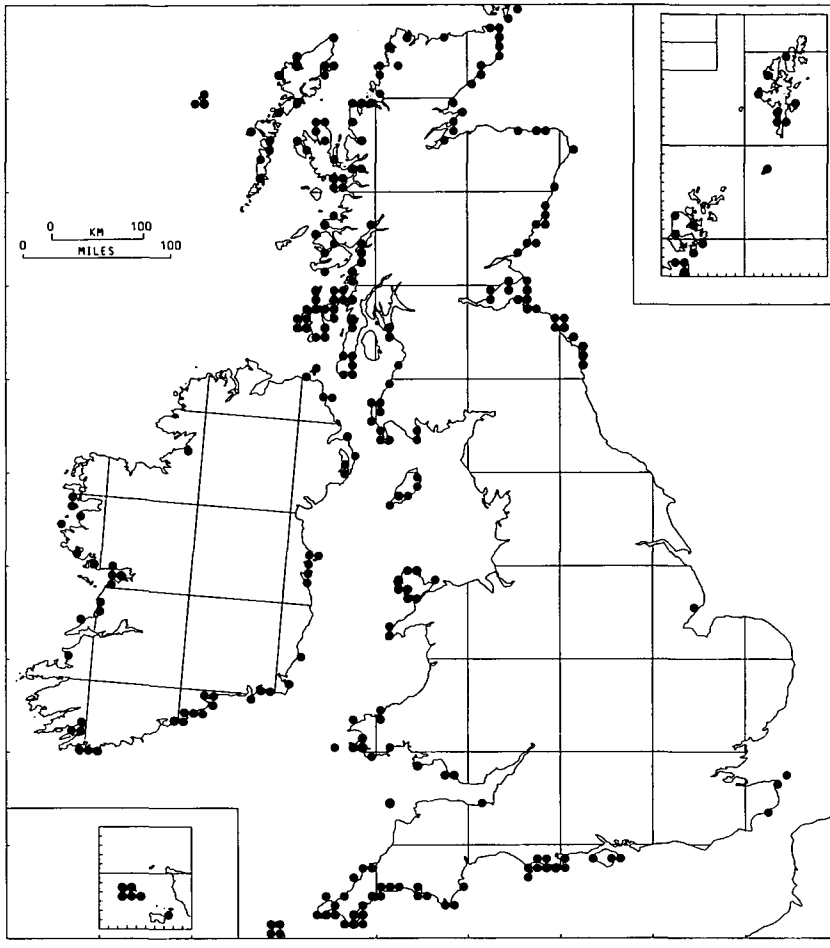
Map 53 **Laminaria hyperborea** (Gunn.) Fosl. The dominant forest-forming seaweed in the subtidal zone. As for most brown algae, Ireland is vastly under-recorded. See van den Hoek (1982b).



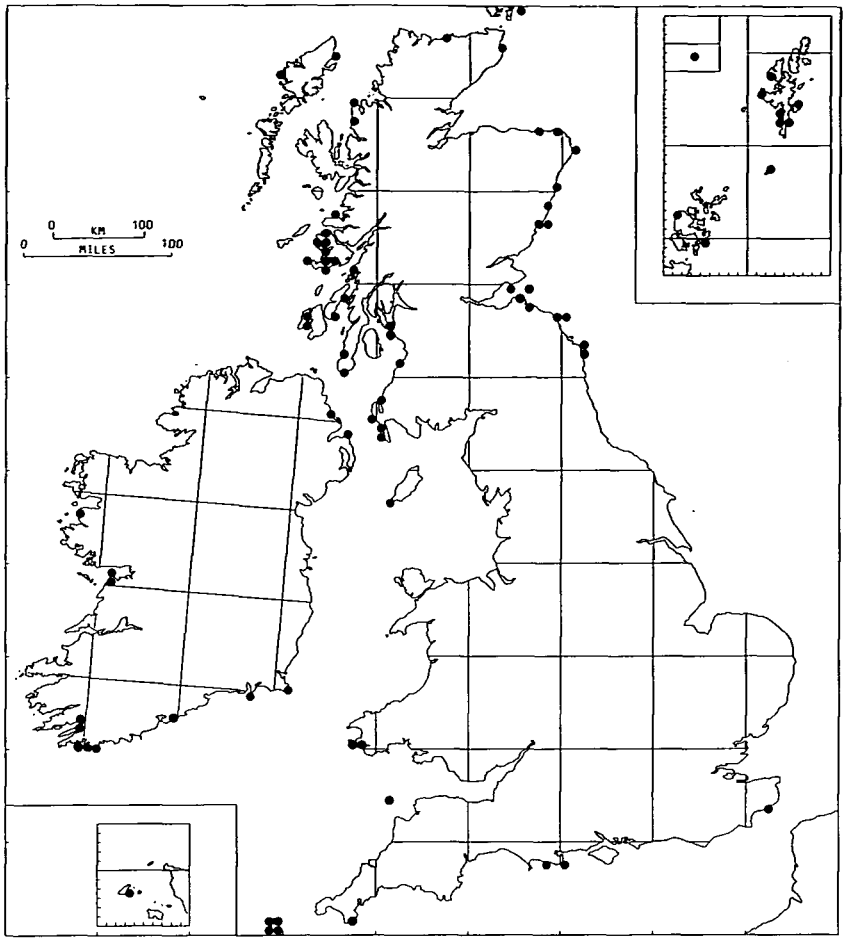
Map 54 **Laminaria ochroleuca** Pyl. A pale-coloured laminarian that spread from France in about 1943, but seems to have extended its range very little since. See Norton (1978) and van den Hoek (1982b).



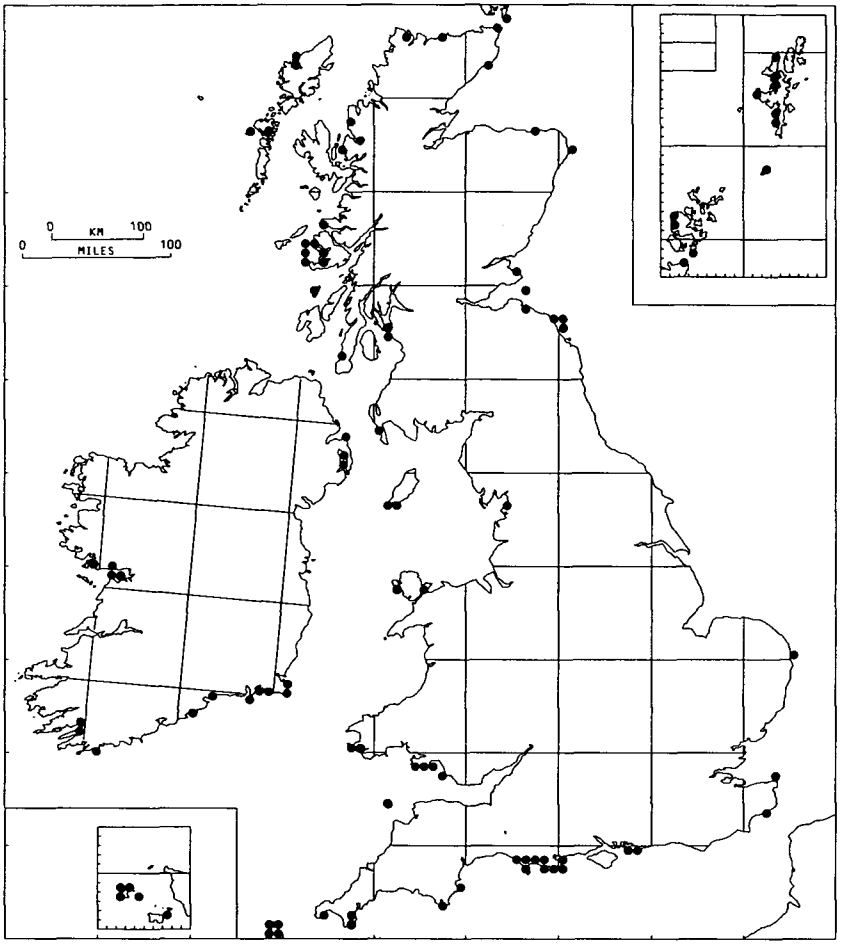
Map 55 **Laminaria saccharina** (L.) Lamour. A common and distinctive alga in lower shore tide pools and on the rock from low water mark downwards, especially in slightly sheltered sites. In the sublittoral it is characteristic of intermittently disturbed sites. See van den Hoek (1982b).



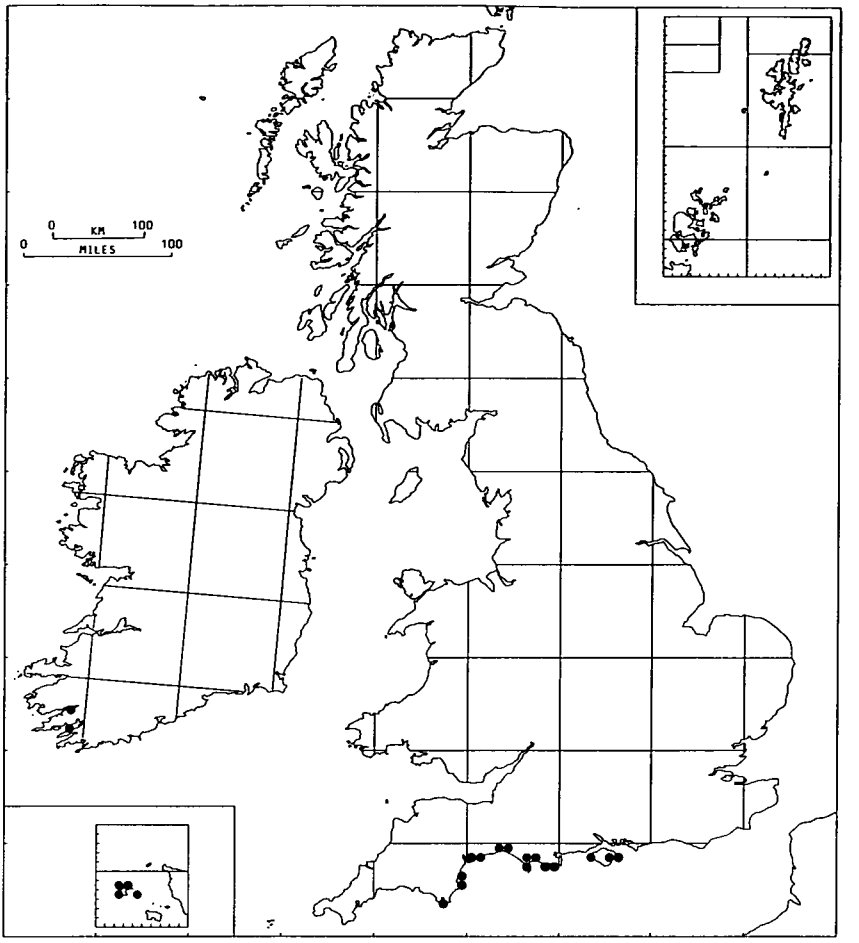
Map 56 **Leathesia difformis** (L.) Aresch. This species is fairly common on many shores. Its apparent absence from most of the east coast of England requires verification.



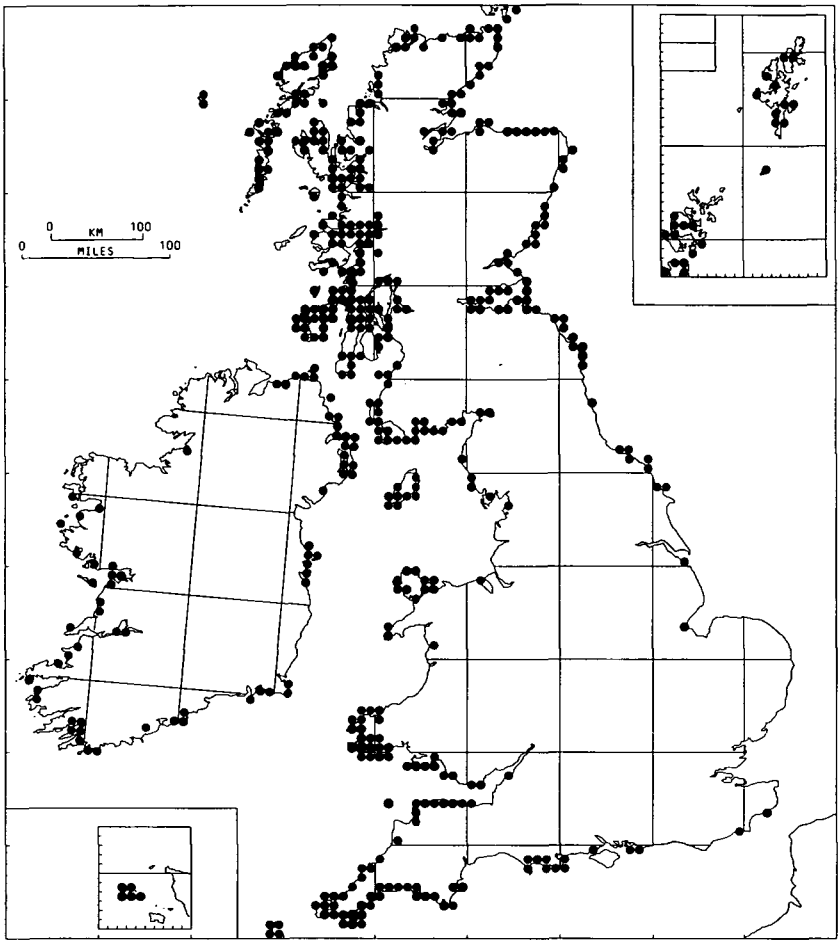
Map 57 **Litosiphon laminariae** (Lyngb.) Harv. Tiny inconspicuous tufts on Alaria. Easily overlooked and, in consequence, probably grossly under-recorded.



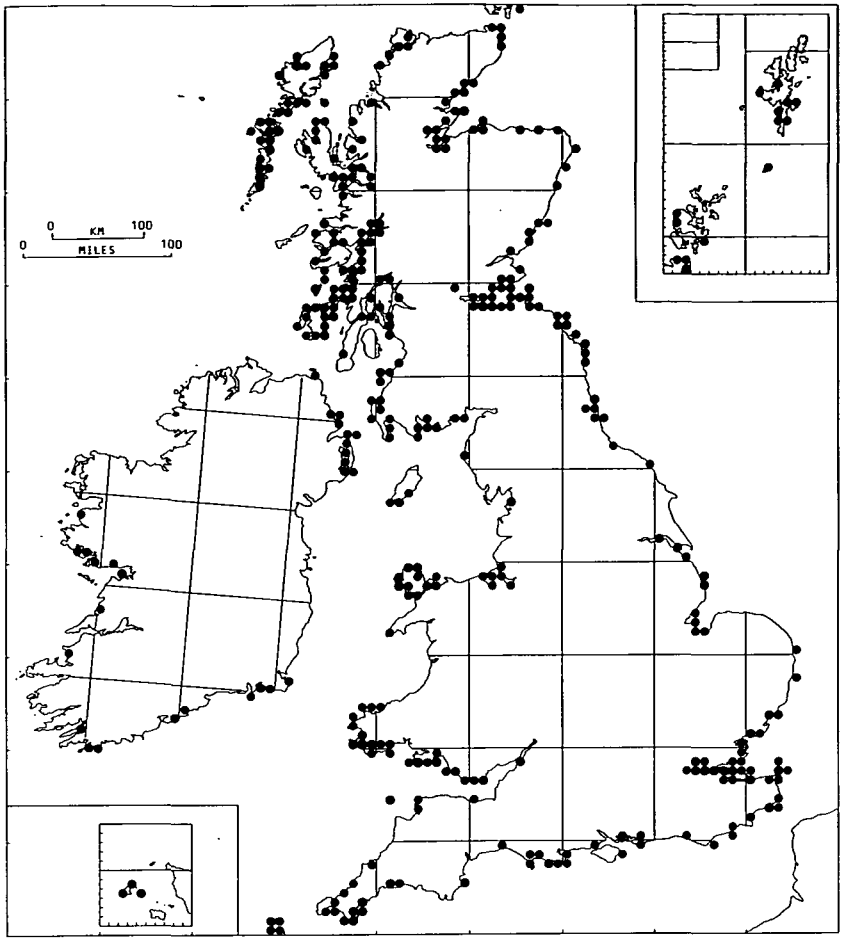
Map 58 **Myrionema strangulans** Grev. Tiny disc-like epiphytic plants easily missed. Most conspicuous on Ulva and often found if looked for.



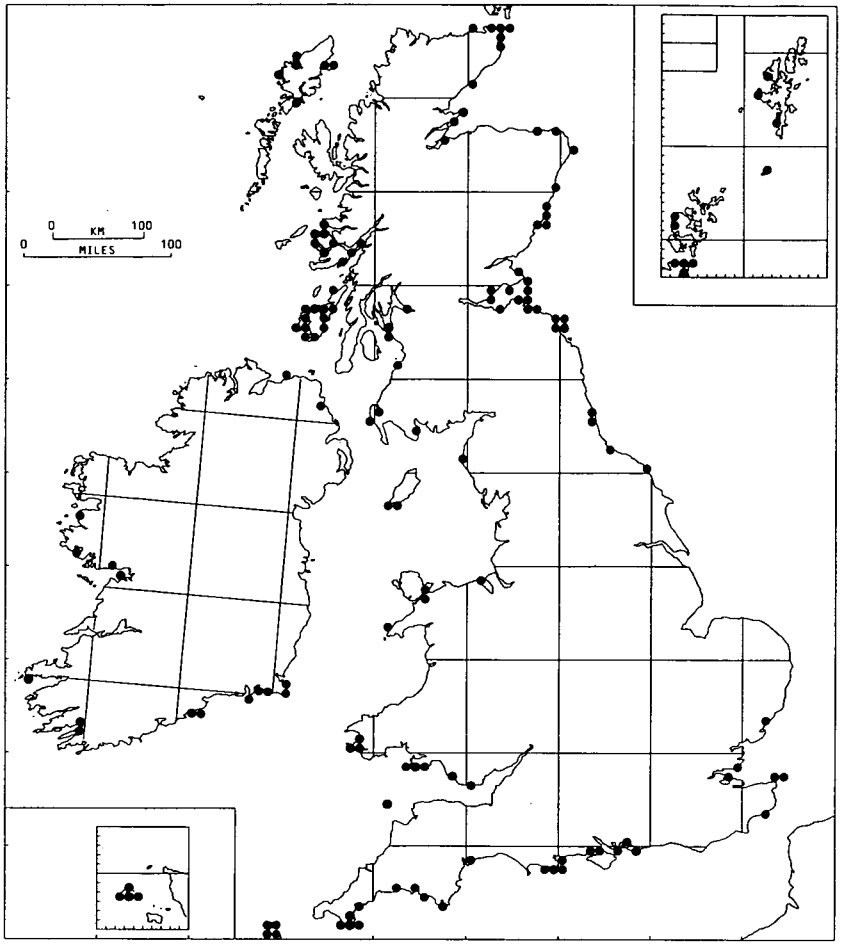
Map 59 **Padina pavonia** (L.) Lamour. A distinctive southern species occasionally (and probably dubiously) reported far beyond the northern limits of the distribution shown on the map. See Price et al. (1979).



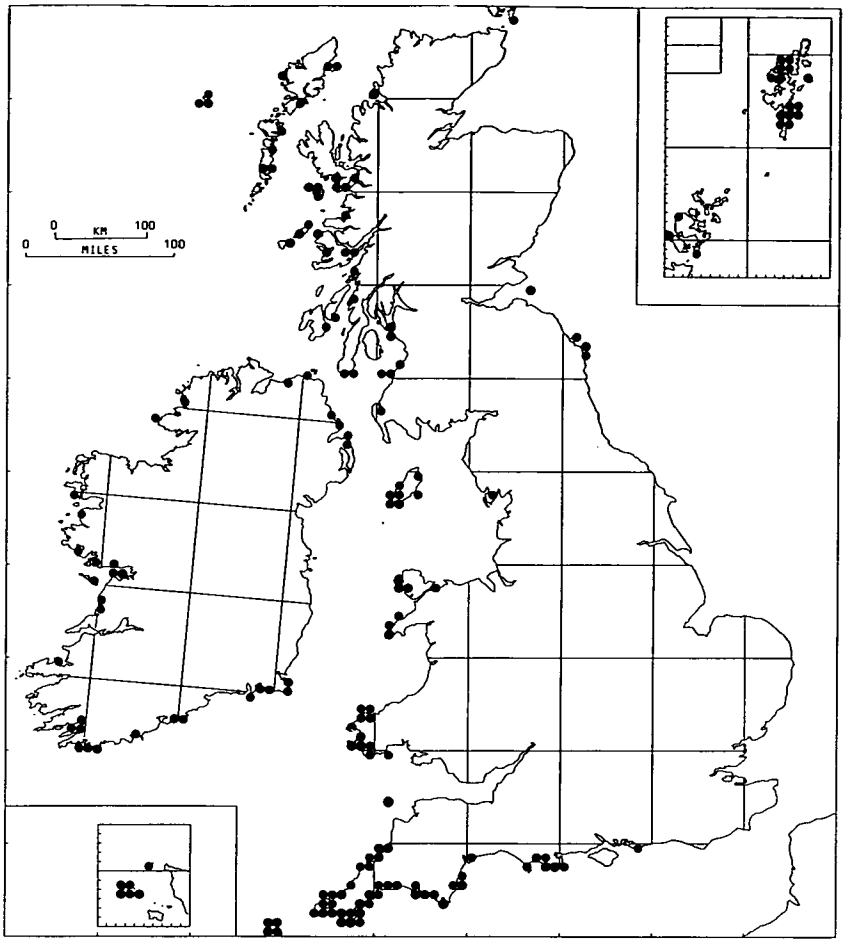
Map 60 **Pelvetia canaliculata** (L.) Dcne et Thur. A distinctive and common high shore dweller. Its apparent scarcity on the east and south-east coasts of England requires investigation.



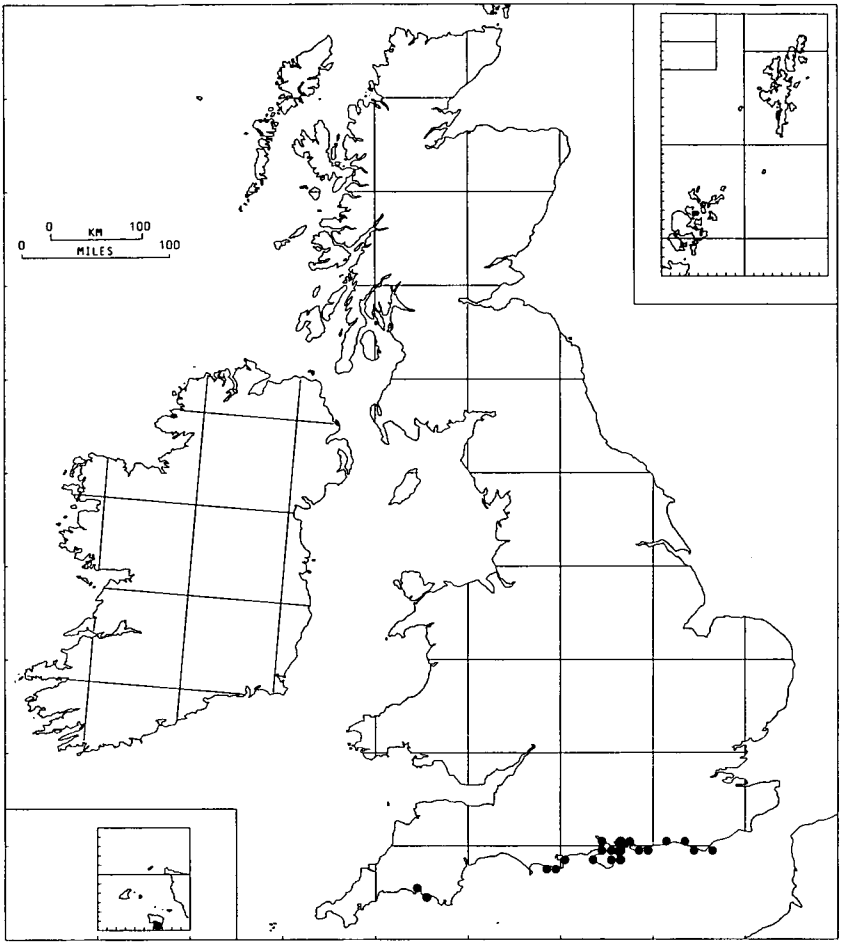
Map 61 **Pilayella littoralis** (L.) Kjellm. One of the commonest filamentous brown algae. Superficially similar to Ectocarpus. Woefully under-recorded in Ireland.



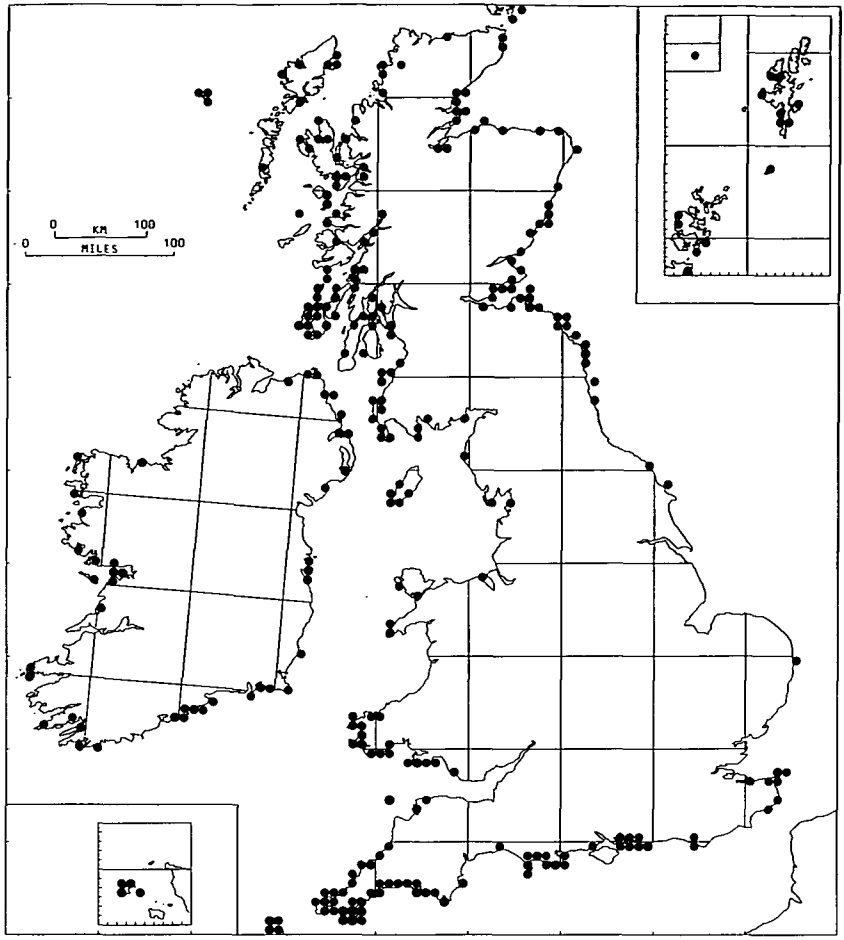
Map 62 **Ralfsia spongiocarpa** Batt. An under-recorded pool-dwelling brown crust.



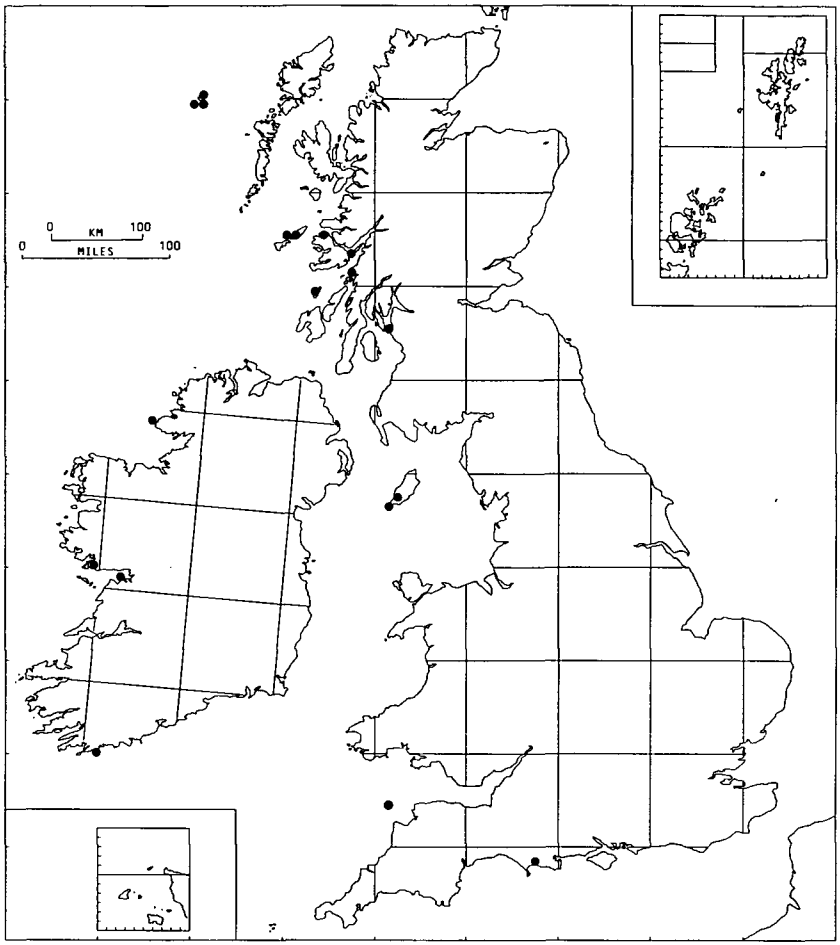
Map 63 **Saccorhiza polyschides** (Lightf.) Batt. Even though it reaches its northern limit in Norway just south of the Arctic circle, its centre of distribution is southern, and like many southern species it has a predominantly westerly distribution around the British Isles. See Norton (1977).



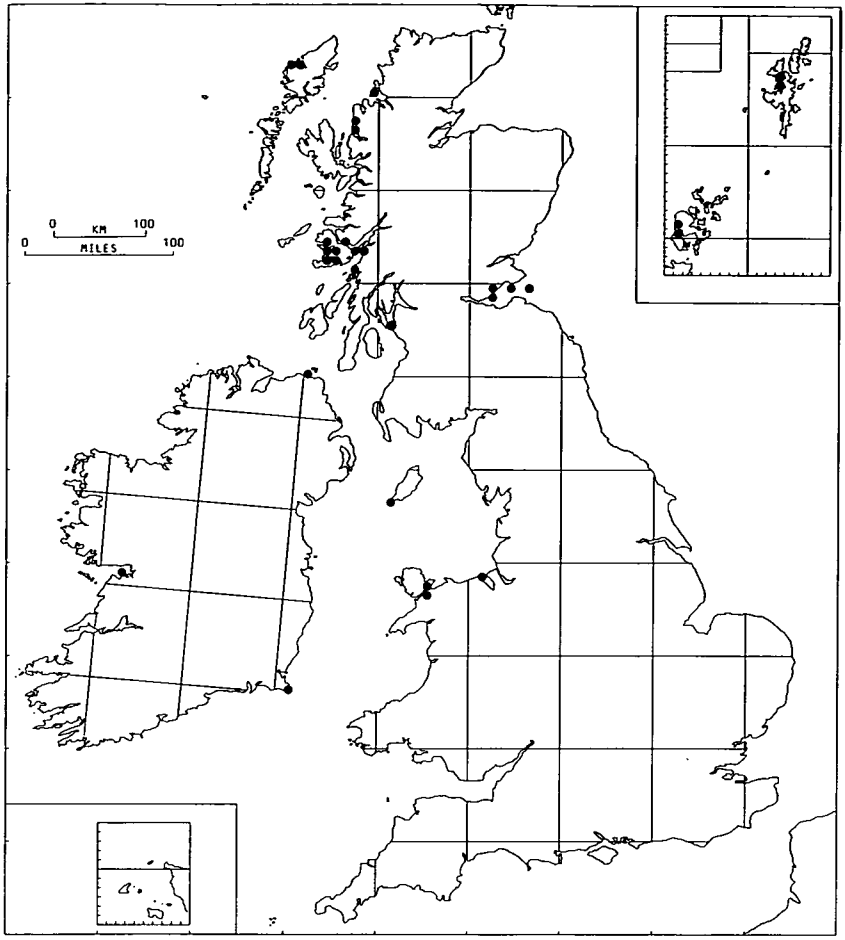
Map 64 **Sargassum muticum** (Yendo) Fensholt A japanese species that appeared on the Isle of Wight in 1973. It spread from France, where it was perhaps introduced originally with oysters from the Pacific. This invasive plant is spreading inexorably along the south coast of England. Across the Channel its range now extends from Brittany to The Netherlands. See Critchley et al. (1983) and van den Hoek (1982b).



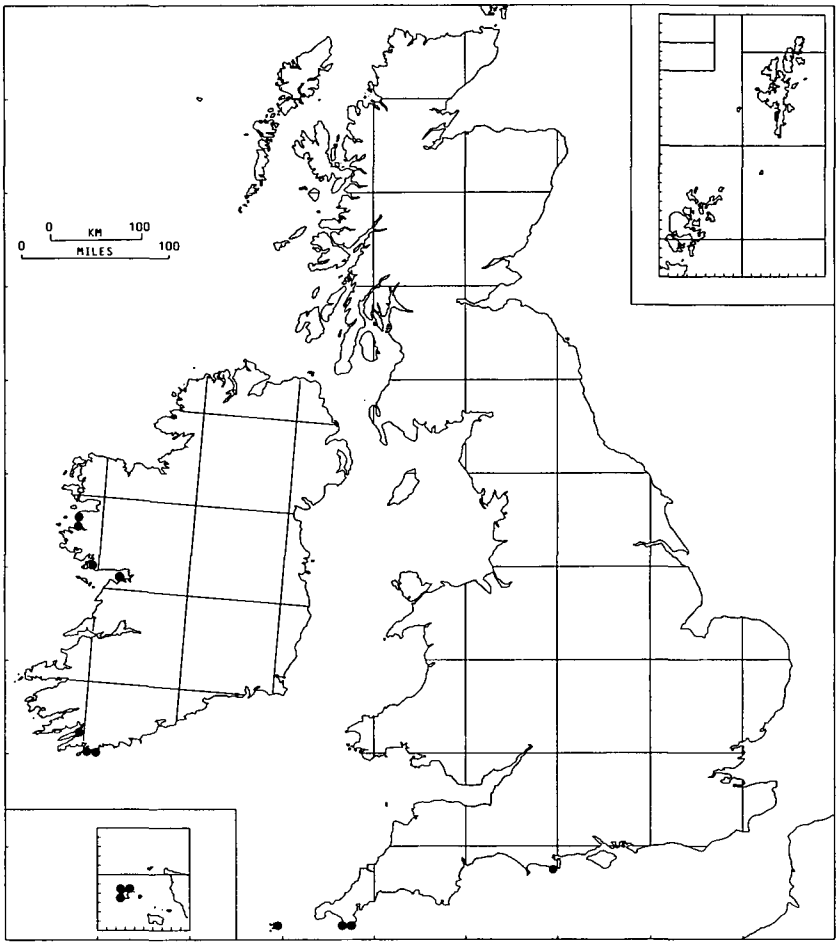
Map 65 **Scytosiphon lomentaria** (Lyngb.) Link A distinctive and common intertidal pool-dweller, most in evidence from winter to early summer. See van den Hoek (1982b).



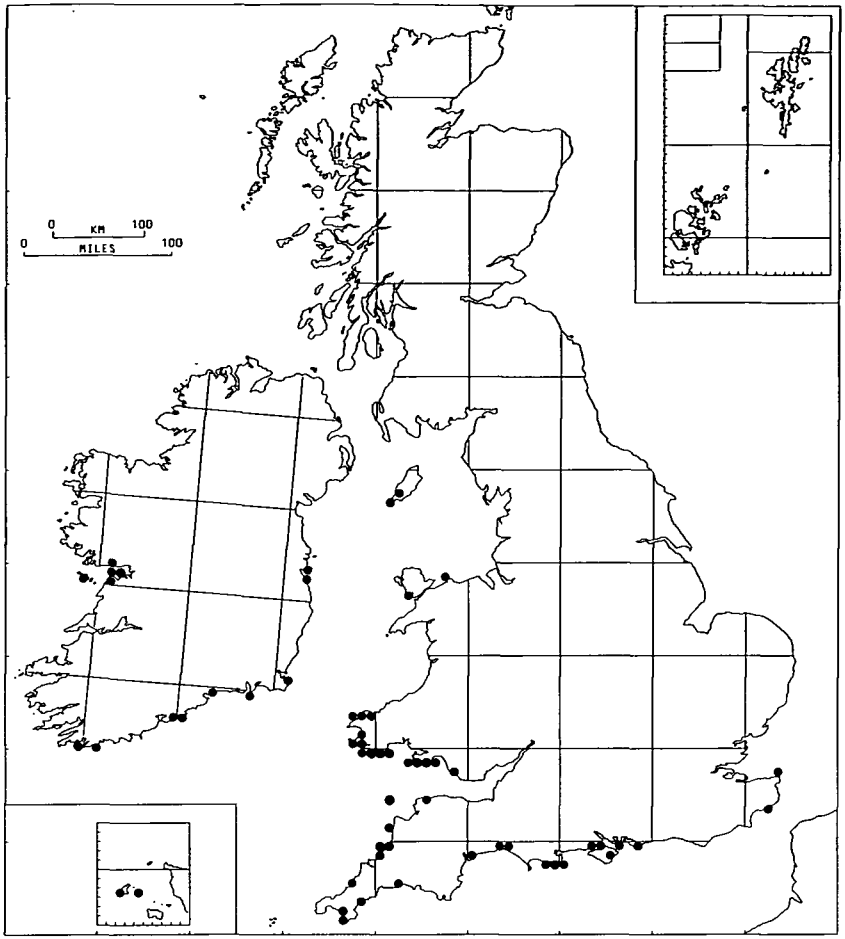
Map 66 **Sphacelaria plumula** Zanard. A fairly distinctive but inconspicuous deep water plant. Undoubtedly uncommon, but even so, under-recorded. See Prud'homme van Reine (1982).



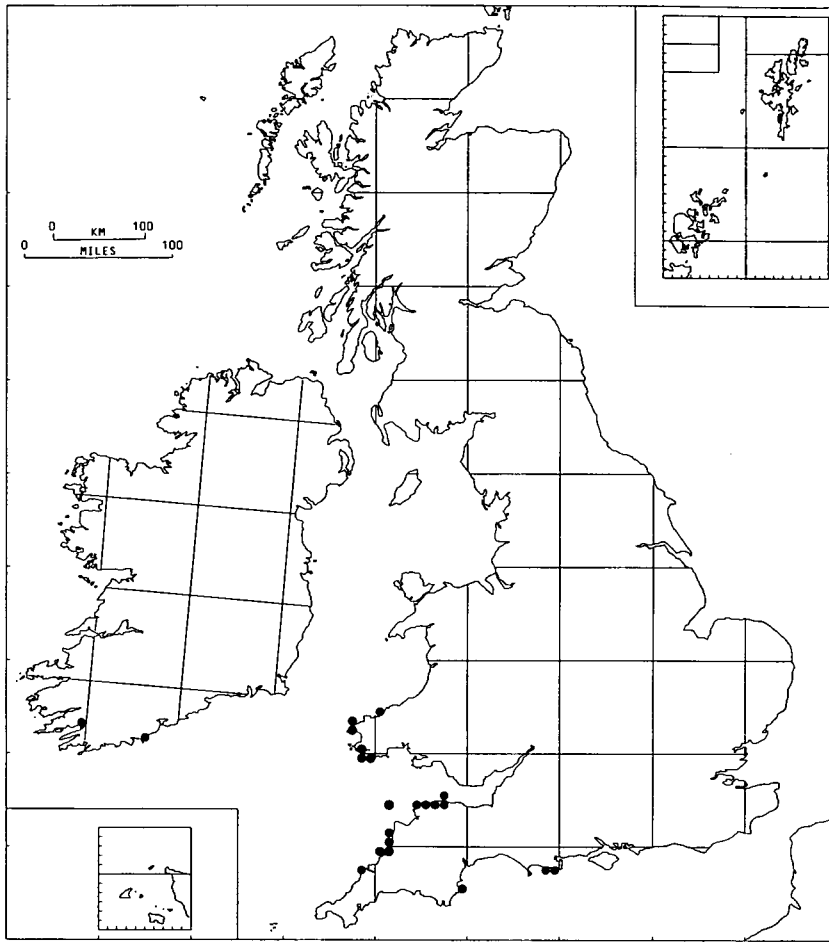
Map 67 **Stictyosiphon tortilis** (Rupr.) Reinke Clearly a 'northern' species, but its southern limits have not been established with any certainty.



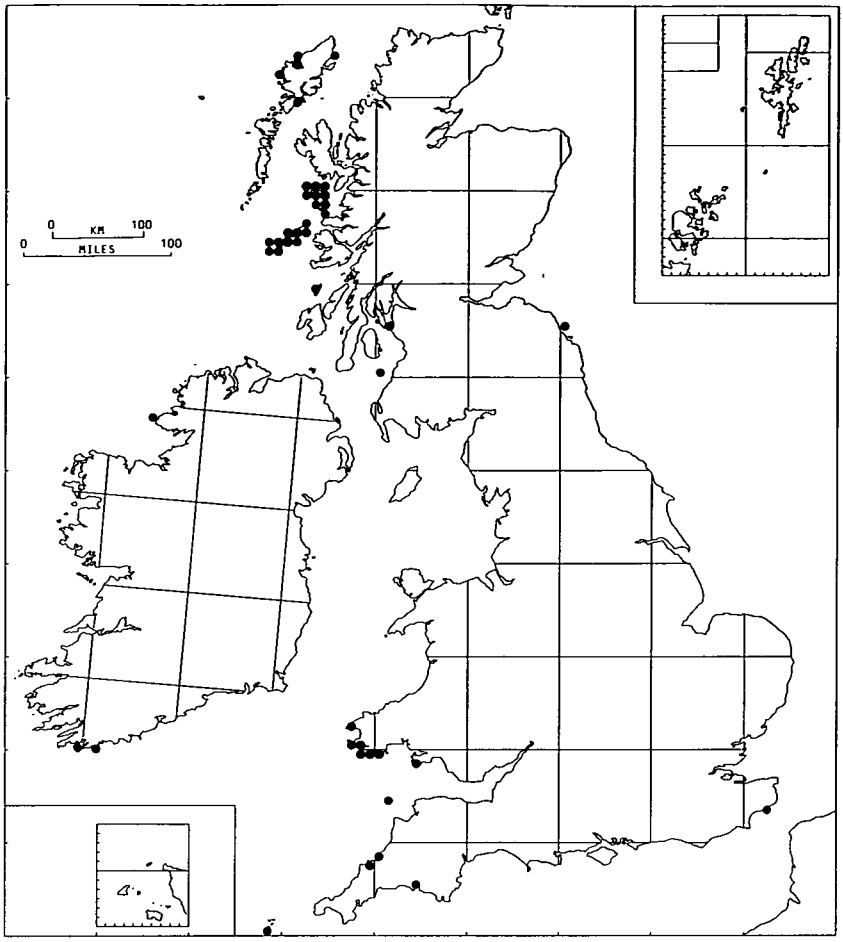
Map 68 **Stilophora rhizodes** (Turn.) J. Ag. A 'southern' species locally common in the south of England. It is reputed to occur much further north than the map indicates, but this requires investigation.



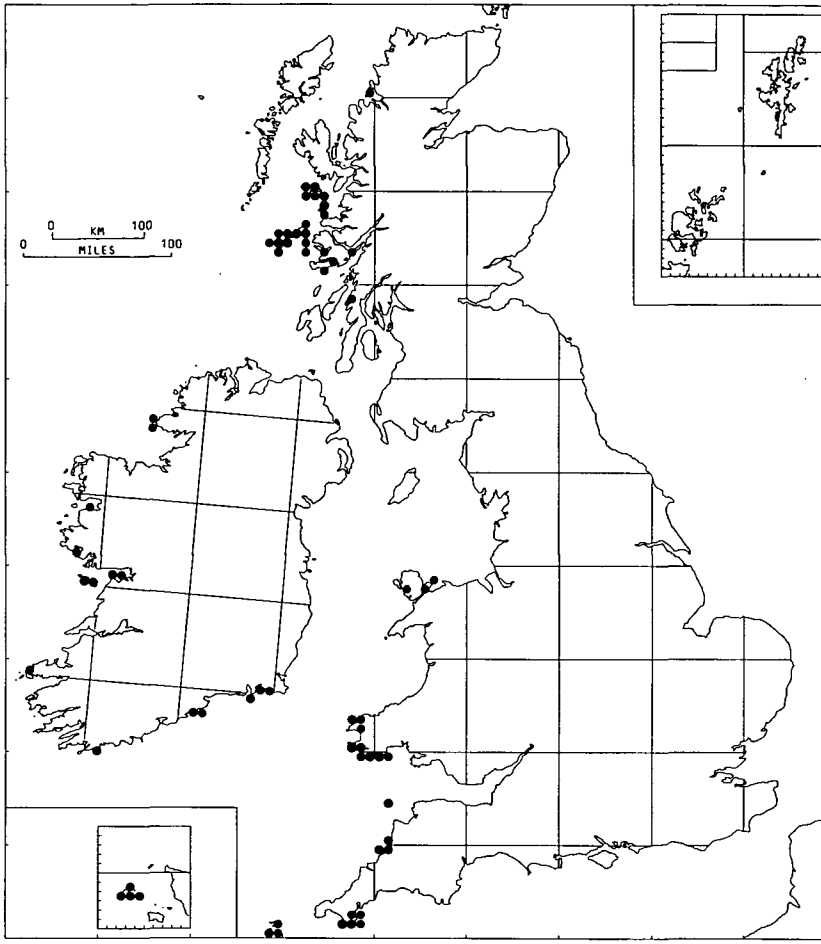
Map 69 **Taonia atomaria** (Woodw.) J.Ag. A fairly distinctive species, locally abundant in the south but becoming progressively rarer northwards. It is characteristic of places with intermittent sand scour.



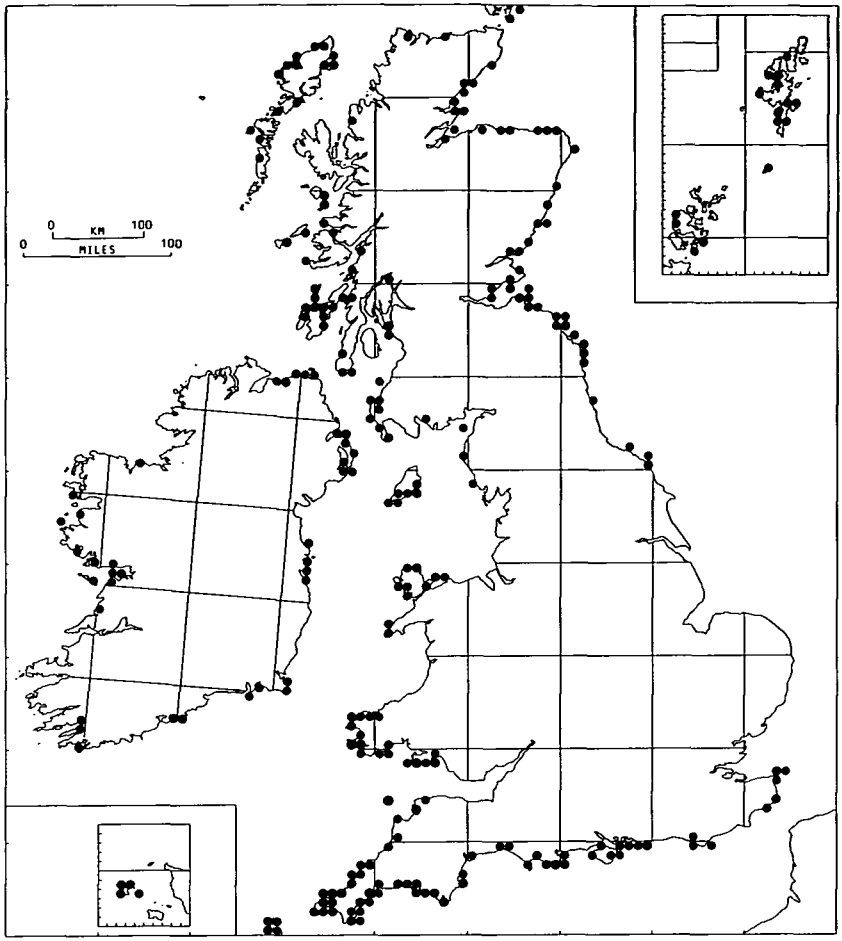
Map 70 **Zanardinia prototypus** (Nardo) Nardo Although a 'southern' species, the map reveals that it occurs much further north and is rather more common than previously thought. See Jephson et al. (1975) and Hiscock & Maggs (1982).



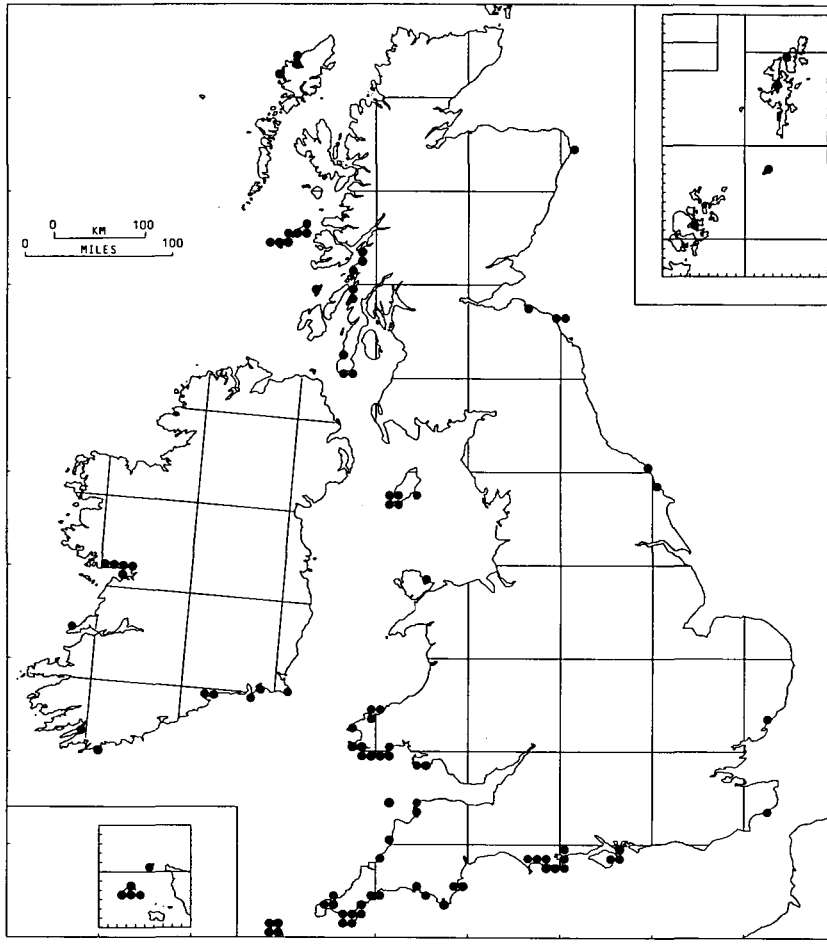
Map 71 **Acrosorium reptans** (Crouan frat.) Kylin This plant is probably merely a prostrate creeping form of Cryptopleura ramosa (map 95). It is inconspicuous and probably under-recorded.



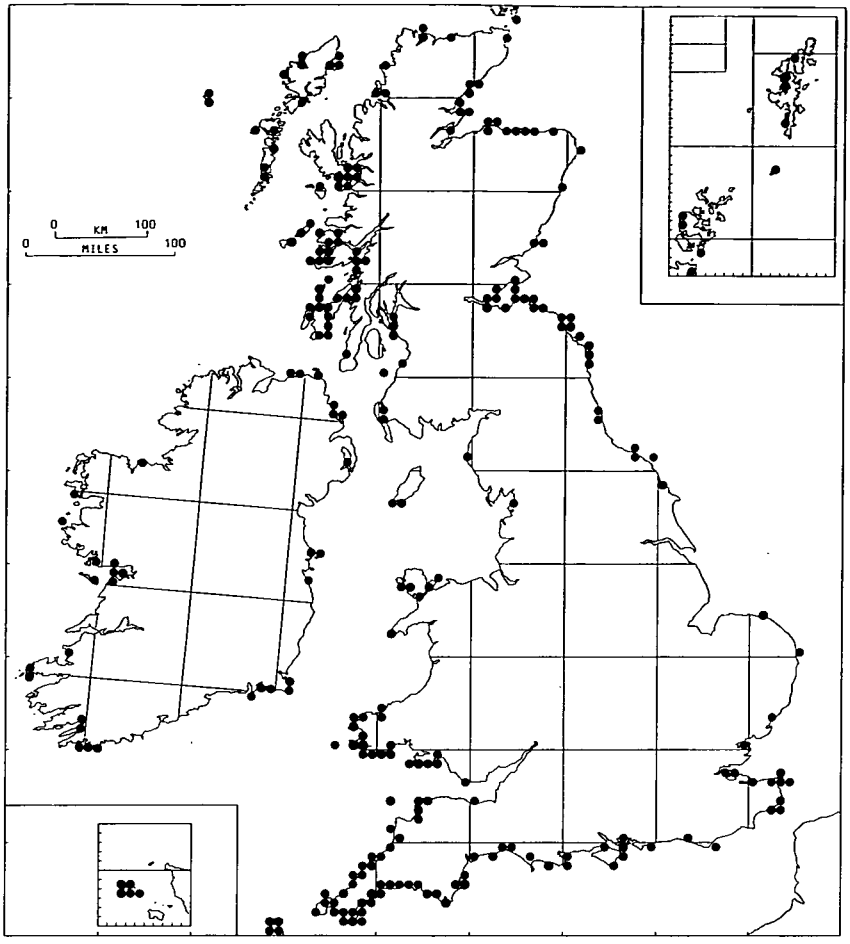
Map 72 **Acrosorium uncinatum** (Turn.) Kylin A subtidal species that is far less rare than formerly thought. It is particularly abundant at some wave-exposed sites in the shallow sublittoral. The hook-like appendages on the thallus are very distinctive although Acrosorium reptans may also possess hooked marginal proliferations.



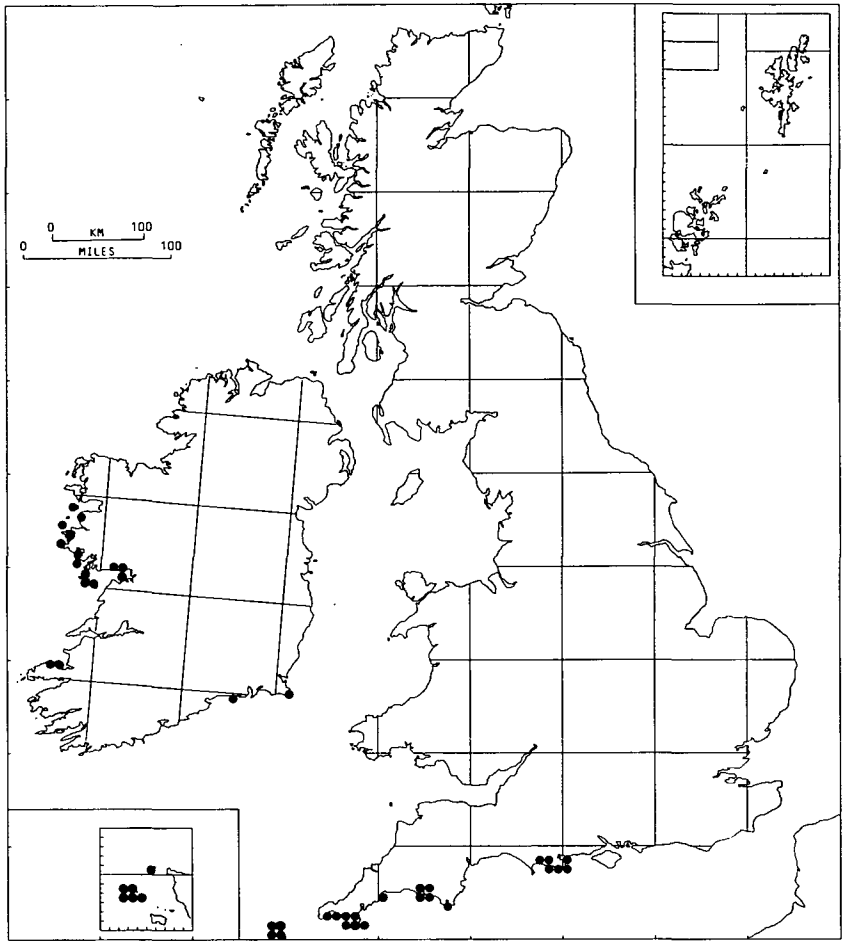
Map 73 **Ahnfeltia plicata** (Huds.) Fries A distinctive species. Its apparent absence from much of the east coast of England needs checking as this coast should not be unsuitable for such a sand-tolerant plant.



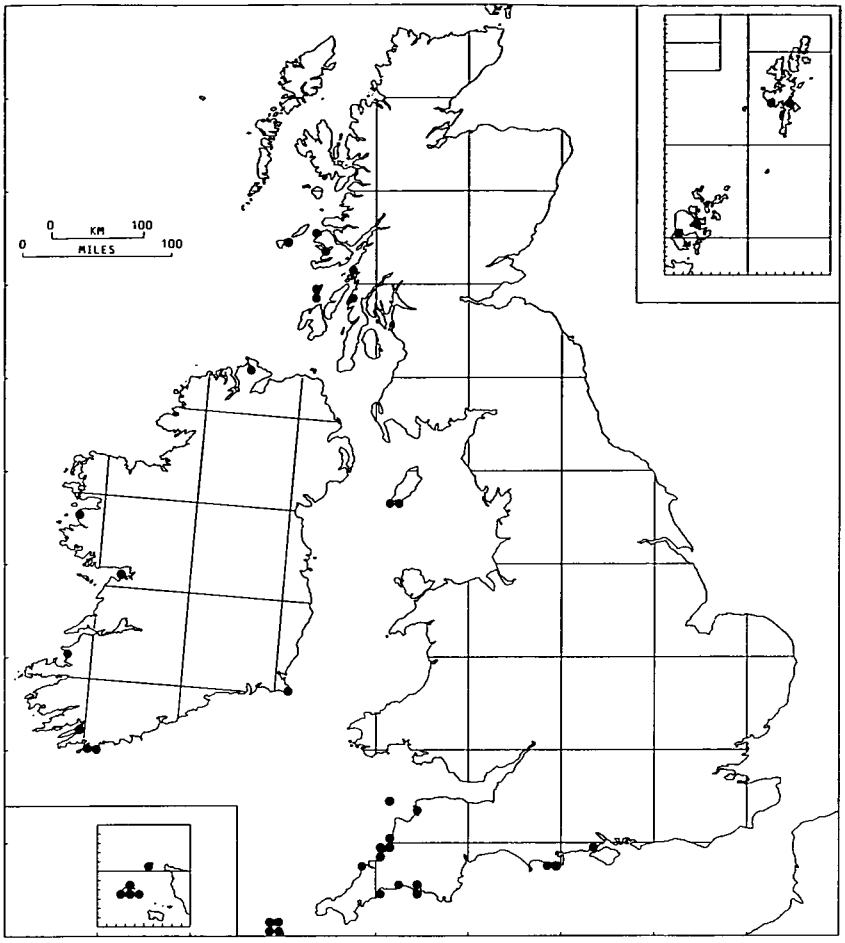
Map 74 **Apoglossum ruscifolium** (Turn.) J. Ag. A distinctive species whose apparent rarity on eastern coasts requires investigation. It inhabits the shallow subtidal zone either on rock or on the stipes of Laminaria hyberborea.



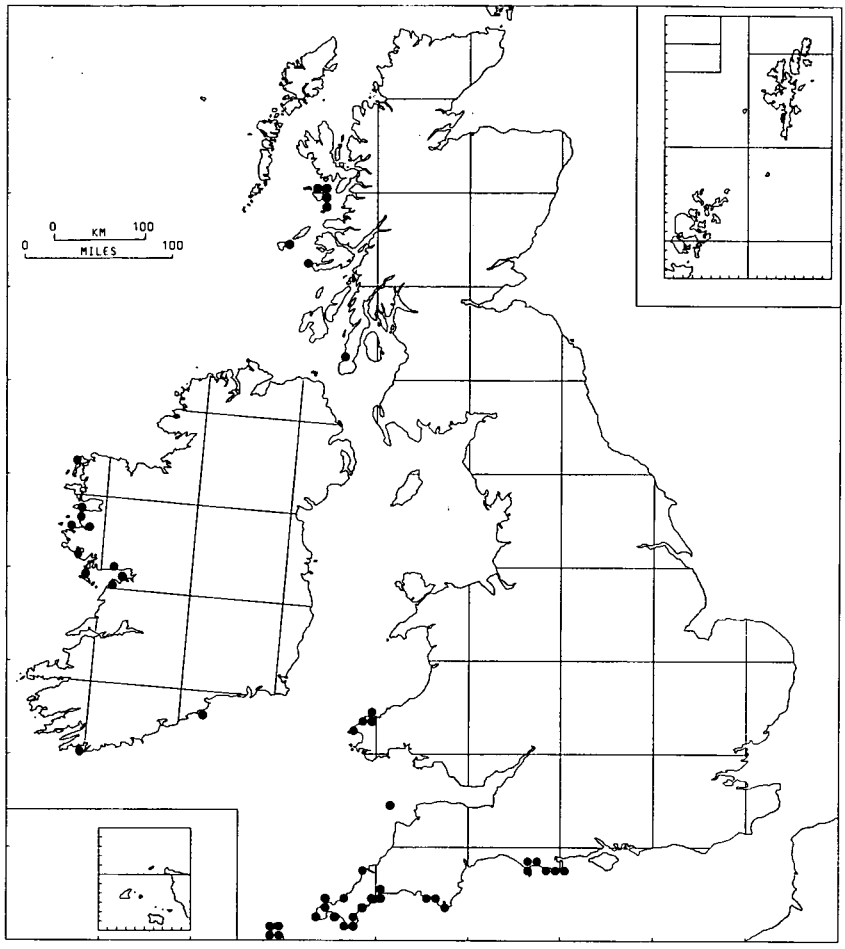
Map 75 **Audouinella floridula** (Dillw.) Woelkerling A common filamentous alga most characteristically found binding intertidal carpets of sand. It is more easily seen in winter, when the cover of other species is reduced.



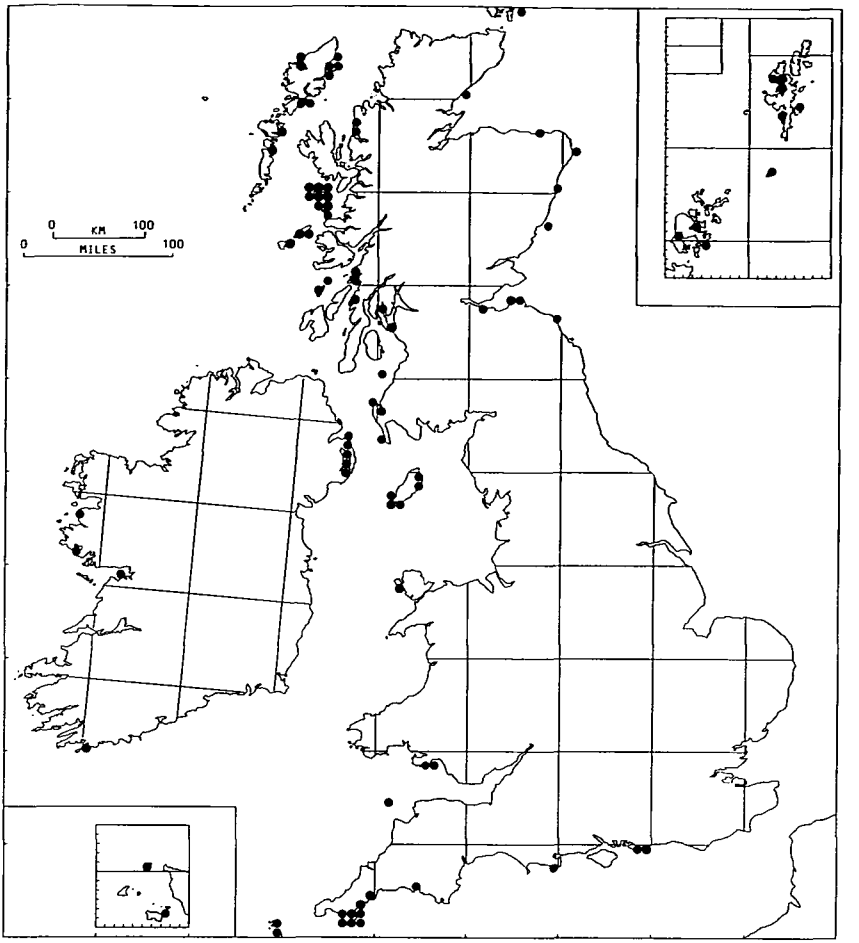
Map 76 **Asparagopsis armata** Harv. Since it was first recorded in the British Isles in 1939 this very distinctive species seems to have consolidated its position on the south and west coasts. See Irvine et al. (1975).



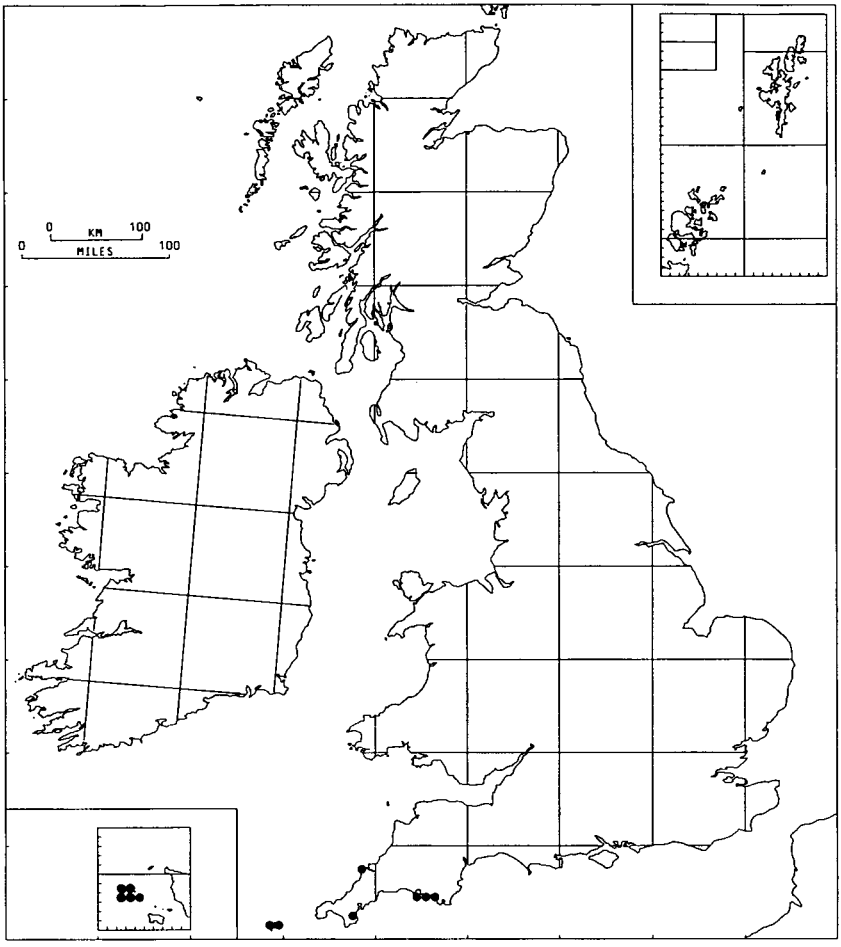
Map 77 **Falkenbergia rufolanosa** (Harv.) Schm. Not a true species, merely the distinct tetrasporic phase of Asparagopsis armata (map 76). Since its first discovery in the British Isles in 1949 it has spread progressively northwards up the west coast, apparently independently of the Asparagopsis phase. It often occurs with the superficially similar Trailliella phase of Bonnemaisonia (map 78). See Irvine et al. (1975).



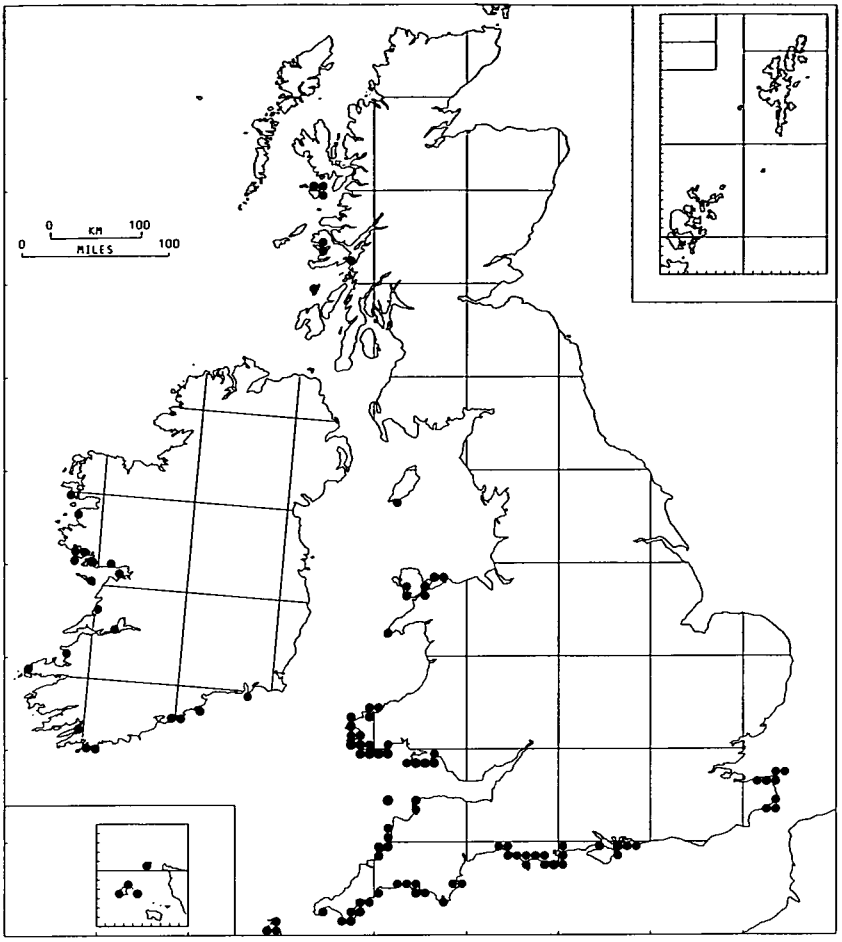
Map 78 **Bonnemaisonia hamifera** Hariot A distinctive species, probably of japanese origin. The first certain record for Britain was in 1893. Since then it has spread northwards, apparently largely by vegetative means. See van den Hoek (1982a).



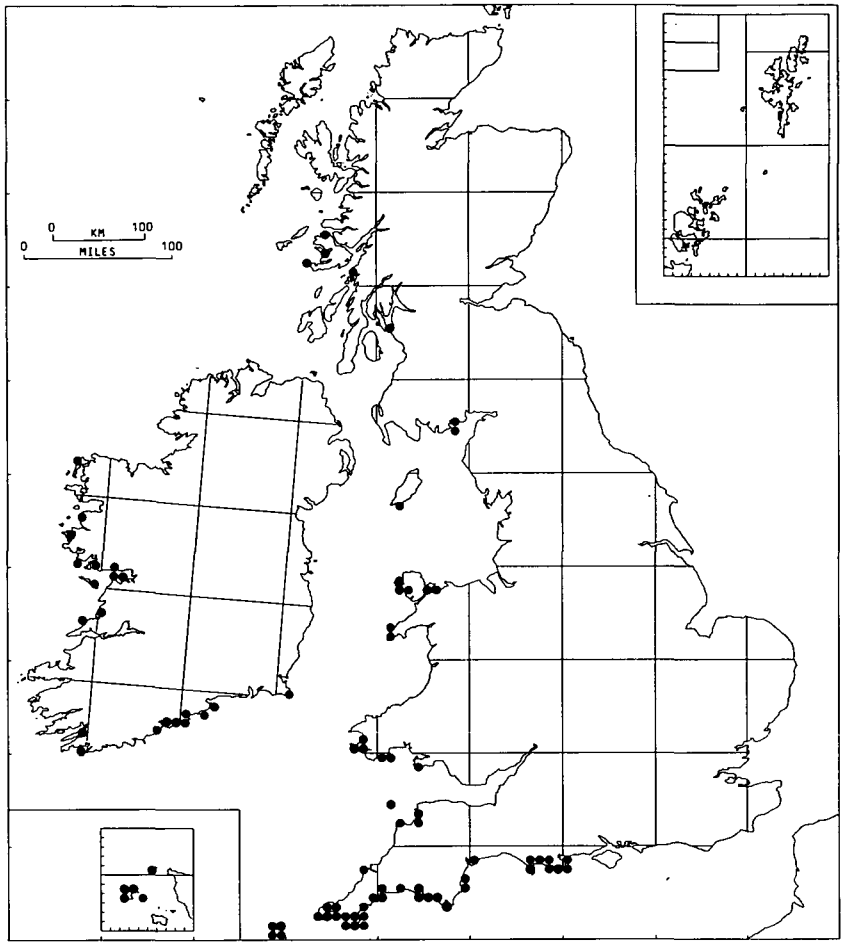
Map 79 **Trailliella intricata** Batt. A distinctive but inconspicuous and therefore under-recorded plant. Not a true species, but merely the tetrasporic phase of Bonnemaisonia hamifera (map 78). Since its initial discovery on the south coast of England in 1890 it has extended its range, largely independently of the Bonnemaisonia phase. It is worth searching the subtidal for it in areas where it is sparsely recorded, such as Ireland and the east coast of England. See van den Hoek (1982a) and McLachlan et al. (1969).



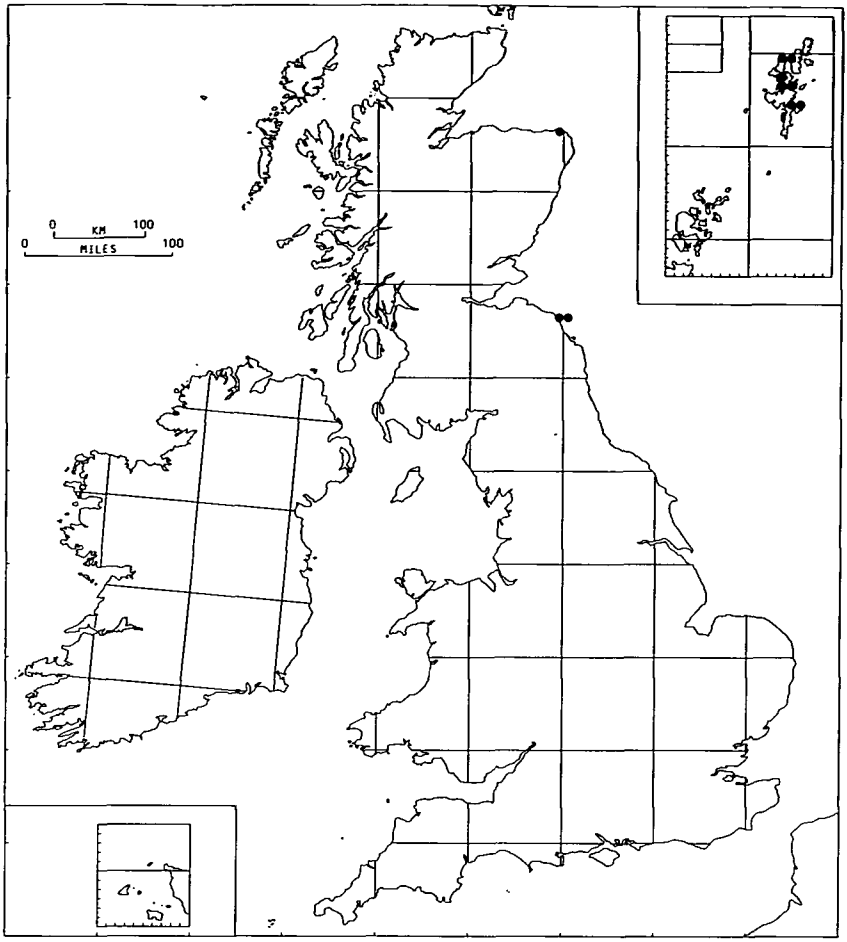
Map 80 **Bornetia secundiflora** (J. Ag.) Thur. A very distinctive, but uncommon, 'southern' species that has a toe-hold in south-west England.



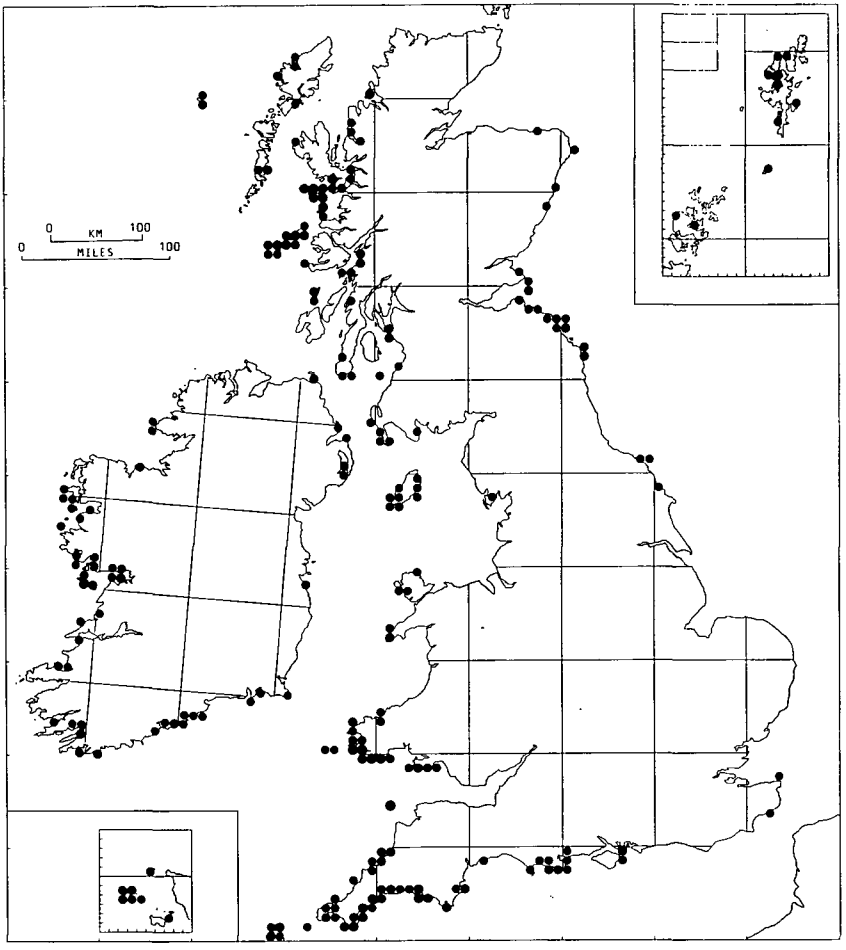
Map 81 **Calliblepharis ciliata** (Huds.) Kütz. A subtidal plant. Like most 'southern' species it has a western distribution in the British Isles where it approaches its northern limit.



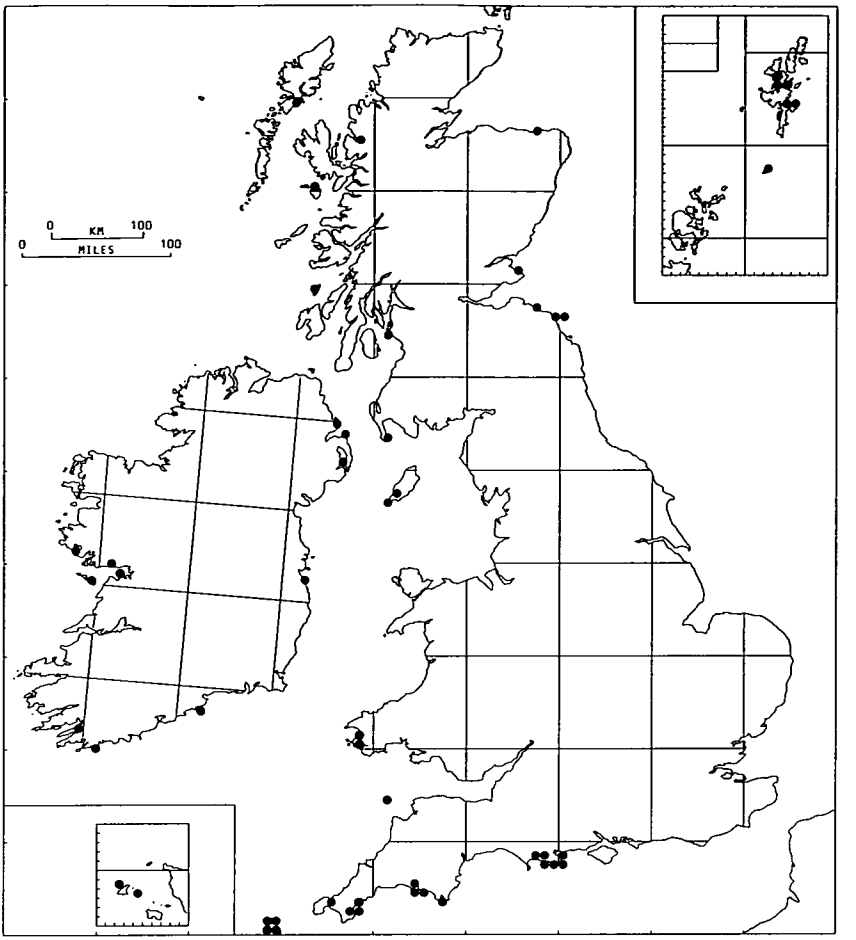
Map 82 **Calliblepharis jubata** (Good. et Woodw.) Kütz. A distinctive 'southern' species showing a western distribution similar to that of C. ciliata (map 81), a species with which it is easily confused. An inhabitant of lower shore tide pools and the shallow subtidal zone.



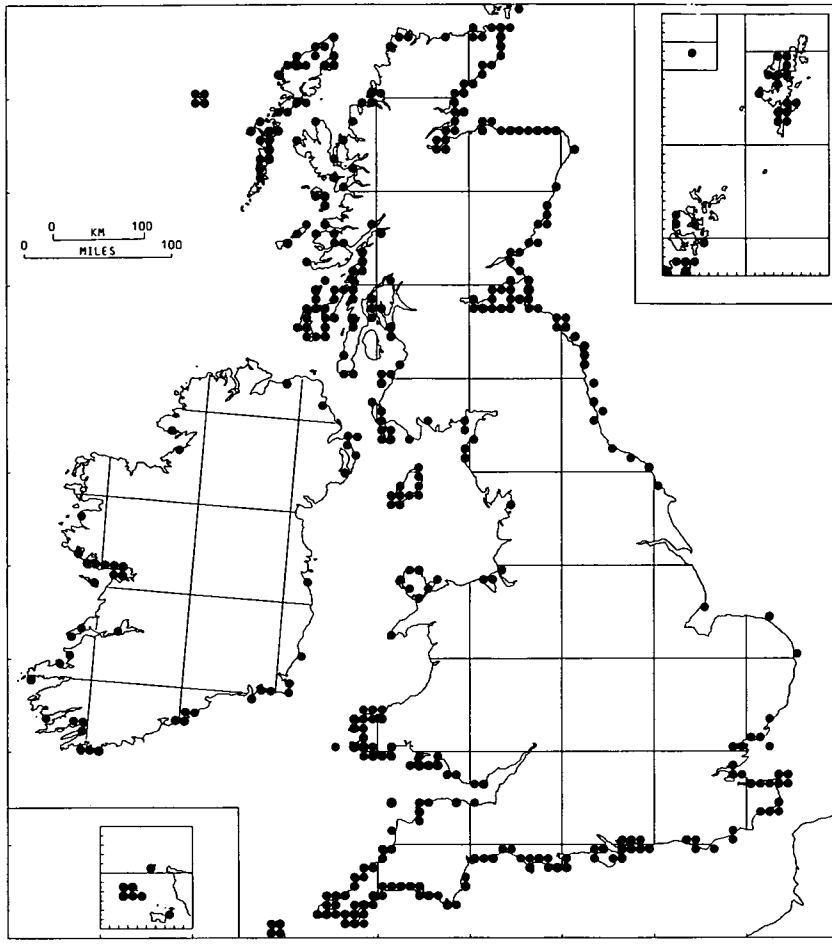
Map 83 **Callophyllis cristata** (C. Ag.) Kütz. A circumpolar species that extends south into northern Britain. It seems to be rare, but it resembles Sphaerococcus and Plocamium and if confused with these species it may have gone unrecorded.



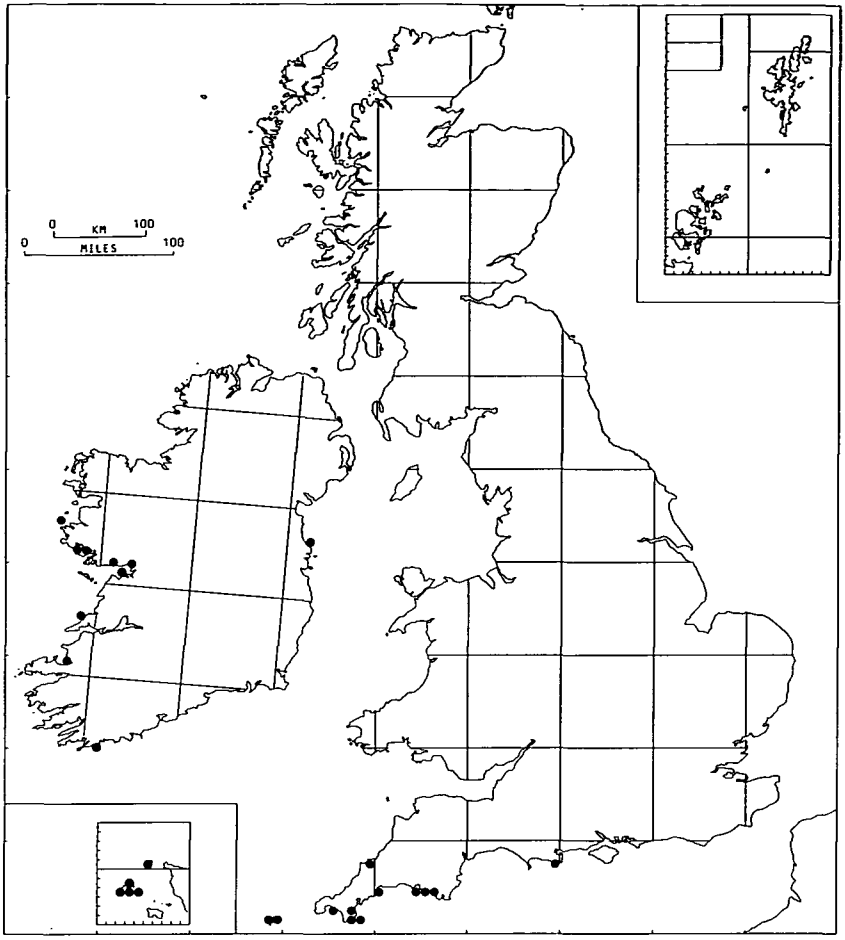
Map 84 **Callophyllis laciniata** (Huds.) Kütz. A common subtidal species, generally distributed but apparently absent from much of the eastern half of the south coast of England.



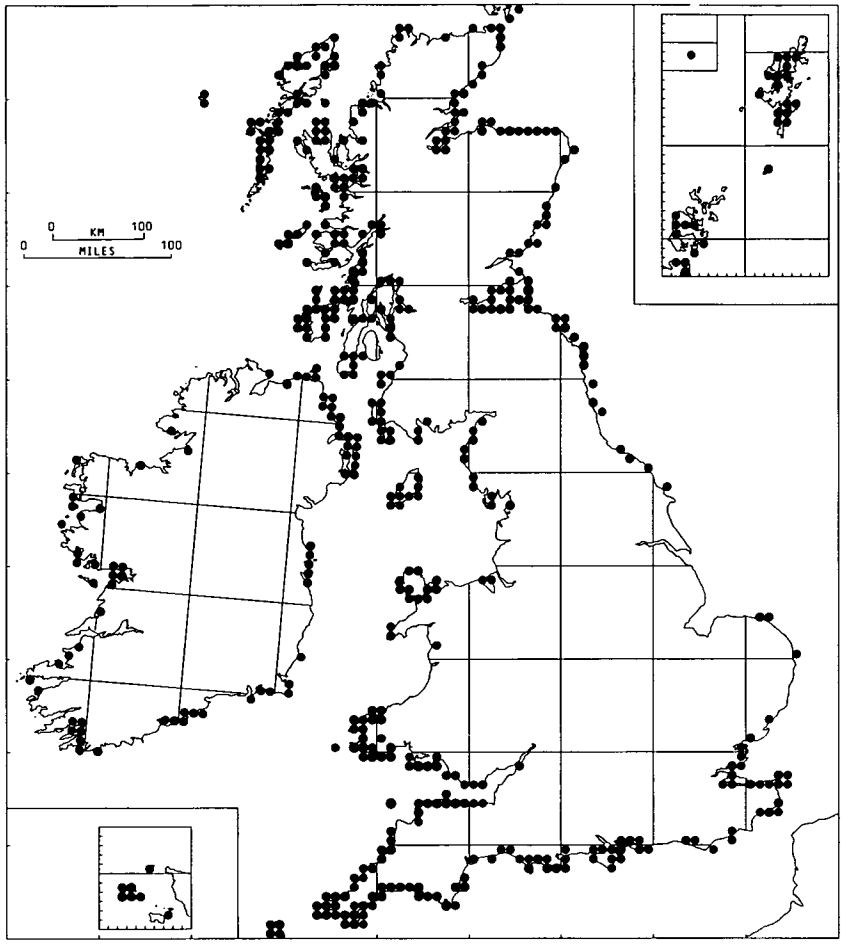
Map 85 **Callocolax neglectus** Schmitz ex Batt. A tiny inconspicuous pale cushion, epiphytic and possibly parasitic on Callophyllis laciniata (map 84), rarely recorded but often present if looked for.



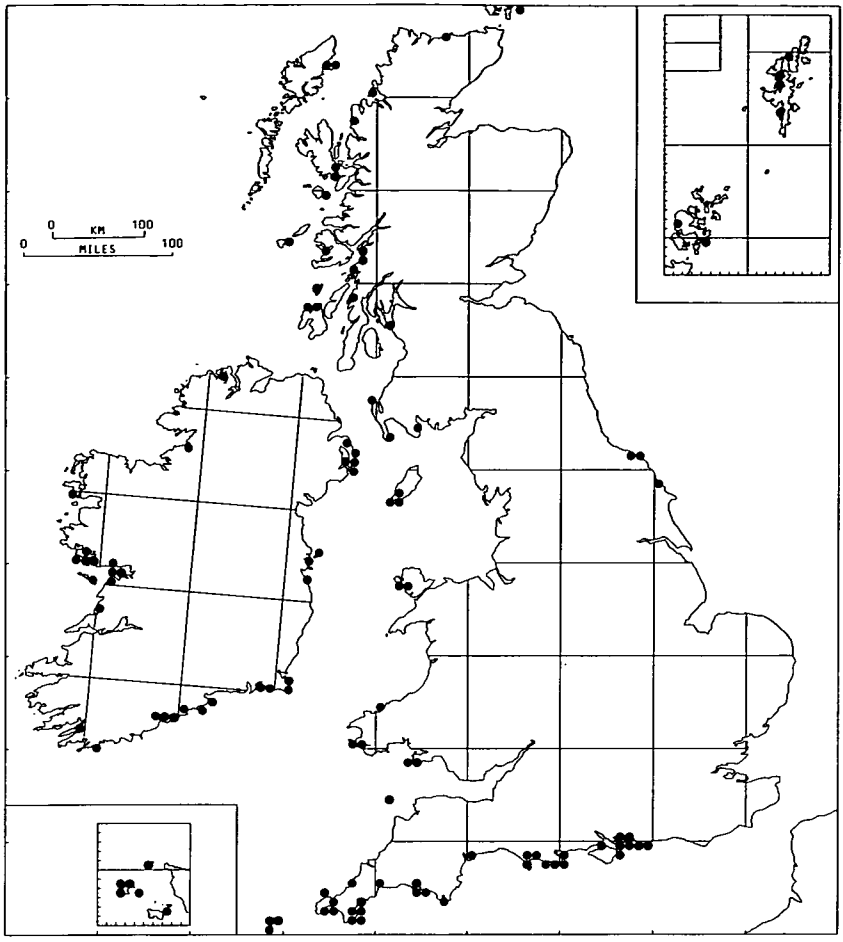
Map 86 **Ceramium rubrum** (Huds.) C. Ag. This species is really an aggregate embracing all the fully corticate non-spiny species of Ceramium. It is very common, but is clearly under-recorded in Ireland.



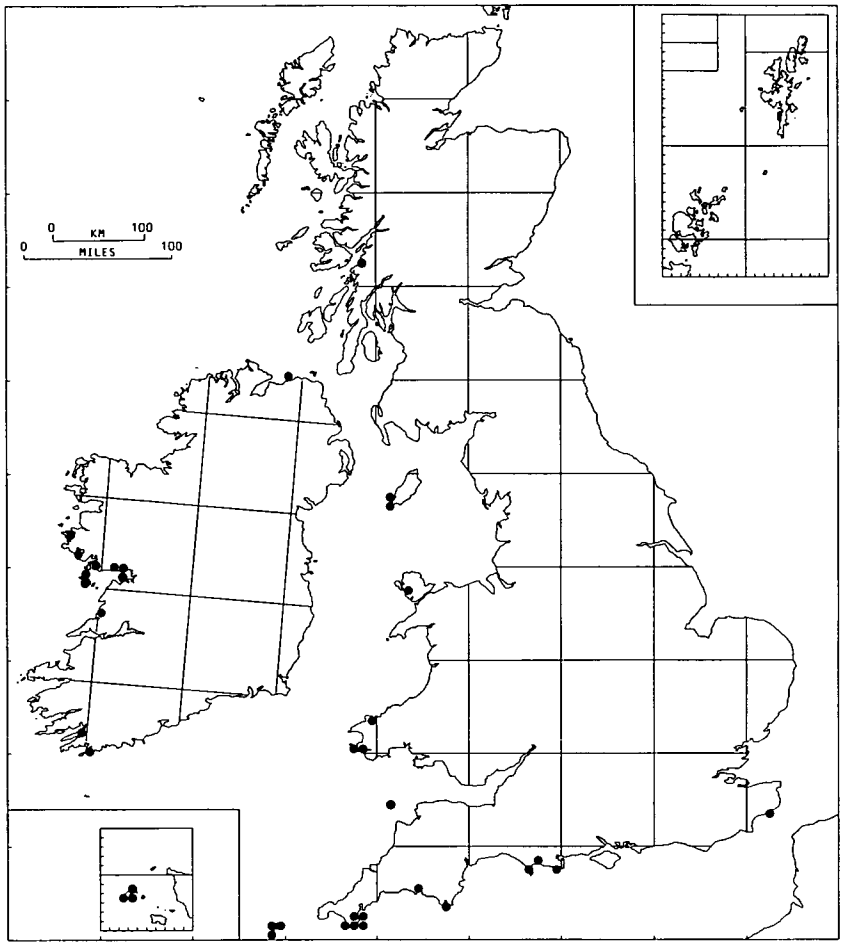
Map 87 **Champia parvula** (C. Ag.) Harv. This 'southern' species appears to be more restricted in its distribution than previously thought. Many earlier records in the literature are misidentifications of Chylocladia verticillata (map 89).



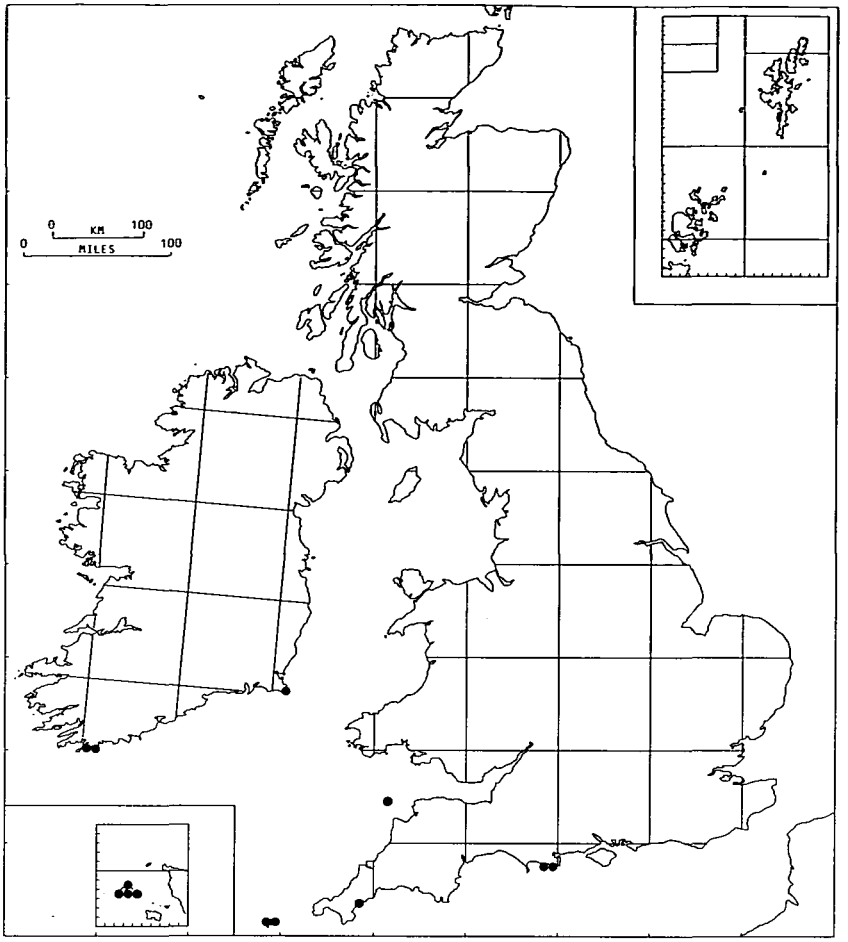
Map 88 **Chondrus crispus** Stackh. The sparsity of records from Ireland even for 'Irish Moss' is testimony to the degree to which many common species are under-recorded there. See van den Hoek (1982a).



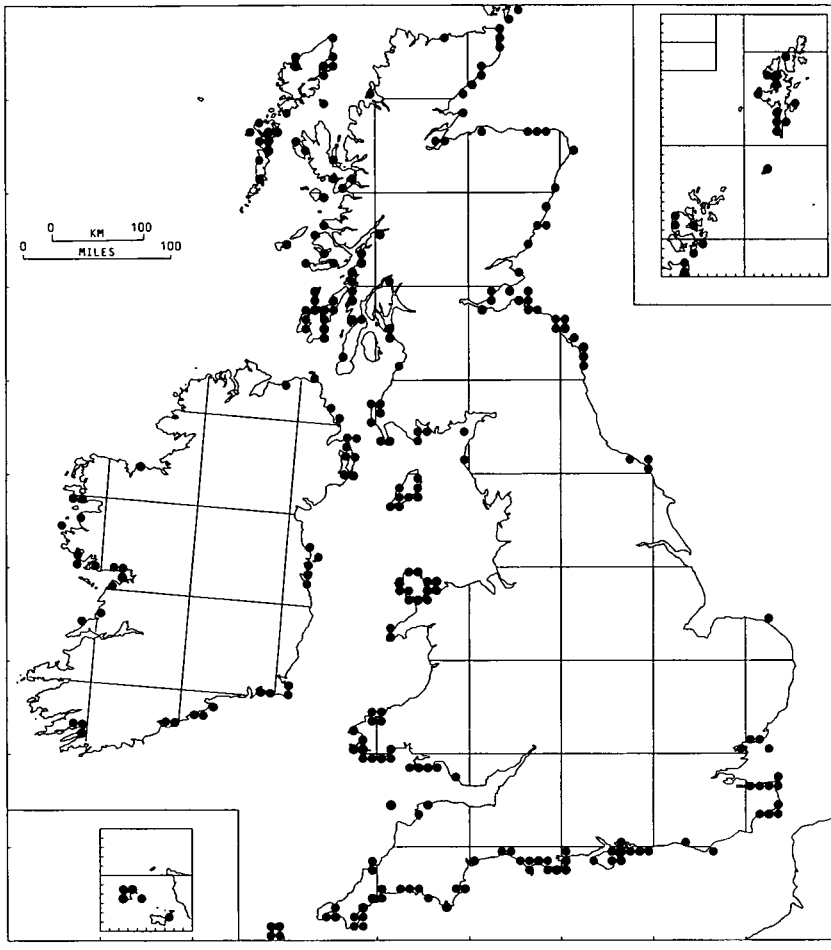
Map 89 **Chylocladia verticillata** (Lightf.) Bliding A 'southern' species that is fairly common on western shores, but rare on the east coast of England. It is most commonly found in tide pools or in the subtidal zone.



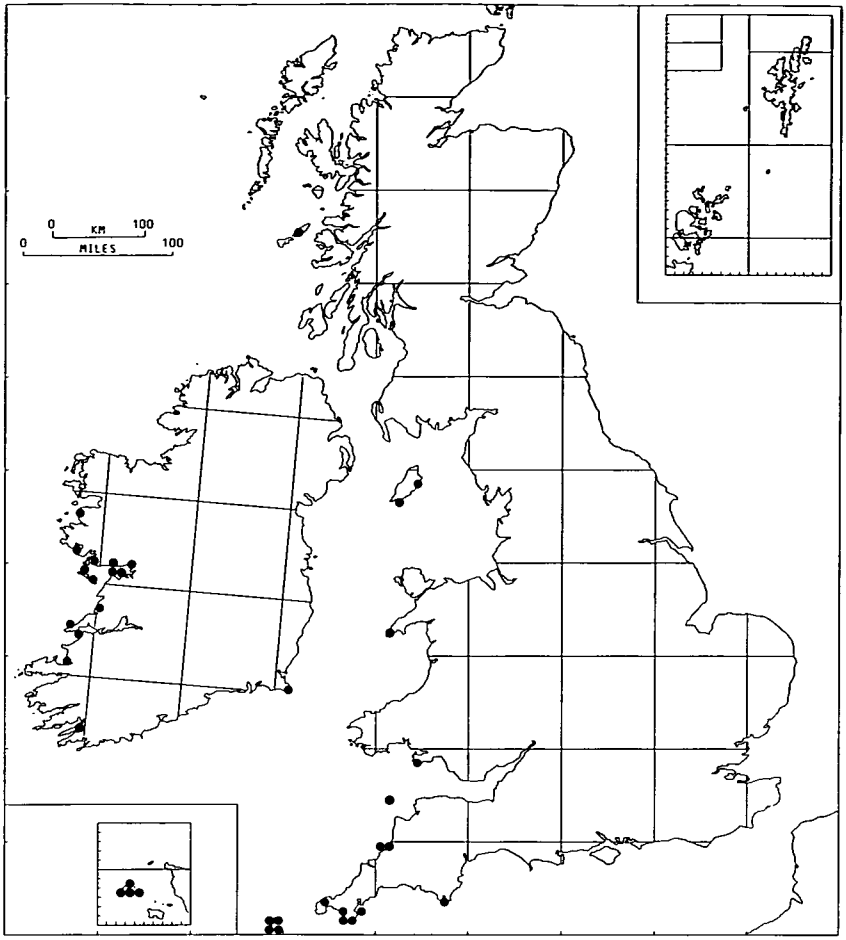
Map 92 **Corynospora pedicellata** (Sm.) J. Ag. A filamentous alga inhabiting deep pools and the subtidal zone. Only recognizable under the microscope and therefore probably under-recorded.



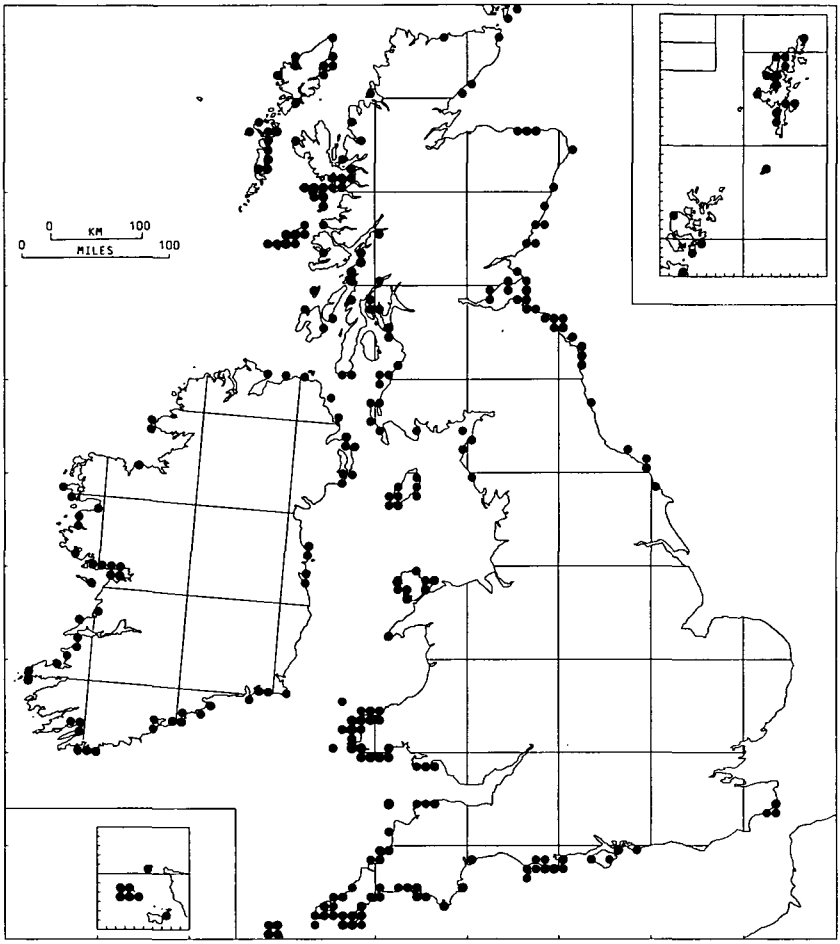
Map 93 **Crouania attenuata** (C. Ag.) J. Ag. An inconspicuous but distinctive plant. Rare and with a very limited distribution in the British Isles.



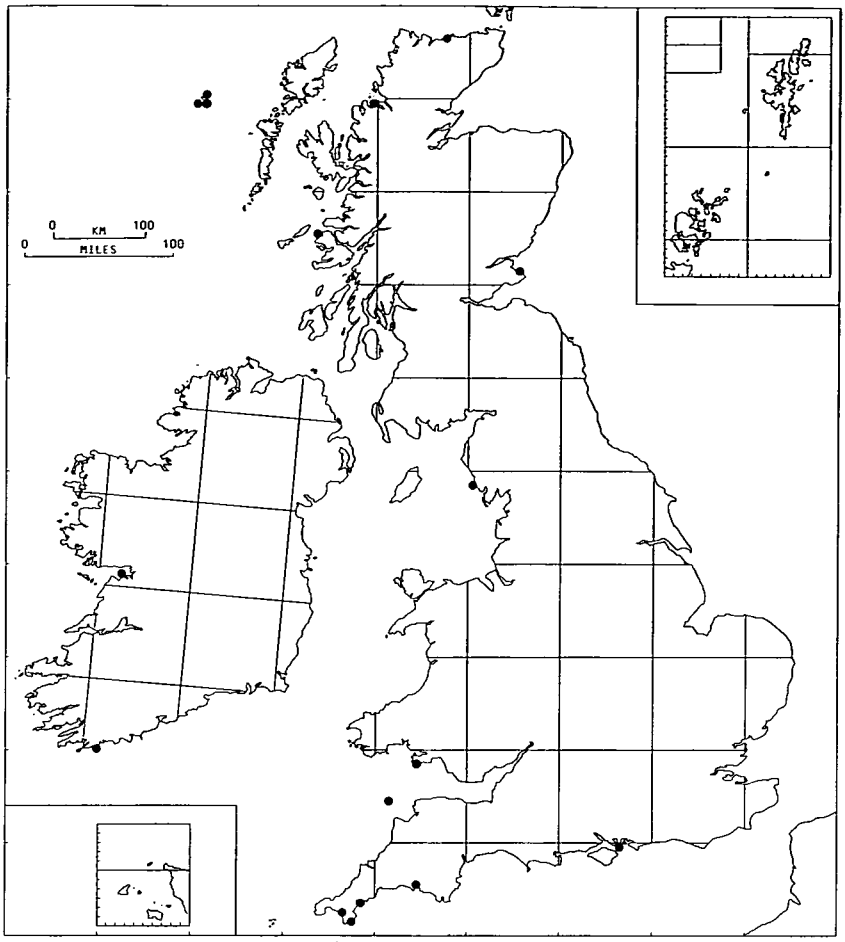
Map 96 **Cystoclonium purpureum** (Huds.) Batt. A 'northern' species that is fairly common and widespread around the British Isles.



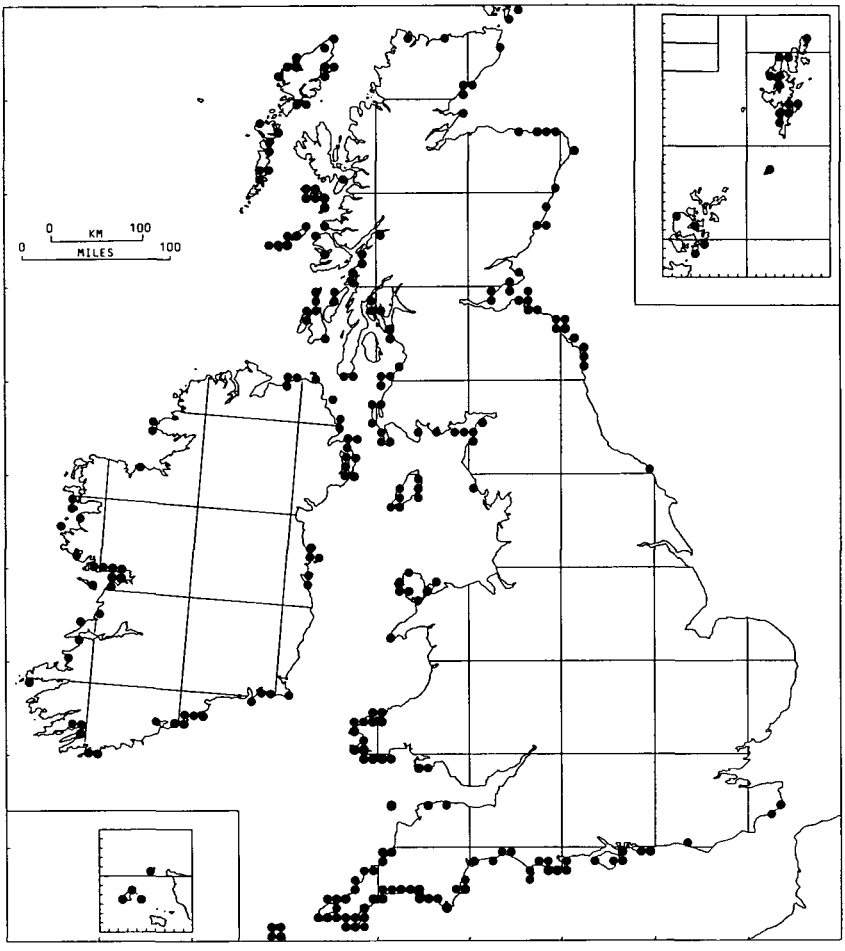
Map 97 **Dasya hutchinsiae** Harv. An uncommon species confined to intertidal pools and the subtidal zone on the western coasts of the British Isles. Its recorded northern limit is off the Hebridean Island of Coll, a region that seems to be the northernmost outpost of many 'southern' species.



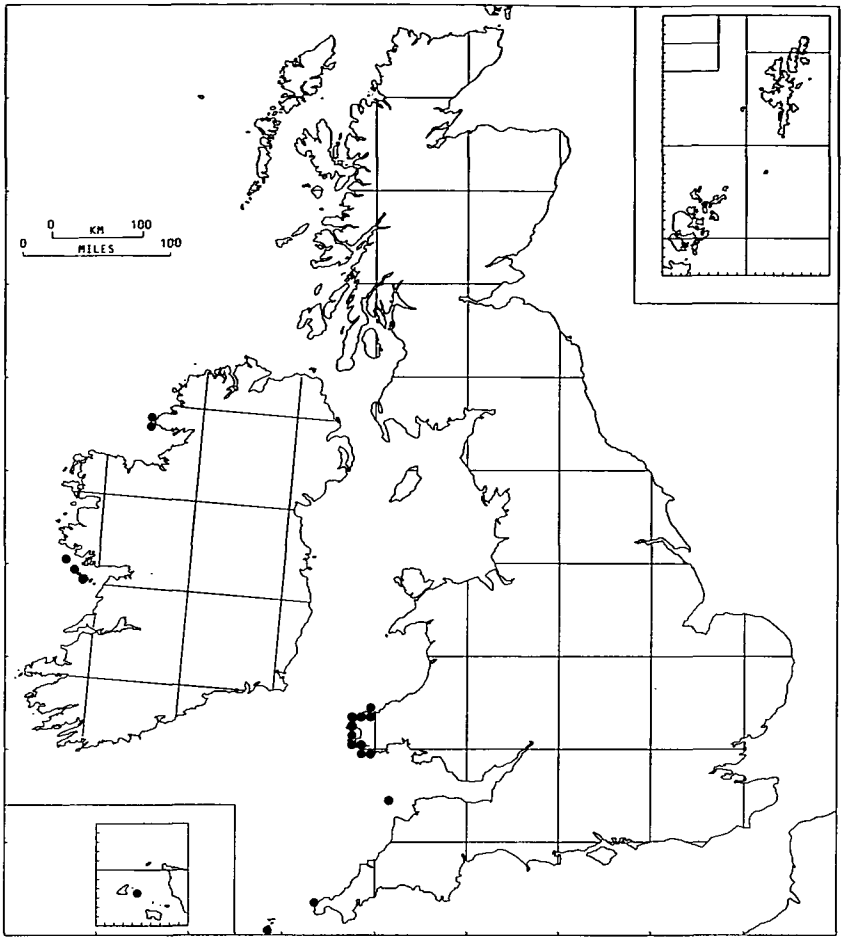
Map 98 **Delesseria sanguinea** (Huds.) Lamour. A common and distinctive subtidal plant. In summer it is one of our most beautiful seaweeds, but in winter it tends to die back to the midribs. Its apparent scarcity on the east coast of England requires investigation.



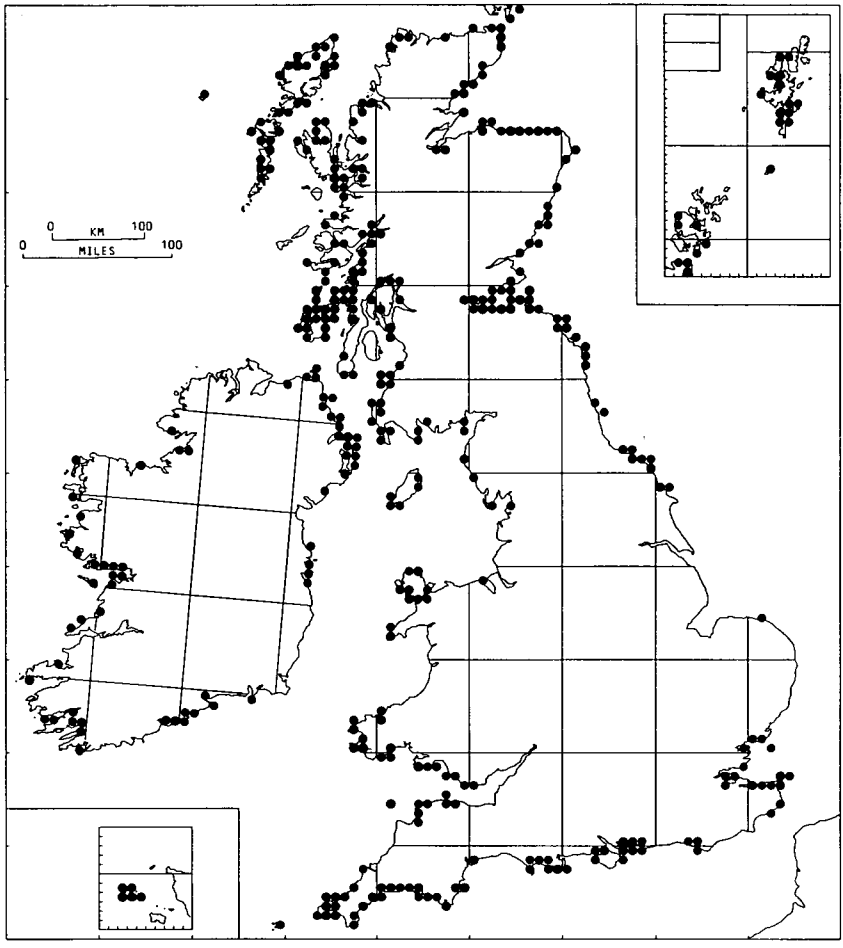
Map 99 **Dermatolithon corallinae** (Crouan frat.) Fosl. A small calcareous crust frequently found on Corallina officinalis (map 91) if searched for. Greatly under-recorded.



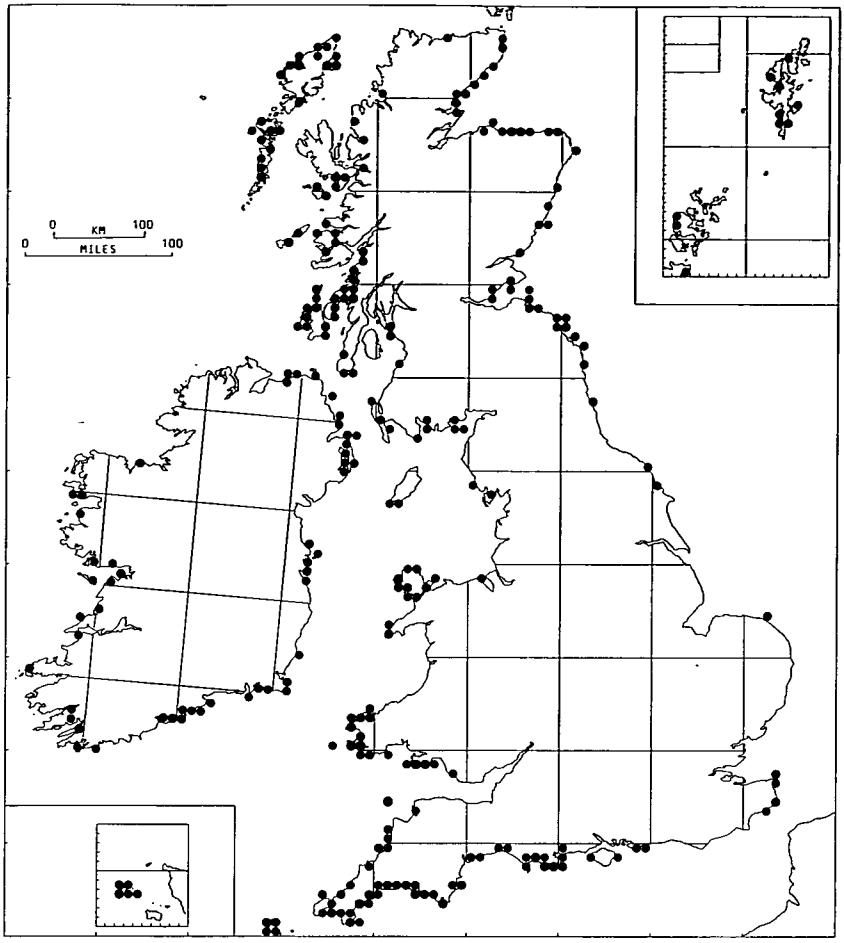
Map 100 **Dilsea carnosa** (Schmidel) O. Kuntze A common and distinctive subtidal plant. Its apparent scarcity on the east coast of England requires investigation.



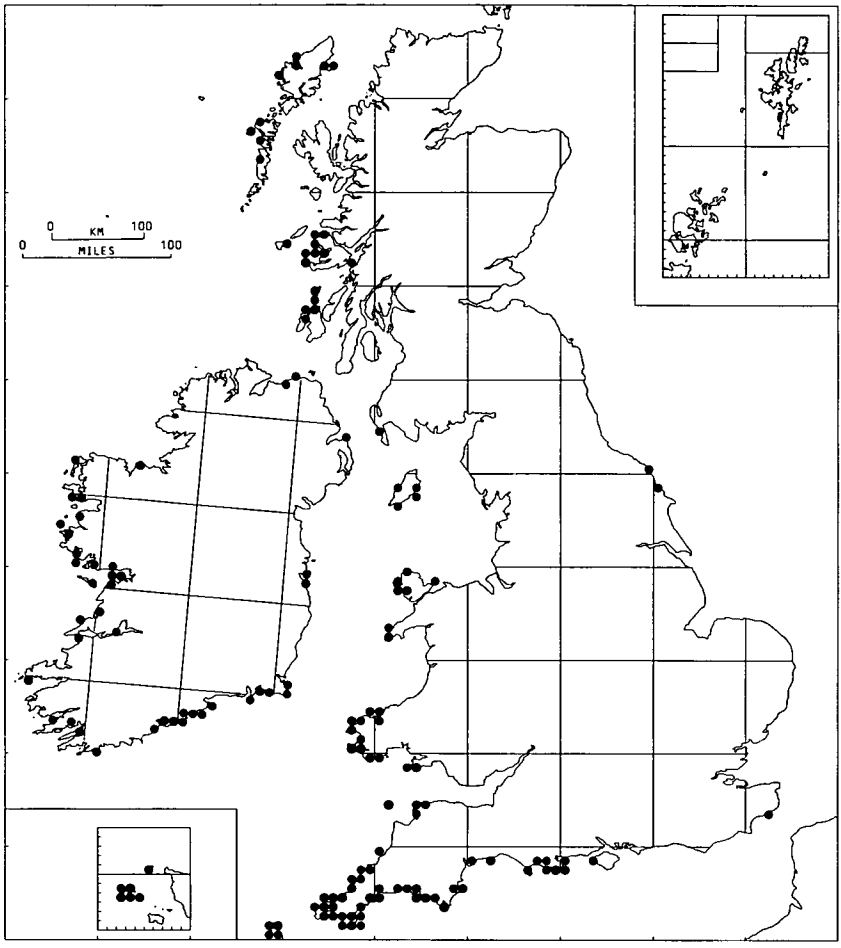
Map 101 **Drachiella spectabilis** Ernst et J. Feldm. This subtidal plant is both more abundant and more widely distributed than formerly thought. It is rarely recorded because, except in early summer when the plants display a striking blue iridescence, it is inconspicuous and easily overlooked. See Maggs and Guiry (1982a) and Hiscock and Maggs (1984).



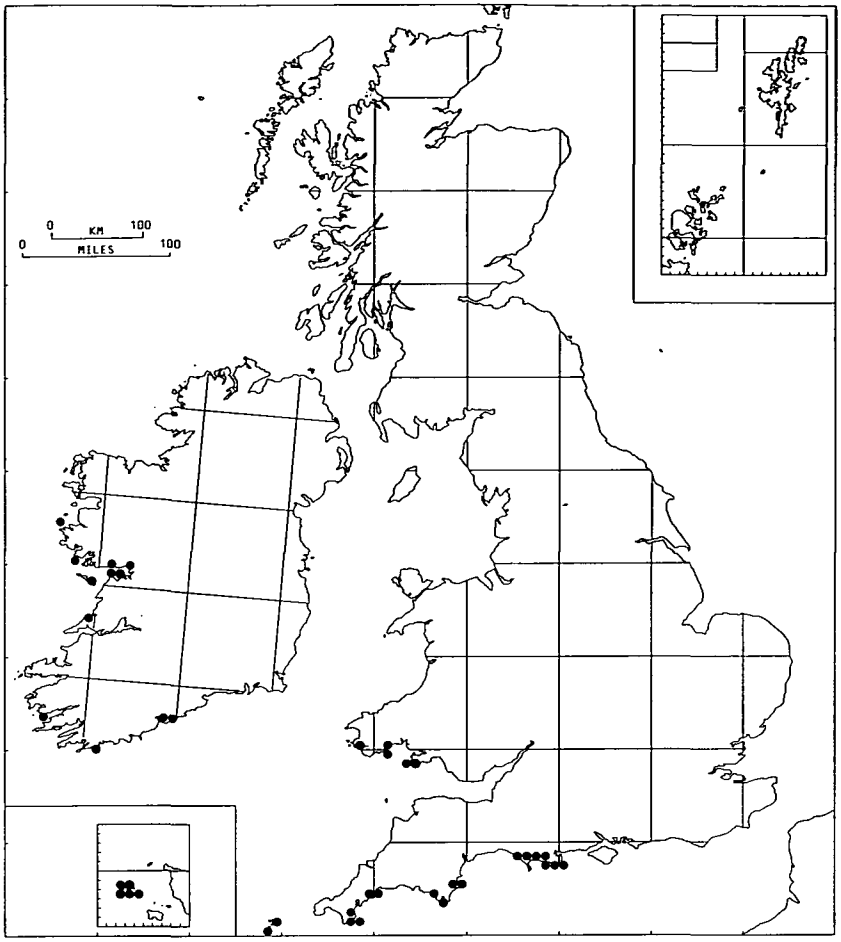
Map 102 **Dumontia contorta** (S.G. Gmelin) Rupr. A 'northern' species common in British shores especially in intertidal pools. See van den Hoek (1982b).



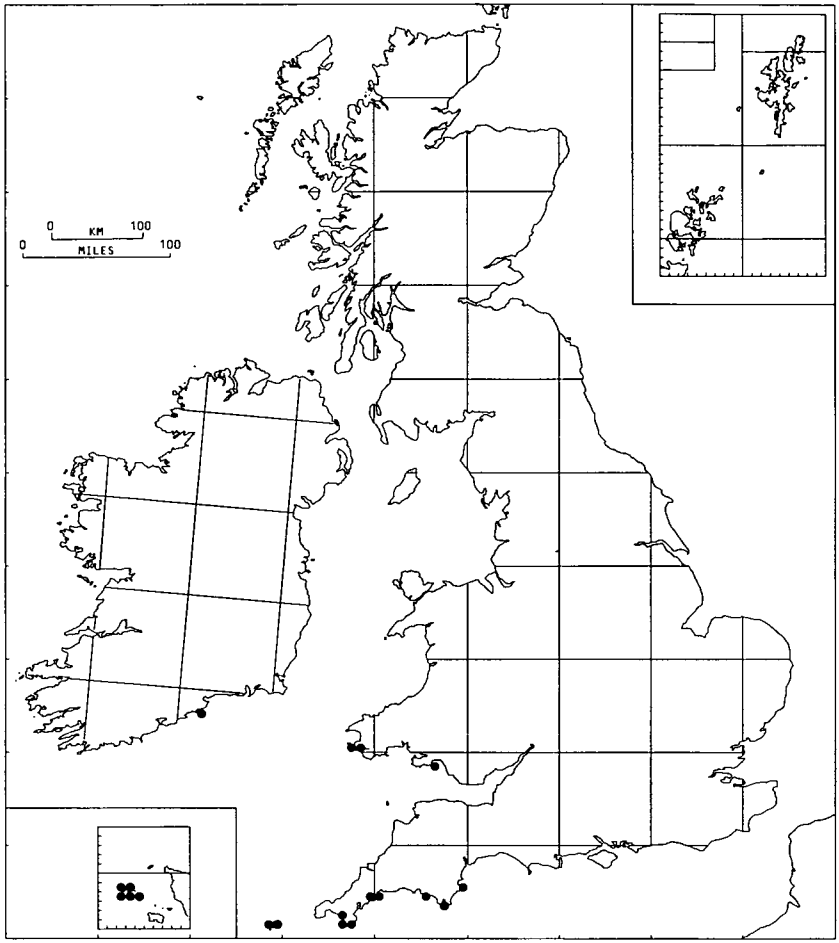
Map 103 **Furcellaria lumbricalis** (Huds.) Lamour. A 'northern' species common and widespread around the British Isles. Found in the lower shore tide pools and in the subtidal zone. Easily confused with Polyides rotundus.



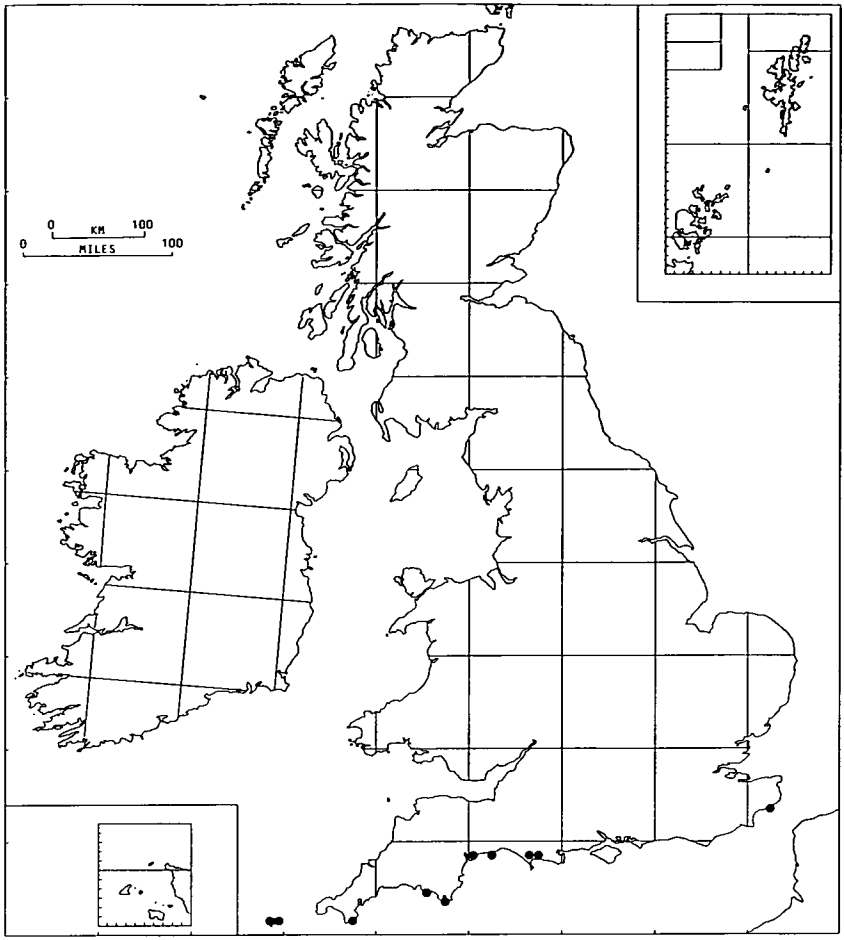
Map 104 **Gastroclonium ovatum** (Huds.) Papenf. A distinctive 'southern' species, fairly common on western shores but very rare on the east coast. Most often found in lower shore tide pools or in the shallow sublittoral zone, especially on somewhat exposed coasts.



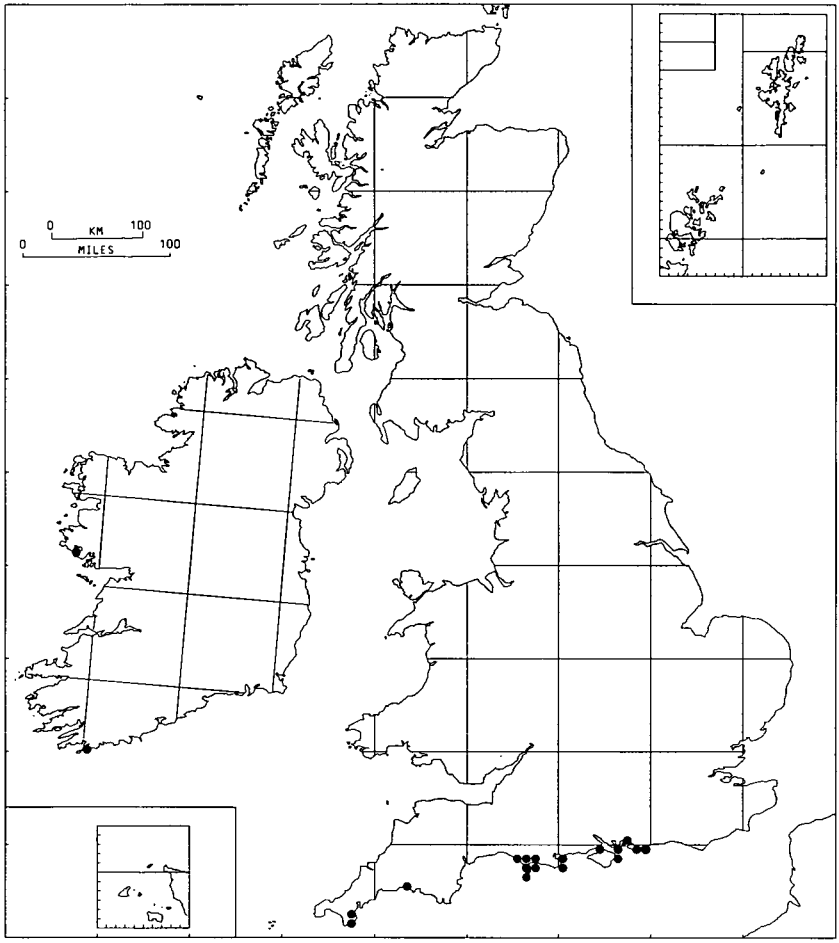
Map 105 **Gigartina acicularis** (Wulf.) Lamour. A 'southern' species that is locally abundant in the south west of the British Isles. It is easily confused with several other species and therefore may sometimes be overlooked.



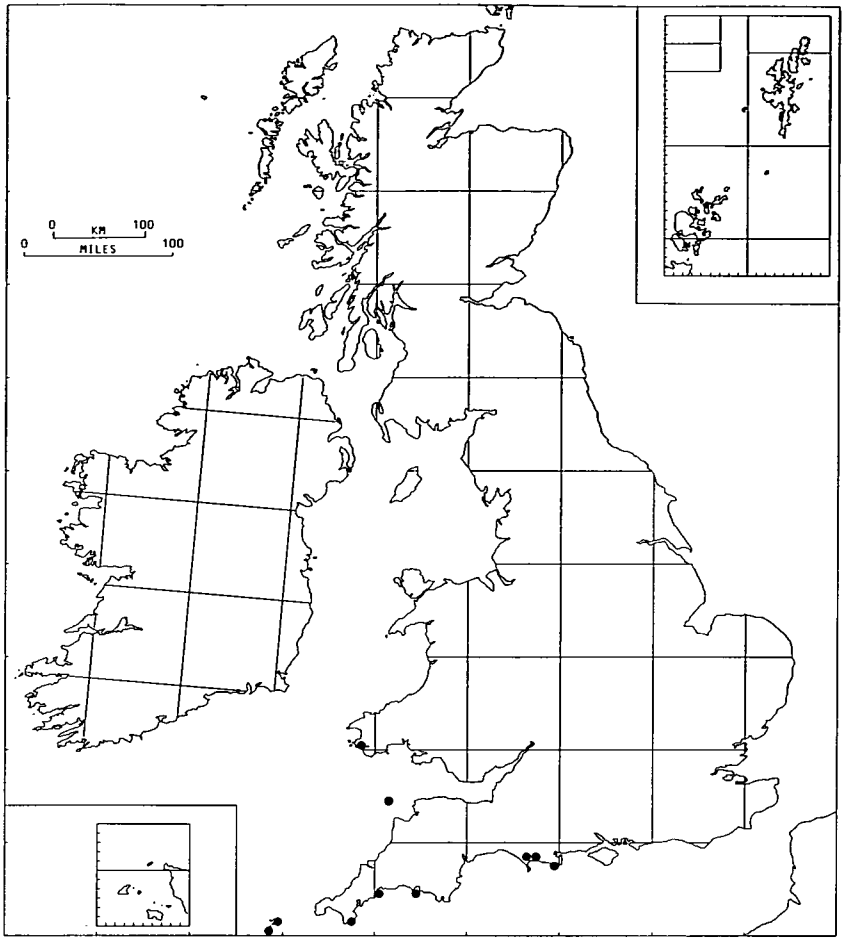
Map 106 **Gigartina pistillata** (S.G. Gmel.) Stackh. A 'southern' species confined to south-western shores. Unless cystocarps are present, it may sometimes be mistaken for Furcellaria or Polyides and therefore fail to get recorded.



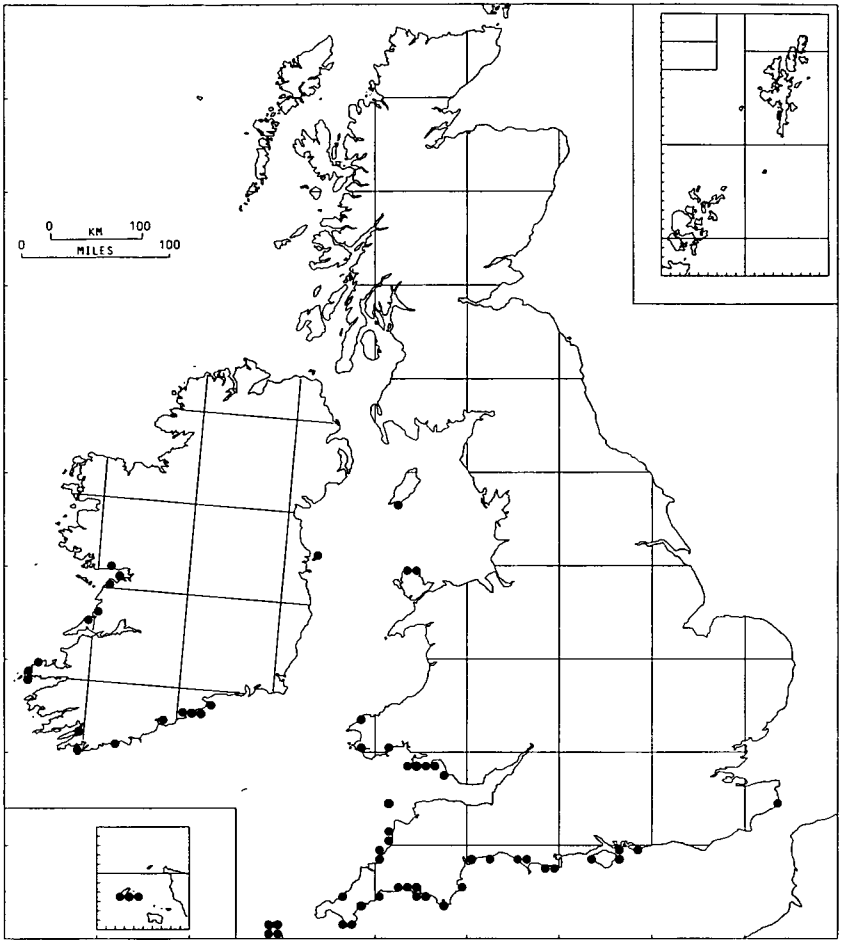
Map 107 **Gigartina teedii** (Roth) Lamour. A cosmopolitan inhabitant of warm - temperate waters in the northern hemisphere, but rare in Britain.



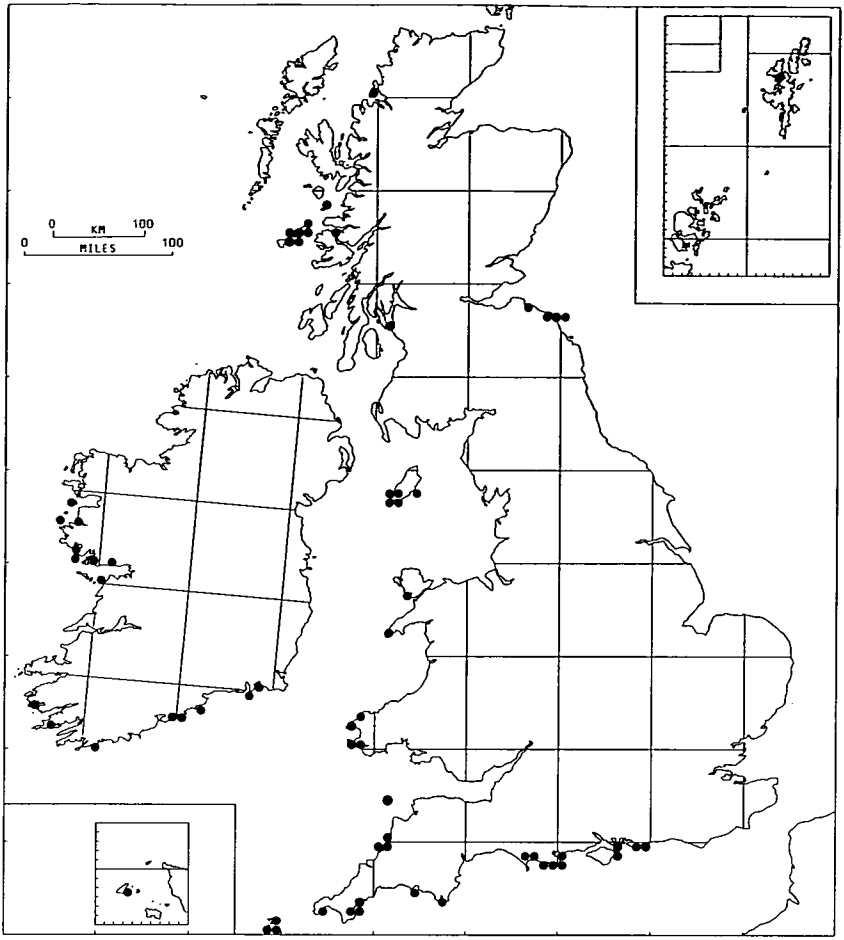
Map 108 **Gracilaria bursa-pastoris** (S.G. Gmel.) Silva A species widely distributed in warmer waters, but apparently rare in the British Isles. Found in the shallow subtidal zone on sheltered shores. It is easily confused with G. verrucosa, a much commoner species, and may thus be overlooked.



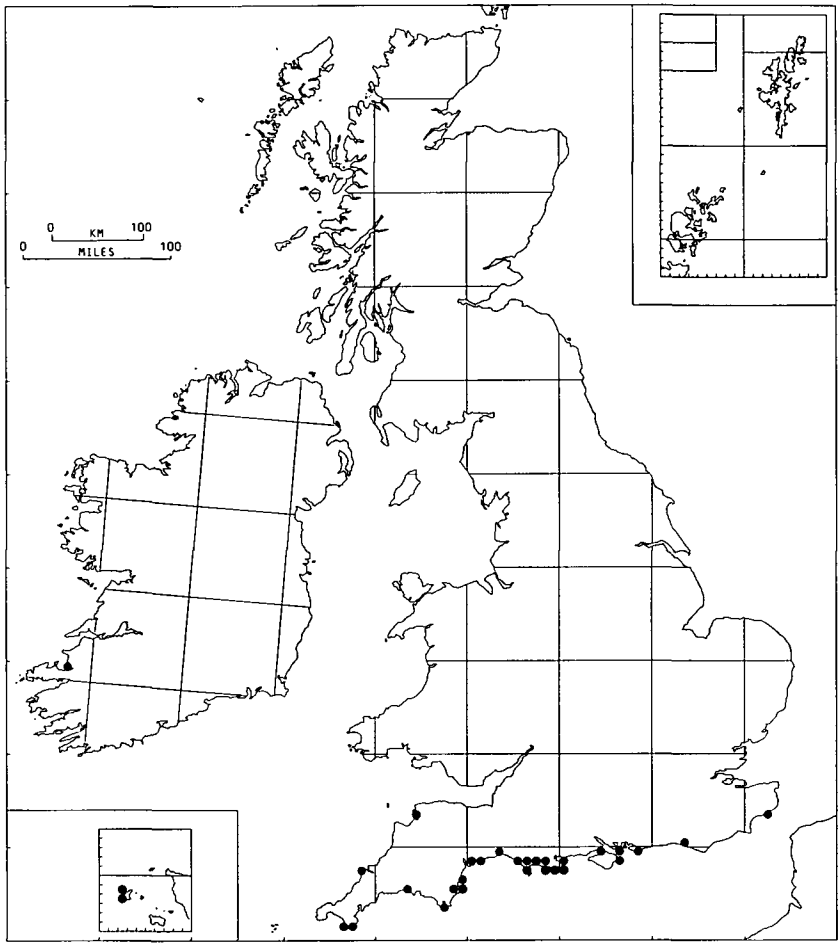
Map 109 **Grateloupia dichotoma** J. Ag. A widespread warm-water species occurring in south west Britain. The plants are quite small and not easy to identify with certainty so may be under-recorded.



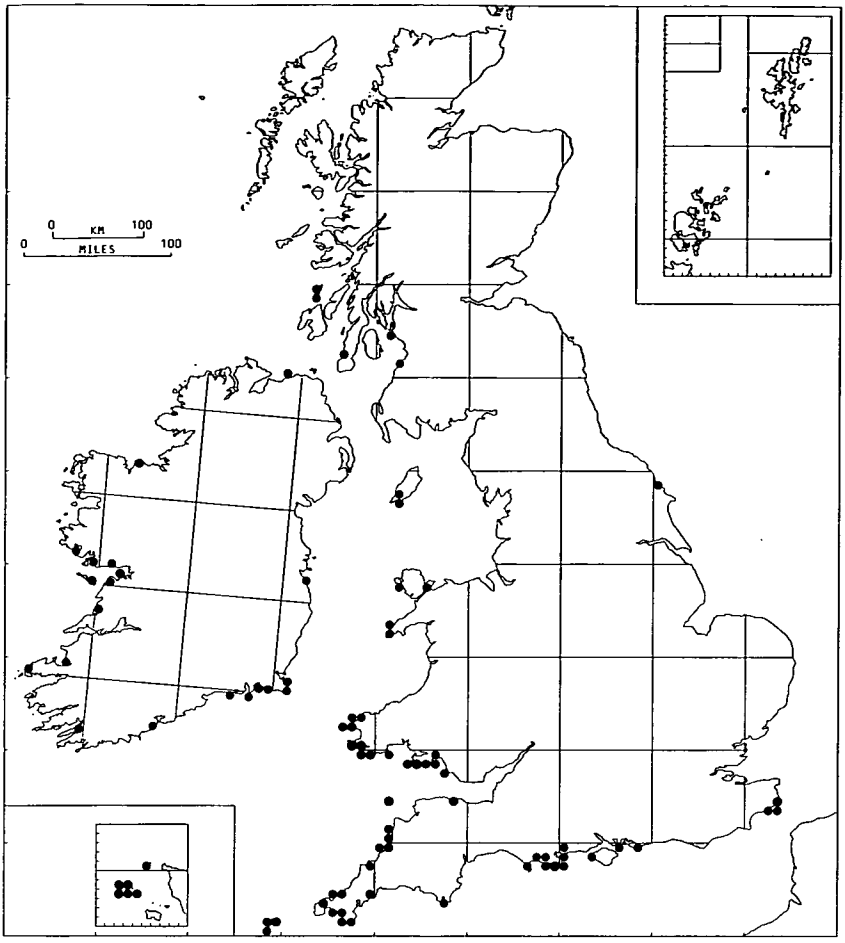
Map 110 **Grateloupia filicina** (Lamour.) C. Ag. A cosmopolitan species found in most warmer seas and, like several members of the genus, reaching its northern limits around the British Isles.



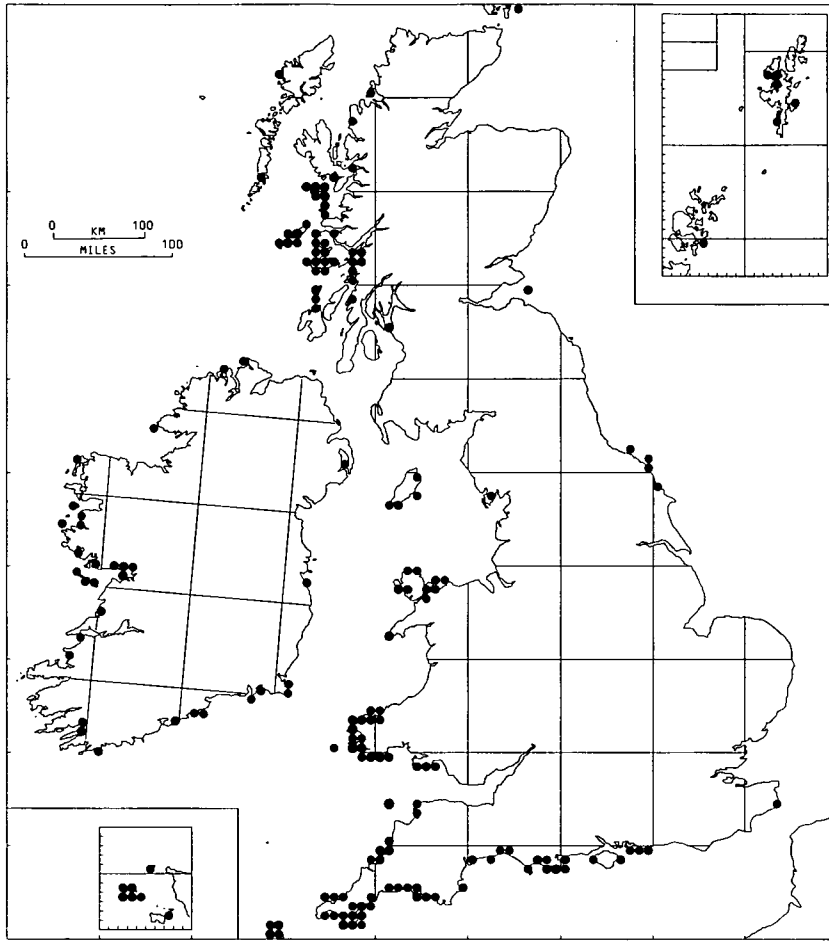
Map 111 **Halarachnion ligulatum** (Woodw.) Kütz. A locally abundant, largely deep water species. It should be searched for on the east coast where it may be more frequent than present records suggest. The plants are very variable in appearance and can be confused with Platoma unless examined microscopically.



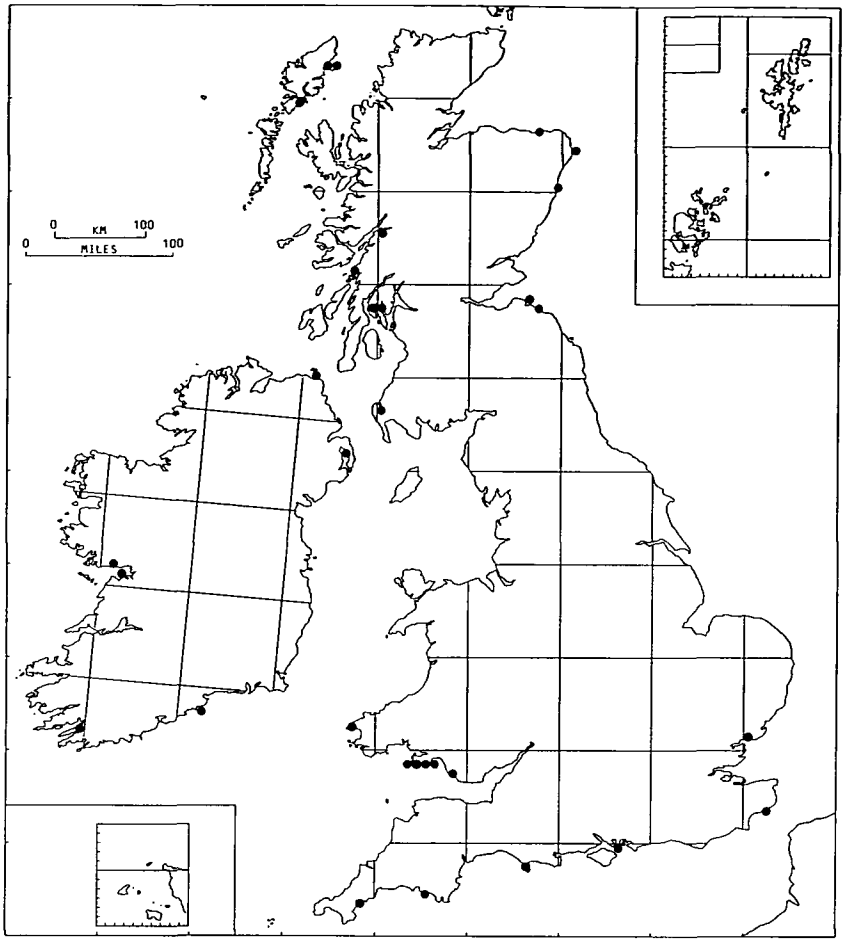
Map 112 **Halopitys incurvus** (Huds.) Batt. A distinctive 'southern' species. Locally quite abundant subtidally on the south coast of England and well worth searching for in southern Ireland.



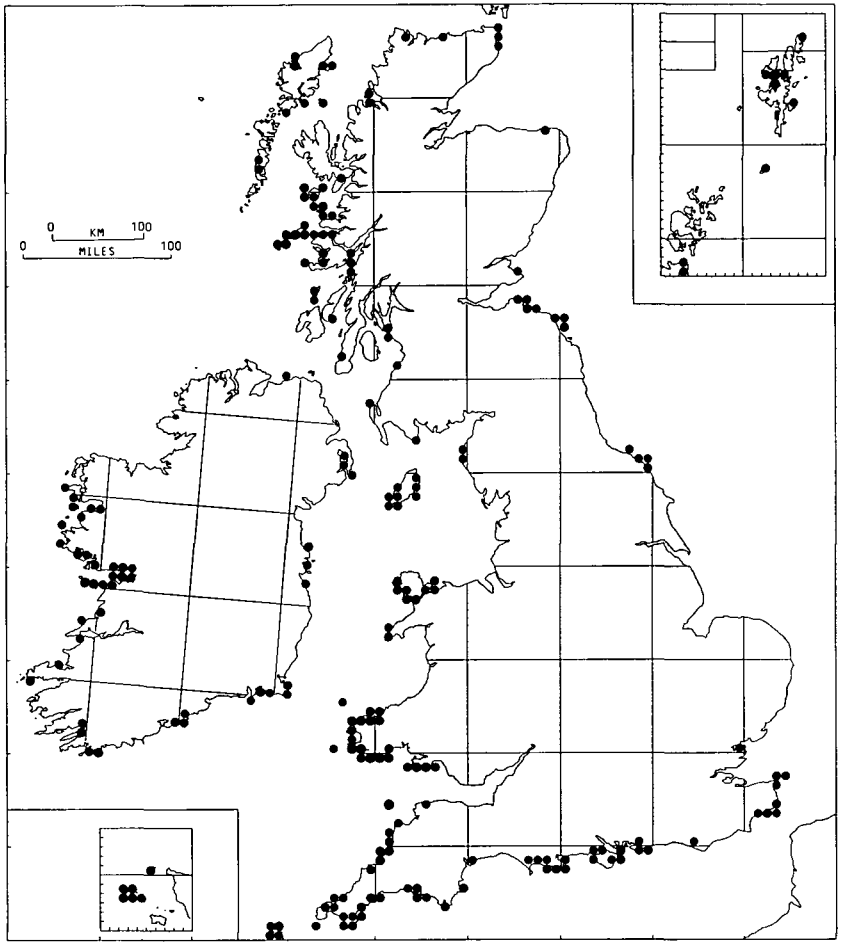
Map 113 **Halurus equisetifolius** (Lightf.) Kütz. A distinctive plant, locally abundant especially subtidally in the south but becoming progressively rarer northwards. Apparently very rare on the east coast.



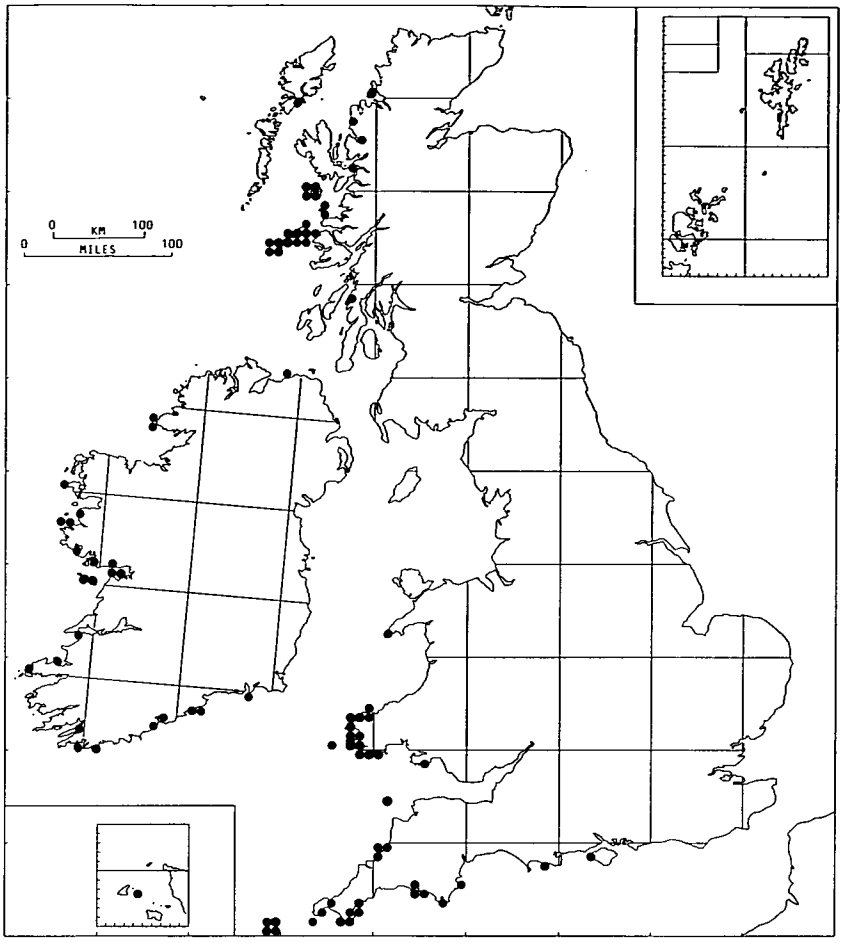
Map 114 **Heterosiphonia plumosa** (Ellis) Batt. A beautiful and distinctive subtidal plant. Formerly considered to be rare in Scotland, but in fact fairly common off western shores although uncommon on the east coast.



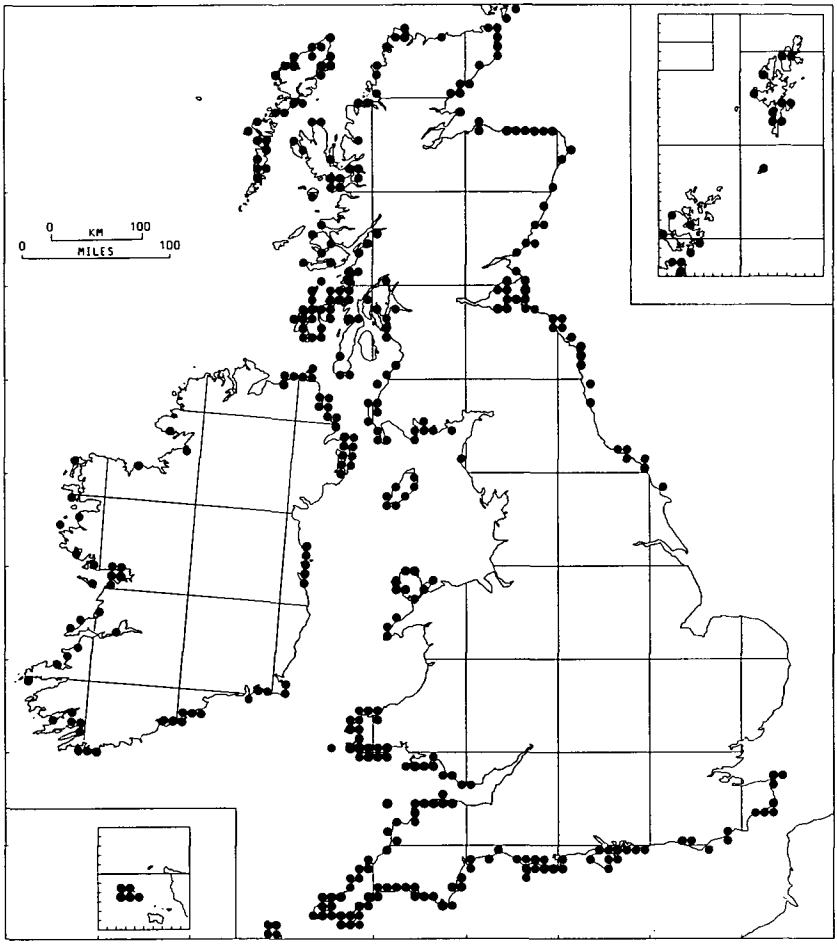
Map 115 **Hildenbrandia crouanii** J. Ag. Like all crustose algae this species is almost certainly under-recorded. It is certainly far less rare than formerly thought.



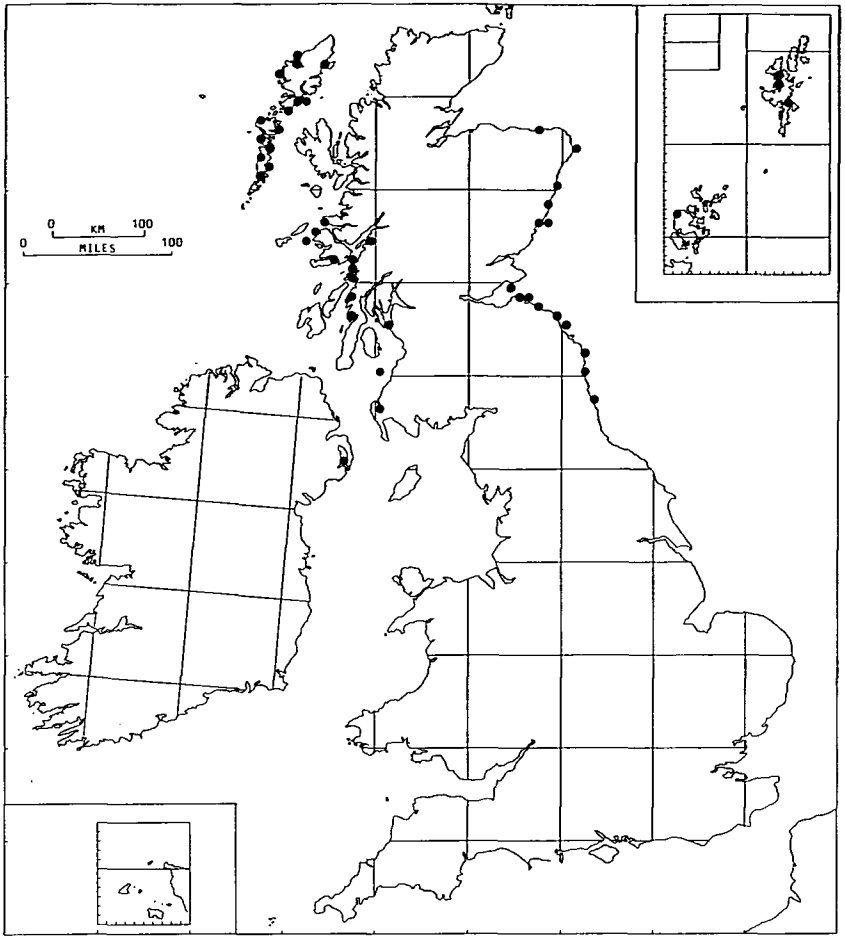
Map 116 **Hypoglossum woodwardii** Kütz. One of the more distinctive red seaweeds. It is quite common in Scotland although previously said to be rare. Found from around low water mark downwards, often on the stipes of Laminaria.



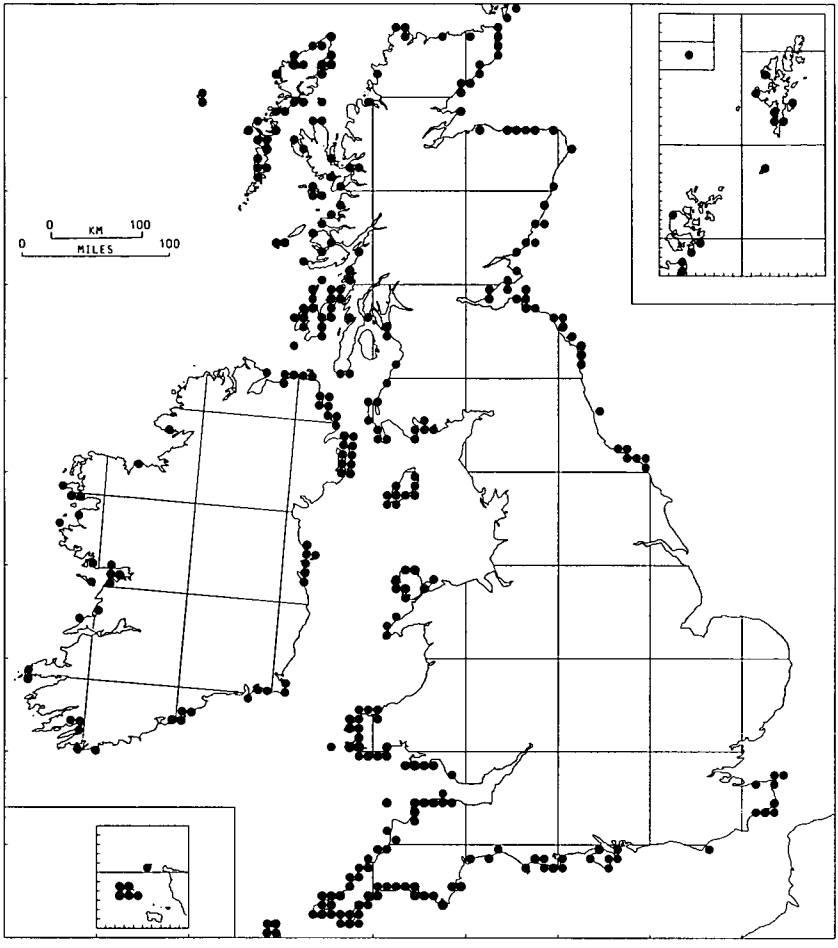
Map 117 **Kallymenia reniformis** (Turn.) J. Ag. A 'southern' species with the usual westerly distribution around the British Isles. Found in deep tide pools on the lower shore and in the subtidal zone, often on the stipes of Laminaria.



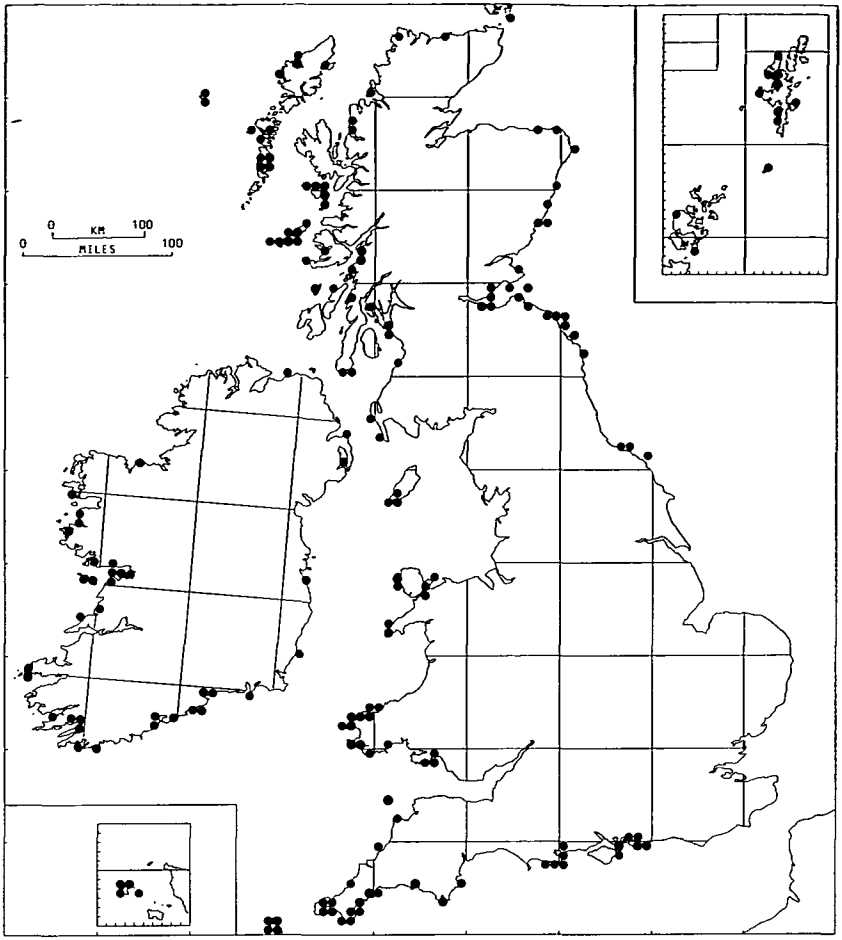
Map 118 **Laurencia pinnatifida** (Huds.) Lamour. One of the commoner intertidal red algae. However, L. platycephala, a newly described species, is very similar (see Magne 1980) and all records must be checked.



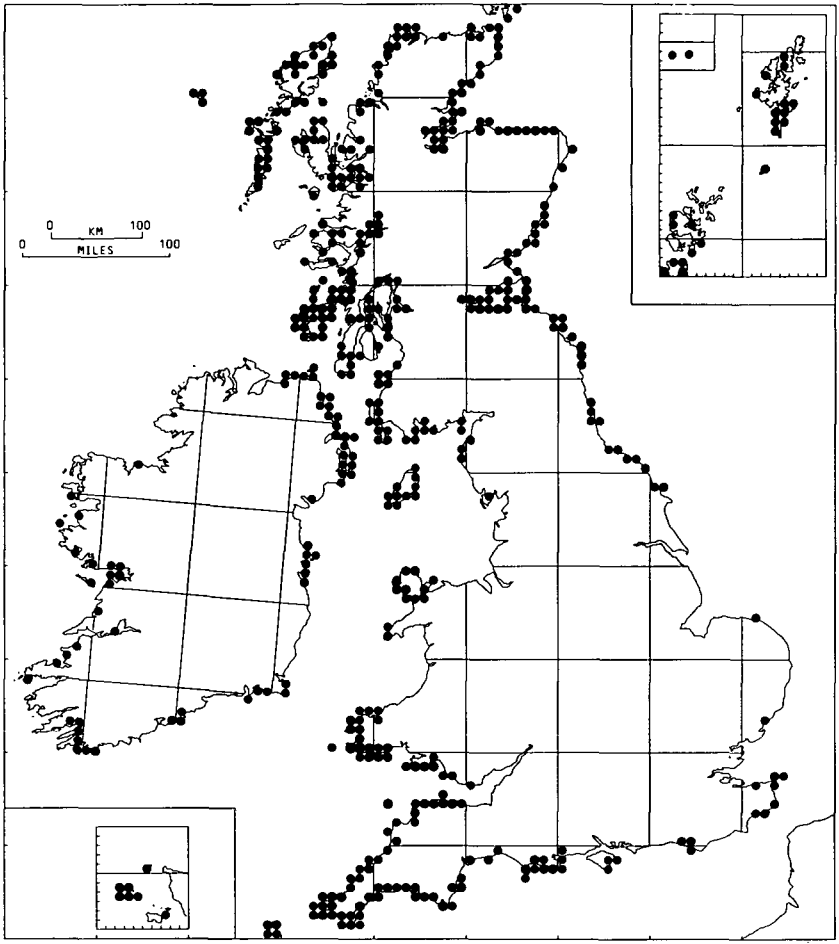
Map 119 **Lithothamnion glaciale** Kjellm. An Arctic Ocean species reaching northern Britain (see Adey and Adey 1973). It is a subtidal calcareous crust occurring on bed rock or pebbles or unattached as globular branched maërl or rhodoliths (see Norton and Mathieson 1983). Like all crustose species it is probably under-recorded.



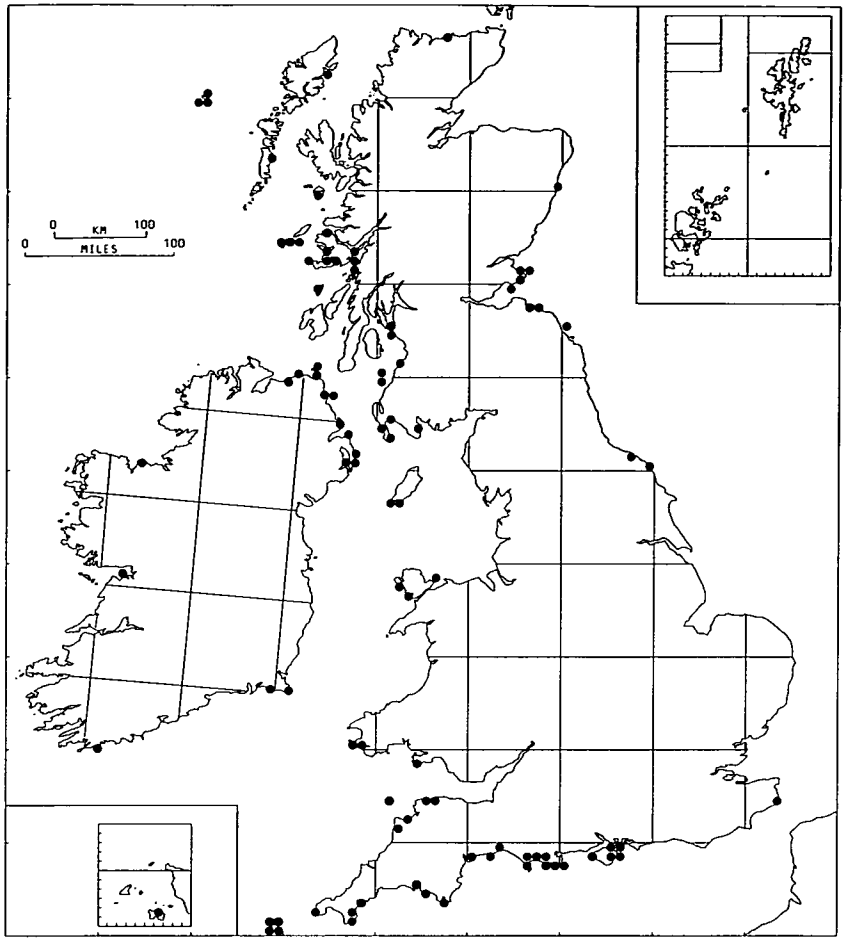
Map 120 **Lomentaria articulata** (Huds.) Lyngb. One of the commonest and most distinctive of intertidal red algae.



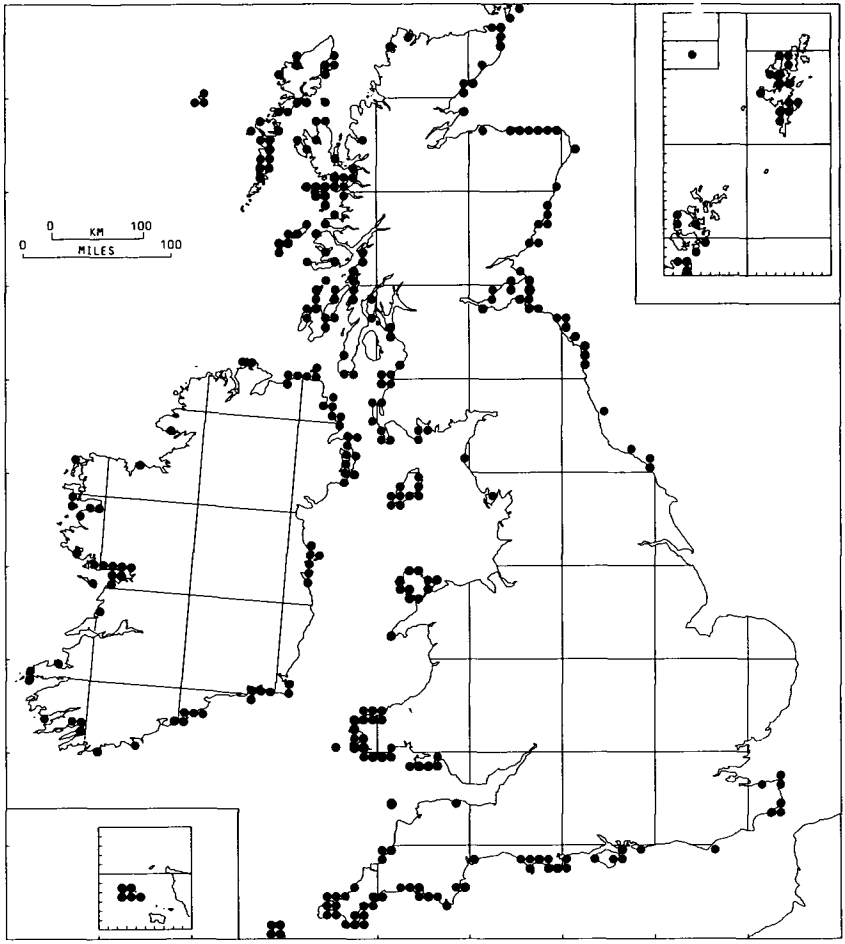
Map 121 **Lomentaria clavellosa** (Turn.) Gaill. A widespread species sometimes confused with Gloiosiphonia capillaris.



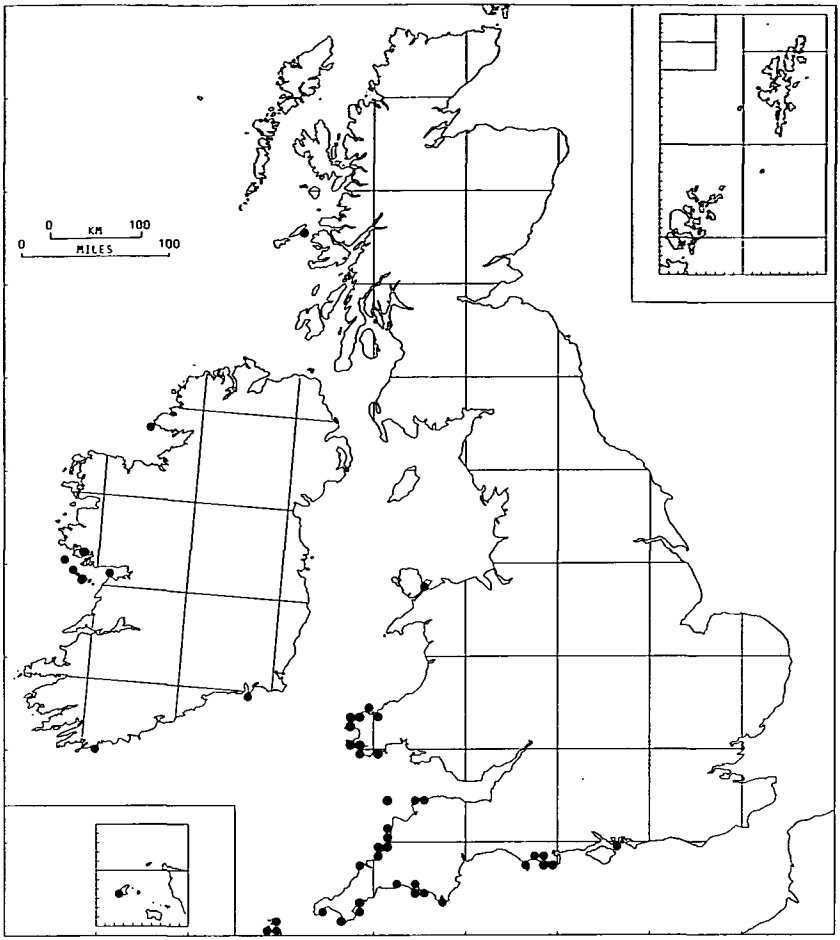
Map 122 **Mastocarpus stellatus** (Stackh.) Guiry (= Gigartina stellata (Stackh.) Batt.) A distinctive although very variable plant. One of the commoner inhabitants of the lower shore and shallow subtidal, sometimes forming very dense stands.



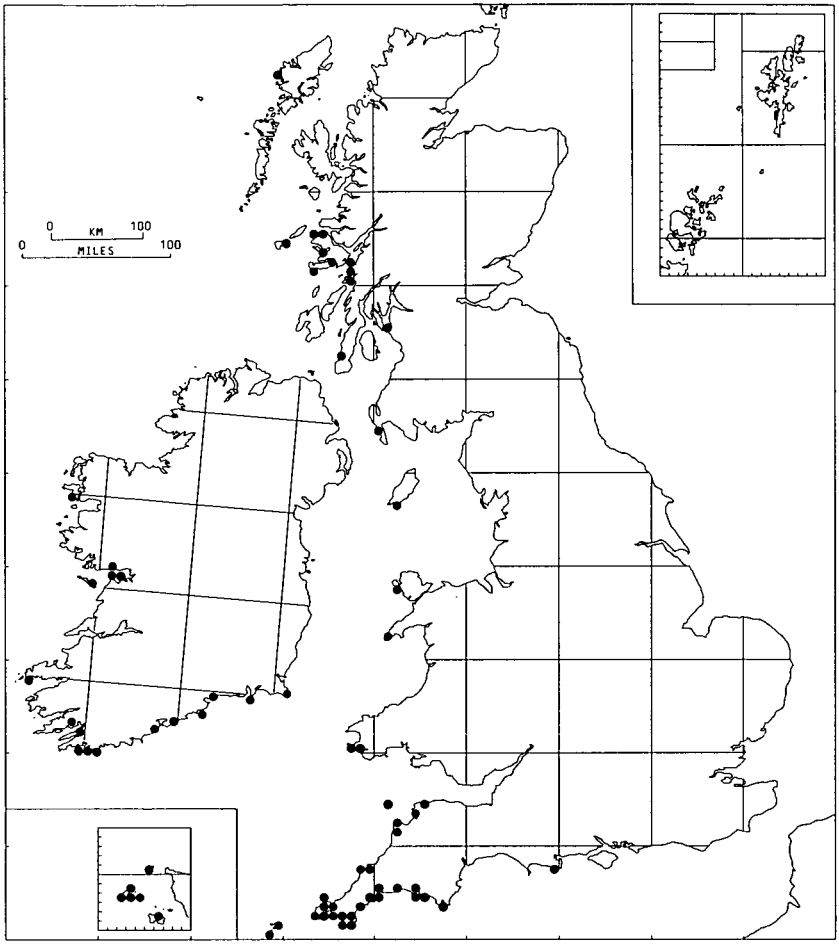
Map 123 **Melobesia membranacea** (Esper) Lamour. A small inconspicuous encrusting membranous alga found mostly on other seaweeds. Probably common, but easily overlooked.



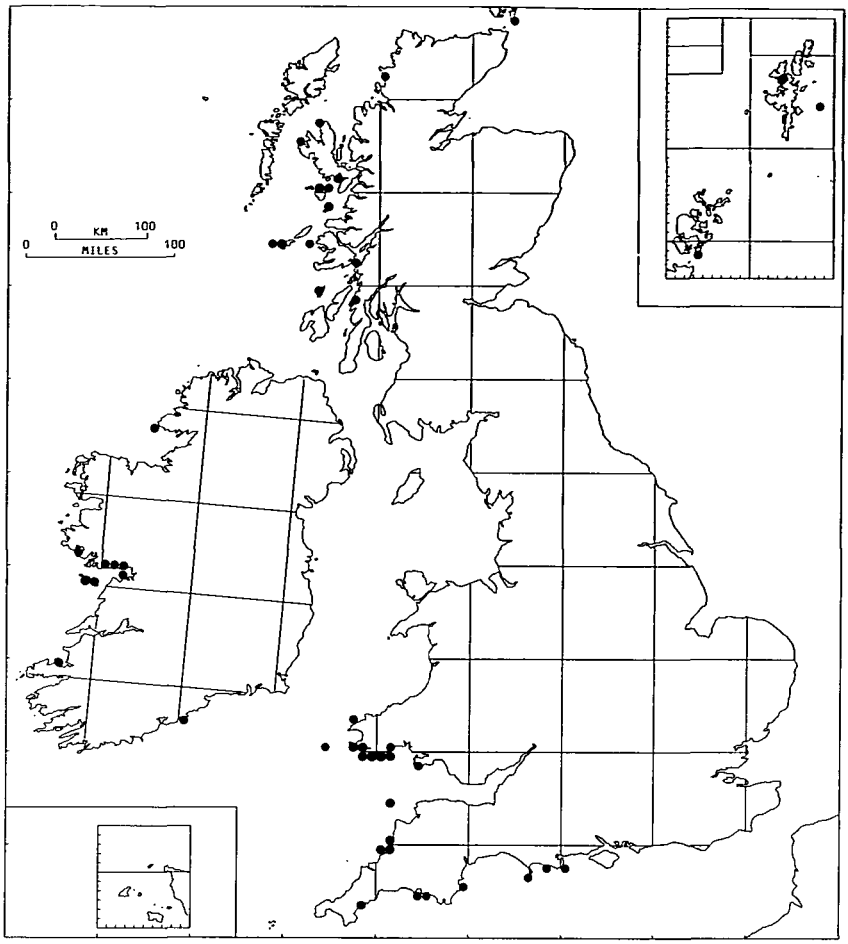
Map 124 **Membranoptera alata** (Huds.) Stackh. A common, easily recognised inhabitant of shady lower-shore pools and the subtidal zone, where it is often found on Laminaria stipes.



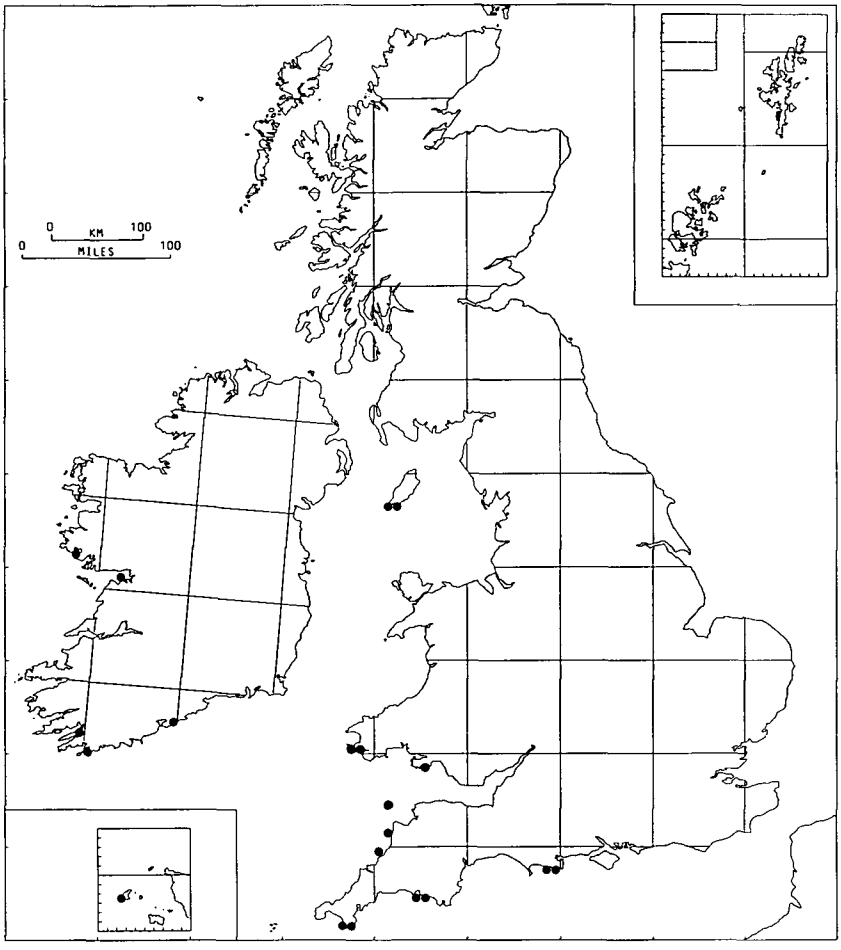
Map 125 **Meredithia microphylla** (J. Ag.) J. Ag. (= Kallymenia microphylla J. Ag.) Another 'southern' species with a westerly distribution around the British Isles. Although it was formerly considered to be rare, the species is in fact locally abundant, especially on subtidal cliffs and overhangs. It is probably frequently mistaken for Kallymenia reniformis (map 117).



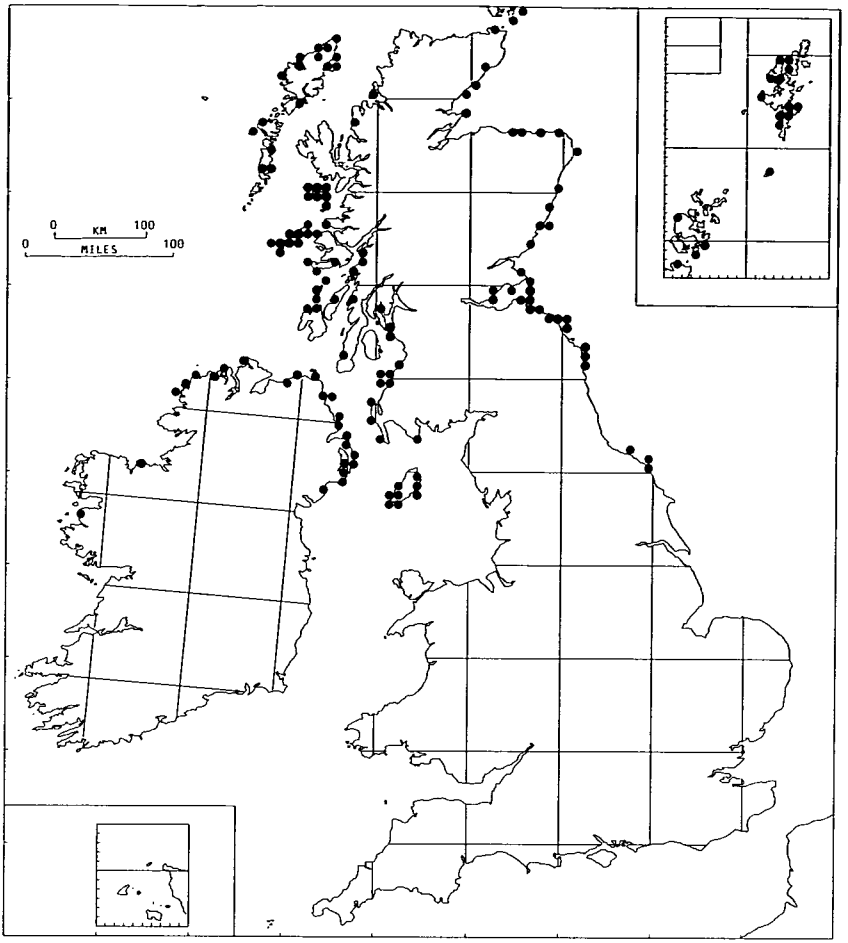
Map 126 **Mesophyllum lichenoides** (L.) Lemoine The most readily recognised of the calcareous crusts. Most characteristically found growing epiphytically on Corallina. It is a 'southern' species occurring on the western coasts of the British Isles. See Adey and Adey (1973).



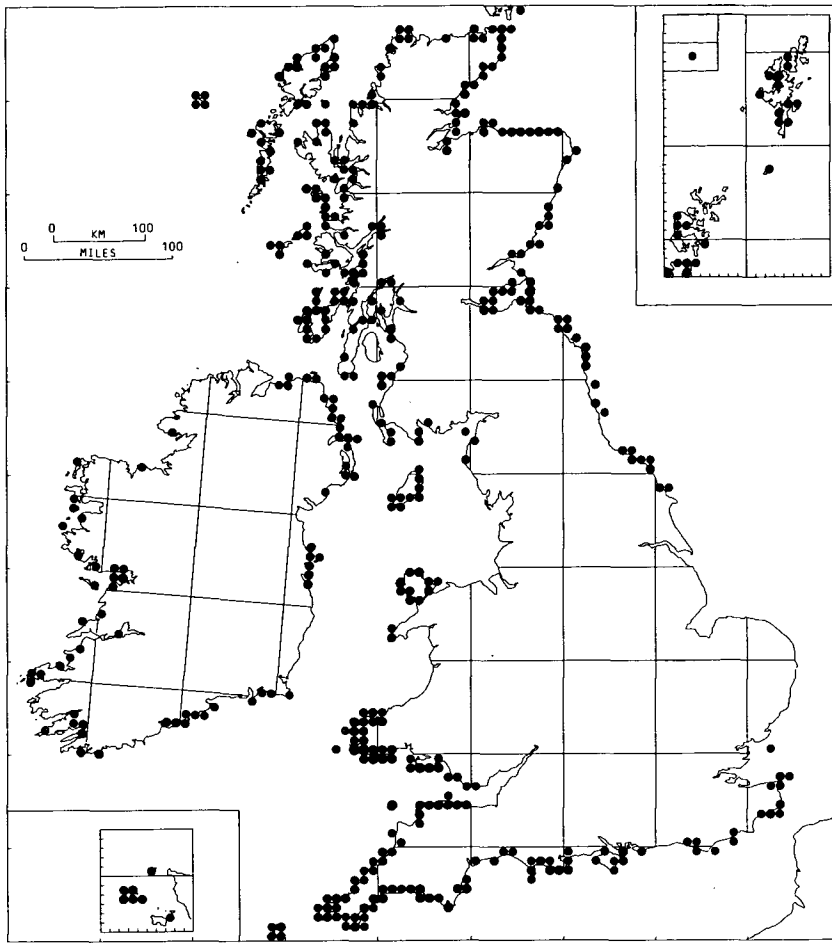
Map 127 **Myriogramme bonnemaisonii** (C. Ag.) Kylin A not uncommon subtidal plant on western shores, but very under-recorded. It usually occurs on kelp stipes.



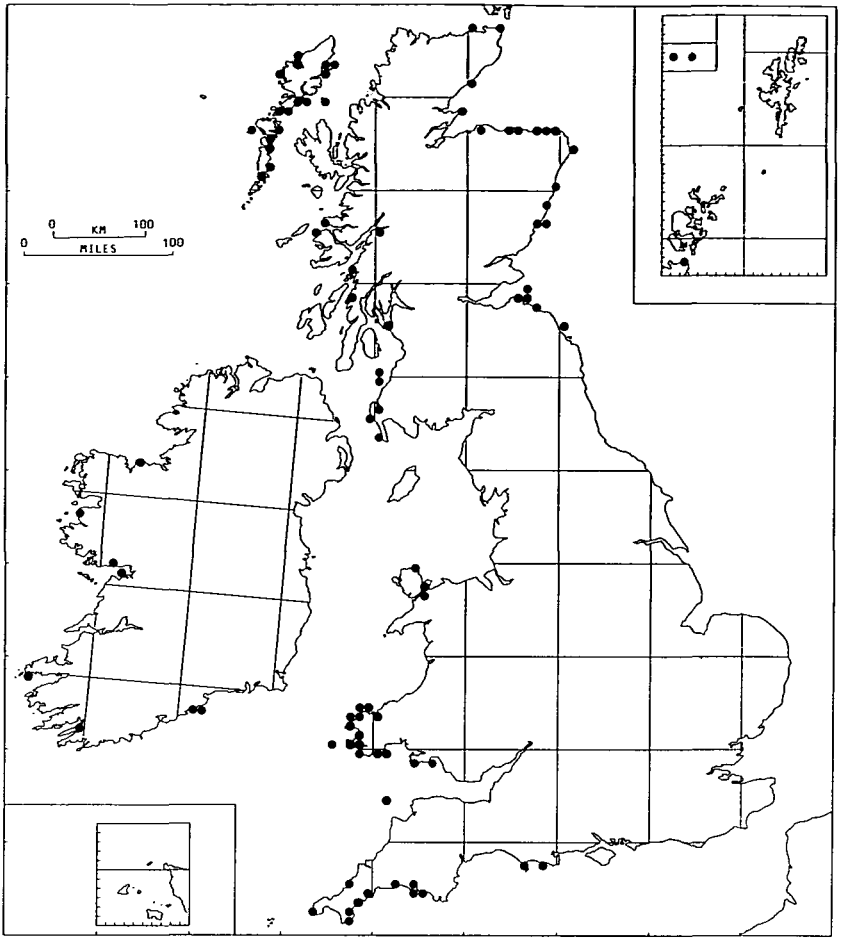
Map 128 **Naccaria wiggii** (Turn.) Endl. A subtidal plant of somewhat sporadic occurrence. A 'southern' species well worth looking for off southern and western shores.



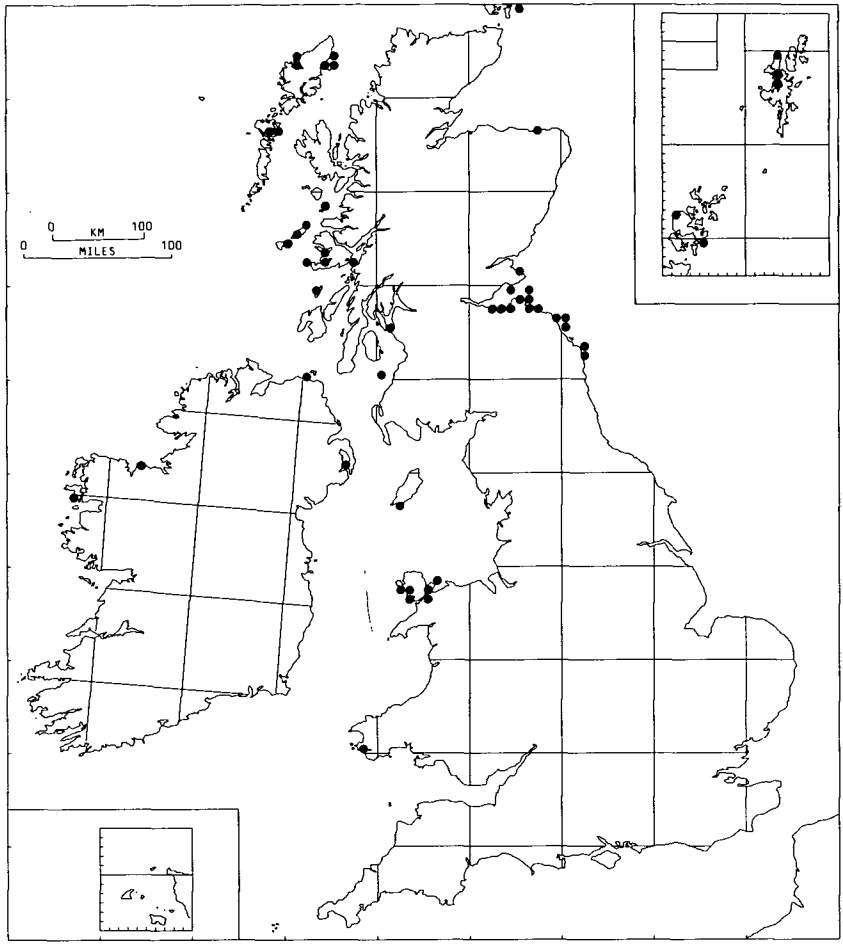
Map 129 **Odonthalia dentata** (L.) Lyngb. One of the most distinctive of the subtidal red algae. It is an inhabitant of the Arctic Ocean that reaches its southern limit around the British Isles.



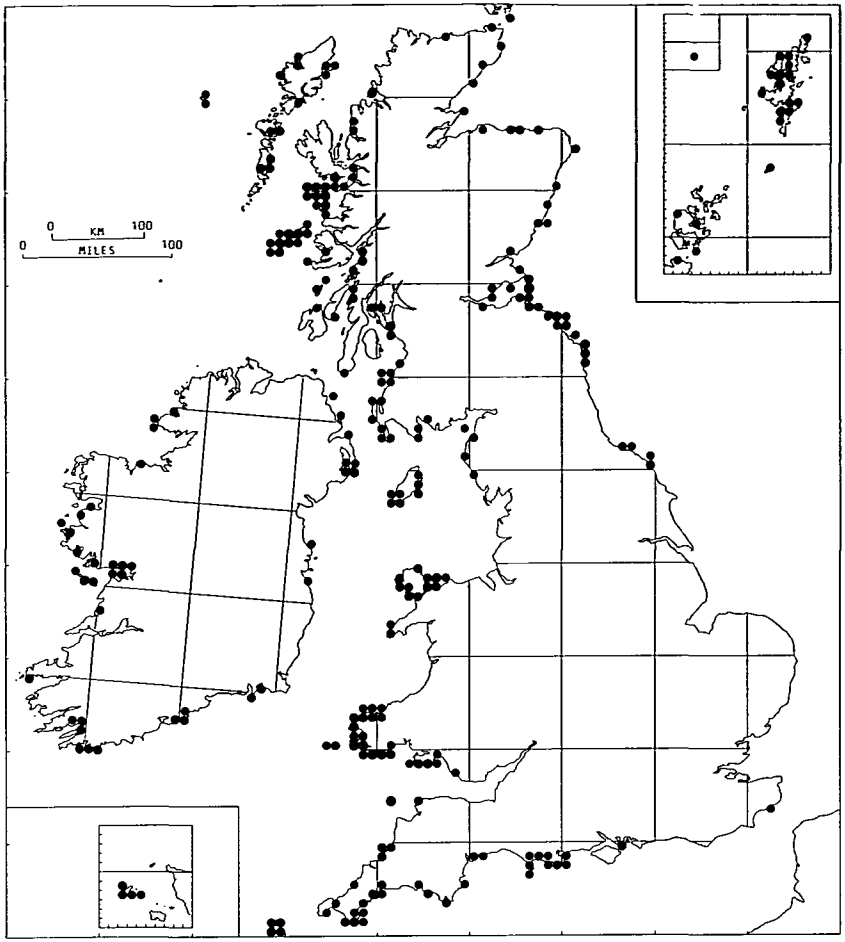
Map 130 **Palmaria palmata** (L.) O. Kuntze One of the commoner inhabitants of the shallow subtidal zone, usually found on Laminaria stipes. It is under-recorded in Ireland, but appears to be genuinely absent from parts of the east coast of England. See Guiry (1975).



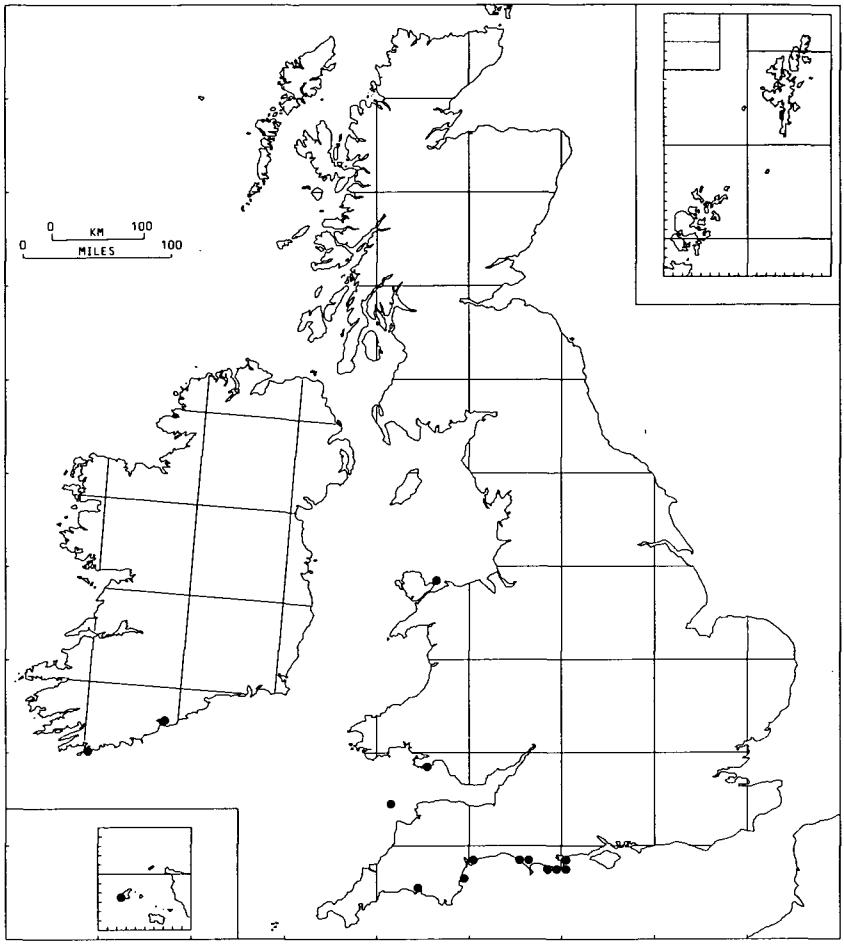
Map 131 **Petrocelis cruenta** J. Ag. An under-recorded species, like all crustose reds. It may be a phase in the life history of Mastocarpus stellatus (map 122).



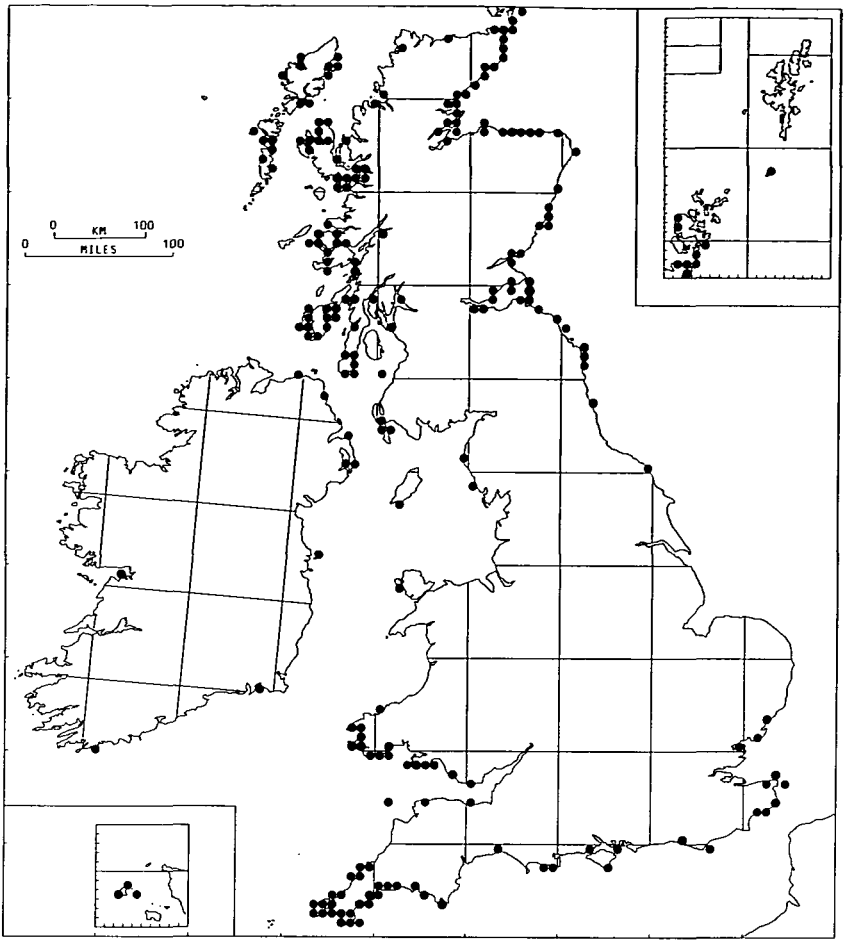
Map 132 **Phyllophora truncata** (Pall.) Zinova A subtidal inhabitant of the Arctic Ocean that reaches its southern limit around the British Isles. Probably commoner than the records suggest.



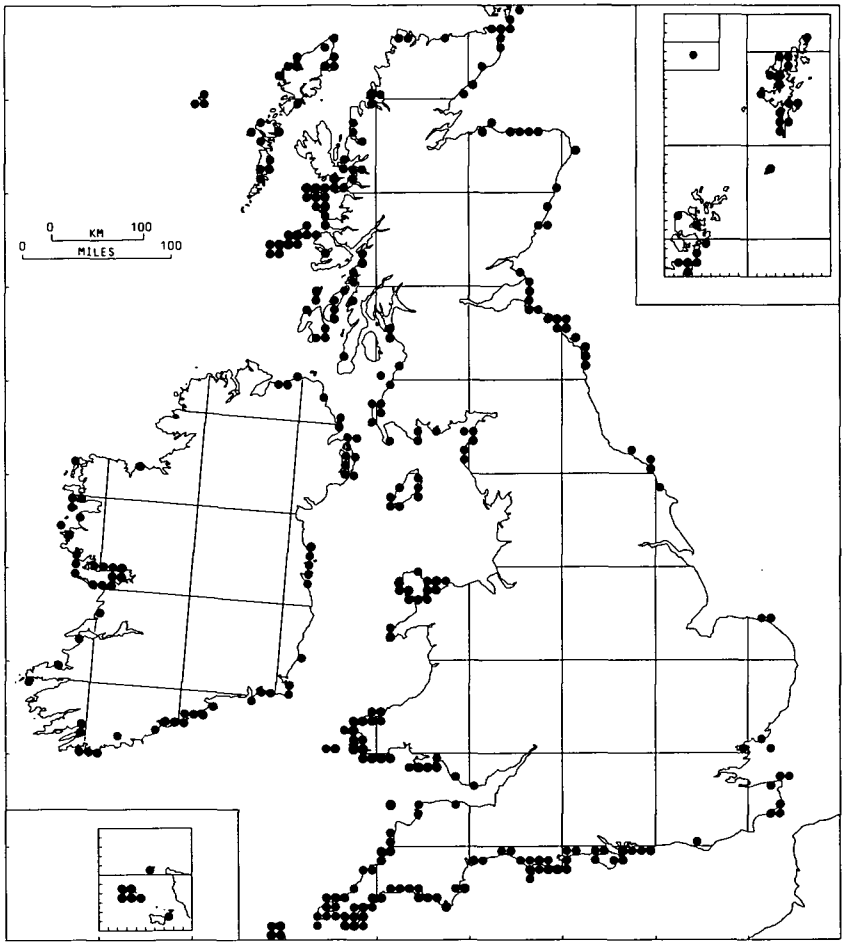
Map 133 **Phycodrys rubens** (L.) Batt. One of our more beautiful algae. Although superficially similar to Delassaria sanguinea, it is readily identified. It is one of the commoner subtidal plants and is found both on rock and on the stipes of Laminaria hyperborea (map 53). Like many other species, it seems to be absent from parts of the east coast of England where there is both turbid water and a scarcity of suitable substrate.



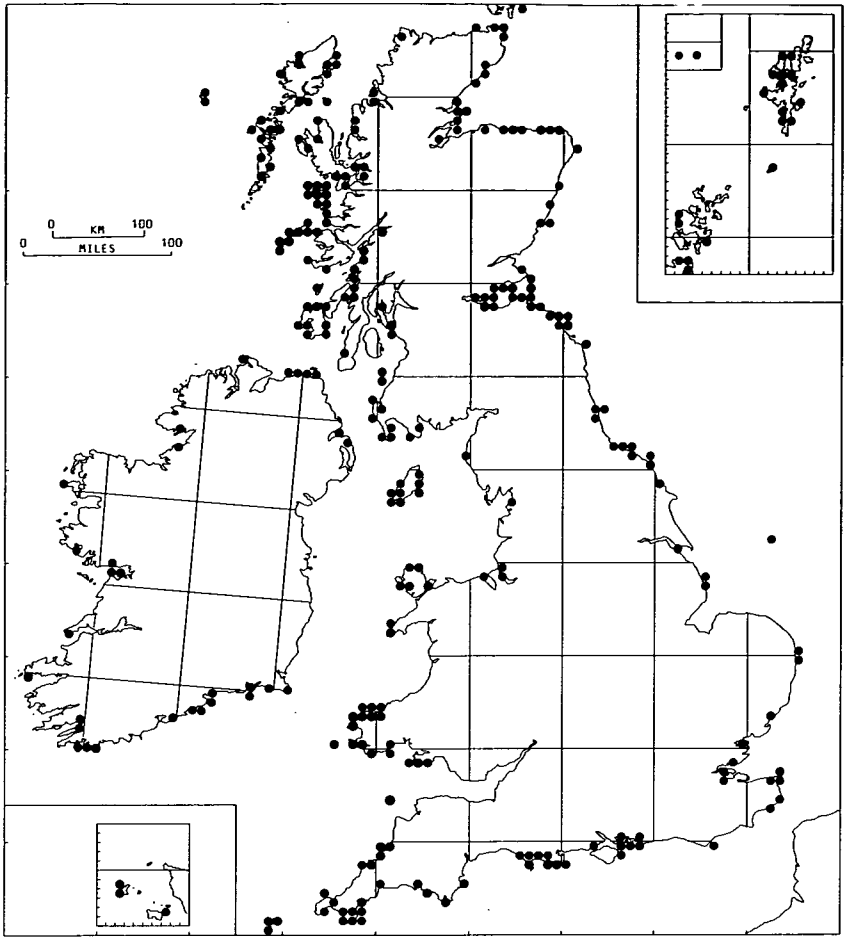
Map 134 **Phyllophora sicula** (Kütz.) Guiry et L. Irvine. Only distinctive in winter when fertile. A 'southern' species found subtidally or in lower-shore pools.



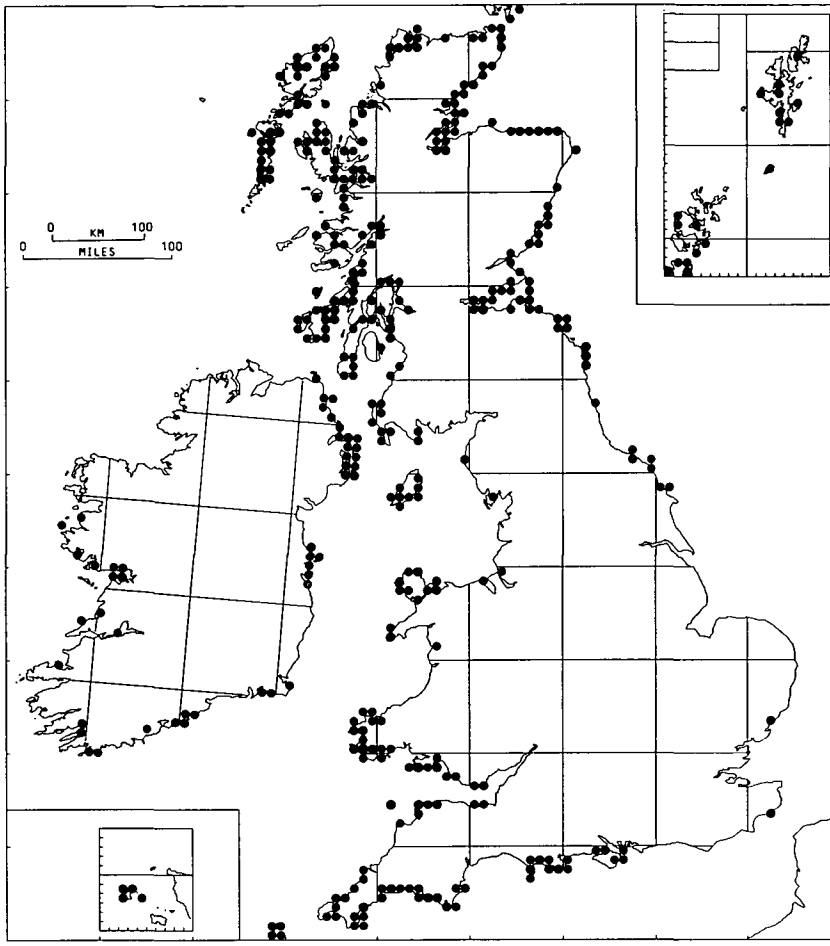
Map 135 **Phymatolithon lenormandii** (Aresch.) Adey One of the commoner and best recorded of the calcareous crustose species, but even so, more often ignored that identified. Woefully under-recorded in Ireland. See Adey and Adey (1973).



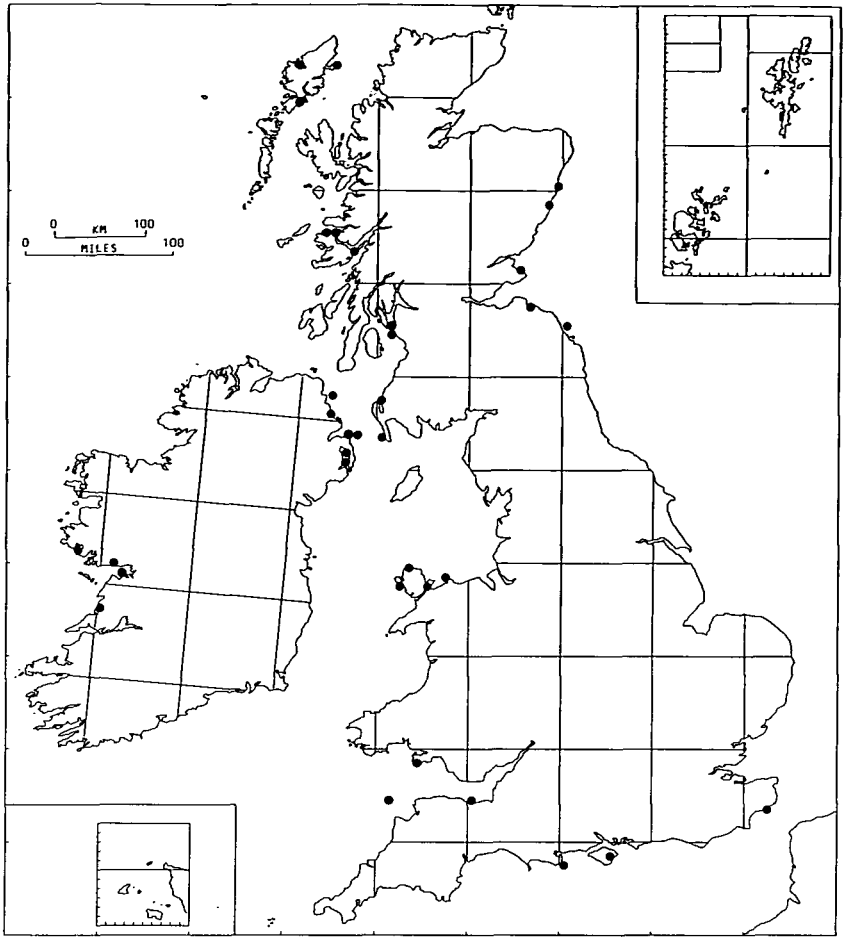
Map 136 **Plocamium cartilagineum** (L.) Dixon One of the commonest and most distinctive of the subtidal red seaweeds, found both on rock and on the stipes of Laminaria. Greatly under-recorded in Ireland.



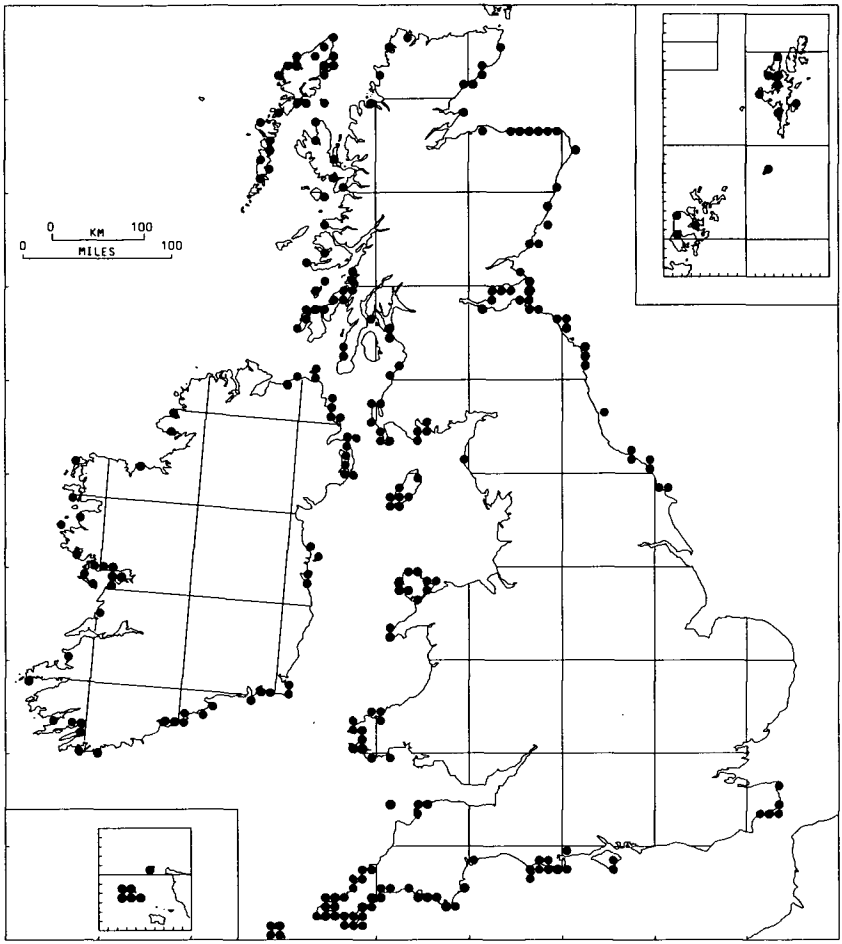
Map 137 **Polysiphonia urceolata** (Lightf. ex Dillw.) Grev. The commonest subtidal member of the genus, frequently found on Laminaria stipes. It tends to die down in winter and becomes very much less obvious. Very under-recorded in Ireland.



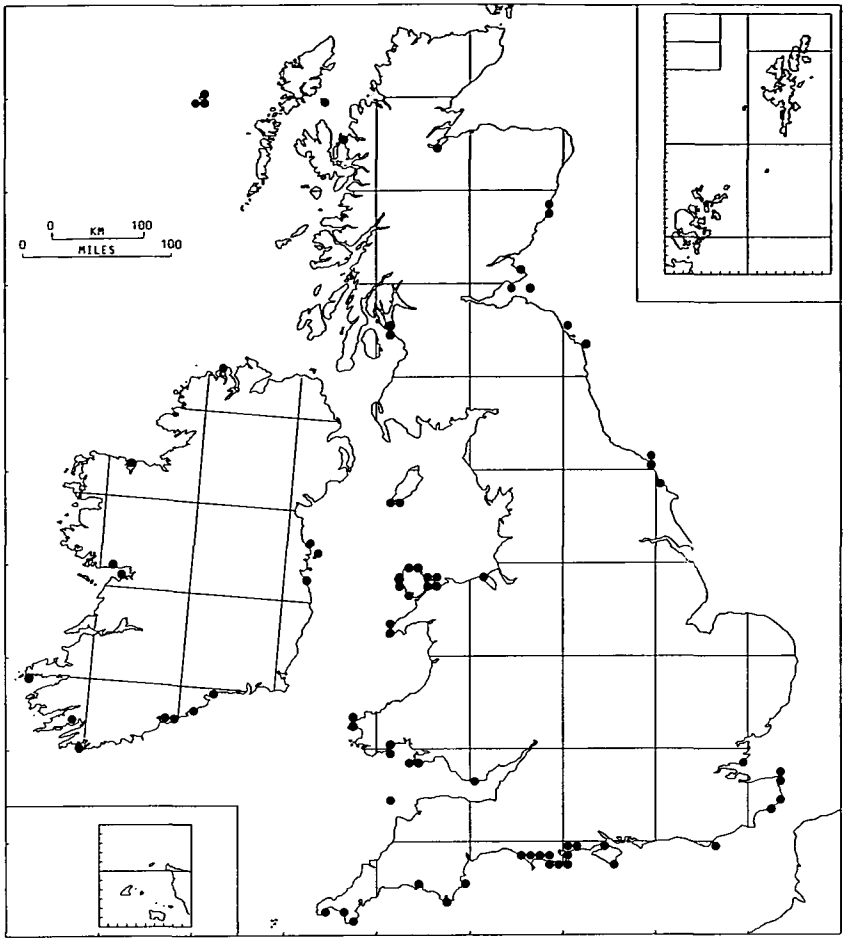
Map 138 **Polysiphonia lanosa** (L.) Tandy A common epiphyte wherever its main host plant Ascophyllum (map 25) is found. Probably the most readily identified of Polysiphonia species.



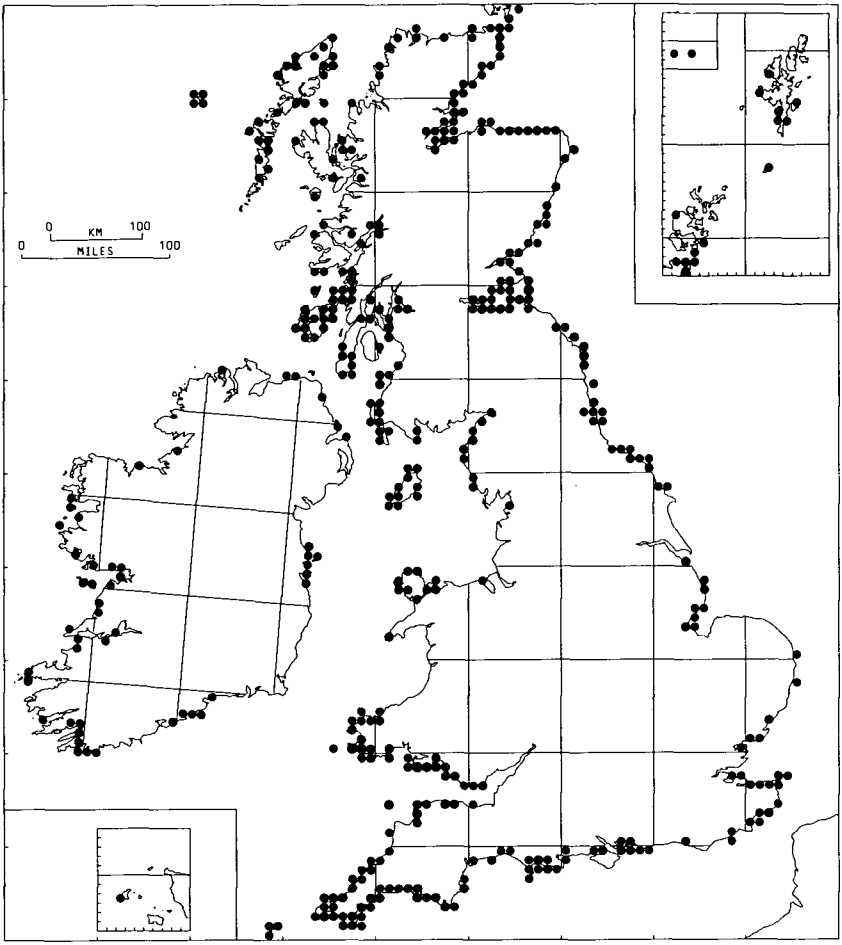
Map 139 **Choreocolax polysiphoniae** Reinsch A tiny pale cushion that grows parasitically on Polysiphonia lanosa (map 138). It is rarely recorded, but is usually found if looked for.



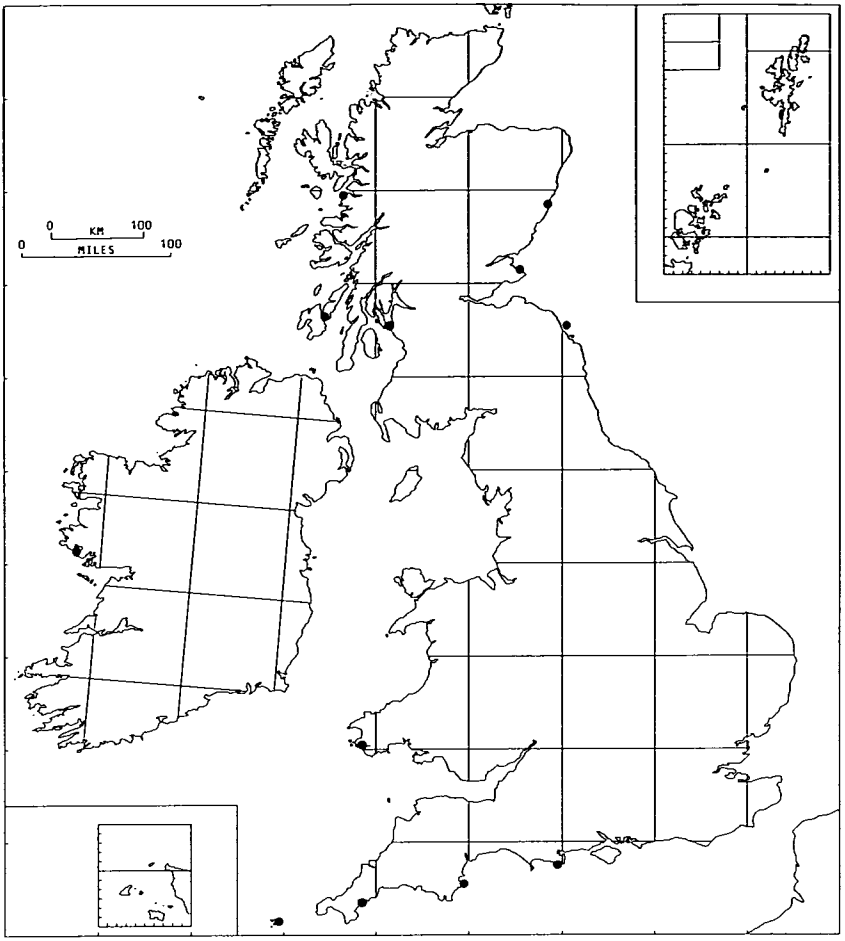
Map 140 **Plumaria elegans** (Bonnem.) Schmitz A common inhabitant of shady gullies and caves on the shore.



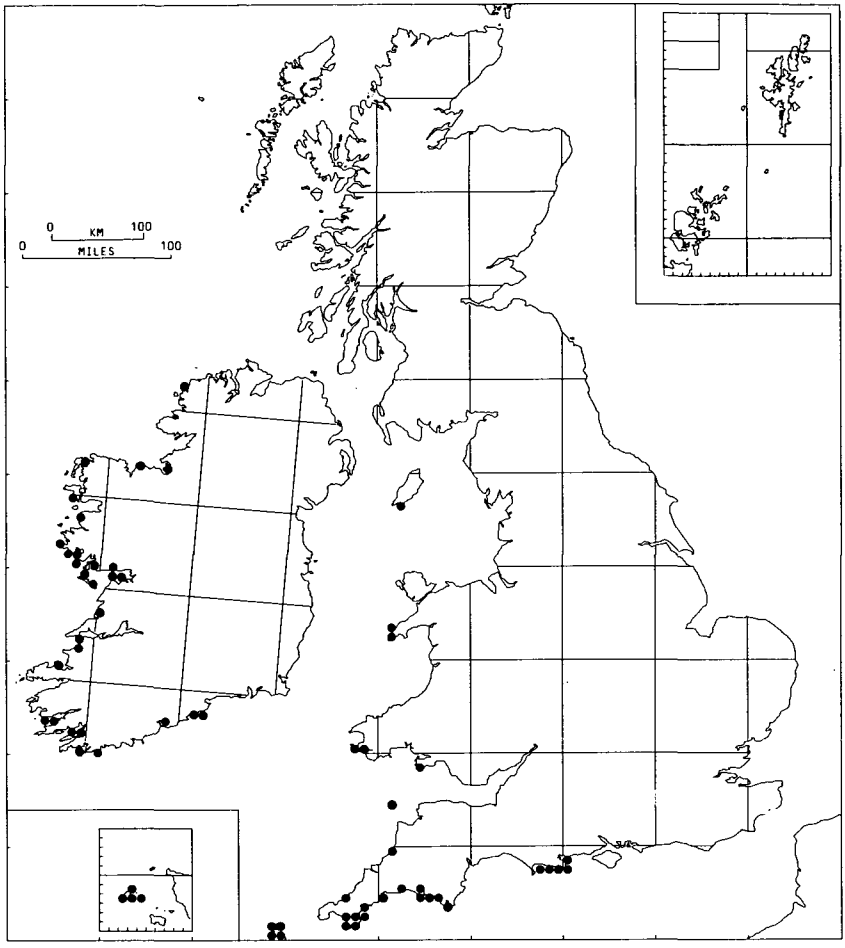
Map 141 **Porphyra linearis** Grev. Probably fairly common high on rocky shores throughout the British Isles, but, because it is quite small and a winter ephemeral, it is often overlooked.



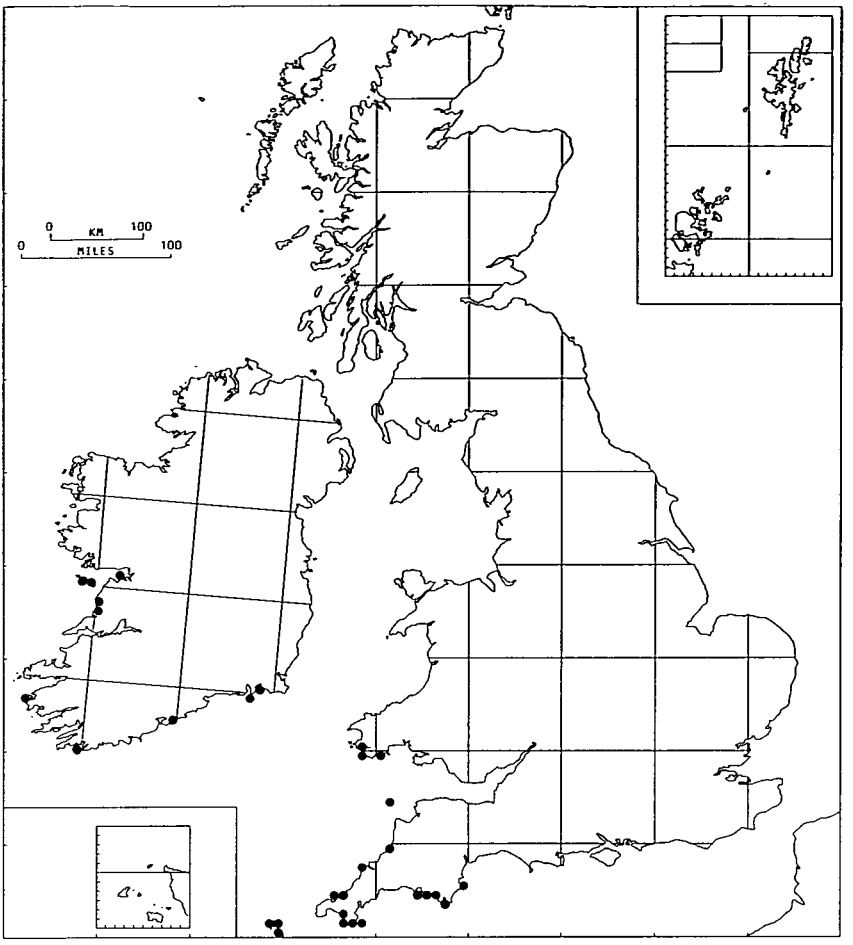
Map 142 **Porphyra umbilicalis** (L.) J. Ag. By far the commonest member of the genus and abundant on many rocky shores. It tolerates a greater degree of wave exposure than most other red algae.



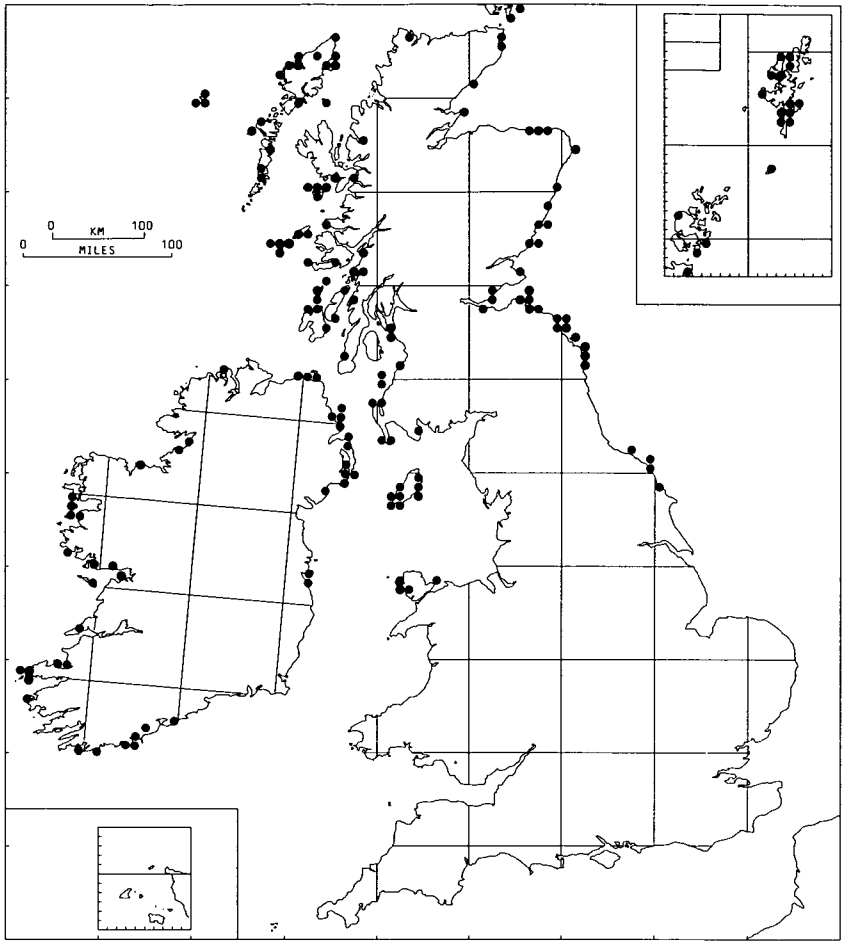
Map 143 **Conchocelis rosea** Batt. Not a true species, merely a phase in the life histories of Porphyra spp. and Bangia. However, unlike these intertidal plants, it is frequently found subtidally, where it is the commonest cause of red stains on dead shells. It is one of the most under-recorded entities in the entire flora.



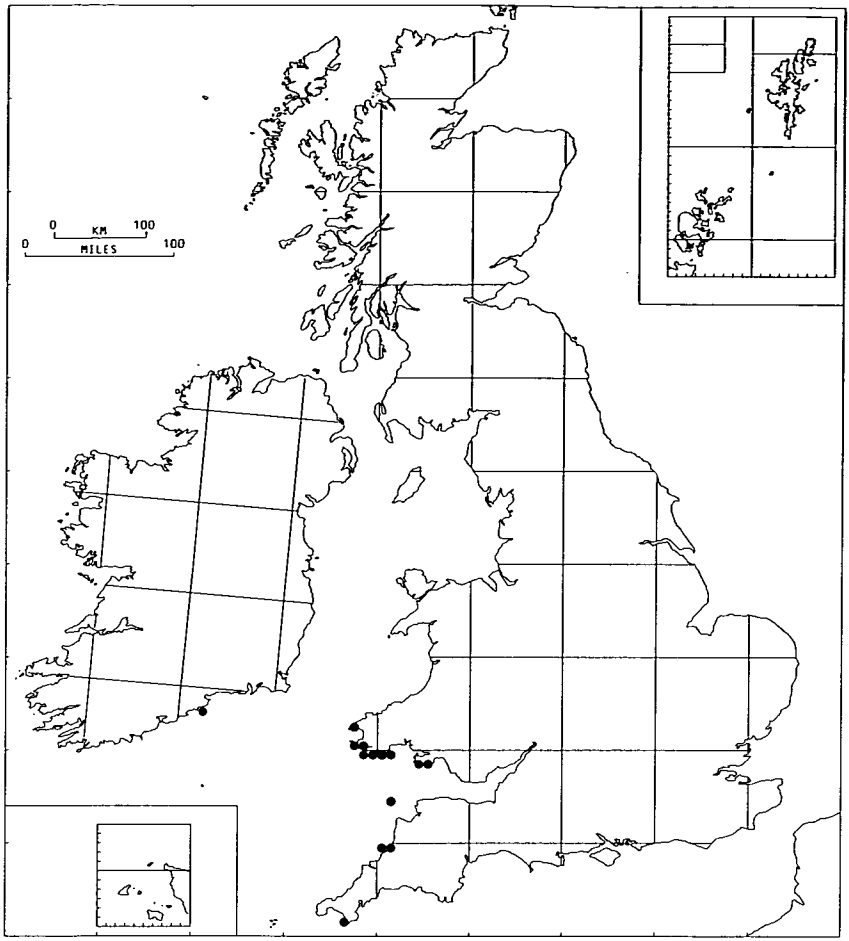
Map 144 **Pterocladia capillacea** (S.G. Gmel.) Born. et Thur. A 'southern' species inhabiting deep pools on the lower shore in the south and west. No fertile plants have ever been found in this region, where it must be propagating itself by vegetative means.



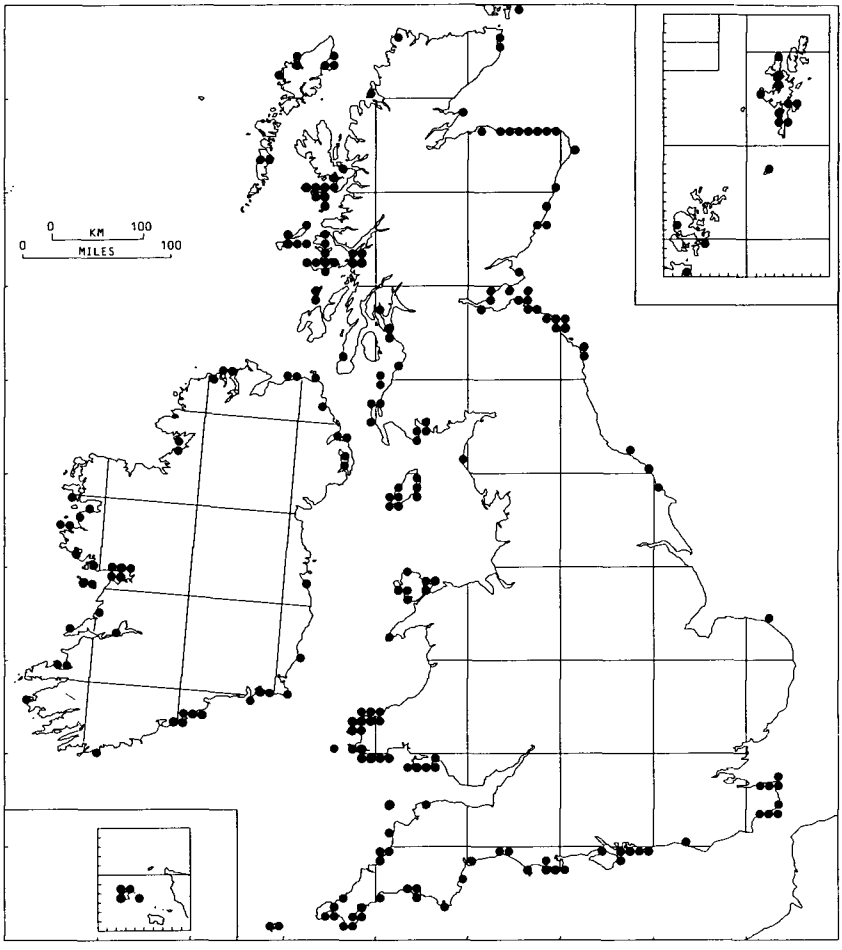
Map 145 **Pterosiphonia complanata** (Clem.) Falkenb. An inhabitant of the warmer waters of the North Atlantic that just extends northwards into the south west of the British Isles. See Norton and Parkes (1972) and Hiscock and Maggs (1984). Its northern limit on the west coast of Ireland remains exactly the same as that recorded in 1847. This is probably because the plants reproduce largely vegetatively at their northern limit and this precludes further spread.



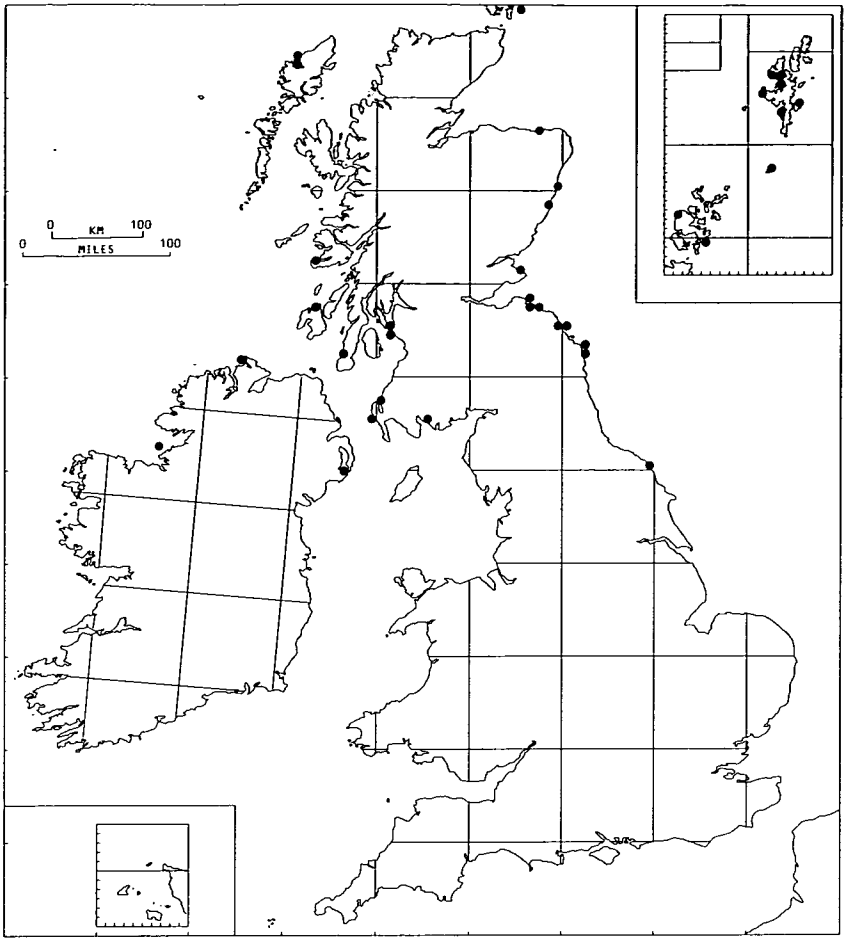
Map 146 **Ptilota plumosa** (Huds.) C. Ag. A common subtidal species most frequently found on Laminaria stipes. It is a 'northern' species and sporadic records from the south of England have all proved to be robust specimens of Plumaria elegans (map 140).



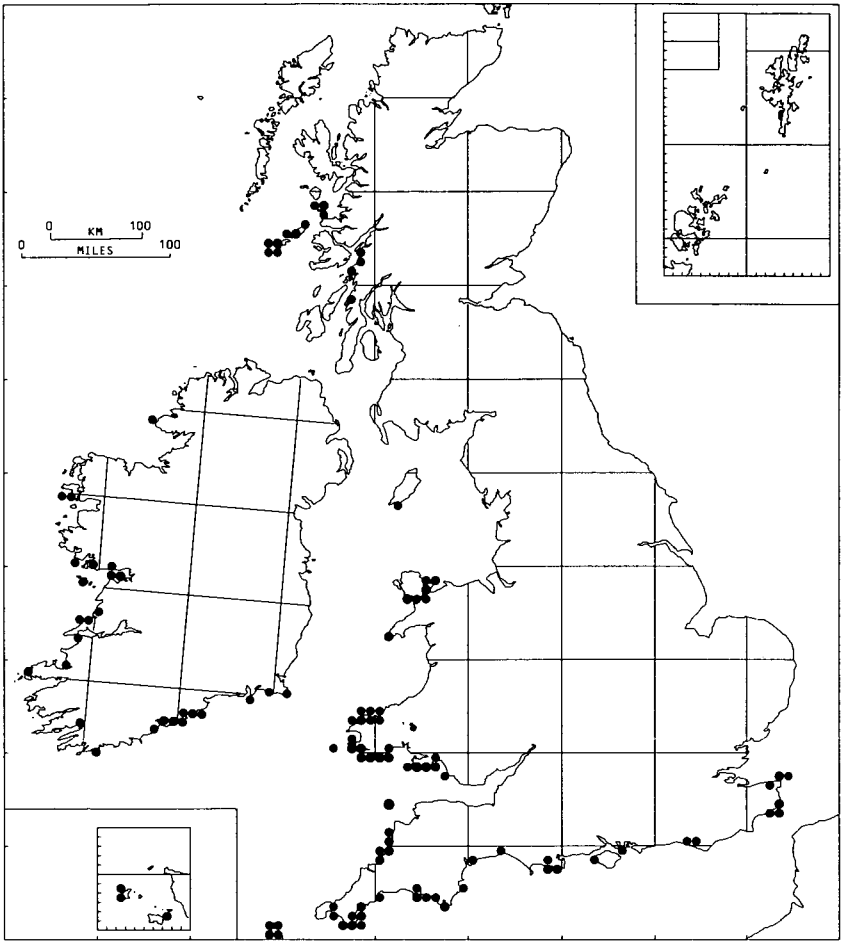
Map 147 **Radicilingua thysanorhizans** (Holm.) Papenf. A 'southern' species that just reaches the south west corner of the British Isles. Although rarely recorded, it can be locally abundant subtidally especially in pebble sites exposed to currents and scouring, and on cliff faces and overhangs.



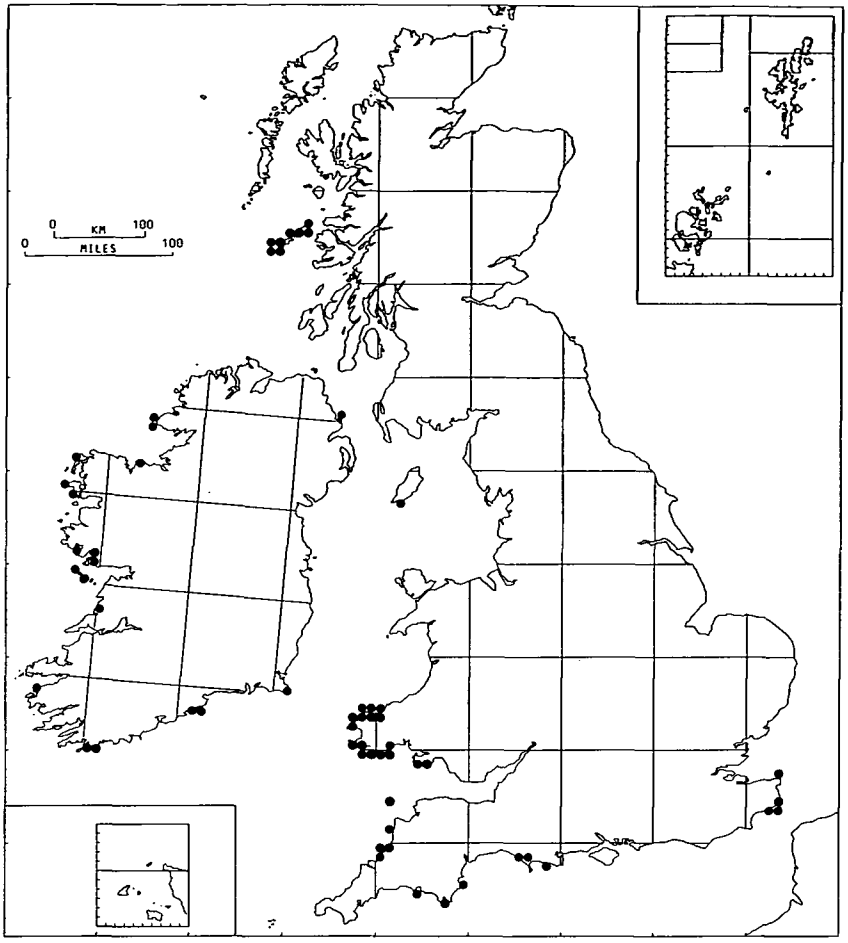
Map 148 **Rhodomela confervoides** (Huds.) Silva A species found from approximately low water mark downwards. The bushy summer plants die back to the main axes in winter. Widely distributed in the North Atlantic.



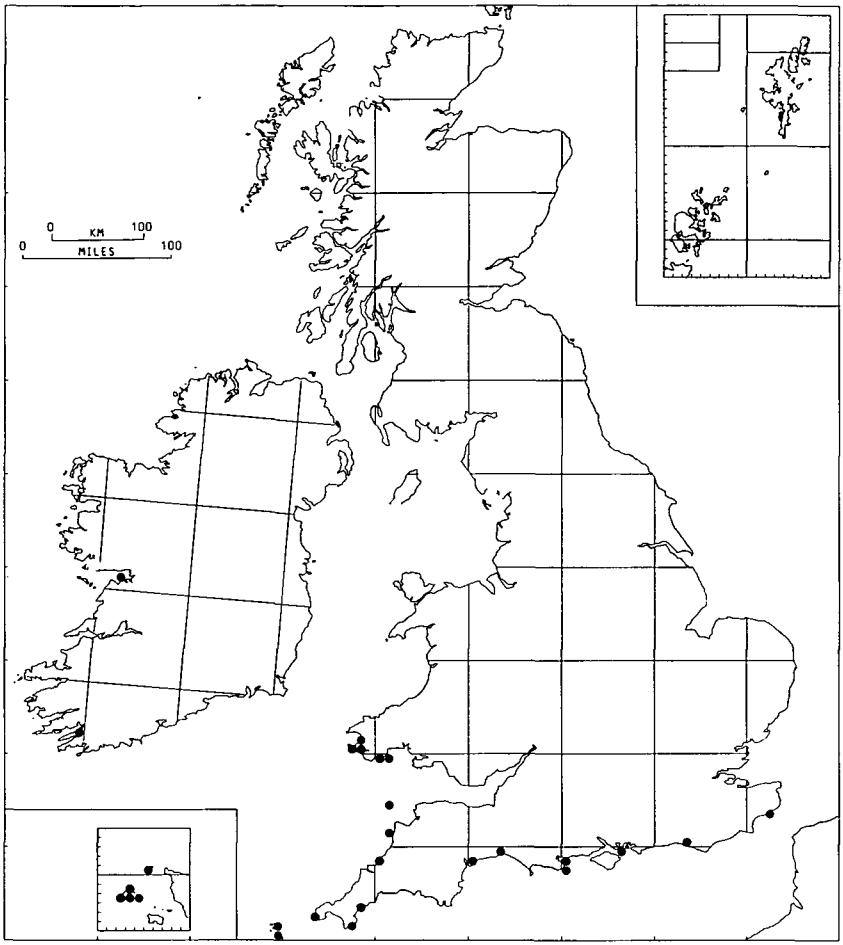
Map 149 **Rhodomela lycopodioides** (L.) C. Ag. An inhabitant of the Arctic Ocean that reaches its southern limit around the British Isles. It can be relatively common in the extreme north.



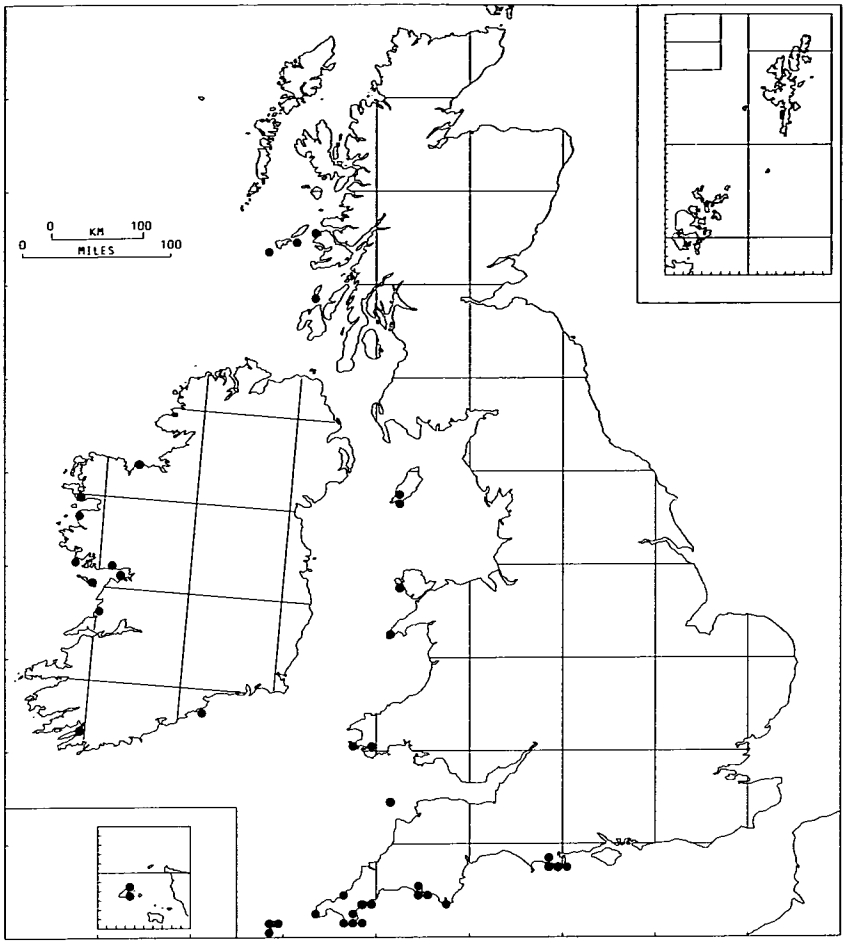
Map 150 **Rhodymenia pseudopalmata** (Lamour.) Silva A largely subtidal 'southern' species reaching its northern limit here. It is easily confused with several other species, but is not uncommon in the south and west. See Guiry (1977).



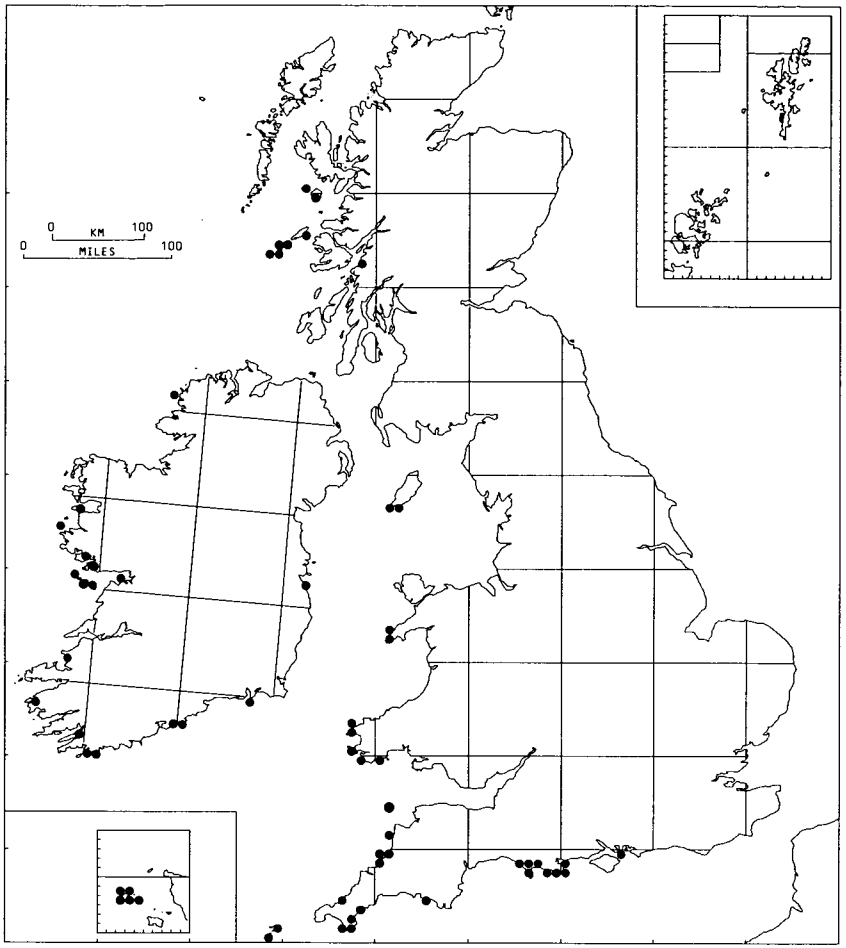
Map 151 **Schottera nicaeensis** (Lamour. ex Duby) Guiry et Hollenberg A 'southern' species exhibiting the usual westerly distribution around the British Isles. It is nothing like as rare as formerly thought and its recently discovered abundance off some of the Inner Hebridean Islands suggests that it may extend even further north. See Guiry and Hollenberg (1975) and Mitchell et al. (1983).



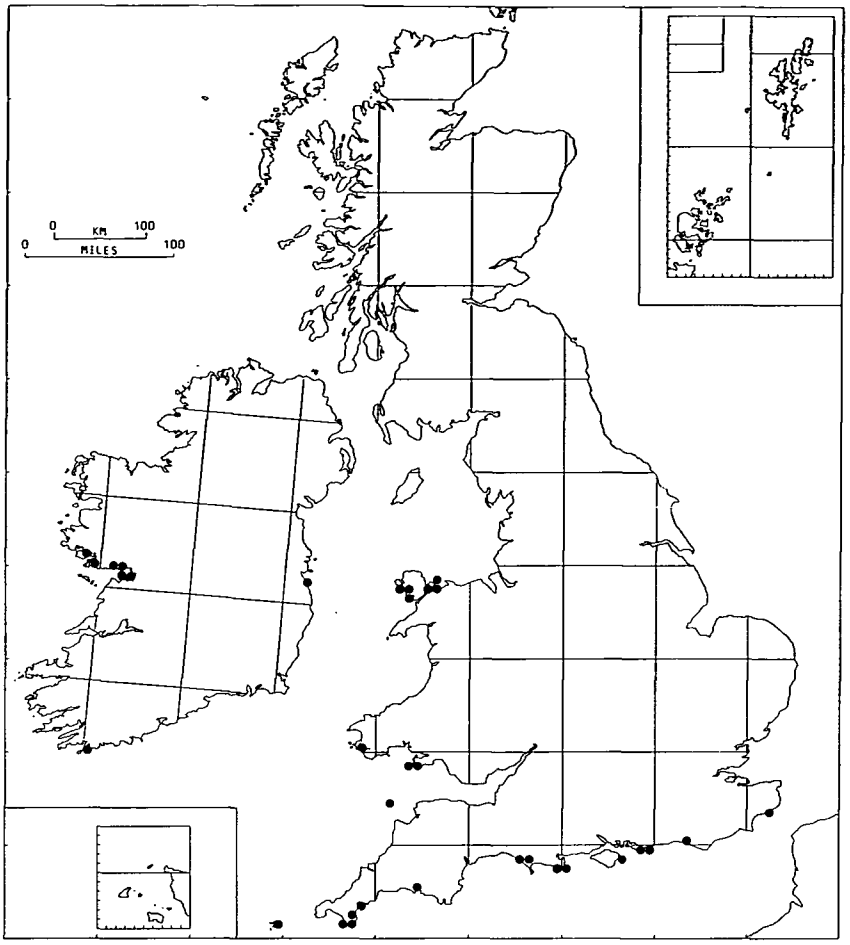
Map 152 **Scinaia forcellata** (Turn.) Biv. A 'southern' species, restricted in the British Isles to the south and west coasts. The belief that this species is more widely distributed seems to stem from the frequency with which S. turgida, a wider ranging species, has been mistaken for it. See Maggs and Guiry (1982b).



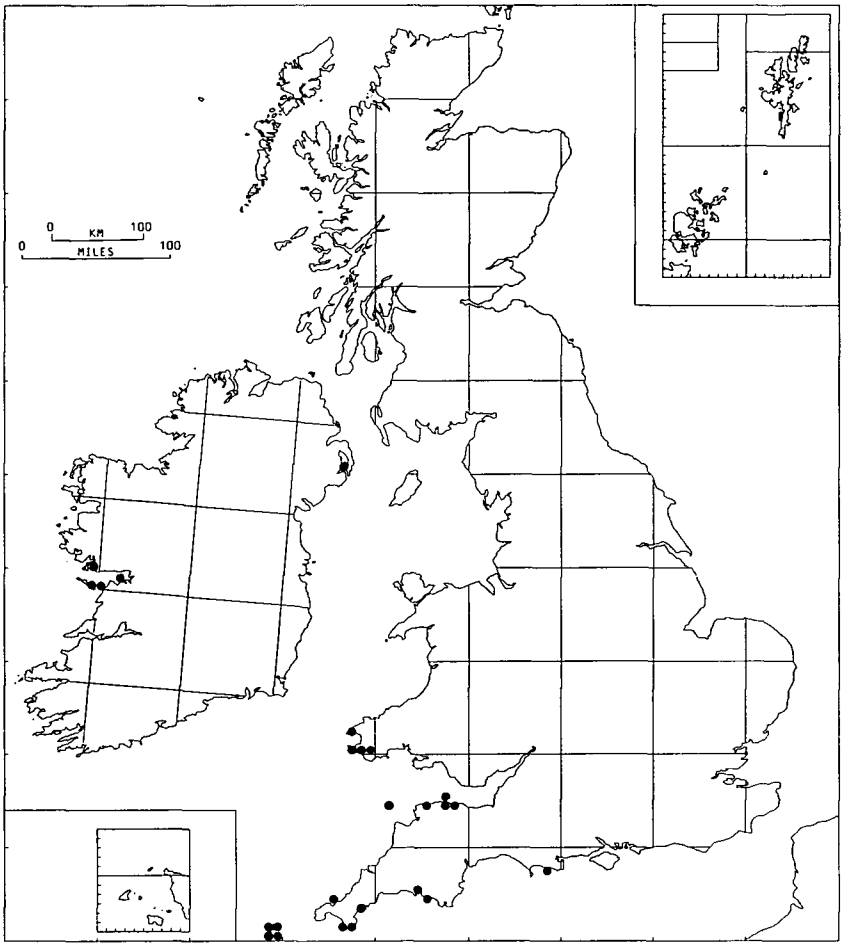
Map 153 **Sphaerococcus coronopifolius** Stackh. Yet another 'southern' species exhibiting a westerly pattern of distribution. It is probably commoner than the map indicates as it can easily be mistaken for Plocamium.



Map 154 **Sphondylothamnion multifidum** (Huds.) Näg. Here again the westerly pattern is a reflection of a species whose centre of distribution is to the south of the British Isles. Recent diving surveys off the Inner Hebrides have revealed it to be almost as common close to its northern limits as it is further south.



Map 155 **Spyridia filamentosa** (Wulf.) Harv. A 'southern' species locally abundant in south-western Britain. It is now known to occur in Ireland where it is certain to be more widespread than the map indicates.



Map 156 **Stenogramme interrupta** (C. Ag.) Mont. A distinctive 'southern' species locally abundant in the shallow subtidal zone, especially on fairly unstable substrata such as stones and shells. Occurs down to a depth of 15 m off Skomer. More widely distributed in Ireland than the map implies. See Cullinane and Whelan (1981).

INDEX TO MAPS

Species	Map
Desmarestia aculeata	36
ligulata	37
Dictyopteris membranacea	38
Dictyota dichotoma	39
Dilsea carnosa	100
Drachiella spectabilis	101
Dumontia contorta	102
Ectocarpus siliculosus	40
Elachista fucicola	41
Enteromorpha intestinalis	14
prolifera	15
Epicladia perforans	16
Falkenbergia rufolanosa	77
Fucus ceranoides	42
distichus	43
muscoides	47
serratus	44
spiralis	45
vesiculosus	46
Furcellaria lumbricalis	103
Gastroclonium ovatum	104
Gigartina acicularis	105
pistillata	106
teedii	107
Gracilaria bursa-pastoris	108
Grateloupia dichotoma	109
filicina	110
Halarachnion ligulatum	111
Halidrys siliquosa	48
Halopitys incurvus	112
Halopteris filicina	49
scoparia	50
Halurus equisetifolius	113
Heterosiphonia plumosa	114
Hildenbrandia crouanii	115
Himanthalia elongata	51
Hypoglossum woodwardii	116
Kallymenia reniformis	117
Laminaria digitata	52
hyperborea	53
ochroleuca	54
saccharina	55
Laurencia pinnatifida	118
Leathesia difformis	56
Lithothamnion glaciale	119
Litosiphon laminariae	57
Lomentaria articulata	120
clavellosa	121
Mastocarpus stellatus	122
Melobesia membranacea	123
Membranoptera alata	124
Meredithia microphylla	125
Mesophyllum lichenoides	126
Myriogramme bonnemaisonii	127
Myrionema strangulans	58

Species	Map
Naccaria wiggii	128
Odonthalia dentata	129
Padina pavonia	59
Palmaria palmata	130
Pelvetia canaliculata	60
Percursaria percursa	17
Petrocelis cruenta	131
Phycodrys rubens	133
Phyllophora sicula	134
truncata	132
Phymatolithon lenormandii	135
Pilayella littoralis	61
Plocamium cartilagineum	136
Plumaria elegans	140
Polysiphonia lanosa	138
urceolata	137
Porphyra linearis	141
umbilicalis	142
Prasiola stipitata	18
Pterocladia capillacea	144
Pterosiphonia complanata	145
Ptilota plumosa	146
Radicilingua thysanorhizans	147
Ralfsia spongiocarpa	62
Rhizoclonium riparium	19
Rhodomela confervoides	148
lycopodioides	149
Rhodymenia pseudopalmata	150
Saccorhiza polyschides	63
Sargassum muticum	64
Schottera nicaeensis	151
Scinaia forcellata	152
Scytosiphon lomentaria	65
Sphacelaria plumula	66
Sphaerococcus coronopifolius	153
Sphondylothamnion multifidum	154
Spongomorpha arcta	20
Spyridia filamentosa	155
Stenogramme interrupta	156
Stictyosiphon tortilis	67
Stilophora rhizodes	68
Taonia atomaria	69
Tellamia intricata	21
Trailliella intricata	79
Ulothrix flacca	22
Ulva lactuca	23
rigida	24
Zanardinia prototypus	70

ISBN 0 904282 89 9