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ISOPODA

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CONTENTS

NOTES FOR CONTRIBUTORS

Articles and reviews on any aspect of the biology of non-marine isopods of relevance to British and Irish workers will be considered for publication in *Isopoda*. Contributions from non-professional zoologists are particularly welcome. Style should follow that of the current issue. Further details concerning *Isopoda*, and the Non-Marine Isopod Survey Scheme can be obtained from: -

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COVER PHOTOGRAPH

The photograph is of the circular part of a small quatrefoil of stained glass in the west wall of the south porch of St. Mary´s Church, Shrewsbury. The glass, which clearly depicts a woodlouse, was illustrated on the cover of A.O. Chater´s report ´Woodlice in the Cultural Consciousness of Modern Europe´. The photograph was taken by S.P. Hopkin and C.A.C. Hames in September 1986.

Isopoda (1987) 1, 1-7

ASELLUS AQUATICUS (L.), *ASELLUS MERIDIANUS* (RACOVITZA) AND *SPHAEROMA HOOKERI* (LEACH) IN THE RYE AREA, S.E. ENGLAND

E. KATHLEEN GOLDIE-SMITH
44-46 Military Road, Rye, E. Sussex, TN31 7NY

INTRODUCTION

A general survey of aquatic invertebrates was begun on the Local Nature Reserve (LNR) and Site of Special Scientific Interest (SSSI) at Rye Harbour in June 1982 (Fig. 1) and extended to a greater variety of habitats and a wider area around Rye in 1984 (Fig. 2). Records are being made in accordance with the National Biological Recording Schemes, in particular for this study, the Non-Marine Isopod Survey Scheme. Valuable and often unique records have been made with a video camera attached to a microscope, adding titles, dates and an audio commentary when appropriate (Goldie-Smith 1983, 1986).

Asellus aquaticus (Fig. 3a) and *Asellus meridianus* (Fig. 3b) have been identified with the aid of the key by Gledhill *et al* (1976). Usually the difference in head colouration noted by Scourfield (1940) is adequate, with detailed examination of appendages in doubtful cases. Help was received in the early stages from Mr. G.D. Fussey and latterly from Dr. Steve Hopkin. *Sphaeroma hookeri* was identified by Dr. R.J. Lincoln and reference has subsequently been made to the keys and notes of Naylor (1972).

AQUATIC ISOPODS IN THE RYE HARBOUR LNR AND SSSI (FIG. 1)

Sphaeroma hookeri is a brackish water species and is limited strictly to the coastal strip. It is found abundantly in the small pond labelled "Doug. 4-6" and in Ternery Pool and has been recorded along the single drainage dyke called Nook Drain as far as site 9.

Asellus aquaticus is found in the shallow stream labelled "Ridge", which widens into a reedy pool, and is widely distributed in the deep flooded gravel pits of the Castle Water Estate towards the middle of the triangular area. It has been recorded at sites 1, 3, 4, 5, 8 and 10 on the pits themselves, in the reedy ditch (site 7) running from the pits to the northernmost limit of the triangle and in an extensive shallow ditch that follows a snakelike course through the pasture that is bounded on three sides by these pits. The Long Pit and Narrow Pits have not been investigated. The western side of the triangle is bordered mostly by sheep pasture with some arable land which drains towards the River Rother by a system of dykes with small sluices, divided for the purpose of this study into

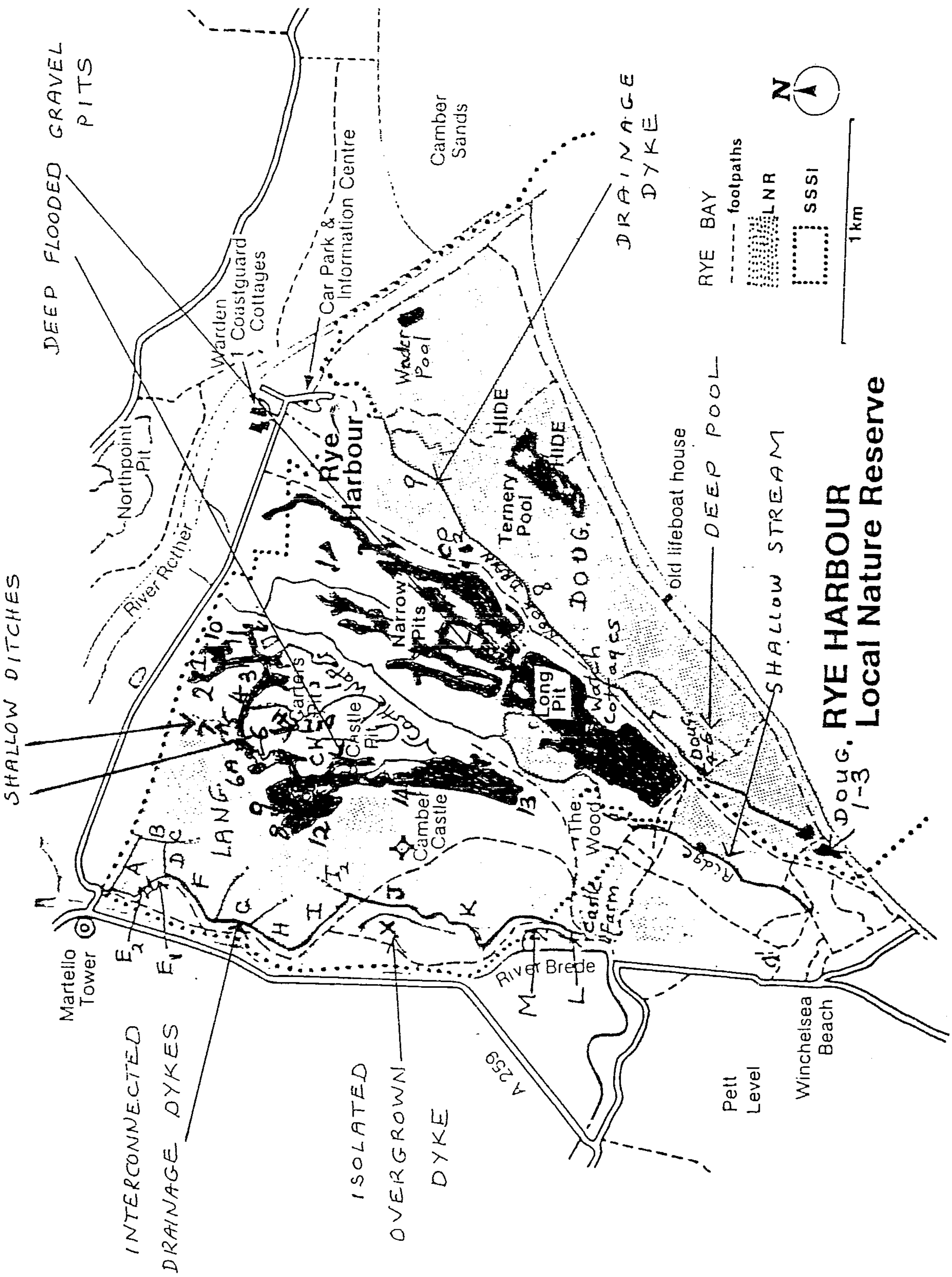

Fig. 1 : Sampling sites on the Rye Harbour LNR and SSSI

alphabetical sections. Although further investigation is needed here, it is significant that Asellus aquaticus has been recorded abundantly in the overgrown Dyke X which has been isolated from the free flow of the system by the filling in at its southern end. It has also been recorded in Dyke I_2, a cul-de-sac which may dry up completely in the summer and at the junction of Dykes D,E and F. Whereas Dykes D and E are in the main flow, Dyke E is restricted by having to pass under a gated trackway.

AQUATIC ISOPODS IN THE RYE AND HASTINGS AREA (FIG. 2)

The distribution patterns of Asellus aquaticus and Asellus meridianus have been studied in detail by Williams (1962a, 1962b, 1963, 1979) and Steel (1961), with reference to physical and chemical factors and associated flora and fauna. The numerous theories concerning their distribution have been reviewed by Moon & Harding (1981) with distribution maps and a full list of references. Given a plentiful supply of inorganic and organic food, it seems that calcium and sodium concentrations may have a direct relationship with this pattern. In general however, the reasons for their distribution are far from being solved.

The numbers of large fish in the moat around Bodiam Castle may explain the apparent absence of Asellus there; possibly the depth of the moat (over 2 m) and the steepness of the banks are also factors. Asellus aquaticus is present in the very small pool in the garden at Moat Farm, Iden, but I have not so far recorded it from the large deep pond which represents part of the ancient moat itself. Asellus aquaticus and Asellus meridianus were found together in abundance in a ´scrape´ in Filsham reedbeds, St. Leonards-on-Sea. The distribution of the two species discovered so far is summarised in Table 1.

ACKNOWLEDGEMENTS

Grateful thanks are due to all the owners of the properties where collections have been made, the wardens and management committee of the Rye Harbour LNR and SSSI, the Nature Conservancy Council, National Trust, Sussex Trust for Nature Conservation, Southern Water Authority, Hastings Fly Fishers Club and a great many others who have given advice, encouragement or technical help in the course of this study.

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Table 1 : Distribution of *Asellus aquaticus* and *Asellus meridianus* in the Rye and Hastings area

Habitat	*A. aquaticus*	*A. meridianus*
Flooded gravel pits	Castle Water Estate, Rye Harbour. Moneypenny Pits, East Guldeford.	-
Drainage dykes	Rye Harbour LNR. Valentine´s Dyke, Shirley Farm.	The Dowels Appledore. "Smuggler´s End", Winchelsea Beach.
Shallow reedy ditch	Site 7 and "Ditch" on Castle Water Estate.	-
Suburban ditch	-	Tennis Club, Rye.
Old bomb crater	-	"Smuggler´s End", Winchelsea Beach.
Shallow stream	"Ridge", Rye Harbour LNR.	-
Large reservoir	-	Powdermill, Sedlescombe.
Small reservoir	Dumbourne Farm, Tenterden.	-
Private lake	"Twin Sisters", Iden.	-
Small garden pond	Moat Farm, Iden.	"Stratton", Fairlight.
Large garden pond	Smallhythe Place. Shirley Farm.	-
Old duckpond	Brede Watch Pond.	-
Field pond	Leasam House.	Peasmarsh Place. Bosney farm.
Woodland pond	-	Flatropers Wood.
"Scrape" in reedbed	Filsham, St. Leonards.	Filsham, St. Leonards.

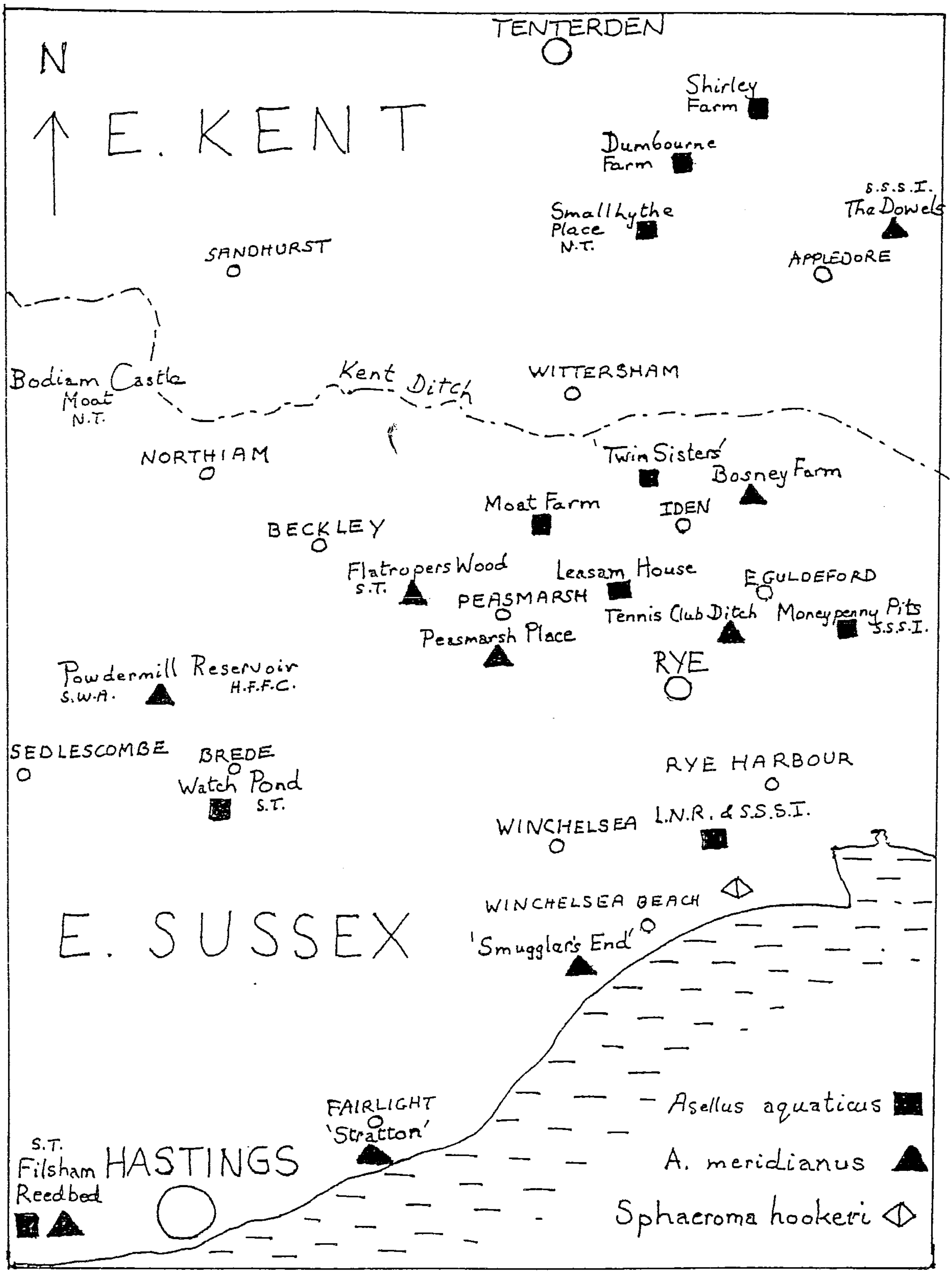

Fig. 2 : Sites in the Rye and Hastings area where <u>Asellus aquaticus</u>, <u>Asellus meridianus</u> and <u>Sphaeroma hookeri</u> have been found.

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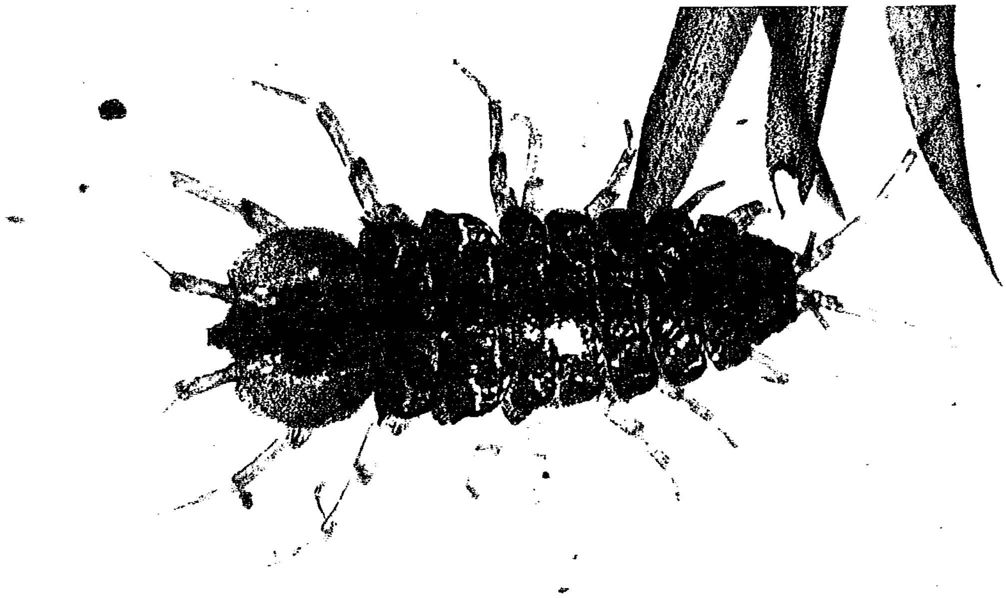

Fig. 3a : Asellus aquaticus (10 mm in length) from Filsham Reedbed. Note that the poorly-pigmented area on the head is divided in two.

Fig. 3b : Asellus meridianus (7 mm in length) from Filsham Reedbeds. Note that the poorly-pigmented area on the head is not divided.

Isopoda (1987) 1, 9-19

PROVISIONAL ATLAS OF THE ASSOCIATION BETWEEN *PLATYARTHRUS HOFFMANNSEGGI* AND ANTS IN BRITAIN AND IRELAND

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INTRODUCTION

Platyarthrus hoffmannseggi is a common woodlouse throughout Europe which ranges widely across the southern half of Britain and southern Ireland (Fig. 1). Its northern range extends to Inverkeithing, Fifeshire (Harding & Sutton 1985). *Platyarthrus hoffmannseggi* is frequently found in the runs and nests of ants, although it is able to survive independently of ants (Williams & Franks 1985). It is, nevertheless, regarded as myrmecophilous, living as an ectosymbiont of ants (Wilson 1971). This categorization is shared with many other invertebrates including beetles, aphids and mites, some of which are found exclusively with ants. The actual nature of the association between *Platyarthrus hoffmannseggi* and ants has not yet been defined. It has been suggested that the main source of food for the woodlice is the ants' faeces (Harding & Sutton 1985) although Bernard (1968) considered *Platyarthrus hoffmannseggi* to be a scavenger which occasionally tends aphids. Williams & Franks (1985) reported that these woodlice may obtain infrabuccal pellets from the ants and gain nutritional benefit in this way. If indeed *Platyarthrus hoffmannseggi* is feeding on the sugar-rich honeydew or the infrabuccal pellets, they are showing a remarkable departure from the feeding habits of other terrestrial isopods.

DISTRIBUTION OF *PLATYARTHRUS HOFFMANNSEGGI* AND ANTS

When considering the nature of the relationship between *Platyarthrus hoffmannseggi* and ants, it is intriguing to question whether the woodlouse is selective in the choice of species with which it associates. Collingwood (1979) gives brief accounts of the distribution and biology of various ant species, which vary considerably with regard to habitat selection and foraging activity. *Formica lemani* for example is abundant in upland regions throughout the British Isles, but is absent from the south east where *Platyarthrus hoffmannseggi* is most common. This species of ant predates small insects and feeds on extrafloral nectaries and aphid honeydew. By contrast, *Myrmica rubra* and *Lasius alienus* favour lowland regions, the latter being found usually on sandy heaths or dry open pasture but remaining subterranean and utilising root aphids. *Myrmica rubra* is abundant in sheltered valleys, usually in alluvial soil by riversides, and collects nectar of umbellifers and other herbs

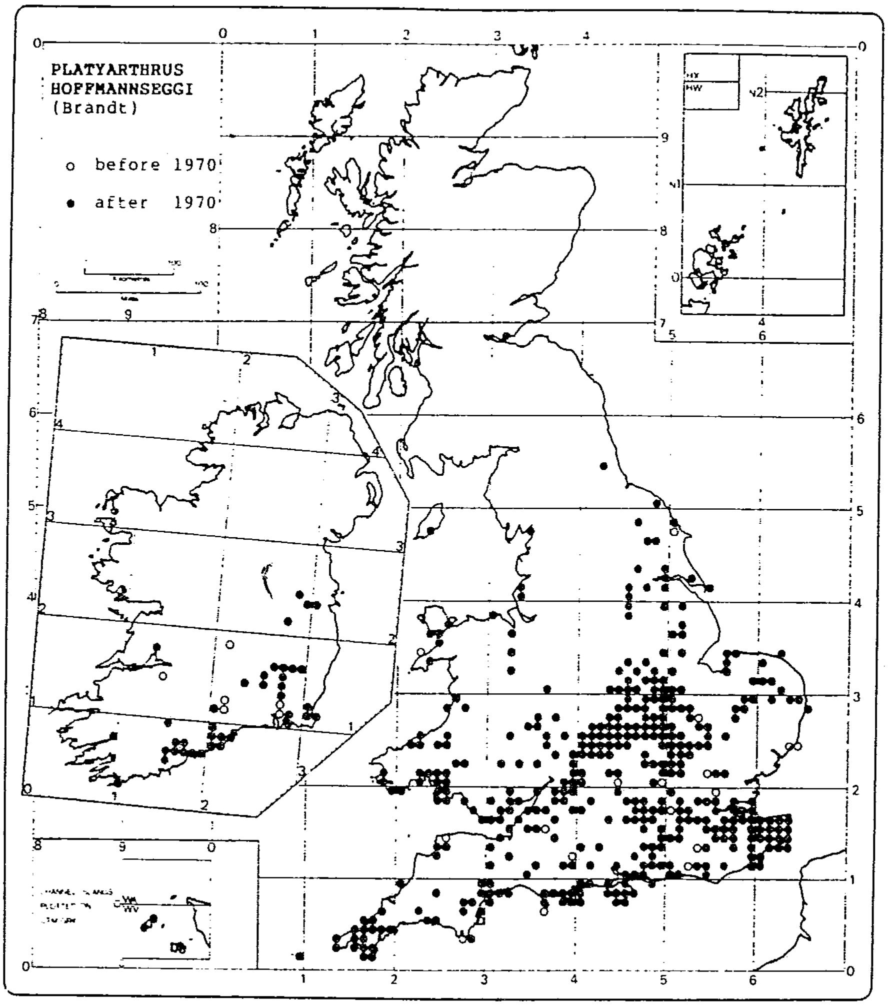

Fig. 1 : Recorded occurrence of Platyarthrus hoffmannseggi in the 10 km squares of the British and Irish National Grids to March 1987.

Table 1 : Species of ants recorded with Platyarthrus hoffmannseggi.

Formica cunicularia	(Latreille)	Fig. 2	Page 13
Formica lemani	(Bondroit)	Fig. 3	Page 13
Formica rufa	(L.)	Fig. 4	Page 14
Lasius alienus	(Foerster)	Fig. 5	Page 14
Lasius brunneus	(Latreille)	Fig. 6	Page 15
Lasius flavus	(F.)	Fig. 7	Page 15
Lasius fuliginosus	(Latreille)	Fig. 8	Page 16
Lasius niger	(L.)	Fig. 9	Page 16
Lasius umbratus	(Nylander)	Fig. 10	Page 17
Myrmica rubra	(L.)	Fig. 11	Page 17
Myrmica ruginodis	(Nylander)	Fig. 12	Page 18
Myrmica sabuleti	(Meinhert)	Fig. 13	Page 18
Myrmica scabrinodis	(Nylander)	Fig. 14	Page 19
Tetramorium caespitum	(L.)	Fig. 15	Page 19

in addition to tending aphids more consistently than other *Myrmica* species.

Preliminary maps of the distribution of *Platyarthrus hoffmannseggi* with the 14 ant species with which it has been recorded (Table 1), are presented here (Figs. 2 to 15). These are derived from all records of *Platyarthrus hoffmannseggi* submitted to the Non-Marine Isopod Survey Scheme to March 1987 which indicated that the species had been found with ants. The maps are derived from those record cards on which the recorder or determiner had noted the species of ant with which *Platyarthrus hoffmannseggi* had been found. It should be noted that several of these records for ants are new 10 km square records based on the maps in the second edition of the Provisional Atlas for this group (Barrett 1979). It is apparent that the yellow meadow ant *Lasius flavus* and the black ant *Lasius niger* are the two most frequently recorded species with *Platyarthrus hoffmannseggi*, followed by *Myrmica rubra* and then scattered and infrequent records of the remaining 11 species of ants.

Lasius flavus and *Lasius niger* are very proficient at utilising aphids, indeed *Lasius flavus* can tend up to 30 species of aphid for their honeydew (Pontin 1978). Surplus aphids are predated to supply the ants' protein requirements. All of the ants with which *Platyarthrus hoffmannseggi* has been found tend aphids to varying degrees. It may be worth noting that two recorders have stated that when *Platyarthrus hoffmannseggi* was found with *Lasius flavus*, the woodlouse was not found in nearby nests of other *Lasius* and *Myrmica* species.

CONCLUSIONS

These preliminary maps (Figs. 2 to 15) show considerable recorder-bias towards collectors who are able to identify ants, and to those species which are most frequently encountered at the surface. However, it is notable that although there are several records for *Lasius flavus* and *Lasius niger* throughout northern Scotland (Barrett 1979), *Platyarthrus hoffmannseggi* has been recorded only once north of the border. It appears to be genuinely rare in this region as several experienced recorders have searched for the species to no avail. *Platyarthrus hoffmannseggi* appears therefore to be less resistant to extremes of climate than its apparently most frequent host species. *Lasius flavus* and *Lasius niger* are very common, live in large colonies and forage and tend aphids above and below ground. There is therefore a greater chance of finding these species than other less common or populous ants while searching for woodlice. A further complication is that some ants are found together with other species on which they predate, such as *Myrmica scabrinodis* feeding on *Lasius flavus* workers.

With the aim of updating the maps, it is hoped that woodlouse recorders will be stimulated to extend their foraging strategies to seek out ant nests and *Platyarthrus hoffmannseggi*. That so little is known of this unique and fascinating woodlouse provides much incentive to discover more about its natural history.

Please send records and/or ants for identification to Chris Hames at the address given at the head of this article.

ACKNOWLEDGEMENTS

Most of the records for ants with *Platyarthrus hoffmannseggi* were made by A.J. Rundle and D.T. Richardson. I am grateful to Malcolm Spooner for his help in identifying some of the ant species and to Paul Harding for allowing access to record cards held at the Biological Records Centre.

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LEGENDS TO MAPS OF ASSOCIATIONS BETWEEN *PLATYARTHRUS HOFFMANNSEGGI* AND ANTS (FIGS. 2 - 15)

The number of 10 km squares of the British and Irish National Grids from which the association has been recorded to March 1987 is given for each map. Isolated records which may be overlooked are arrowed.

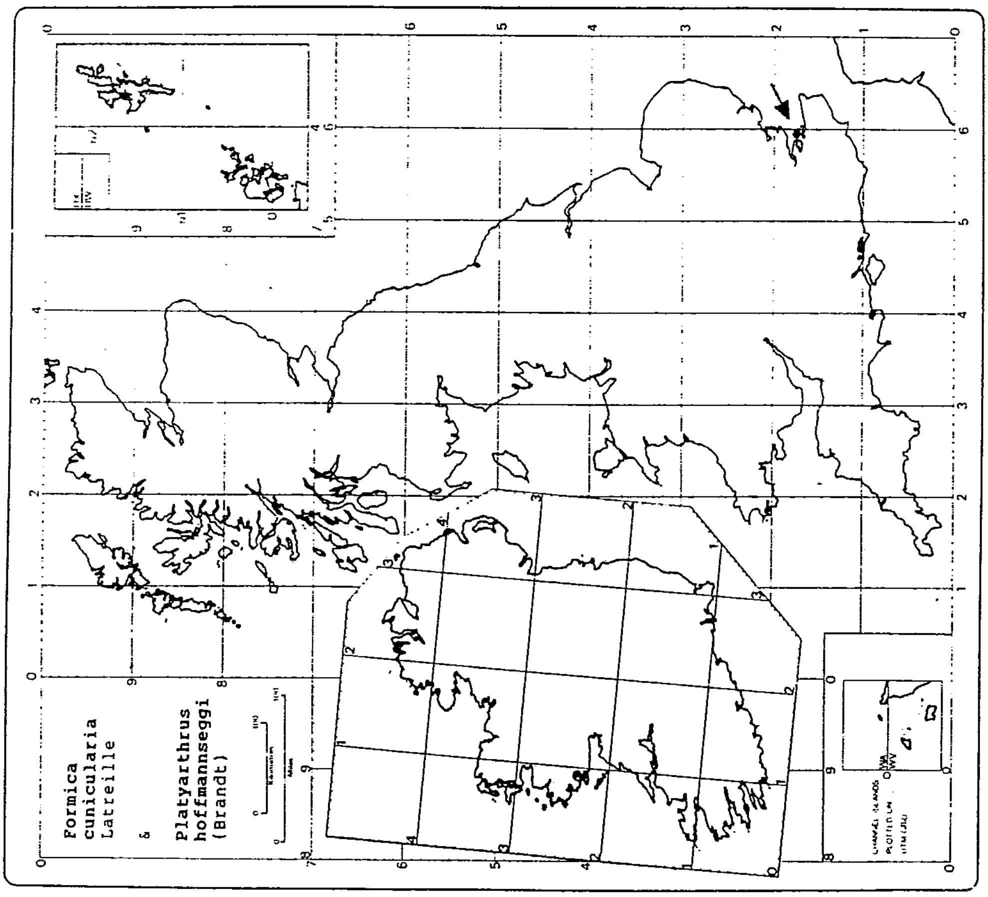

Fig. 2 : Formica cunicularia (1 square)

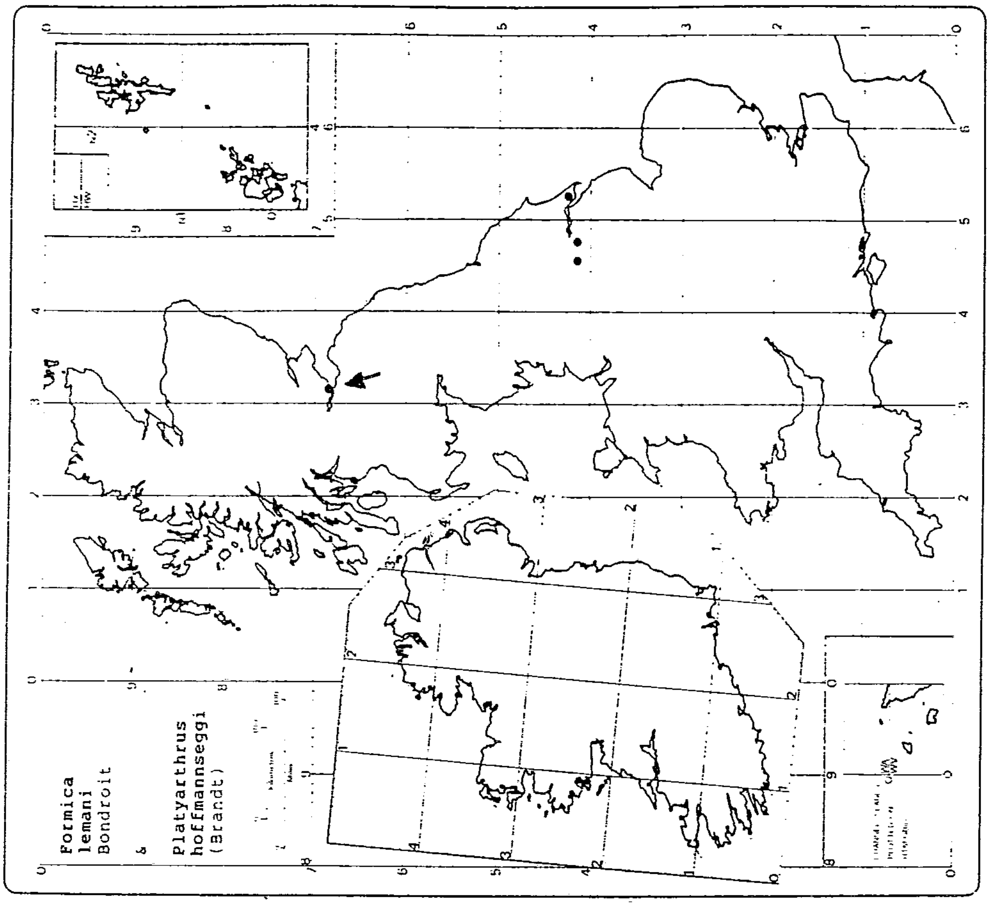

Fig. 3 : Formica lemani (4 squares)

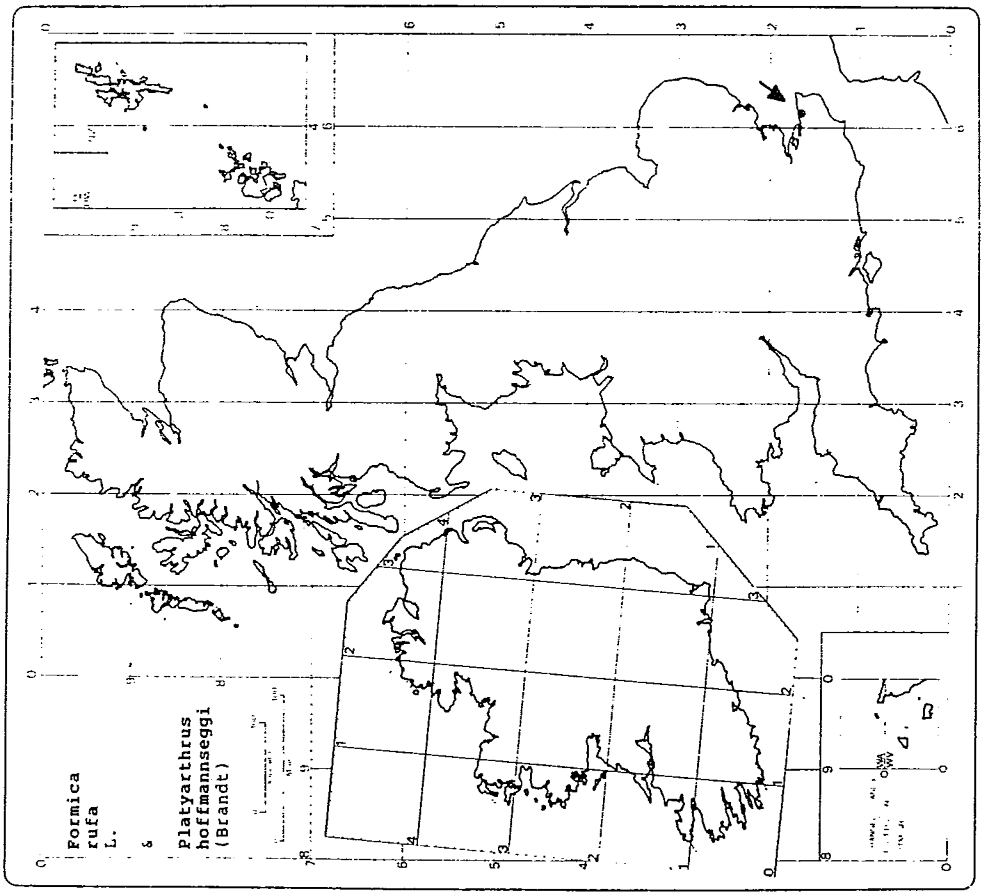

Fig. 4 : Formica rufa (1 square)

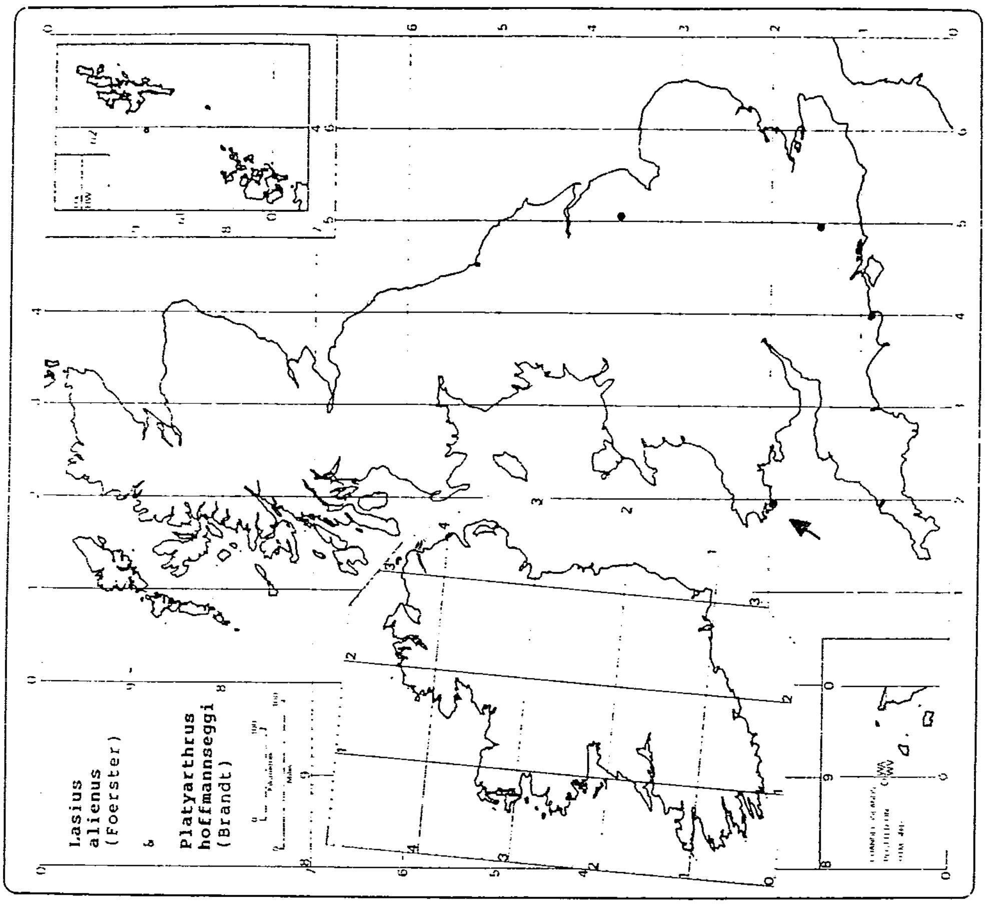

Fig. 5 : Lasius alienus (3 squares)

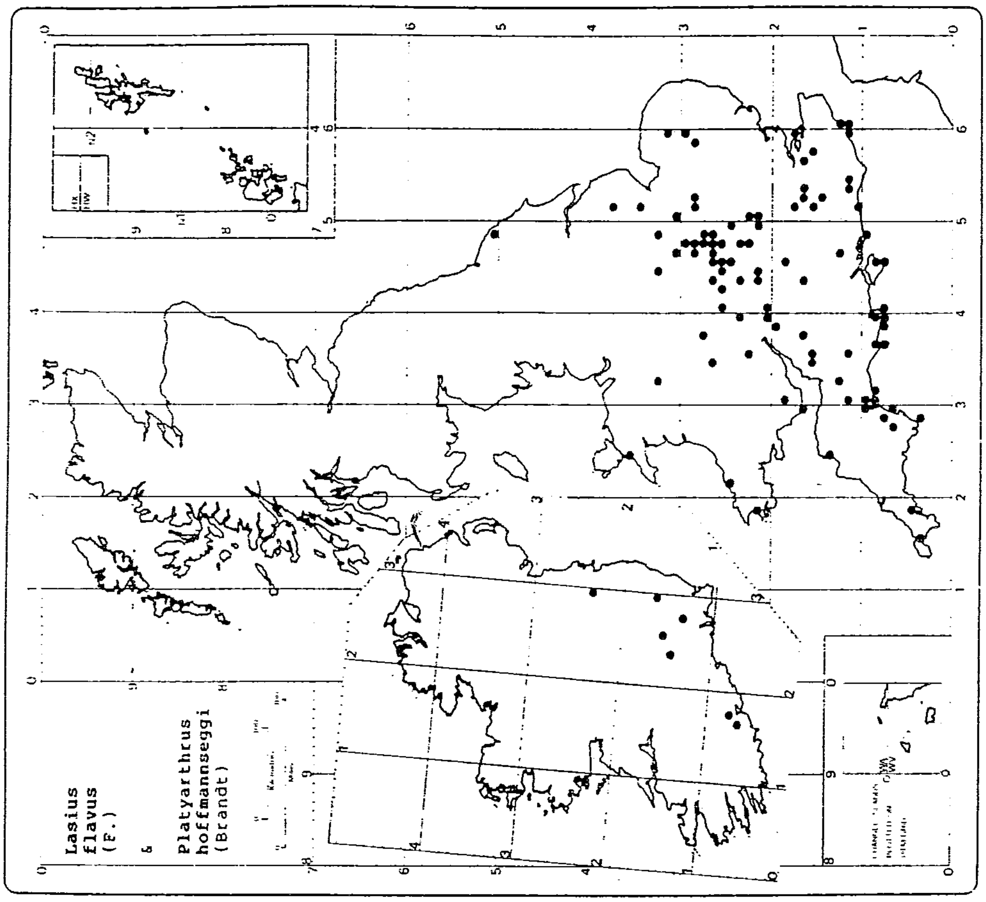

Fig. 7 : Lasius flavus (100 squares)

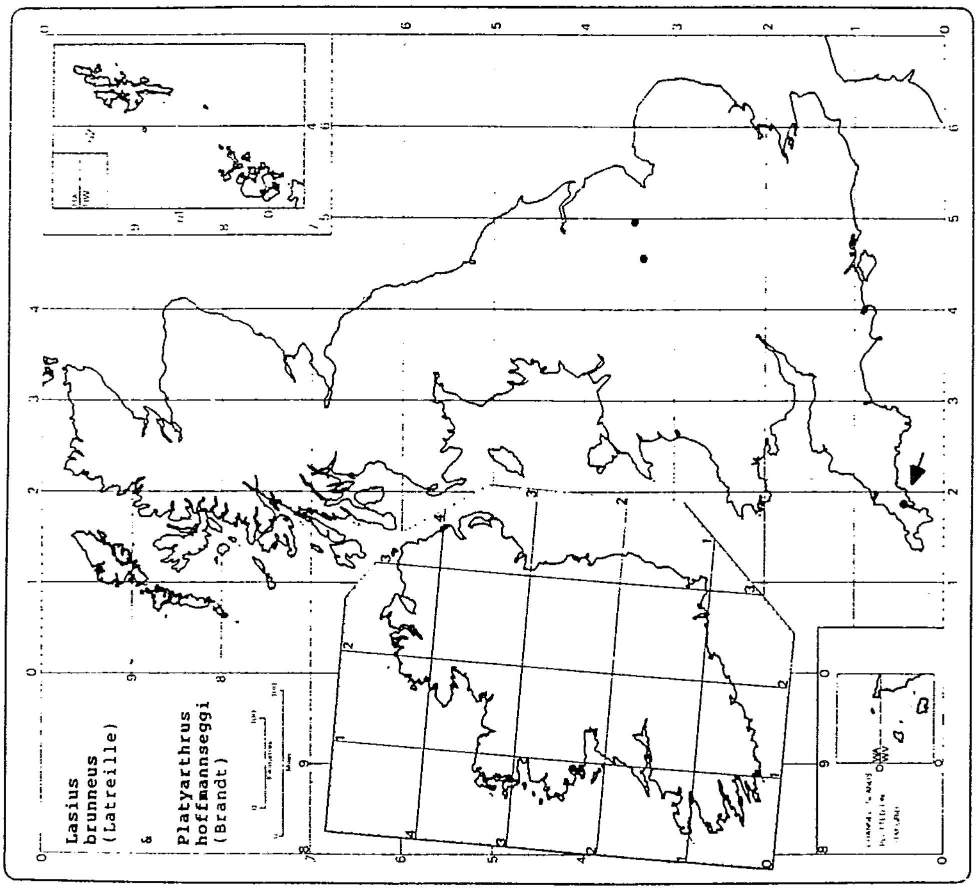

Fig. 6 : Lasius brunneus (3 squares)

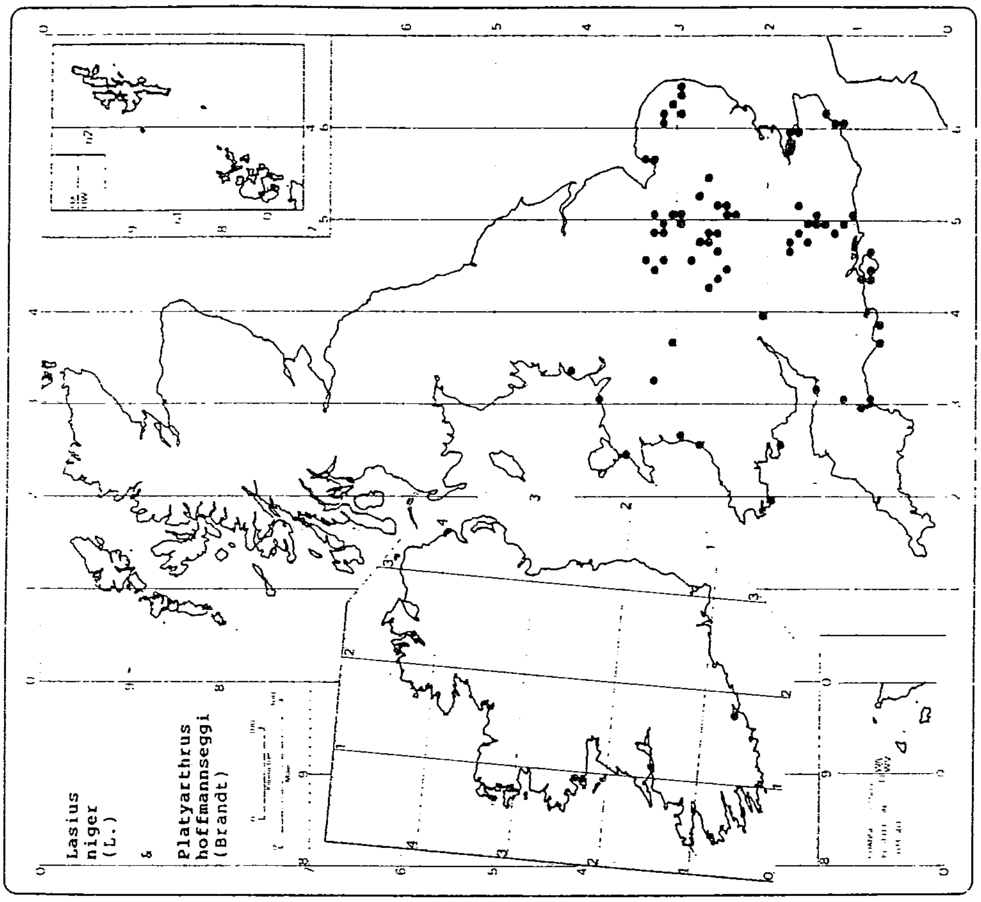

Fig. 9 : Lasius niger (73 squares)

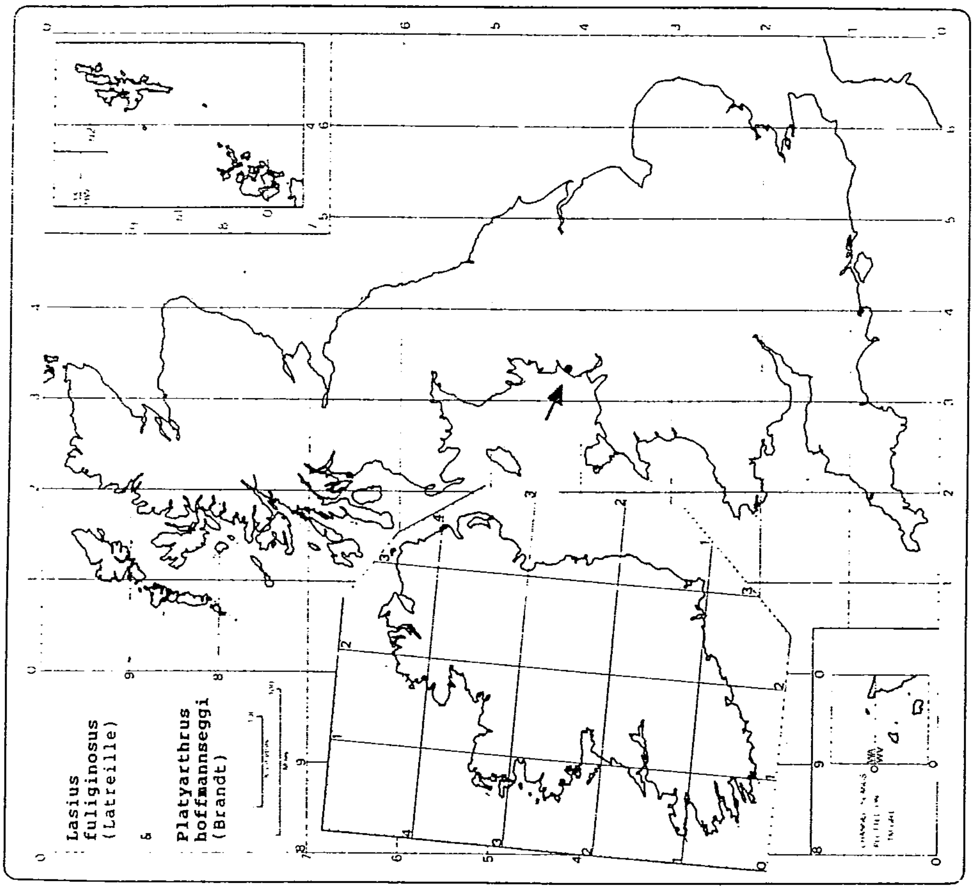

Fig. 8 : Lasius fuliginosus (1 square)

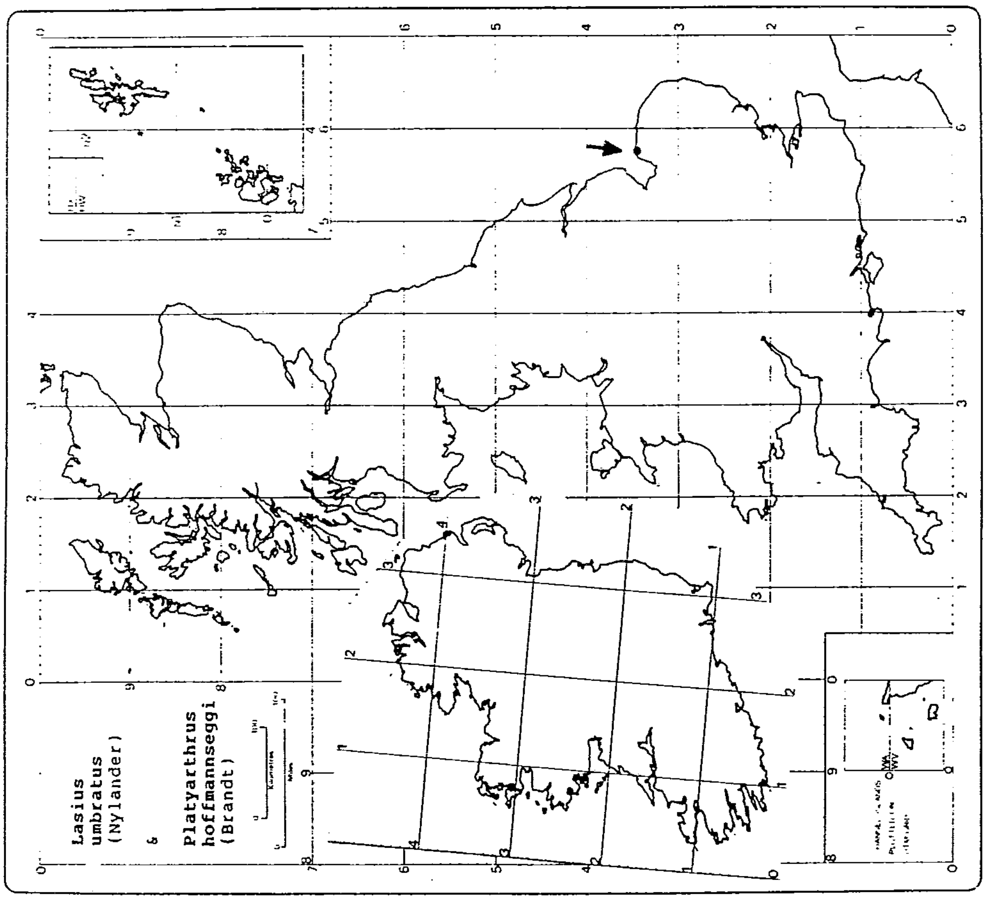

Fig. 10 : *Lasius umbratus* (1 square)

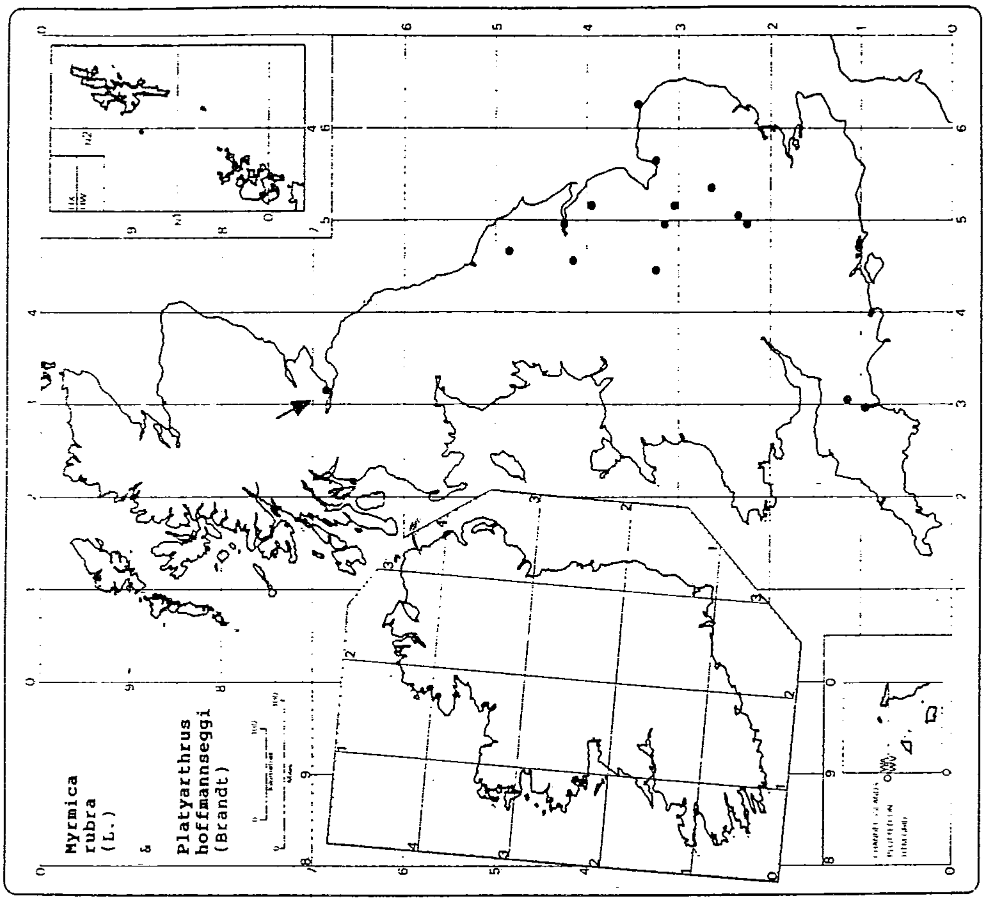

Fig. 11 : *Myrmica rubra* (15 squares)

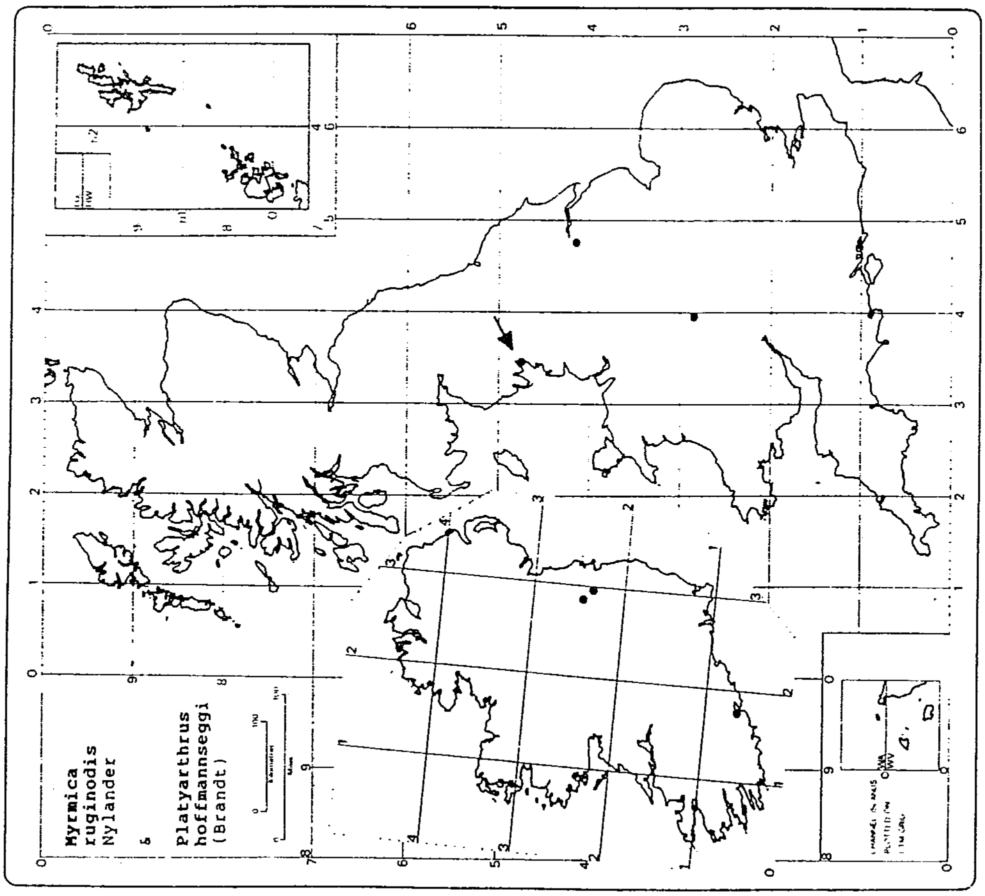

Fig. 12 : *Myrmica ruginodis* (6 squares)

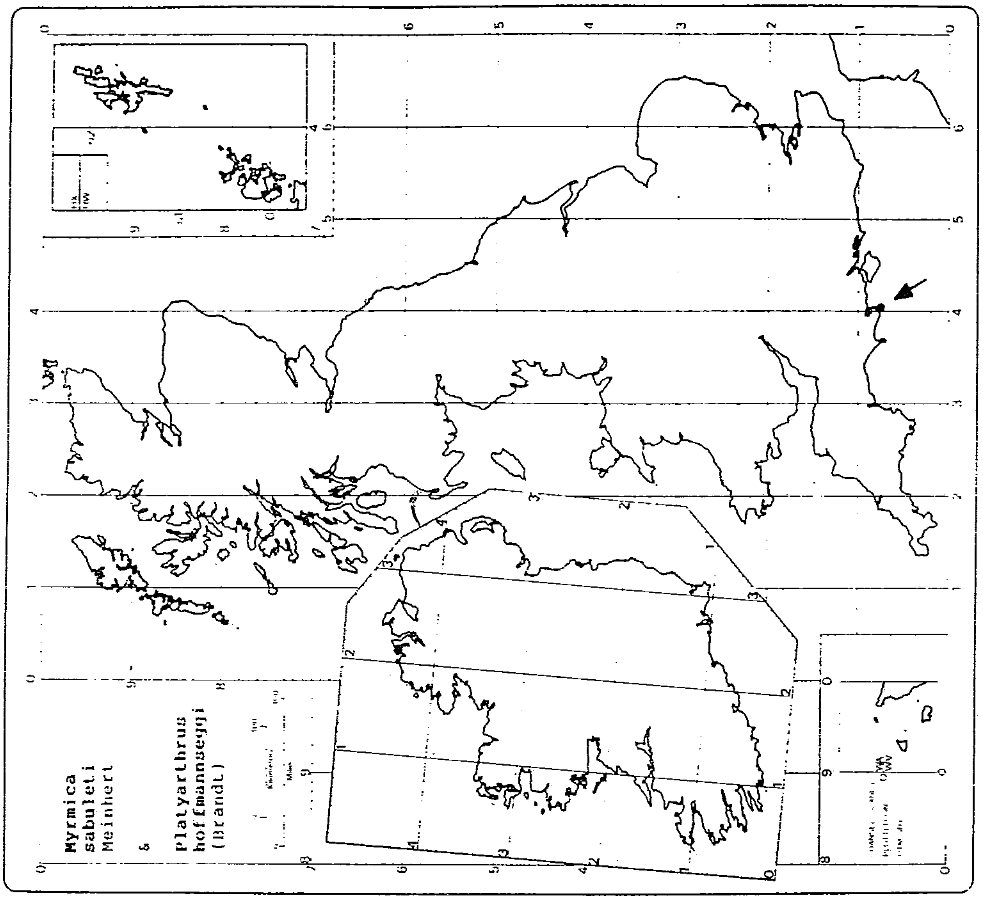

Fig. 13 : *Myrmica sabuleti* (1 square)

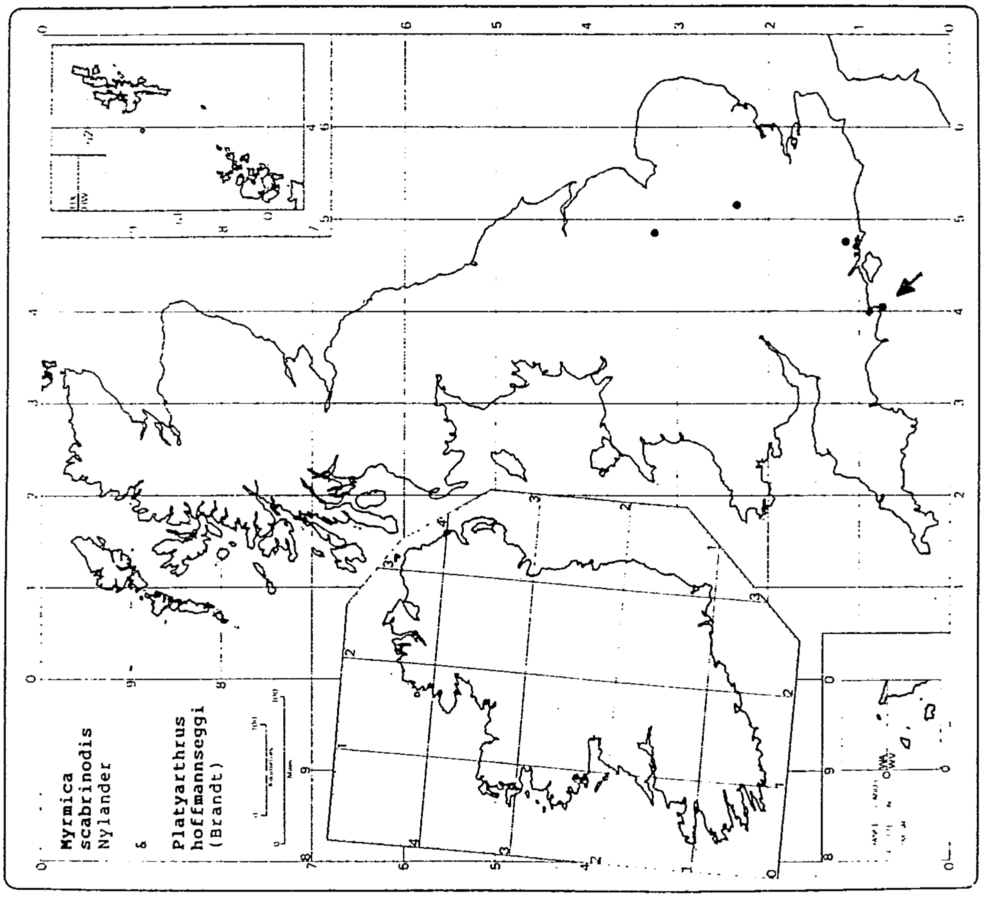

Fig. 14 : Myrmica scabrinodis (4 squares)

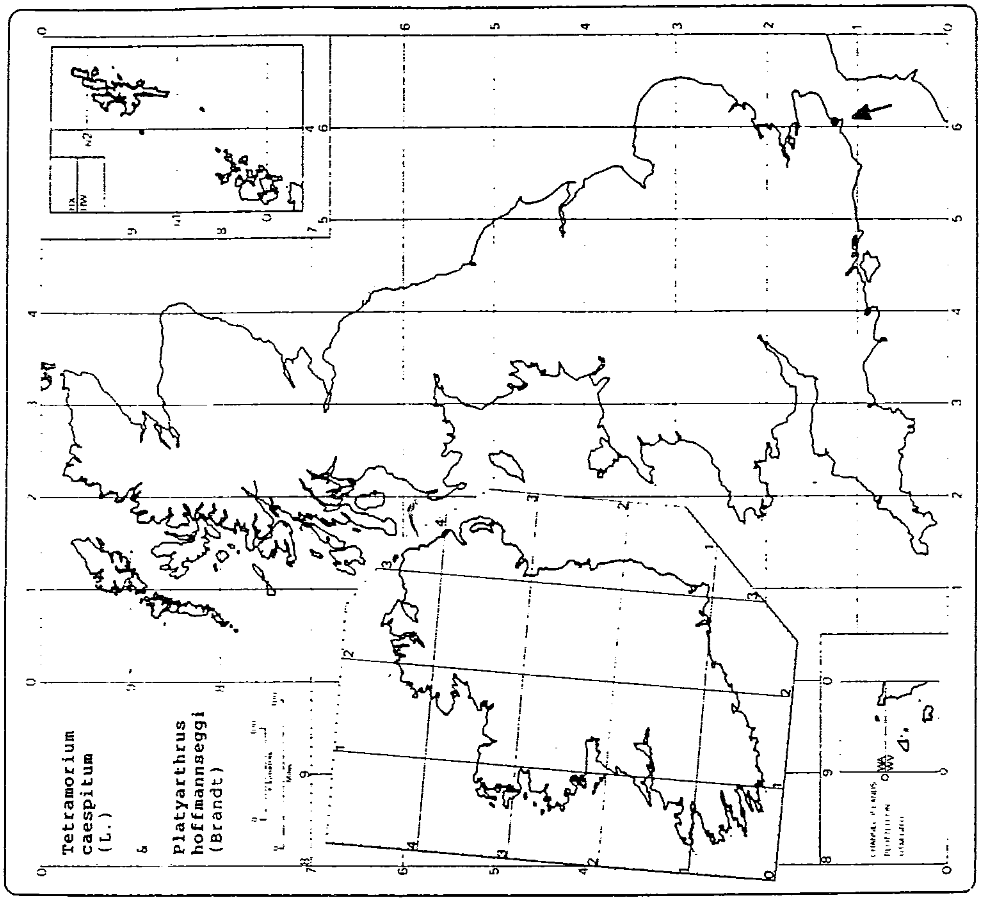

Fig. 15 : Tetramorium caespitum (1 square)

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BIOGEOGRAPHY OF WOODLICE IN BRITAIN AND IRELAND

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INTRODUCTION

A detailed analysis of the distribution and habitat of each of the thirty four species of terrestrial isopods which occur in Britain and Ireland has been presented previously by Harding & Sutton (1985). The distribution maps included in Harding & Sutton's analysis were drawn from records submitted to the Non-marine Isopod Survey Scheme to April 1982. Records submitted after this date have mostly filled in gaps in the maps which would have been expected from the continuous activity of recorders. However, our perception of the ranges of some species have altered in the period since 'Woodlice in Britain and Ireland' was published. In this article, updated distribution maps are presented for fourteen species and a preliminary attempt is made to classify the distribution of terrestrial isopods into six broad categories based on records submitted to the Non-marine Isopod Survey Scheme to March 1987.

FACTORS WHICH CONTROL THE RANGES OF WOODLICE SPECIES

Factors controlling the ranges of woodlice species are either physical or biological. These will modify the growth, fecundity (production of offspring) and survival of each species and limit the number of habitats which they are able to colonise.

1) PHYSICAL FACTORS

a) Climate

Temperature and rainfall are probably the most important factors controlling the distribution of terrestrial isopods in Britain and Ireland. January isotherms run roughly north-west to south-east (Fig. 1) whereas July isotherms run roughly south-west to north-east (Fig. 2). This allows Britain and Ireland to be divided into four quadrants with differing temperature regimes (Fig. 3). Isohyets (lines joining sites with equal rainfall) run roughly north to south so that the west is generally much wetter than the east (Fig. 4).

Presentation of climatic data in this way may however be misleading since extremes of weather are much more likely to control the distribution of a species than annual means. For example, on 12 January 1987, the weather station on Reading University campus recorded the lowest mean temperature for any

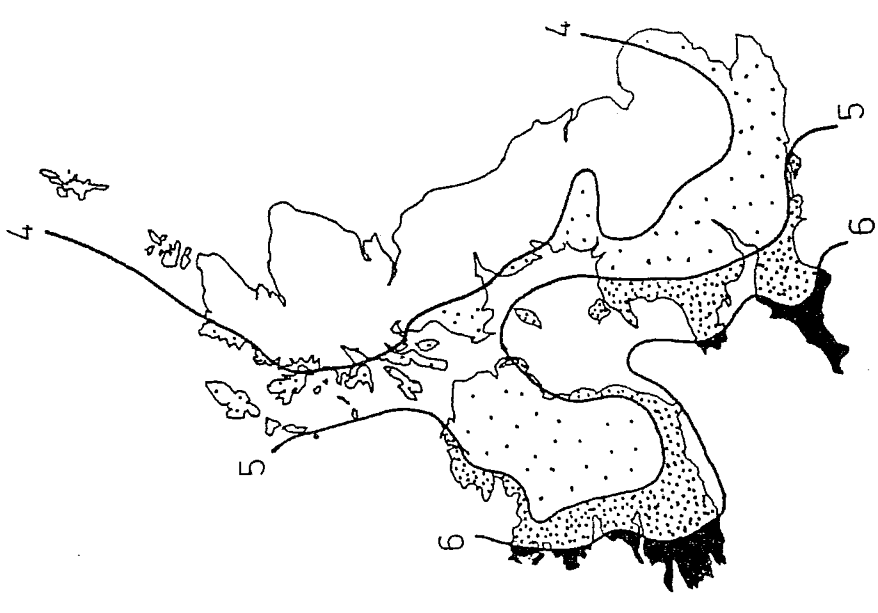

Fig 1 : Mean January
Isotherms (^{o}C)

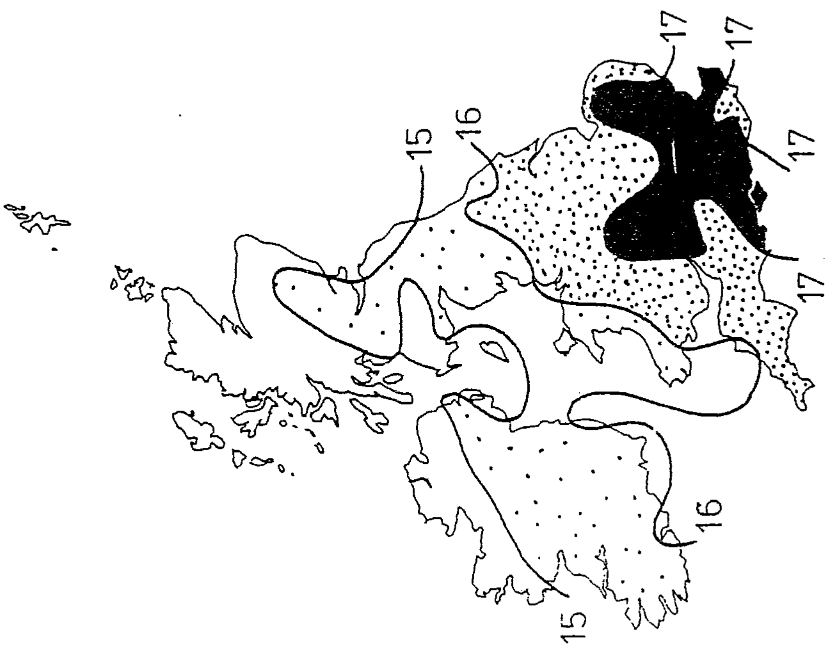

Fig. 2 : Mean July
Isotherms (^{o}C)

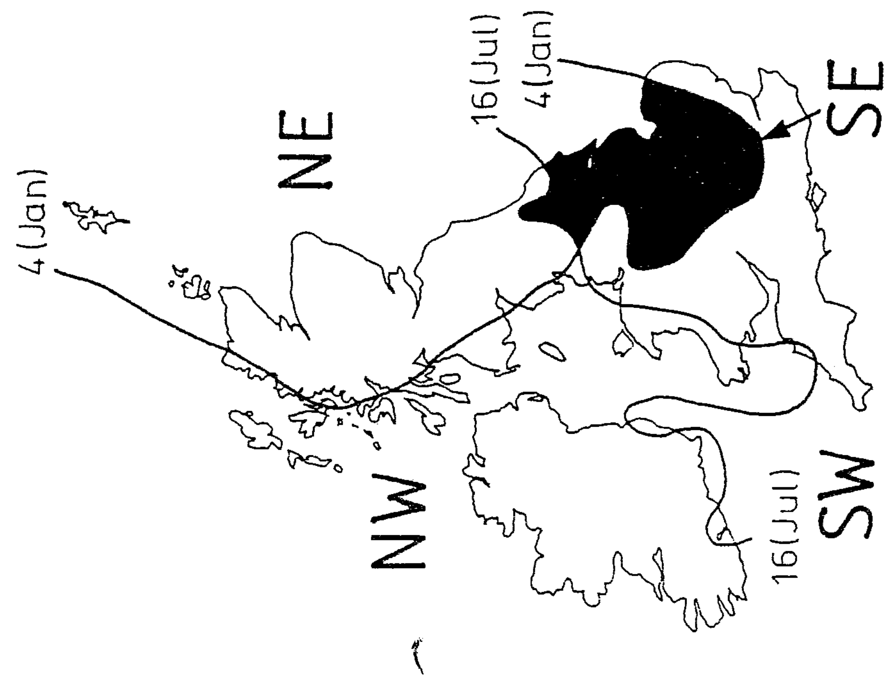

Fig. 3 : Temperature regime
quadrants (SM = Summer
Mean, WM = Winter Mean)
NE = SM < 16 ^{o}C; WM < 4 ^{o}C
SE = SM > 16 ^{o}C; WM < 4 ^{o}C
SW = SM > 16 ^{o}C; WM > 4 ^{o}C
NW = SM < 16 ^{o}C; WM > 4 ^{o}C

day of the year since 1921 (-8.3 °C). The minimum temperature that day (or rather night) was -9.8 °C and the maximum -6.8°C, the lowest maximum since before 1960. The aggregate rainfall was only 8.7 mm, the lowest for January since 1921 and the number of rain days (0.2 mm or more) the second lowest since 1921. There were more sunless days than in any January since 1973; fourteen of these were 14-27 January inclusive, the longest period without measurable sunshine since before May 1958. Such combinations of climatic extremes which may occur only once every 50 years in this area, may be the factor which controls the spread of species which appear on current knowledge to be on the edge of their ranges near to Reading (eg. Armadillidium pulchellum, Fig. 9; Armadillidium depressum, Fig. 12; Trachelipus rathkei, Fig. 16; Trichoniscoides albidus, Fig. 19).

Some species may require a minimum time above a certain temperature to complete their life cycle. For example, only a small area of Britain and Ireland has nine months or more with an average monthly temperature of 6 °C or greater (Fig. 5). This area shows a remarkable correlation with the known distribution of the 'Lusitanian' species Porcellionides cingendus (Fig. 11) and the coastal Halophiloscia couchi (Fig. 8) suggesting that temperature is the most important factor controlling the distribution of these species.

b) Geology

Woodlice do not like acidic habitats since calcium, which they require for their exoskeleton, is usually in short supply in such areas. Calcareous rocks occur mainly in south-east and northern England and central Ireland (Fig. 6). Some species appear to proliferate in areas with calcareous rocks. Armadillidium vulgare (Fig. 13) and Porcellio spinicornis (Fig. 10) are much more common on the chalk and limestone respectively than on other inland sites in the south of England. The presence of calcium in mortar and building stone also appears to enable Porcellio spinicornis (Fig. 10) to colonise synanthropic sites outside its natural "anti-Atlantic" range. All sites in Cardiganshire (Vice County 46) where Porcellio spinicornis has been extensively recorded (Fig. 10) are synanthropic sites (Chater 1986).

c) Altitude

Very few woodlice seem to be able to survive on the highest peaks although it should be pointed out that not many recorders have climbed mountains in search of isopods! I have searched several peaks over 700 m in the English Lake District and although centipedes, spiders, harvestmen (opilionids), mites and Collembola are quite common, I have yet to find a single woodlouse. The combined effects of low temperature and the drying effects of the wind in these exposed areas presumably prevents woodlice from the slopes of such peaks from colonising

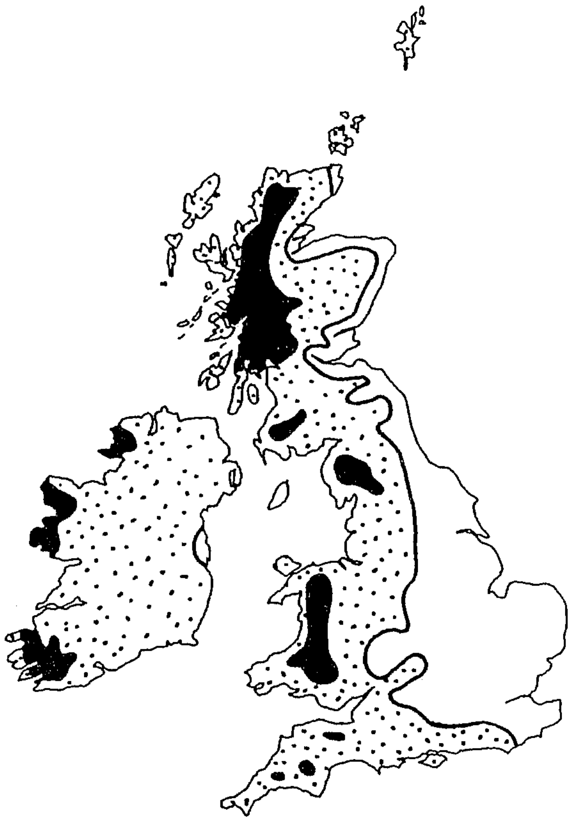

Fig 4 : Isohyets (annual mean mm)

> 1500 mm

750-1500 mm

< 750 mm

Fig. 5 : ´Growing season´ (no. of months) with mean temp. > 6 °C)

⩾ 9 months > 6 °C

< 9 months > 6 °C

Fig. 6 : Main areas of calcareous rocks (chalk and limestone)

the summits.

d) Synanthropy

Woodlice are probably the archetypal urban invertebrates. They reach such numbers in gardens in Reading that the Environmental Health Officer responds to an average of two requests a week from worried members of the public to come and exterminate woodlice from their gardens. Before man started to modify the landscape with buildings, quarries and rubbish tips (official and unofficial!), some species which are currently common and widespread in such sites were probably quite rare. Species such as *Cylisticus convexus* (Fig. 16) are most numerous in natural habitats when these are subject to frequent disturbance, particularly eroding coastal cliffs. This ability to survive and expand in numbers in such sites probably explains why most inland records for *Cylisticus convexus* are from synanthropic sites (Harding & Sutton 1985). Human rubbish, derelict buildings etc. provide a rich variety of niches resulting in the species list for "mature" rubbish tips often exceeding lists of species in natural habitats. Synanthropic species may also be spread rapidly, particularly if they are associated with material which is frequently moved (eg. *Porcellionides pruinosus*, a common resident of dung heaps).

2) BIOLOGICAL FACTORS

a) Competition

There is currently much debate in ecological circles as to whether the distribution of invertebrates is ever limited by competition between species. It is argued that the niches of all species are unique and do not overlap in the wild. Very little experimental work appears to have been carried out on competition between different species of woodlice so conclusions based on distribution data are speculative. However species which may compete in the wild and which would be worth examining in detail in the laboratory are *Armadillidium depressum* (Fig. 12), *Armadillidium vulgare* (Fig. 13) and *Cylisticus convexus* (Fig. 16). *Armadillidium depressum* is very common in gardens in Bristol for example, and does appear to replace *Armadillidium vulgare* in such habitats. *Cylisticus convexus* is frequently common in synanthropic and coastal sites in Scotland and northern England, but is present in much fewer numbers in the south. This is possibly due to competition with *Armadillidium vulgare* which is rare in north-west England and Scotland (Fig. 13). Similar competition may limit the spread of other species into regions which they would otherwise be able to exploit more fully.

b) Disease and Parasitism

Relatively little appears to be known about whether diseases and parasites might limit the distribution of woodlice. Terrestrial isopods are known to carry an iridovirus (which is probably the cause of the purple colour often seen in Trichoniscus pusillus and occasionally other species), a rickettsia, a yeast like organism and parasitic nematodes (Federici 1984). I once pulled horsehair worm (Phylum Nematophora) of 8 cm in length from an Oniscus asellus of 1.2 cm in length. The larvae of several species of dipteran flies have also been found in woodlice and there are some interesting differences in the extent to which different species are parasitised (Bedding 1965). Mites are often present on the external surface of woodlice but they probably do little harm to their hosts in the wild (Colloff & Hopkin 1986). In the laboratory it is probably a different matter and it is likely that many cultures of isopods die out due to disease and parasitism.

c) Symbiotic Relationships with other Invertebrates

In Britain and Ireland, the small white woodlouse Platyarthrus hoffmannseggi is invariably found associated with ants (Hames 1987). Locally, its distribution will be affected by the presence of ant colonies in which it can live. Nationally, there appears to be an additional climatic component controlling its distribution as Platyarthrus hoffmannseggi is very rare in Scotland despite the fact that apparently suitable ant colonies are present.

PROVISIONAL CLASSIFICATION OF WOODLOUSE DISTRIBUTION

The distribution of woodlice species in Britain and Ireland can be divided into six broad categories. A seventh category is reserved for those species on which we have insufficient information to draw any firm conclusions.

1. Coastal

Six species are limited to the coast. Records to date suggest that Armadillidium album, Ligia oceanica, Miktoniscus patiencei and Trichoniscoides saeroeensis (Fig. 7) occur all around the coast of Britain and Ireland in suitable habitats but that Halophiloscia couchi (Fig. 8) is restricted to the south-west. All records for Stenophiloscia zosterae have been from coastal sites but these are insufficient to be sure of its range.

2. North-western distribution

Armadillidium pulchellum (Fig. 9) appears to be the only species with this distribution although further recording in "extreme" habitats such as ant nests (where I have found this species with Formica rufa in the Forest of Dean) and coniferous plantations (where I have found this species under bark in north Hampshire), may reveal it to be much more widespread in southern England. Haplophthalmus mengei may also follow this distribution as recent studies have shown that some inland records for this species in south-east England are in fact of another species of Haplophthalmus new to Britain (Hopkin & Roberts 1987). Expansion of the ranges of ´north-western´ species may be limited by intolerance to high summer temperatures in the south-east (Fig. 2).

3. North-eastern distribution

Porcellio spinicornis (Fig. 10) appears to be the only species with an ´anti-Atlantic´ tendency (Harding & Sutton 1985), perhaps preferring drier areas with mean winter temperatures above 4 ^{o}C (Figs. 1, 4). Records for this species in the west are predominantly synanthropic. It has recently been recorded from a bath in a holiday flat in the Scilly Isles! (Jones & Pratley 1987).

4. South-western (Lusitanian) distribution

Porcellionides cingendus (Fig. 11) exhibits an archetypal Lusitanian distribution (as does the coastal Halophiloscia couchi, Fig. 8). The remarkable resemblance between the area which has a "growing season" of nine months or greater (Fig. 5) and the distribution of this species suggests that Porcellionides cingendus is intolerant of frosts and requires a lengthy period of warm wet weather in which to complete its reproductive cycle. Armadillidium depressum is most common in the south and west (Fig. 12) but there is a strong synanthropic component to its distribution. The range of this species may be expanding if it is an old introduction (Harding & Sutton 1985) and it is worth looking for beyond the edge of its current known range.

5. Southern/South-eastern distribution

Six species fall into this category which may prefer sites with hot summers and cold winters (Fig. 3) with moderate rainfall (Fig. 4), namely Armadillidium nasatum, Armadillidium vulgare (Fig. 13), Haplophthalmus danicus, Ligidium hypnorum (Fig. 14), Platyarthrus hoffmannseggi and Trachelipus rathkei (Fig. 15). The distribution of Trachelipus rathkei is perhaps the most difficult to explain. It is often found in synanthropic sites and may be spreading in a similar manner to that suggested for Armadillidium depressum. Trachelipus rathkei has recently been found in two further 10 km squares in Worcestershire by P.F. Whitehead.

6. Widespread distribution

Eight species are widespread in Britain and Ireland, Androniscus dentiger, Cylisticus convexus (Fig. 16), Oniscus asellus, Philoscia muscorum, Porcellio scaber, Porcellionides pruinosus, Trichoniscus pusillus and Trichoniscus pygmaeus. Porcellio dilatatus was certainly widespread in the past but appears to have become much less common in recent years (Harding & Sutton 1985). All these species appear to be native with the exception of Porcellionides pruinosus which may have been introduced in animal dung.

7. Insufficient records

Too few records have been submitted for eight species, to allow firm conclusions on their distribution to be made (with the possible exception of Oritoniscus flavus which on current evidence seems to be restricted to south-east Ireland). Armadillidium pictum, Buddelundiella cataractae, Eluma purpurascens (for which several new sites in Kent have been added since 1982, Fig. 17), Metatrichoniscoides celticus (found at an inland site in 1986 by Arthur Chater, Fig. 18), Porcellio laevis, Trichoniscoides albidus (Fig. 19) and Trichoniscoides sarsi (discovered under snow in Wytham Wood near Oxford in March 1987, Fig. 20) should all be specifically searched for to increase our knowledge of the ranges of these little-known isopods.

CONCLUSIONS

Records from new and previously-visited sites are needed if we are to determine the true ranges of woodlice in Britain and Ireland, and to monitor possible changes in the distribution patterns of the different species. The speed at which woodlice can spread should not be under-estimated. Experiments carried out on the desert woodlouse Hemilepistus reaumuri have shown that an individual can walk continuously for 7 kilometres on a rotating ball without stopping and can cover over 100 km if removed every day and allowed to feed (Hoffmann - personal communication). There seems no good reason to suppose that the larger species of British and Irish woodlice are any less able at long distance walking than their desert cousins!

ACKNOWLEDGEMENTS

I am grateful to Paul Harding for allowing access to pre- and post-April 1982 records, George Fussey who was responsible for checking record cards from 1982 to 1985 and to the recorders who supplied the data which enabled the 1982 maps to be updated.

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WOODLICE DISTRIBUTION MAPS (FIGS. 7 - 20)

The maps show the recorded occurrence in Britain and Ireland of selected species, using the 10 km squares of the British and Irish National Grids, for records received to March 1987. The maps were prepared by adding post-April 1982 records to maps copied by hand from those published by Harding & Sutton (1985).

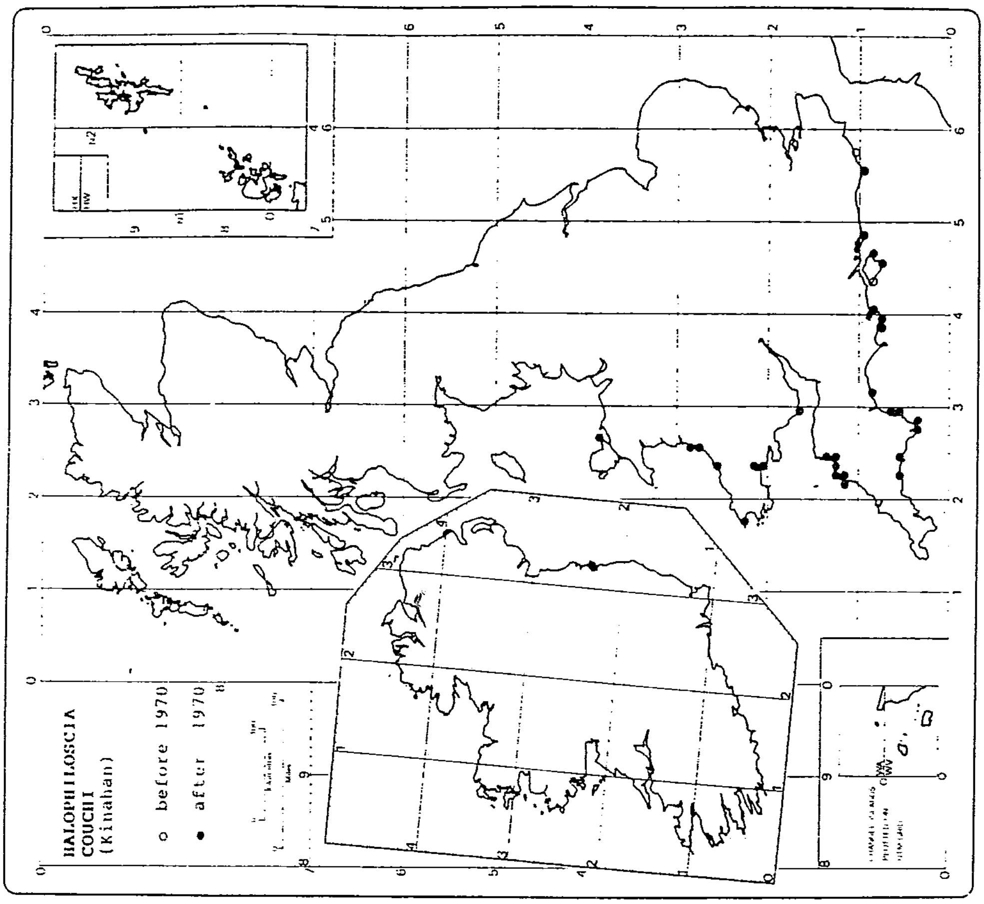

Fig. 8 : *Halophiloscia couchi*
COASTAL (LUSITANIAN)

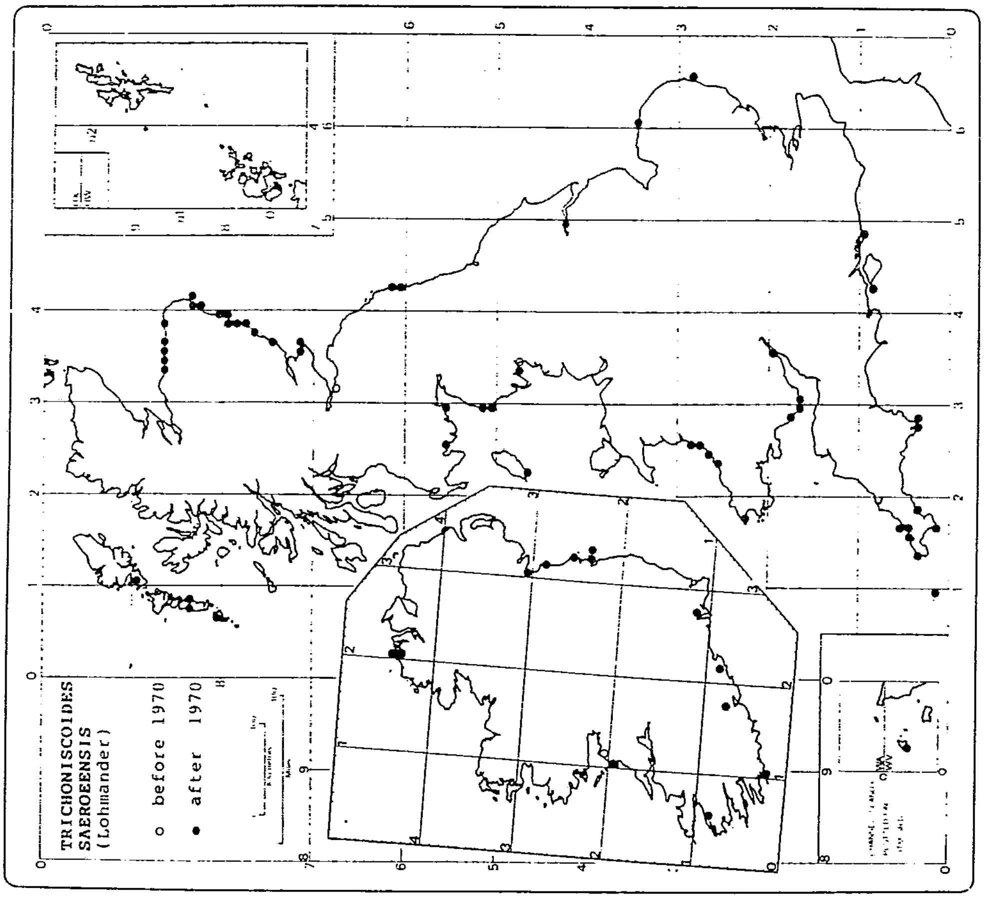

Fig. 7 : *Trichoniscoides saeroeensis*
COASTAL

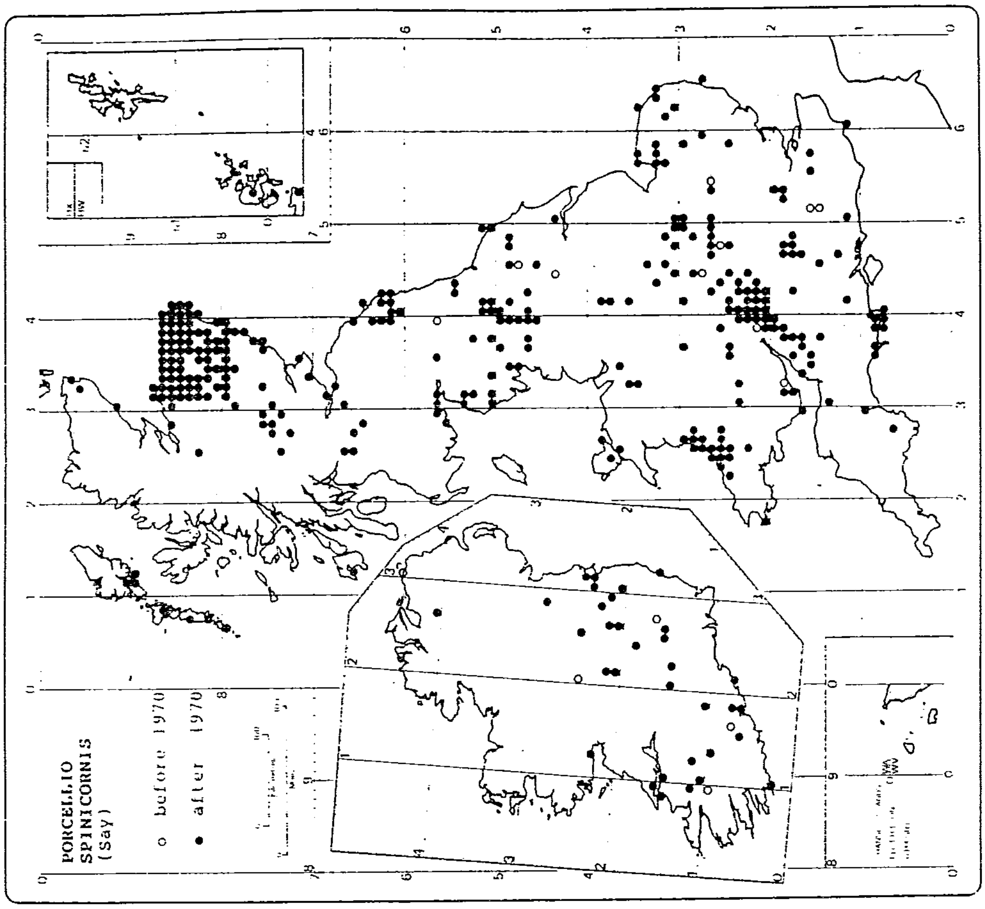

Fig. 10 : Porcellio spinicornis
NORTH-EASTERN

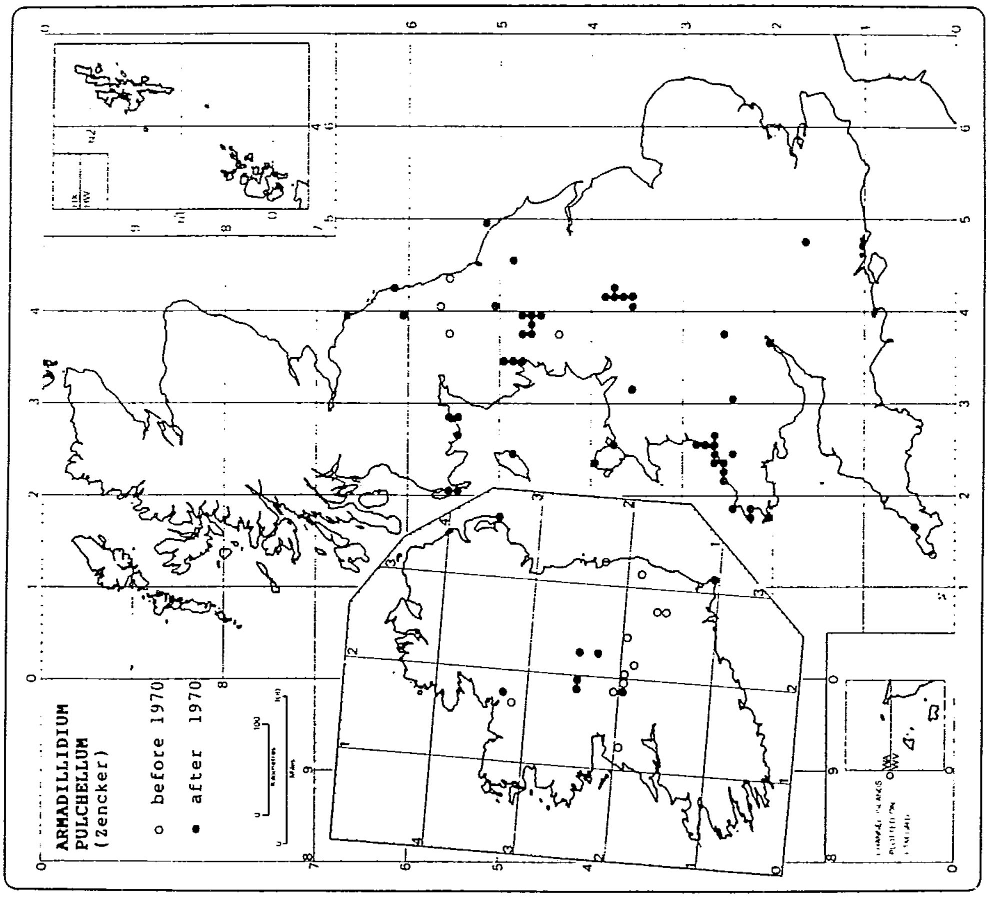

Fig. 9 : Armadillidium pulchellum
NORTH-WESTERN

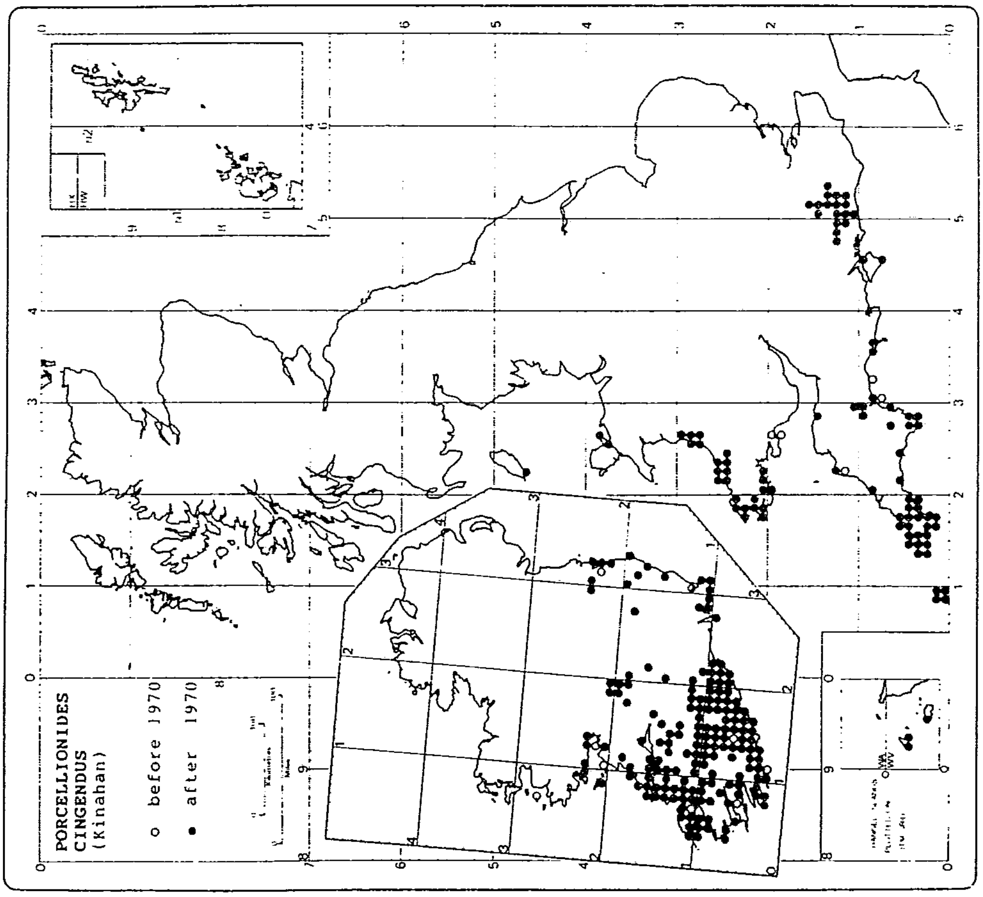

Fig. 11 : *Porcellionides cingendus*
SOUTH-WESTERN (LUSITANIAN)

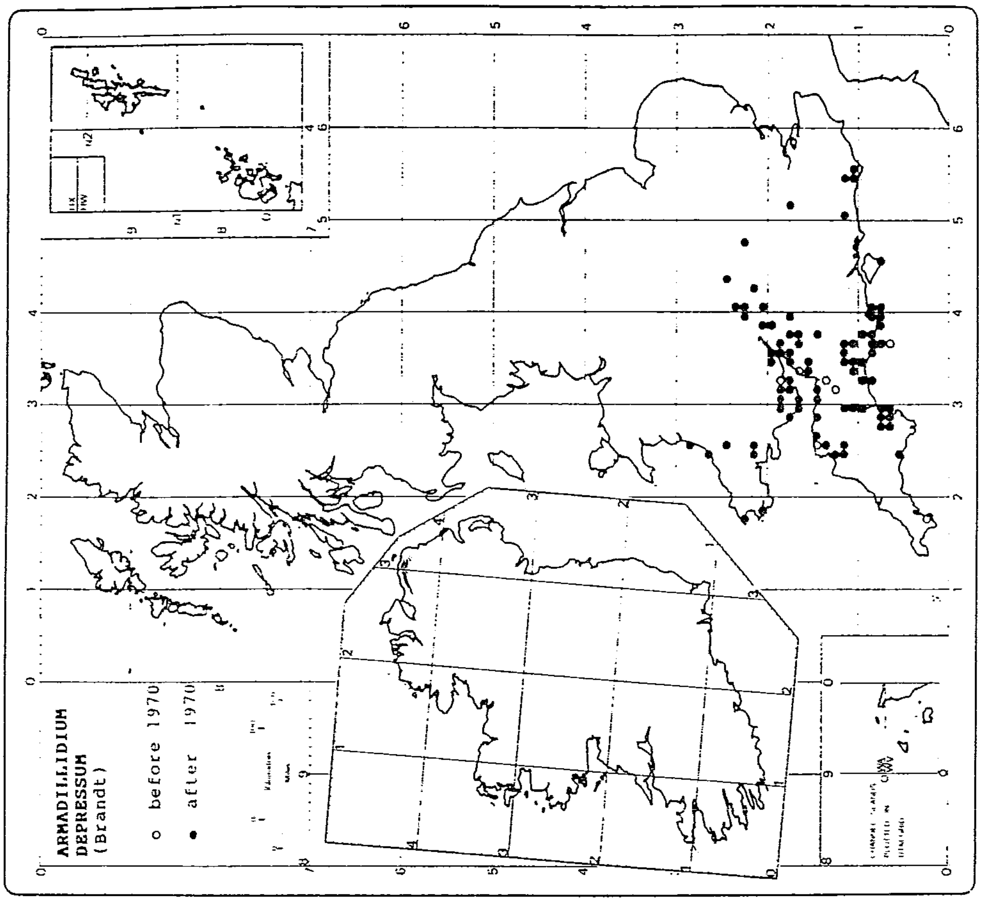

Fig. 12 : *Armadillidium depressum*
SOUTH-WESTERN

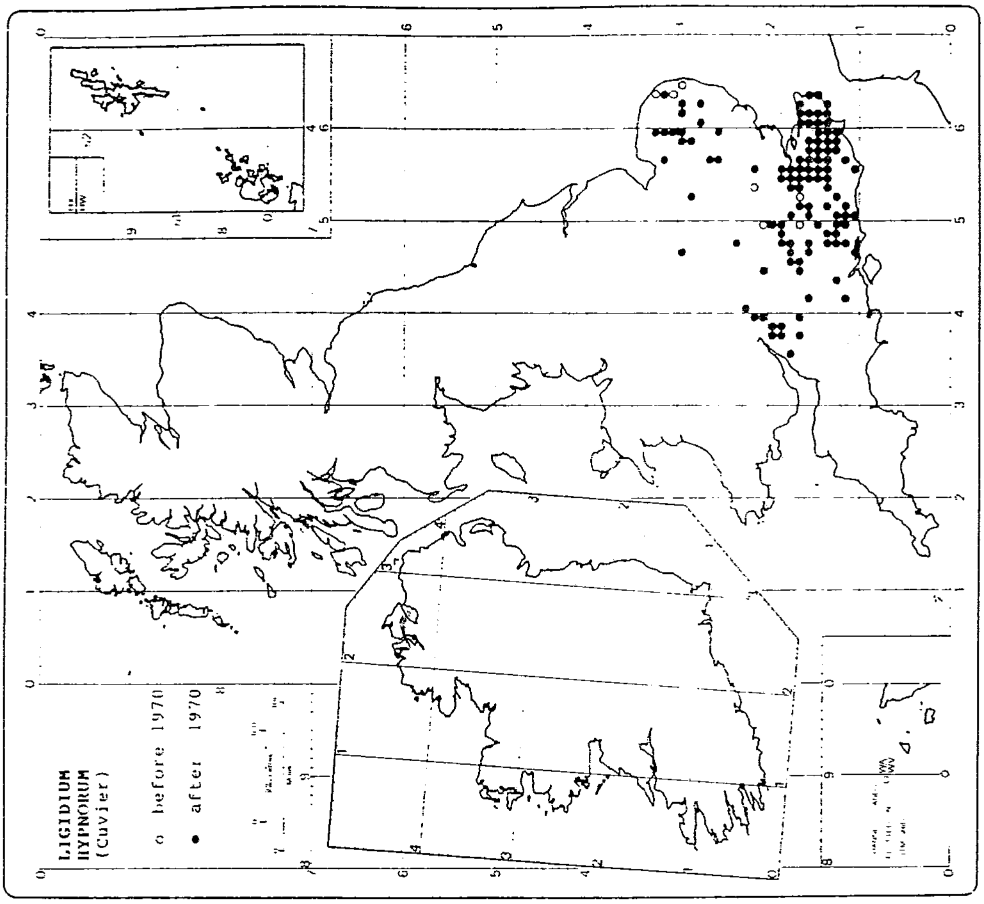

Fig. 14 : Ligidium hypnorum
SOUTHERN/SOUTH-EASTERN

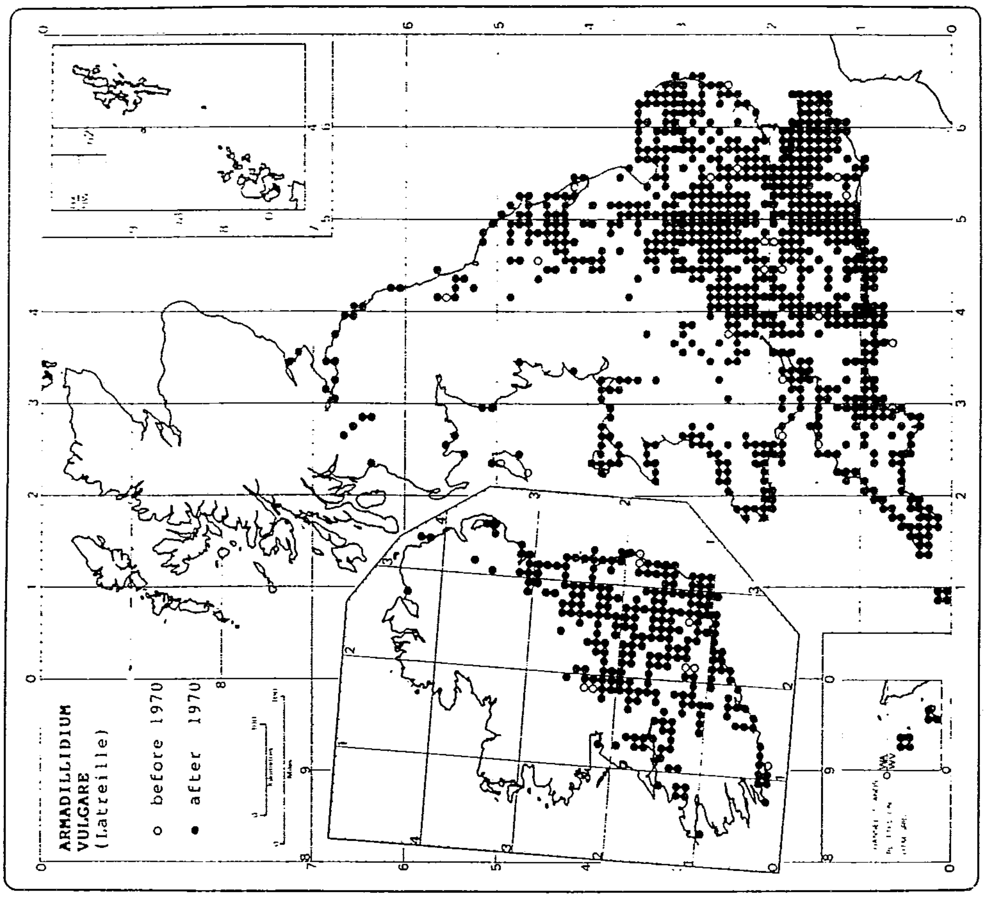

Fig. 13 : Armadillidium vulgare
SOUTHERN/SOUTH-EASTERN

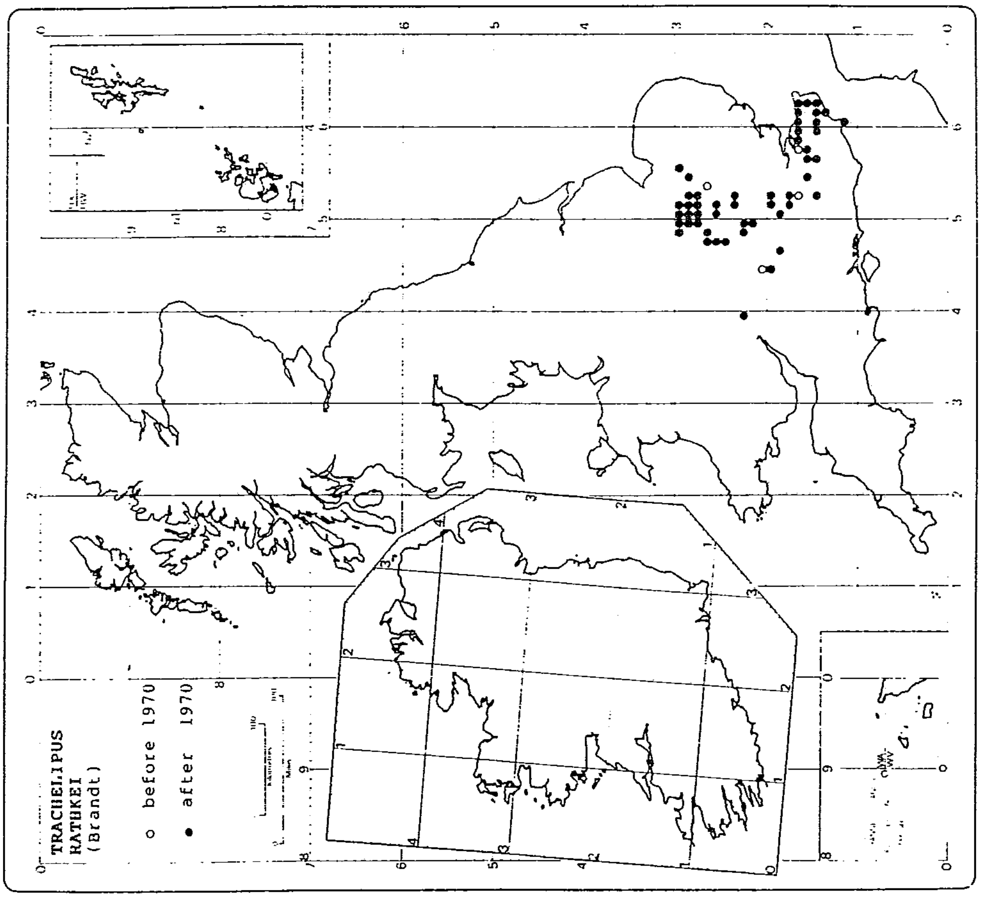

Fig. 15 : Trachelipus rathkei
SOUTHERN/SOUTH-EASTERN

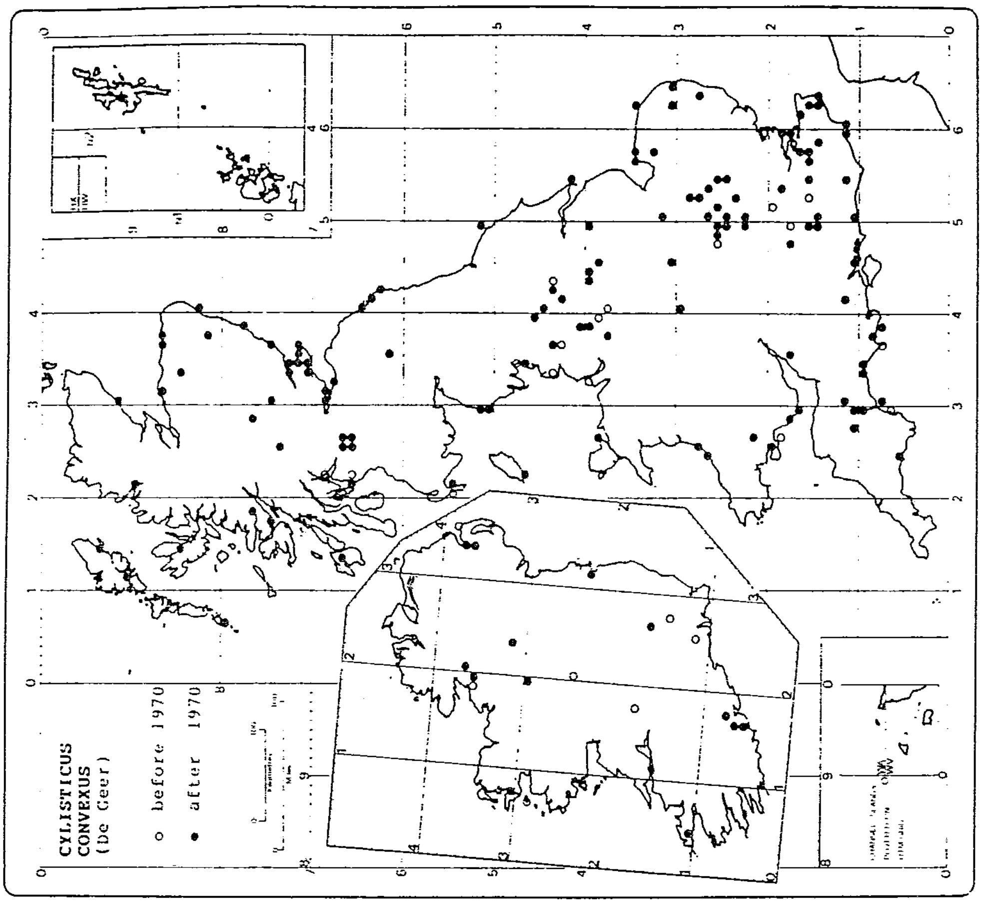

Fig. 16 : Cylisticus convexus
WIDESPREAD

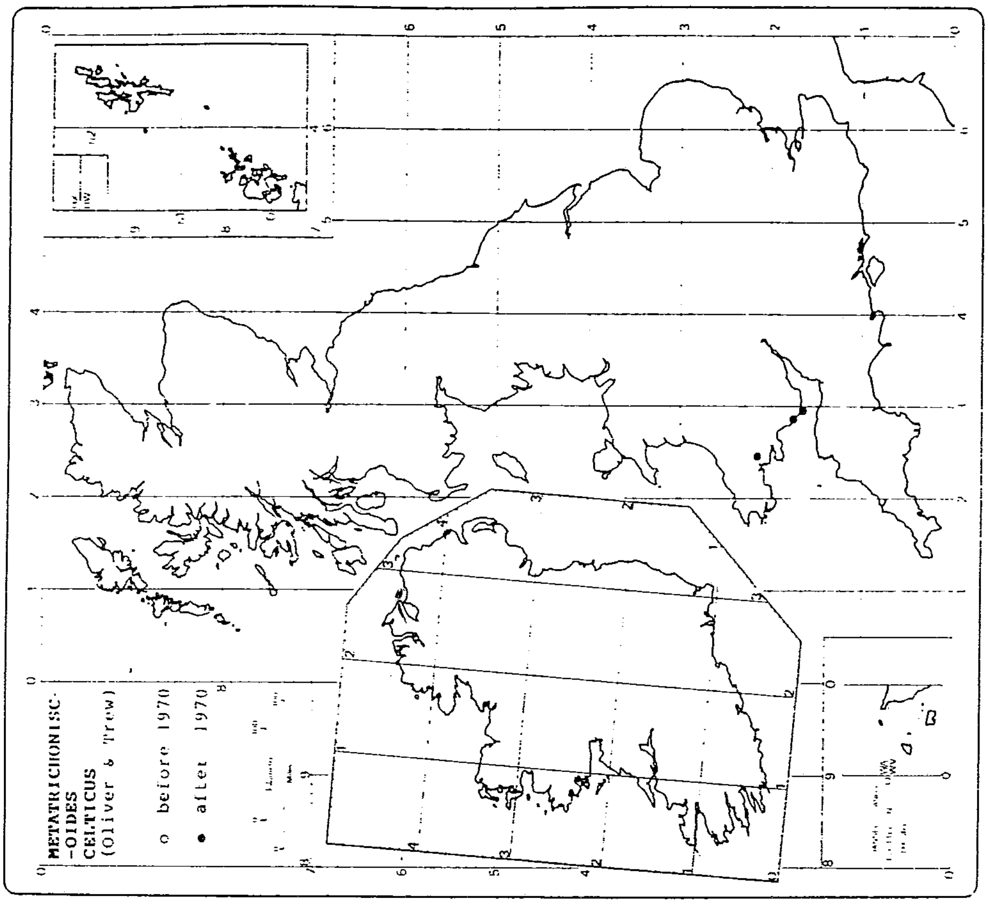

Fig. 18 : Metatrichoniscoides celticus
INSUFFICIENT RECORDS

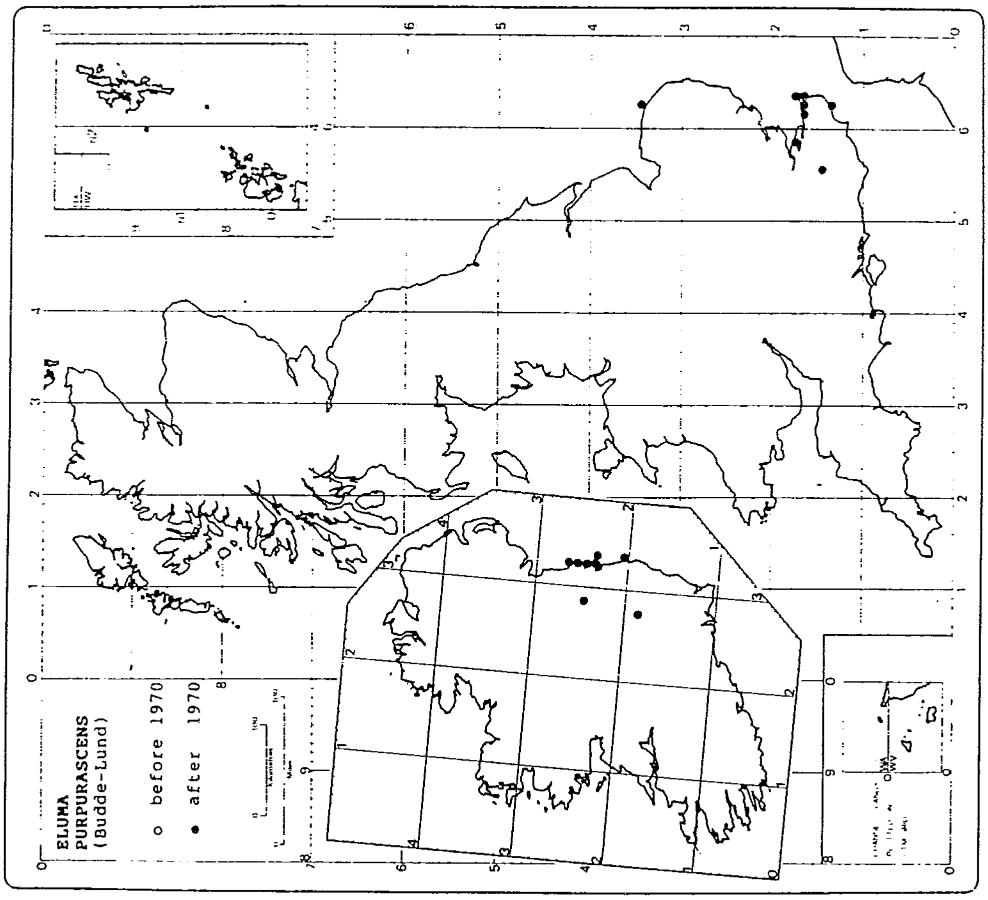

Fig. 17 : Eluma purpurascens
INSUFFICIENT RECORDS

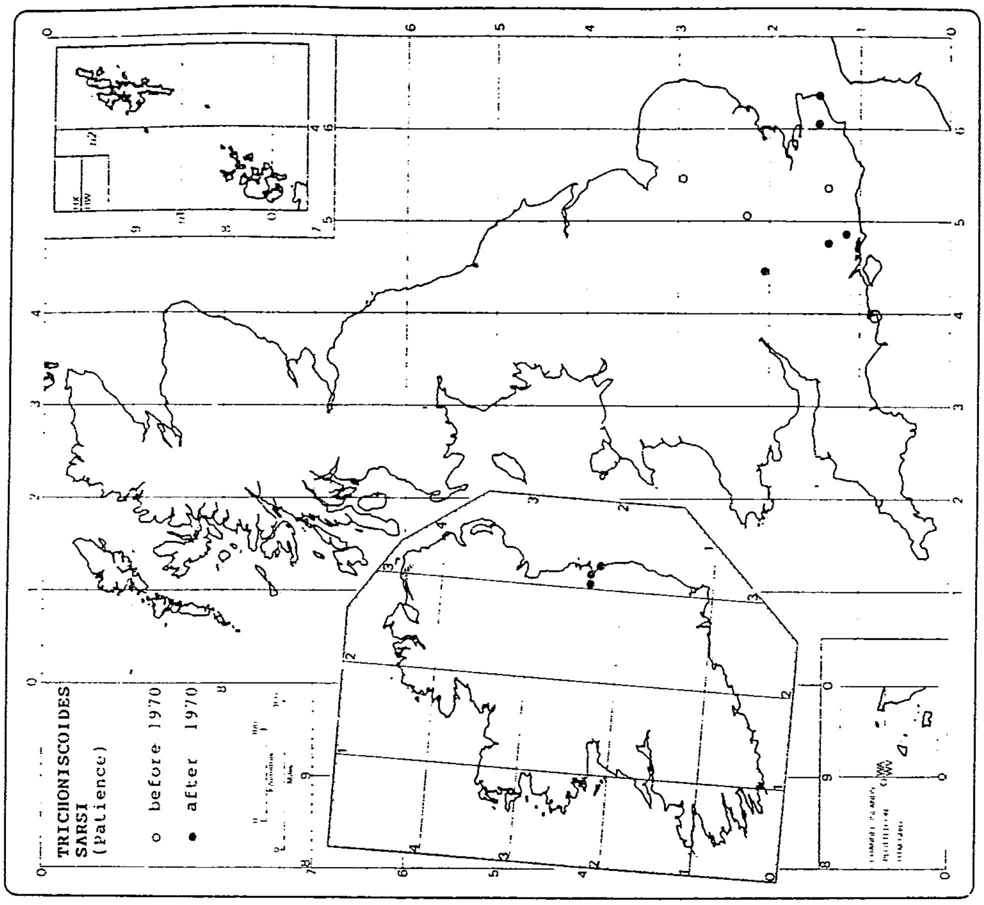

Fig. 18 : Trichoniscoides sarsi
INSUFFICIENT RECORDS

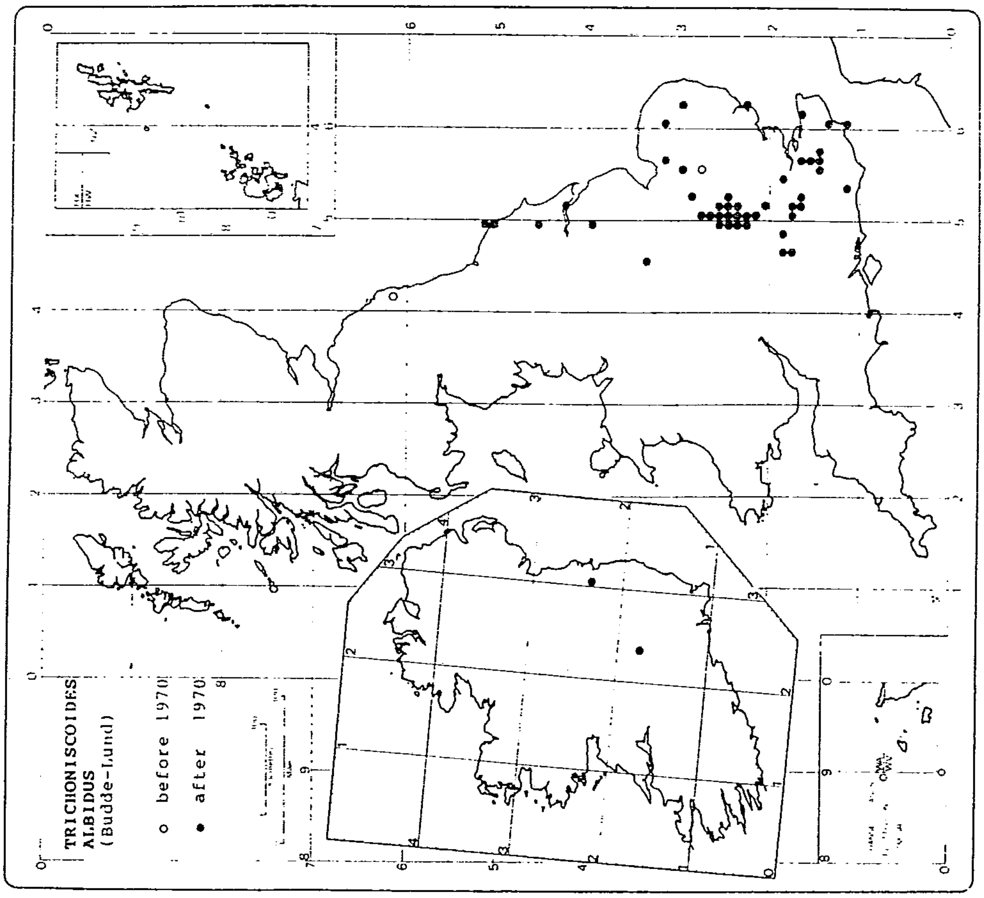

Fig. 19 : Trichoniscoides albidus
INSUFFICIENT RECORDS

Isopoda (1987) 1, 37-48

A SPECIES OF HAPLOPHTHALMUS NEW TO BRITAIN

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INTRODUCTION

Members of the genus *Haplophthalmus* are small (<5 mm in length) poorly-pigmented soil-dwelling isopods with pronounced longitudinal ridges on the tergites. The situation regarding the identity, nomenculature and validity of species within the genus is, to say the least, confused. In this article we attempt to unravel some of this confusion and describe the features that enable the three species which are now known to occur in Britain and Ireland to be identified.

BRITISH KEYS TO SPECIES OF HAPLOPHTHALMUS

Both Edney (1954) and latterly Sutton *et al* (1972) have relied mainly on tergal ornamentation in their keys to *Haplophthalmus* in Britain. In Sutton *et al* (1972), the key on page 88 states the following;

Sub-Family Haplophthalminae

Key to Genus *Haplophthalmus*

1.	*Ridges* on dorsal surface of pereionites usually with 3-4 teeth (fig. 22A); any projections close to mid-line on 3rd pleonite very feeble	*Haplophthalmus danicus*
	Ridges on dorsal surface of pereionites usually with more than 4 teeth (fig. 22C); prominent pair of projections on 3rd pleonite	*Haplophthalmus mengei*

In the guide to French terrestrial isopods by Vandel (1960), *Haplophthalmus danicus* is the only species described without prominent projections on the 3rd pleonite. However, Vandel describes at least five species of *Haplophthalmus* which do have prominent projections on the 3rd pleonite, and whose general morphology is similar to the species *Haplophthalmus* "*mengei*" of British authors. There were thus two possibilities. First, the species we have been calling *Haplophthalmus mengei* in Britain was not in fact this species but was one of the others described by Vandel (1960). Second, there may have been more than one species 'hiding' within records for *Haplophthalmus* "*mengei*" submitted to the Non-Marine Isopod Survey Scheme.

We therefore set out to study these possibilities by re-examining specimens of *Haplophthalmus* in our own reference collections, and those of Arthur Chater, Gordon Corbet, Paul Harding, Eric Philp and Adrian Rundle, from a wide range of sites in Britain and Ireland. These specimens were compared with the descriptions of species of *Haplophthalmus* given in the most recent European publications (Table 1).

CHARACTERS USED TO IDENTIFY *HAPLOPHTHALMUS* SPECIES

Three main characters have been used by European authors to separate different species of *Haplophthalmus*. First, tergal ornamentation, second, the arrangement of spines and structure of the 7th pereiopods (legs) of males and third, the structure of the endopodites of the 1st pleopods of males (which are on the posterior ventral surface and are used for sperm transfer to the females during mating).

1) Tergal ornamentation

a) Validity

Vandel (1960) makes considerable use of the arrangement of ridges and the shape of projections on the dorsal surface of the pereionites and pleonites for the identification of species of *Haplophthalmus*, and even provides a key (p. 360) for the identification of females based on this feature. However, he states in his introduction to the key to females that tergal ornamentation does not enable "une détermination absolument certaine".

b) Conclusions based on examination of British material

We have found considerable within-species variation in the tergal ornamentation of the pereionites between individuals from the same site and populations which are clearly of the same species (based on male 7th pereiopods and genitalia) from different sites. On the 3rd pleonite, the absence of prominent projections was a reliable character on which to separate *Haplophthalmus danicus* from other members of the genus in almost all specimens examined. However in a small number of *Haplophthalmus danicus*, these projections were quite large and in a small number of *Haplophthalmus* "*mengei*", they were quite small. This had led to mis-identification of the species in four cases. We conclude therefore that tergal ornamentation is not a completely reliable specific character to use, at least until the variability within and between populations of the same species has been quantified, preferably by scanning electron microscopy.

2) 7th pereiopods (legs) of males

a) Validity

The arrangement of spines and structure of the 7th (last) pair of legs of males is usually species-specific. Although this is a much more reliable character than tergal ornamentation, we have still found within-species variation in the presence or absence of particular spines and their arrangement. This even extends to differences between the right and left legs of the same individual. Presumably, spines may be broken off, bend, or fail to form properly during hardening of the new cuticle after moulting. It is therefore best to examine both 7th legs of individual males and to examine more than one specimen if these are available. The orientation is also critical and the same leg appears quite different depending on whether the internal or external face is being examined.

b) Conclusions based on examination of British material

The specimens of Haplophthalmus which we examined could be split into three distinct groups.

GROUP 1 - Haplophthalmus danicus (Budde-Lund 1880)

The structure and arrangement of spines on the 7th pereiopods of all male in this group were identical with illustrations of Haplophthalmus danicus given by the European authors listed in Table 1. The structure and arrangement of spines is distinctive (Fig. 1a, b) and is a reliable feature on which to separate Haplophthalmus danicus from other species of Haplophthalmus.

GROUP 2 - Haplophthalmus mengei (Zaddach 1884)

The structure and arrangement of spines on the 7th legs of males in this group agreed closely with diagrams of Haplophthalmus perezi in Vandel (1960)(= Haplophthalmus mengei of subsequent authors, see Table 1), the most characteristic features being the position of spine X on the internal face of the carpus near to its junction with the propodus, and the "swollen" appearance of the spines on the ventral side of the propodus (Fig. 2). These specimens had therefore been correctly named and were definitely Haplophthalmus mengei (Zaddach 1884).

GROUP 3 - Haplophthalmus NEW TO BRITAIN (N.T.B.)

The structure and arrangement of spines on the 7th legs of two male specimens of Haplophthalmus "mengei" collected in 1964 from Wytham Wood near Oxford by Stephen Sutton, were definitely not the same as those of Haplophthalmus mengei in Group 2 described above, although they did possess prominent projections on the third pleonite. There were three consistent differences (Fig. 2). First, spine X was positioned much closer to the main group of spines on the distal end of the carpus. Second, the spines on the ventral side of the propodus were thin and never appeared "swollen". Third, the distal end of the carpus possessed a distinct "bulge" which projected externally. This feature is obvious in a binocular microscope when the 7th legs of males are viewed "end on" while still attached to the woodlouse.

We visited Wytham Wood on two occasions during early March 1987 and managed to collect about 30 specimens of Haplophthalmus N.T.B. from what appears to be a thriving population under rotting wood and boulders on the banks of the stream which flows into the Duck Pond at SP 460 075. More male specimens of this species were also discovered in collections of Haplophthalmus "mengei" made from two sites near Maidstone in Kent by Eric Philp and Gordon Corbet in 1985 and 1986 respectively, and from a site in Bedfordshire between Luton and St. Albans by Adrian Rundle in 1977. Records to date suggest that Haplophthalmus N.T.B. favours wetter habitats than Haplophthalmus mengei.

Examination of all the male specimens of Haplophthalmus N.T.B. from the Kent, Oxford and Bedfordshire sites showed that the arrangement of spines on the 7th pereiopods of the males was, like the tergal ornamentation, subject to some variation. This variation was sufficient to allow Haplophthalmus N.T.B. to be keyed out to at least five species of Haplophthalmus based on drawings of the 7th male pereiopods given by European authors (Table 1). Difficulties with using the structure of the 7th pereiopods as a specific character are further compounded by the unfortunate practice of these authors of omitting spines from their drawings if they believe them not to be of diagnostic importance. We therefore had specimens which were definitely not Haplophthalmus mengei but which could have been any one of several species described by European authors (Table 1). The final feature which had to be examined to attempt a firm identification was the structure of the male 1st and 2nd pleopods.

3) 1st and 2nd pleopods of males

a) Validity

In terrestrial isopods, the paired pleopods on the posterior ventral surface are each composed of an ´internal´ (endopodite) and ´external´ (exopodite) structure. In males, the 1st and 2nd pleopods are modified to form structures for the transmission of sperm to females during copulation. The structure of the 1st and 2nd pleopodal endo- and exopodites of males are invariably species-specific and their examination is the definitive method of confirming the identity of a species (although they are difficult to examine without dissection, particularly in small species; it also means that females of a few species are difficult or impossible to identify).

Vandel (1960) relied on subtle differences in the appearance of the 1st pleopodal endopodites of males to separate several of the species in his "groupe mengei" (see Table 1). However, care should be taken when erecting new species based on very subtle differences in the appearance of these structures as they are liable to swell or contract depending on the mounting medium used for microscopical examination. The method of preservation of the animal is also important; a freshly-killed woodlouse contains a considerable amount of water which will force thin areas of the cuticle to rupture if the isopod is placed straight into water-free, spirit-based solutions.

b) Conclusions based on examination of British material

In *Haplophthalmus danicus*, the endopodite of the first pleopod of males is very distinctive with a pointed tip (Fig. 1c). In *Haplophthalmus mengei*, the tip of the 1st pleopodal endopodite of males is also pointed (Fig. 3), appearing "arrow-like" when viewed laterally on intact specimens. However, the tips of the 1st pleopodal endopodites of all the male specimens of *Haplophthalmus* N.T.B. examined were much more swollen than that of either *Haplophthalmus danicus* or *Haplophthalmus mengei* (Fig. 3) and on current knowledge appears to be a reliable character to use to separate it from *Haplophthalmus mengei*.

IDENTIFICATION OF HAPLOPHTHALMUS SPECIES IN BRITAIN

The absence of prominent projections on the 3rd pleonites is usually sufficient to separate *Haplophthalmus danicus* from the other species, although the 7th male pereiopods should be checked for certain identification. Species with prominent projections can be provisionally identified by viewing the woodlouse from the side in a binocular microscope. The pleopods of males tend to curl away from the body when the woodlice are preserved in 70% alchohol and the distinction between the "arrow-like" 1st pleopods of *Haplophthalmus mengei*, and the much more "finger-like" 1st pleopods of *Haplophthalmus* N.T.B., is easy to see (Fig. 3). Certain identification should be made by careful examination of the spines on the carpus and propodus of the 7th legs of males, and for the presence of the prominent "bulge" on the carpus of *Haplophthalmus* N.T.B. (Fig. 2).

ASSIGNING A SPECIFIC NAME TO HAPLOPHTHALMUS N.T.B.

Assigning a name to the new British species proved to be problematical. Four species in Vandel (1960) have a relatively broad tip to the 1st male pleopodal endopodite and all have similar male 7th pereiopods, namely *Haplophthalmus mengei* (= *H. montivagus* of Gruner, 1966), *H. meridionalis*, *H. provincialis* (which includes three subspecies) and *H. teissieri*. Although further work is required before a firm conclusion can be reached, it does seem possible that these four ´species´ are conspecific. Assigning a specific name to Haplophthalmus N.T.B. must therefore be postponed until a comprehensive review has been conducted of all the species of Haplophthalmus described to date.

CONCLUSIONS

Three species of the genus Haplophthalmus are now known to occur in Britain. Haplophthalmus danicus (Budde-Lund 1880) has probably been correctly identified in the vast majority of cases and the species appears to be widespread in southern England and Wales but is scarce in northern England, Scotland and Ireland (Fig. 4). Haplophthalmus mengei (Zaddach 1884) is probably widespread in Ireland, Wales, north and west England and on Scottish coasts, but appears on current (albeit limited) information to be rare in south-east England where it may be restricted to coastal sites (Figs. 5, 6). A species of Haplophthalmus NEW TO BRITAIN (N.T.B.) is now known to occur in West Kent, Bedfordshire and Oxfordshire (Fig. 7). It has not been possible to assign a specific name to this species pending a review of the Genus. Haplophthalmus N.T.B. seems to prefer damper habitats than Haplophthalmus mengei and should be searched for, particularly in wet deciduous woodland in south-east England.

ACKNOWLEDGEMENTS

We are grateful to Arthur Chater, Gordon Corbet, Paul Harding, Eric Philp and Adrian Rundle for the loan of specimens and to Dr. C. Gibson (Warden) and Mr. B.E. Rivers (Oxford University Land Agent) for permission to sample in Wytham Woods.

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Table 1 : Synonymy of *Haplophthalmus* species in some of the most recent European publications.

AUTHOR(S)	SPECIES NAME		
EDNEY (1954)	*H. danicus* Budde-Lund 1879	*H. mengei* Zaddach 1884	-
VANDEL[1] (1960)	*H. danicus* Budde-Lund 1879	*H. perezi* Legrand 1942	*H. mengei* Zaddach 1884
DOMINIAK (1961)	*H. danicus* Budde-Lund 1879	*H. mengei* Zaddach 1884	*H. legrandi* *n. nov.*
GRUNER[2] (1966)	*H. danicus* Budde-Lund 1880	*H. mengii* Zaddach 1884	*H. montivagus* Verhoeff 1941
SUTTON *et al* (1972)	*H. danicus* Budde-Lund 1879	*H. mengei* Zaddach 1884	-
HARDING & SUTTON (1985)	*H. danicus* Budde-Lund 1880	*H. mengei* Zaddach 1884	-
HOPKIN & ROBERTS (This paper)	*H. danicus* Budde-Lund 1880	*H. mengei* Zaddach 1884	-

[1]Vandel includes another seven species in his "groupe *mengei*". Four of these (*H. meridionalis*, *H. provincialis* (split into three sub-species), *H. teissieri*, *H. transiens*) are separated from his *H. perezi* and *H. mengei* by very subtle differences in the arrangement of spines on the 7th pereiopods and tips of the 1st pleopodal endopodite of males.

[2]Gruner includes one other species *H. mariae* (Strouhal 1953) which is very distinctive and is unlikely to have been confused with other species in the genus.

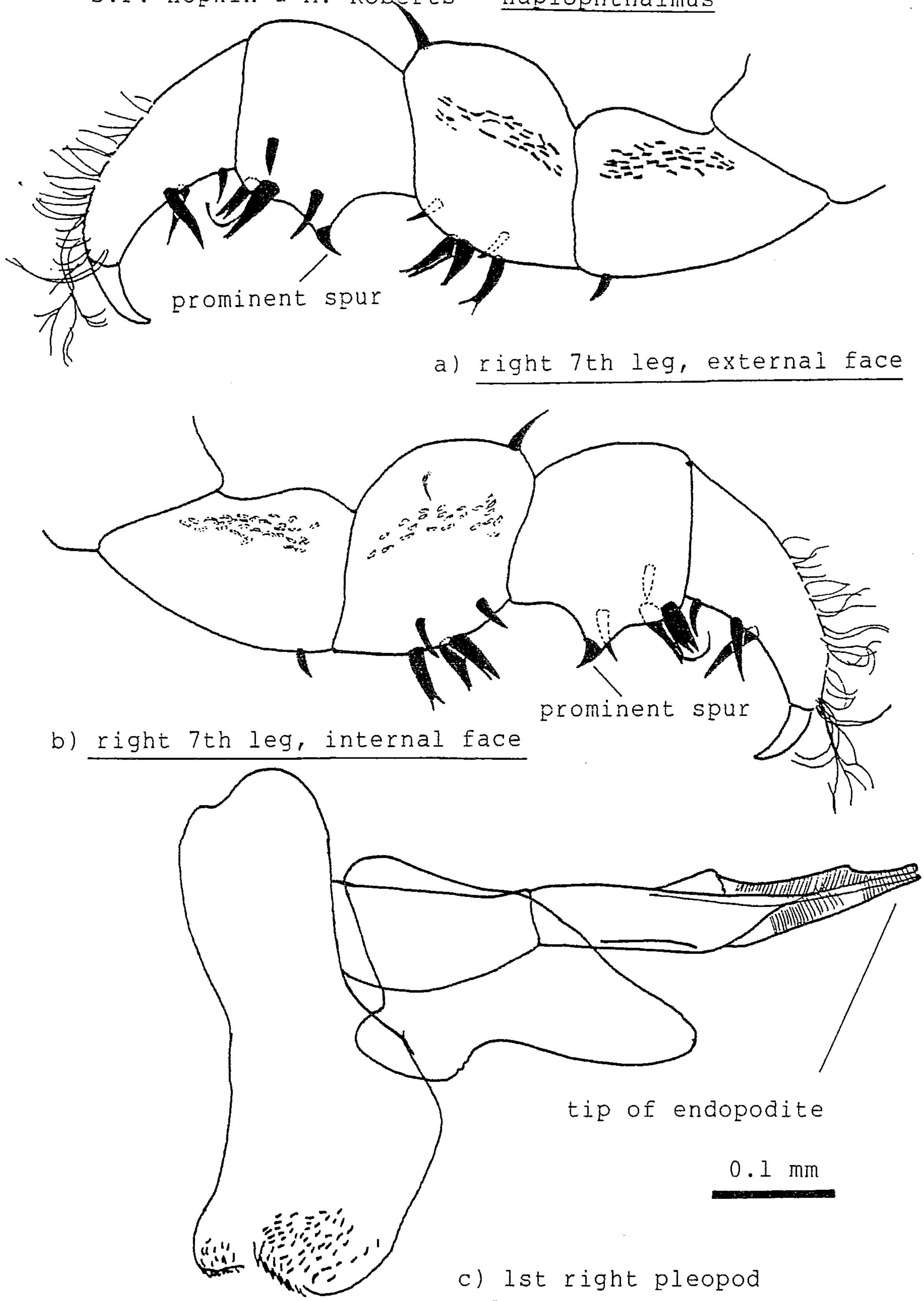


Fig. 1 : *Haplophthalmus danicus*, male from Moor Copse, Berks. (SU 635 740, 12/6/86). a) Right 7th leg external face. b) same leg, internal face. c) 1st right pleopod. All to same scale X200.

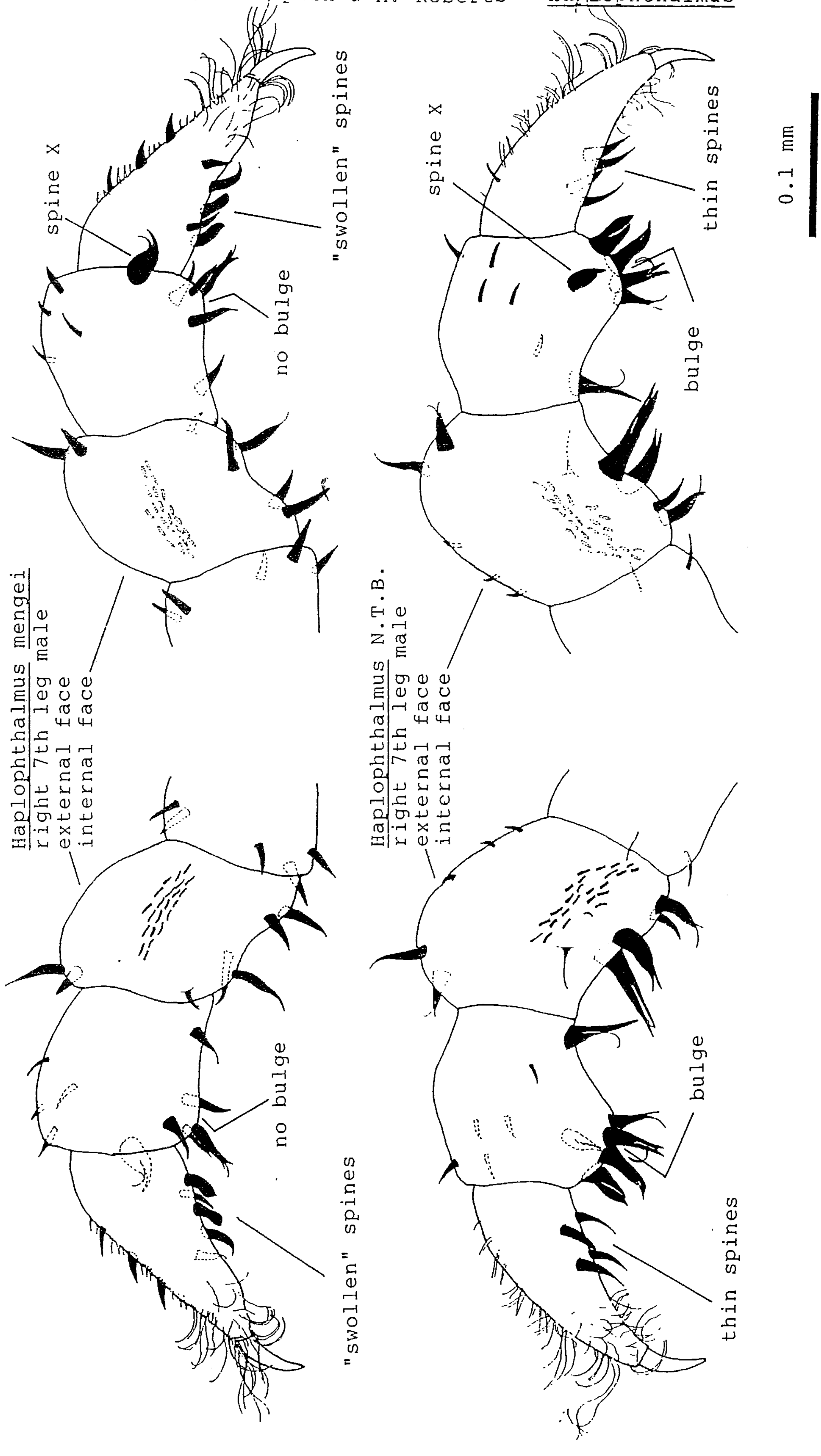
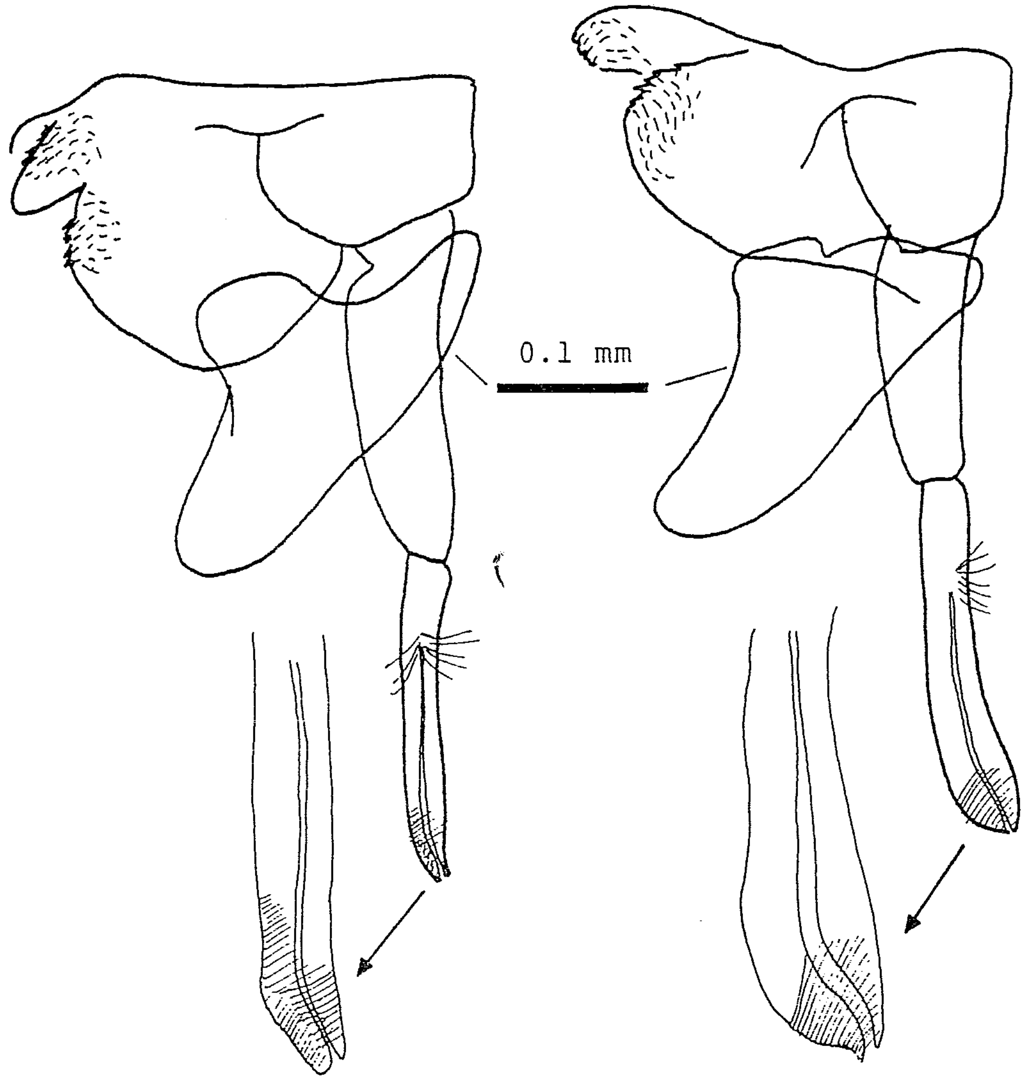


Fig 2 : Internal and external faces of the same 7th right leg from a specimen of *Haplophthalmus mengei* from St. Bees beach, Cumbria (NX 958 118, 3/8/86) and *Haplophthalmus* N.T.B. from Wytham Wood near Oxford (SP 460 075, 10/3/87). All to same scale X280



Haplophthalmus mengei	*Haplophthalmus* N.T.B.
tip of endopodite thin and "arrow-like"	tip of endopodite swollen and "finger-like"

Fig. 3 : 1st pleopods from the right side of the same specimens of *Haplophthalmus mengei* and *Haplophthalmus* N.T.B. illustrated in Fig. 2. Both pleopods X200 (tips X400).

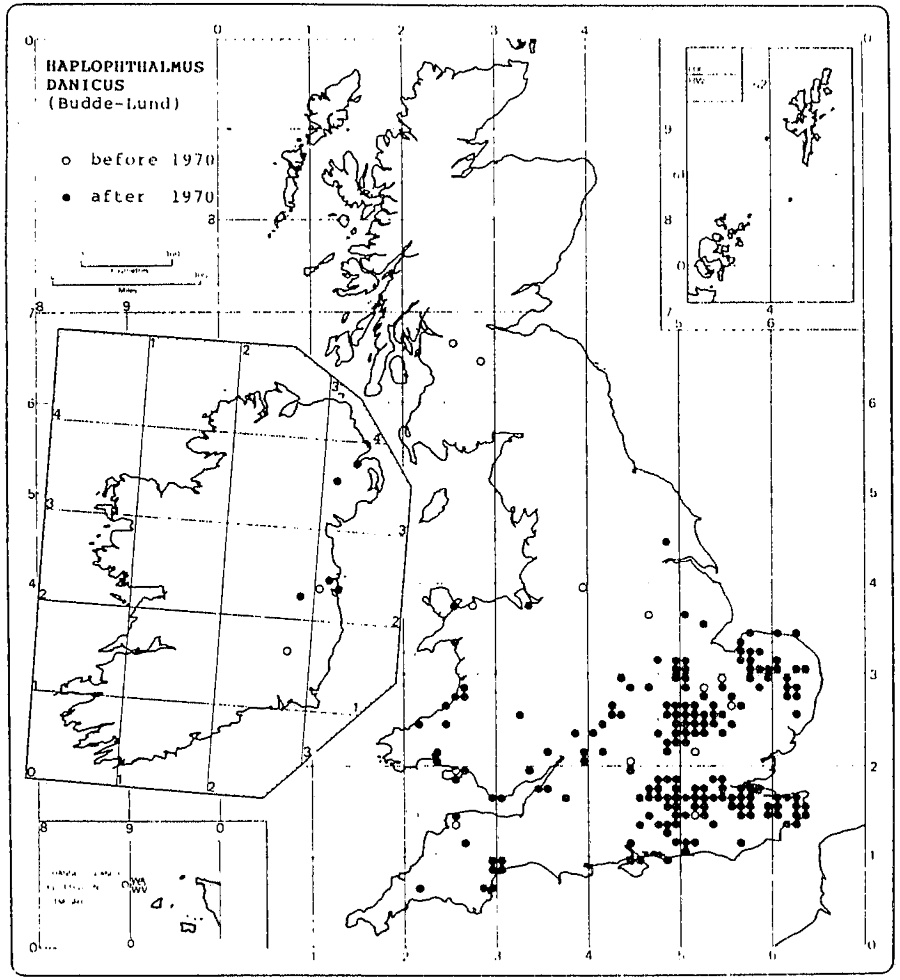


Fig. 4 : Records received to March 1987 of *Haplophthalmus danicus*.

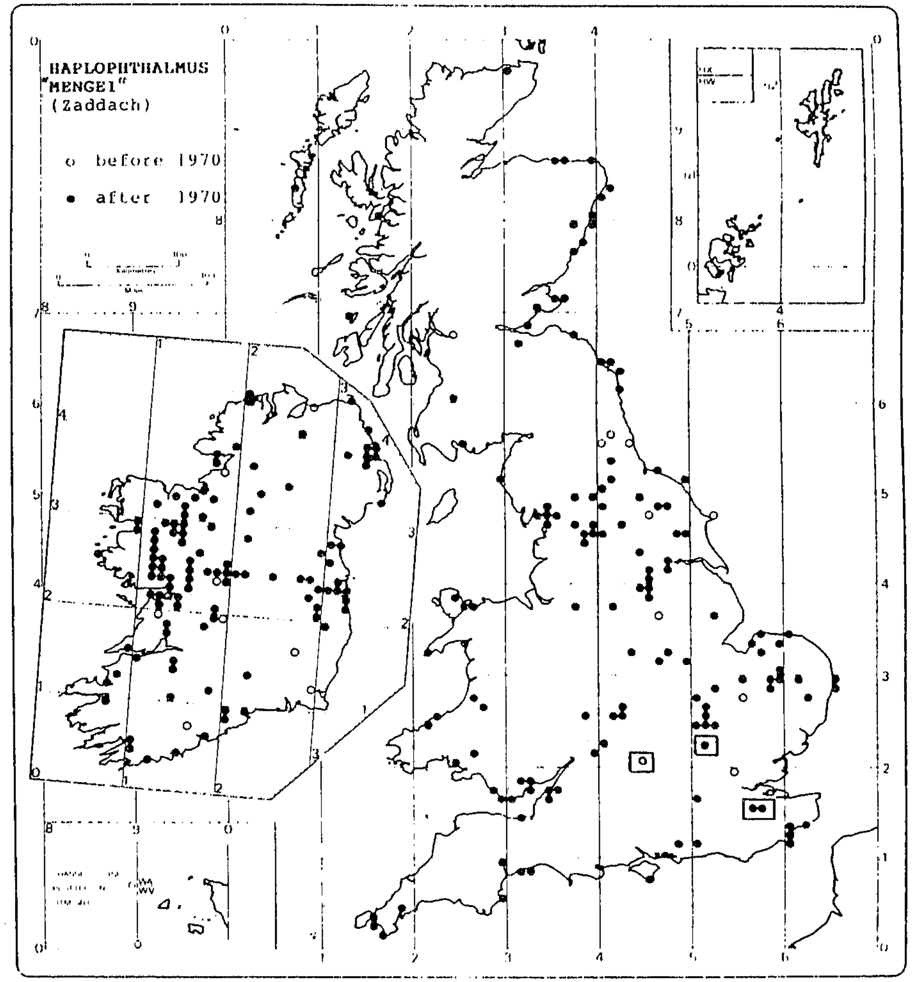


Fig. 5 : Records received to March 1987 of *Haplophthalmus* "*mengei*". The three boxes enclose records now known to be of *Haplophthalmus* N.T.B.

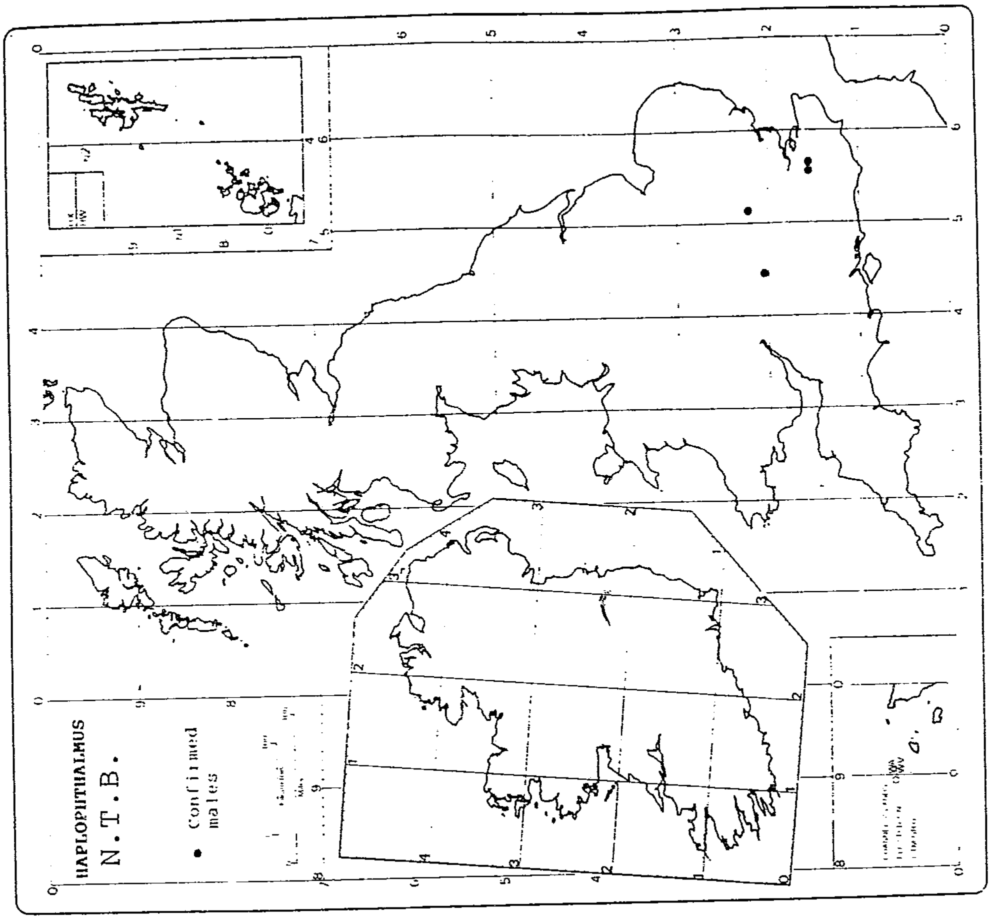


Fig. 7 : Confirmed records of *Haplophthalmus* N.T.B. based on examination of male 7th pereiopods and genitalia.

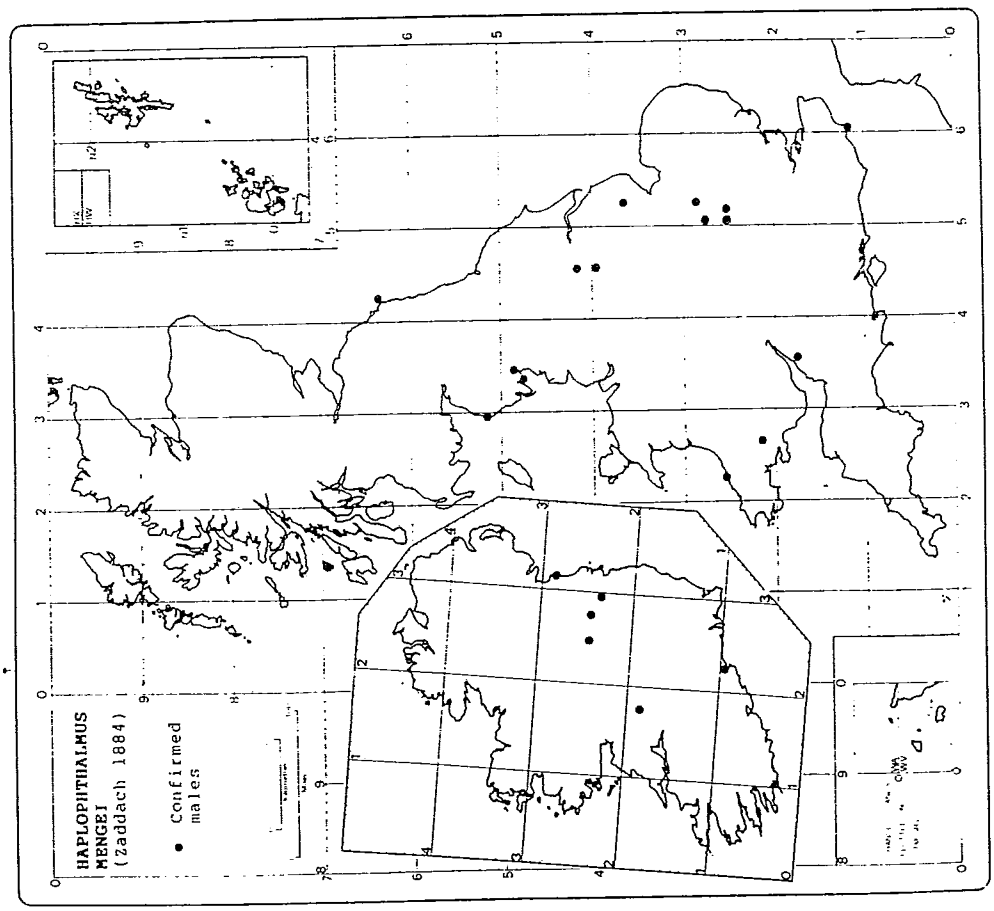


Fig. 6 : Confirmed records of *Haplophthalmus mengei* based on examination of male 7th pereiopods (legs) and genitalia.

Isopoda (1987) 1, 49-54

WOODLICE OF THE ISLES OF SCILLY

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INTRODUCTION

The Isles of Scilly are an archipelago lying 27 miles (43 km) W.S.W. of Land´s End, Cornwall (Fig. 1). Today, five major islands are inhabited, St. Mary´s, Tresco, St. Martins, Bryher and St. Agnes, although other islands have been inhabited in the past. Of about 150 smaller islands, rocks and reefs, 40 are vegetated. The total exposed land surface at H.W.N.T. is approximately 3,900 acres (1,600 ha). They are composed entirely of granite over which are deposits of blown sand, alluvium and head.

GEOGRAPHY AND CLIMATE

The Scilly Isles were last connected to the mainland during the Mid-Pleistocene and during the glacial advances the environment must have been extremely unsuitable for many of the isopods found on the islands at present, the ice sheet having reached Scilly on at least one occasion (Scourse 1986). In addition, the changes in sea level associated with the glacial advances and retreats resulted in the islands being at times all part of a larger island and at other times virtually all submerged. The rise of the sea after the last advance probably split St. Agnes and Annet away from the rest of the Scilly land mass during the Bronze age. The subsequent rise in sea level has fragmented the remaining super-island into the present islands. This was a gradual process and is thought not to have been completed until the Middle Ages (Fowler & Thomas 1979).

The present climate is very mild, much milder than the mainland. Regular rainfall and sea fogs maintain a high humidity. There is a virtual absence of snow, and frosts are limited to fewer than five days a year. For 350 days a year, the air temperature is in excess of 5 °C. A comprehensive summary of climatic conditions is given in Lousley (1971).

VEGETATION

Compared with the mainland, habitat types are limited. The coastal environment is obviousely well represented with bare

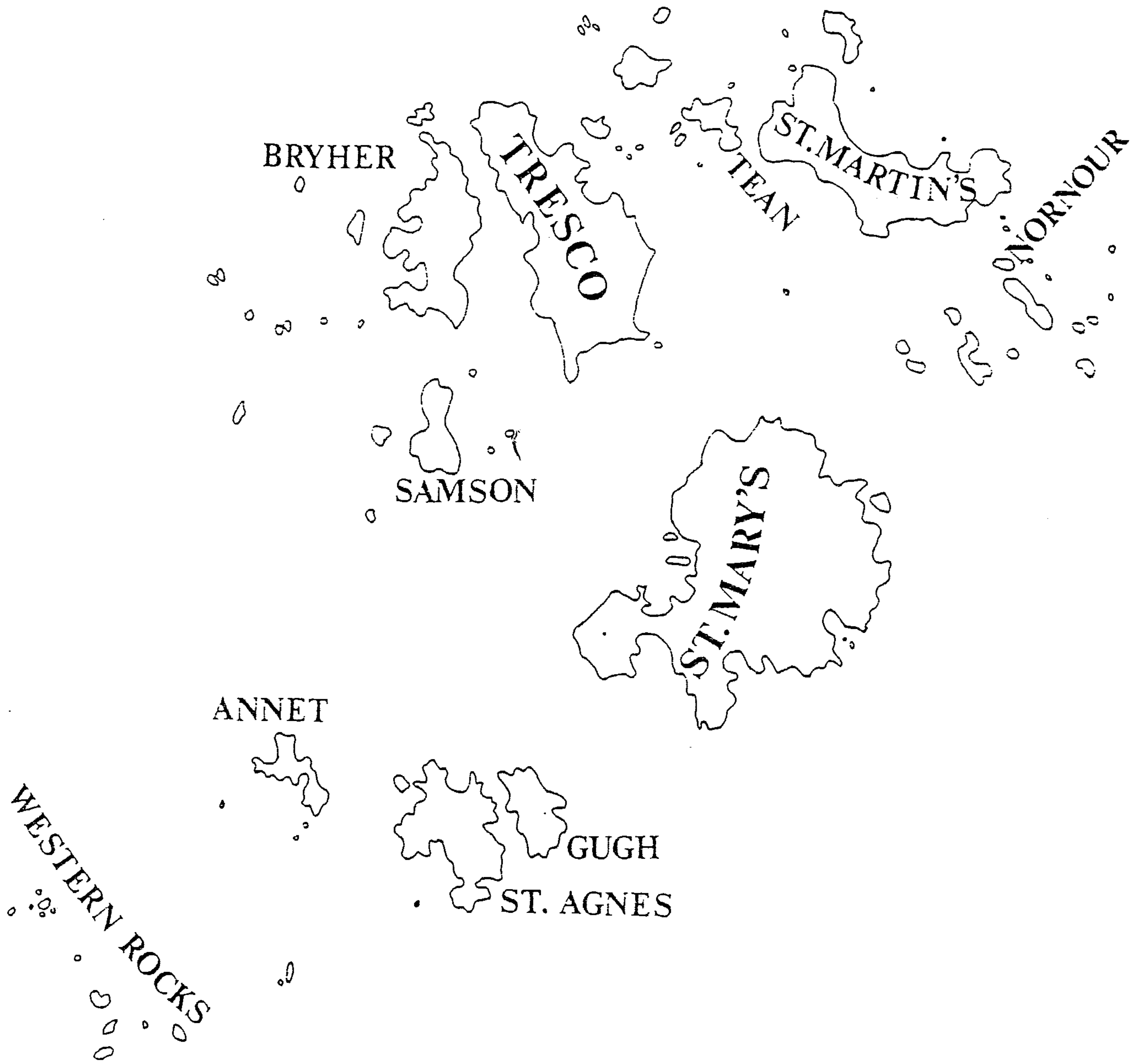

Fig. 1 : The Isles of Scilly

granite cliffs, boulder and shingle beaches, sandy beaches and dunes. Many of the small rocks have a sparse littoral flora and Annet is unusual in being almost entirely covered with tall mounds of thrift (*Armeria maritima*). Natural woodland is absent although it was certainly present during the Bronze Age and may have lasted until much later. There are small amounts of neglected elm (*Ulmus* sp.) coppice on St. Mary's as well as sallow (*Salix* sp.) thickets in wetter areas. Conifer shelter belts have been planted on St. Mary's and Tresco. Tresco also has ornamental woodland planted in and around the Abbey Gardens. There are large areas of Western Maritime Heath dominated by stunted heather (*Calluna vulgaris*) on all the major islands and some areas are dominated by bracken (*Pteridium aquilinum*), bramble (*Rubus* sp.) and bluebell (*Endymion non-scriptus*). The cultivated areas are small fields bounded by stone walls, often with shelter strips of *Pittosporum crassifolium*, an introduced shrub.

In 1835, Augustus Smith started to build his ornamental garden on Tresco. This led to the importation of exotic plants from all over the world, especially from the southern hemisphere (Lousley 1971).

FAUNA

The isopod fauna of the islands is slightly impoverished compared with that of the mainland but it includes one exotic species which has been accidentally introduced from outside Britain. At the maximum extent of the ice advance, the fauna must have been small. Some species may have arrived naturally from warmer refugia further south but in the absence of proof of such refugia it seems likely that many, if not most, species now present owe their introduction to human agency. This has been proposed as the most likely method of arrival for other creatures such as the Scilly shrew (*Crocidura suaveolens*)(Corbet 1961).

In theory it should be possible to date the arrival of some species from their presence or absence on certain islands, e.g. any species which is not present on all of the major islands (excluding the St. Agnes group) is likely to have arrived after the Middle Ages. However, subsequent inter-island introductions and recent extinctions would confuse the issue. Only when sufficient data has been collected from all of the major islands will it be possible to test the theory.

WOODLICE COLLECTED FROM SCILLY

The species described below were collected in the Autumn of 1982, 1983 and 1984, and the Spring of 1985 and 1986. Most specimens were collected by the authors but other material was collected by A.J. Stones and R. Image. To date, 16 species of terrestrial isopod have been collected from Scilly (Table 1).

	St. Mary's	St. Agnes	Tresco	Bryher	St. Martin's	Tean	Gugh	Annet	Nornour
Armadillidium album						●			
A. vulgare	●	●	●	●	●	●	●	●	●
Chaetophiloscia sp.			●						
Cylisticus convexus	●								
Halophiloscia couchi			●						
Ligia oceanica	●	●	●	●	●	●	●	●	●
Miktoniscus patiencei	●						●	●	●
Oniscus asellus	●	●	●	●	●	●	●	●	●
Philoscia muscorum	●	●	●	●	●	●	●	●	●
Platyarthrus hoffmannseggi	●	●				●			
Porcellio dilatatus	●	●	●	●	●				
P. scaber	●	●	●	●	●	●	●	●	●
P. spinicornis	●								
Porcellionides cingendus	●	●	●	●	●	●	●	●	●
Trichoniscus pusillus	●				●				
Trichoniscoides saeroeensis	●						●		●

Table 1 : Woodlice collected from the Isles of Scilly

1. Ligia oceanica

This species is common, occurring on the rocky shores of all islands so far visited.

2. Miktoniscus patiencei

This supra-littoral species has been collected from four islands since 1985. It inhabits soil-filled cracks in the coastal granite from sea level to the cliff tops. It has also been sieved from coarse granite gravel along with Trichoniscoides saeroeensis.

3. Trichoniscoides saeroeensis

This has been collected from three islands and occurs in the same microhabitats as Miktoniscus patiencei

4. Trichoniscus pusillus

Despite its abundance elsewhere in Britain, this species has only been collected twice, once from St. Mary´s and once from St. Martins. This scarcity appears to be genuine and it seems likely that the thin acid soils which cover much of the island are not suitable for this species.

5. Halophiloscia couchi

Collected once from the stony shore at Old Grimsby, Tresco in 1986. It may well have been overlooked elsewhere.

6. Oniscus asellus

Common, found on all islands visited.

7. Philoscia muscorum

Common, found on all islands visited.

8. Platyarthrus hoffmannseggi

So far collected from ants´ nests on St. Marys (where it is widespread), St. Agnes and Tean. Despite much searching it has been found nowhere else.

9. Armadillidium album

Two individuals were collected from an area of blown sand on Tean in 1985 and two more from the strandline in 1986. There are several miles of potentially suitable shorelines on other islands where this species could occur.

10. Armadillidium vulgare

Common, collected on all islands visited.

11. Cylisticus convexus

A single specimen was collected from a coastal rubbish tip on St. Marys in 1985 by A.J. Stones.

12. Porcellio dilatatus

This species is common on the five inhabited islands but has not been found elsewhere.

13. Porcellio scaber

Common on all five islands visited.

14. Porcellio spinicornis

A single specimen was collected in 1984 from the bath of a holiday flat in Hugh Town, St. Mary's.

15. Porcellionides cingendus

Common on all islands visited, particularly in grassland.

16. Chaetophiloscia sp.

On Tresco, there is a species of this genus which is capable of living out of doors. One specimen was collected just outside the Gardens in 1985 and another in the gardens in 1986. Unfortunately both specimens have been females and thus cannot be attributed to a species. It is hoped that a male specimen will be obtained in the future.

ACKNOWLEDGEMENTS

Thanks are due to the Nature Conservancy Council warden R. Lawman for arranging for us to visit uninhabited islands and the boatman W.C. Nicholas for getting us to them. M. Nelham gave us permission to collect in the Gardens at Tresco.

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Isopoda (1987) 1, 55-64

A REPORT ON THE WOODLICE OF CORNWALL

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INTRODUCTION

Since December 1982 the author has been engaged in the study of terrestrial isopods in the county of Cornwall. During this time I have recorded 15 species from the county. At the end of 1983 I produced a "Report on the Non-marine Isopoda of Cornwall" based solely on my own records. This present article is an update of that report incorporating all of my records to date.

The maps accompanying this article show the distribution of each species in tetrads in Cornwall (2 x 2 km squares) and represent the author's records only (Fig. 3). Records of other species which I have not been able to find to date are given in Harding & Sutton (1985).

1. Ligia oceanica (Fig. 4)

As you might expect in a county virtually surrounded by the sea, Ligia oceanica is a common creature of the Cornish coast where rocky conditions exist. Although it can sometimes be found well up on the splash zone, Ligia oceanica is not found away from the sea shore or estuary. The species is very rarely found in stretches of sandy coastline. Most specimens are predominantly grey/green and black in colour. The largest specimen I have found was 3 cm in length (Poltesco, SW 72- 15-).

2. Androniscus dentiger (Fig. 5)

This woodlouse is very easy to identify, despite its small size (up to 6 mm long), with the aid of the colour plate in Sutton (1980). It is rose red in colour with a double yellow median stripe along the perion, and spine-bearing tubercles. Closer examination will reveal that the eyes are composed of a single ocellus. Although Androniscus dentiger does not appear to be all that common in Cornwall, it is not too difficult to find if searched for specifically. Damp leaf litter around the base of buildings and other man-made structures are favoured places, as are the underside of stones embedded in the splash zone of the seashore.

3. Haplophthalmus mengei (Fig. 6)

A recent addition to the Cornish fauna, I have recorded Haplophthalmus mengei from four sites between November 1983 and

November 1986 (Kynance Cove, SW 685 133; St. Michael's Mount, SW 51- 29-; Hayle Towans, SW554 387; Pencalenick, SW 855 453). In the first three instances, the species was found under stones in the splash zone of the sea shore at an altitude of 10 m or less. At Pencalenick, a small estate on the banks of the Tresillian River (tidal at this point), Haplophthalmus mengei was found at the base of an old brick wall. Up to 3 mm in length, Hapolphthalmus mengei is white in colour with numerous ridges on its body. In Cornwall it has been found in association with Androniscus dentiger, Trichoniscus pygmaeus and Trichoniscoides saeroeensis.

4. Miktoniscus patiencei (Fig. 7)

Miktoniscus patiencei is a small (up to 4 mm) white woodlouse with a dark central 'stripe' (the gut contents) and a very tuberculate head and body. The profile of the pereion and pleon is stepped. Each eye is composed of a single ocellus. This species had previousely been found at two sites in Cornwall, Lantivet Bay (SX 166 518) by Paul Harding and Ogo-dour Cove (SW 667 159) by Adrian Rundle. My only record for Miktoniscus patiencei is from Gew-graze (SW 676 143) only 1.5 km from Ogo-dour Cove. At Gew-graze, the species was found under stones embedded in the earth and vegetation along the edge of a small stream. The stream entered the splash zone of the sea shore at this point, about 10 m above sea level. In addition to Miktoniscus patiencei, Trichoniscoides saeroeensis and Trichoniscus pygmaeus were found in the same microsite. My identification was confirmed by Dr. P.G. Oliver.

5. Trichoniscoides saeroeensis (Fig. 8)

This species, not previosly recorded in the south-west, is amongst the smallest of the British woodlice. Up to 3 mm in length, usually smaller, it is easy to overlook. The mildly tuberculate body surface is predominantly white with a pink/orange pigment on the pleon as well as a fairly firm central line of the same colour on the pereion. Perhaps the most striking feature of Trichoniscoides saeroeensis is its eyes, each of which is composed of a single pink/orange ocellus. So far I have recorded Trichoniscoides saeroeensis from seven sites in Cornwall, all of them on the coast. On every occasion the specimens were found in the splash zone of the sea shore, usually below the 20 m mark under stones in damp, but not wet, soil. Where small streams reach the cliff edge, or where a cliff is slumping, often prove to be good sites for recording this species. In its own microsite, I have found Trichoniscoides saeroeensis to be dominant in numbers when found with Trichoniscus pusillus, Trichoniscus pygmaeus, Platyarthrus hoffmannseggi, Haplophthalmus mengei, Androniscus dentiger and Miktoniscus patiencei.

6. Trichoniscus pusillus (Fig. 9)

This species has clearly been under-recorded in Cornwall (see Harding & Sutton 1985). However, I have found it to be very common in almost any damp location, right down to the splash zone of the seashore. In long periods of dry weather the species becomes difficult to find as it is very prone to desiccation. Often it is the only species, with Oniscus asellus, that can be found in the barren mass of rhododendrons that pass as a "Cornish Estate". Trichoniscus pusillus is shiny in appearance and purple/brown in colour, being up to 5 mm in length. Each eye is composed of three ocelli which, although touching in adults, are widely spaced in juveniles.

7. Trichoniscus pygmaeus (Fig. 10)

Trichoniscus pygmaeus is another species which appears to have been under-recorded in Cornwall. Its very small size (2 mm in length) means that it is easily overlooked. In addition to this, care must be taken not to confuse this species with juvenile Trichoniscus pusillus whose lack of pigment give them the appearance of Trichoniscus pygmaeus. Unlike juvenile Trichoniscus pusillus however, the three ocelli in each eye of Trichoniscus pygmaeus are closely set, usually touching. Trichoniscus pygmaeus can be found almost everywhere where the soil is not too dry. In the splash zone of the seashore I have found it in the same microsites as Trichoniscoides saeroeensis, Haplophthalmus mengei and Androniscus dentiger.

8. Oniscus asellus (Fig. 11)

This species is the most commonly seen woodlouse in Cornwall and can easily be told apart from its Porcellio look-alikes by its glossy body surface, the absence of pleopodal lungs and the three sections of the flagellum of the antenna compared with the two sections of a Porcellio. Up to 16 mm in length, in colour Oniscus asellus looks similar to the plate of Porcellio spinicornis in Sutton (1980) and the two may be confused at a casual glance. Oniscus asellus is the large species you would be most likely to encounter in a wood, or leaf litter therein. It can be found anywhere under stones, rotting wood etc., although it does not have the tolerance of sand dunes shown by its close relative Philoscia muscorum.

9. Philoscia muscorum (Fig. 12)

Up to 11 mm in length, Philoscia muscorum, one of the County's commonest species, can be found in three colour forms, the usual brown, a very attractive red and occasionally, a yellow form. All three forms have a dark median stripe and care must be taken when separating this species from another common woodlouse of our county Porcellionides cingendus. Porcellionides cingendus can also have a median stripe of sorts and is often found with Philoscia muscorum. However Philoscia muscorum has three sections to the flagellum of the antenna and no pleopodal lungs whereas Porcellionides cingendus has two sections to the flagellum and two pairs of pleopodal lungs. For a woodlouse with no pleopodal lungs, Philoscia muscorum copes remarkably well with the dry conditions of coastal sand dunes where it is often prolific. It can even be found inside a house. At times, a species very rapid in movement.

10. Platyarthrus hoffmannseggi (Fig. 13)

Platyarthrus hoffmannseggi is a common isopod of the Cornish coast, almost always in the company of ants and usually in ant nests. It can be found inland, although it tends to be absent from the tracts of land in the county spoiled by tin mining (acid conditions), even though suitable ant nests seem to be present. The presence of Platyarthrus hoffmannseggi may not be immediately apparent at first as individual s may not be at the surface of the ant nest at the time. However, careful scrutiny of the galleries of the nest will often be rewarded with the site of the blind lodger scurrying along with its frenzied hosts. The species is white in colour, oval in shape, is blind and reaches a length of 2 to 3 mm. It is interesting to note that Platyarthrus hoffmannseggi does not appear to suffer from desiccation as do many of its woodlouse brethren of a similar size, being plentiful during dry spells.

11. Armadillidium nasatum (Figs. 1, 14)

Harding & Sutton (1985) shows this species as being present throughout the Lizard Peninsula. However, in four years I have only recorded Armadillidium nasatum from one site. I found it to be very common around walls all along the lane from Porthleven (SW 63- 24-) to Loe Bar (SW 64- 24-). It even out-numbered the ubiquitous Armadillidium vulgare which was also present at this cliff-top site. Given this, my failure to find Armadillidium nasatum elsewhere is puzzling. A mature specimen with its very prominent scutellum on the head is very distinctive, although juveniles are less so to the naked eye. Curiously all the living specimens I encountered were well under 10 mm in length whereas the numerous dead specimens were all between 10 and 15 mm in length. The body appeared mottled brown and grey although this can be variable.

12. Armadillidium vulgare (Fig. 15)

The commonest pillbug in Cornwall, often called a "Chiggy Pig", Armadillidium vulgare can be found around most of the Cornish coast, especially in sand dunes where it is the dominant species. However, it can be found inland as well in walls and leaf litter. On one occasion at Gear Sands (SW 77- 55-) I saw what I thought to be an aquatic woodlouse in a pool with very warm water swimming along. When I caught it with my net I found it to be a specimen of Armadillidium vulgare alive and well. It was apparently deliberately in the water for when I put it down near the edge of the water, it submerged itself again! Was it trying to keep cool? Another feature of this species in the dunes is the large number of dead specimens found in the bottom of rabbit scrapes and similar type gulleys. Does the unfortunate individual fall into the scrape only to find it can´t get out

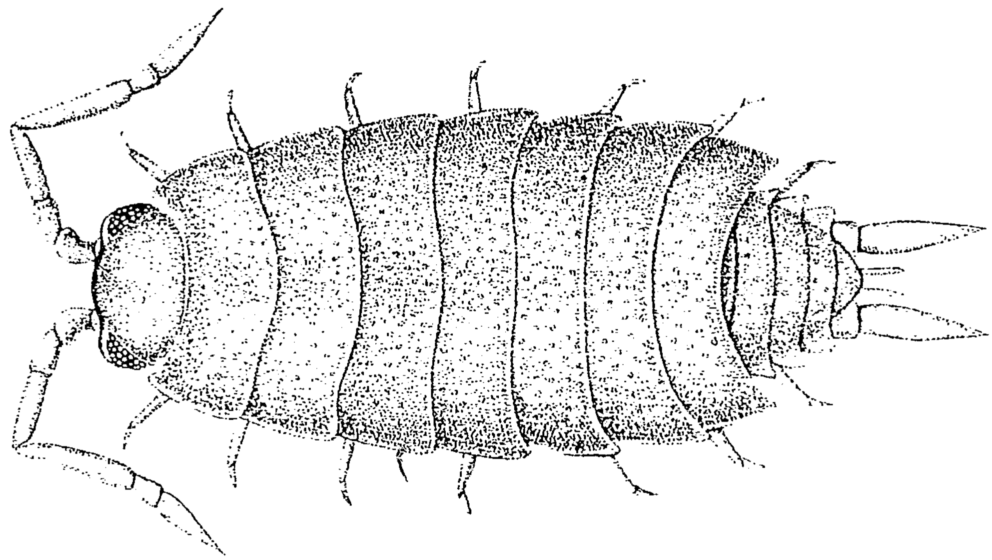

Fig. 2 : Porcellionides cingendus (7 mm)

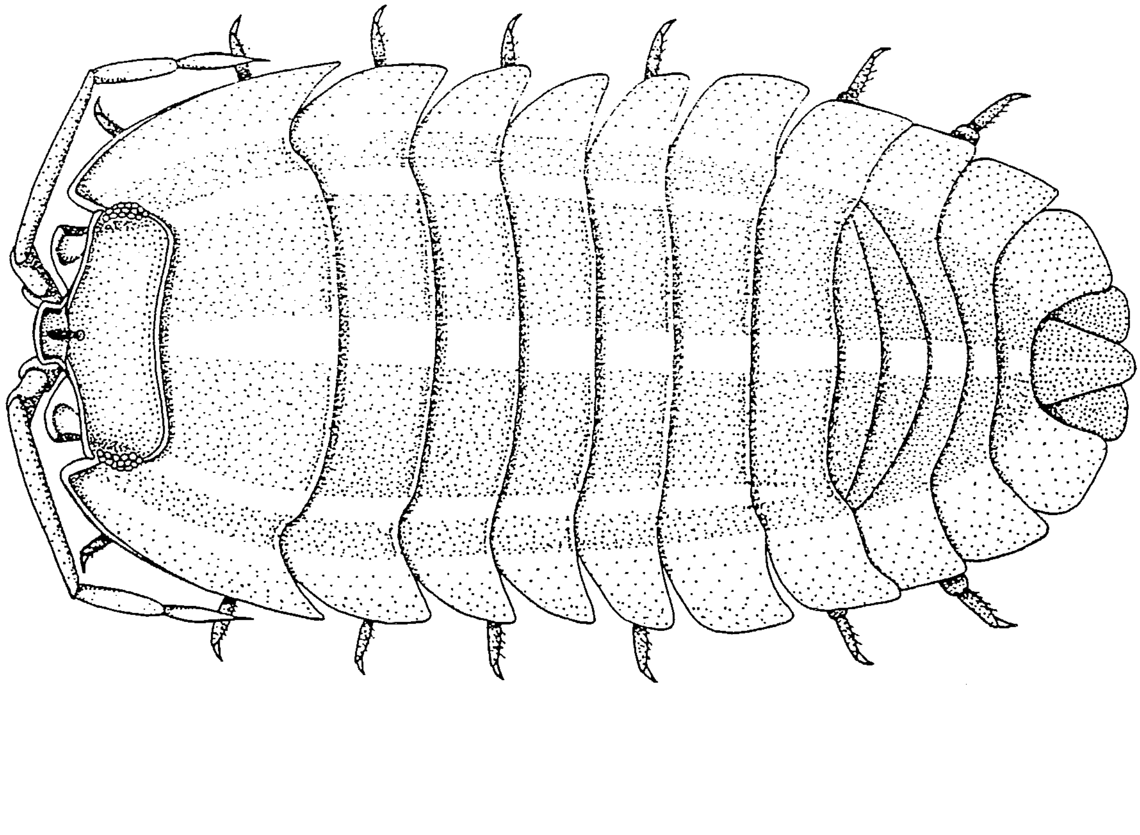

Fig. 1 : Armadillidium nasatum (11 mm).

because the high sides of the prison crumble at any attempt to escape? Armadillidium vulgare can be up to 18 mm long, is very variable in colour, although the variegated form is quite common, as is the slate grey form. A very attractive brick red form can also be found, and all the varieties can have a very shiny body surface. Sometimes found in ant nests.

13. Porcellio scaber (Fig. 16)

Porcellio scaber is one of the most common woodlice in Cornwall. It is usually slate grey in colour but this is variable. Its tuberculate body can be up to 17 mm in length and has a matt appearance. Porcellio scaber is found everywhere from damp woodland to coastal sand dunes and can even be found amongst the rocks of a boulder beach. This is also the species you are most likely to encounter in your home where it does no harm, feeding only on material that is already decaying. In fact Porcellio scaber is the dominant woodlouse in built up areas. The archetypal "Grammer-Zow"?

14. Porcellionides cingendus (Figs. 2, 17)

Generally under-recorded, this is a ´Lusitanian´ species which is common around the cliff tops of Cornwall. However, this species can be found away from the coast in grass verges, around dung heaps and in leaf litter. It has also proved to be quite common in the built up area of Falmouth. Up to 7 mm in length, its colour is variable but is often mottled brown and yellow. A median line along the pereion, formed by an agglomeration of speckles, is sometimes present. Easily confused with Philoscia muscorum, Porcellionides cingendus is usually slimmer and slower moving than the former species and has a slightly tuberculate body surface.

15. Asellus meridianus (Fig. 18)

I have recorded this species of freshwater isopod on only two occasions, once from the mud of a stagnant pool which had all but dried up, and once from a reservoir. Apart from this, I have found it very difficult to catch the aquatic species.

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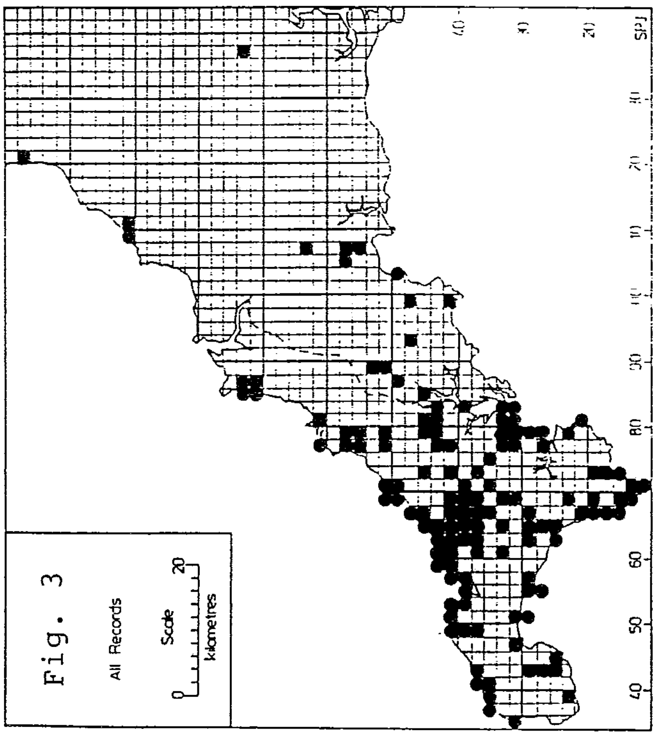
Fig. 3
All Records
Scale
0
20
kilometres
SPJ

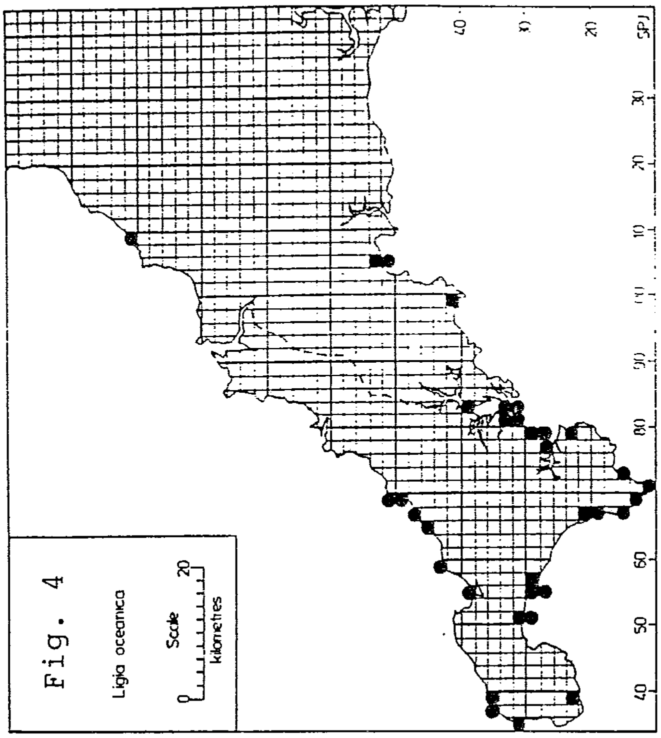
Fig. 4
Ligia oceanica
Scale
0
20
kilometres
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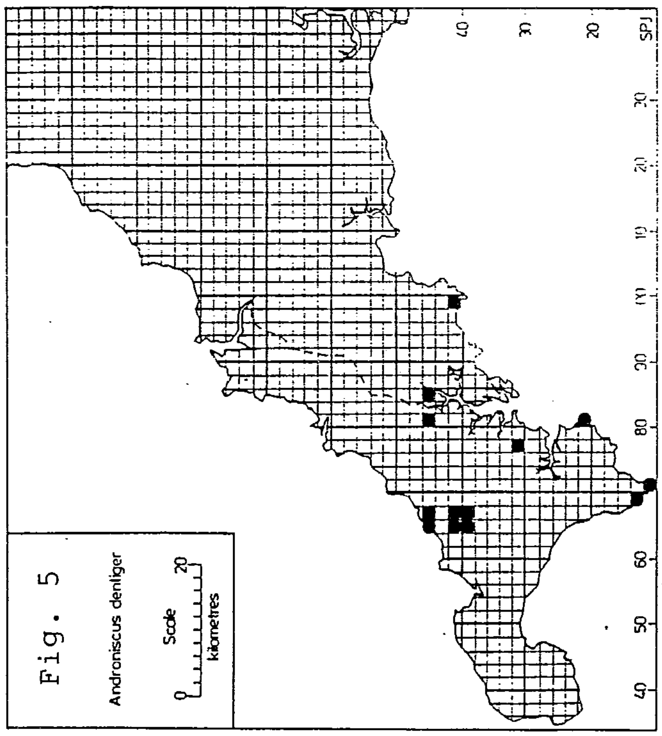
Fig. 5
Androniscus dentiger
Scale
0
20
kilometres
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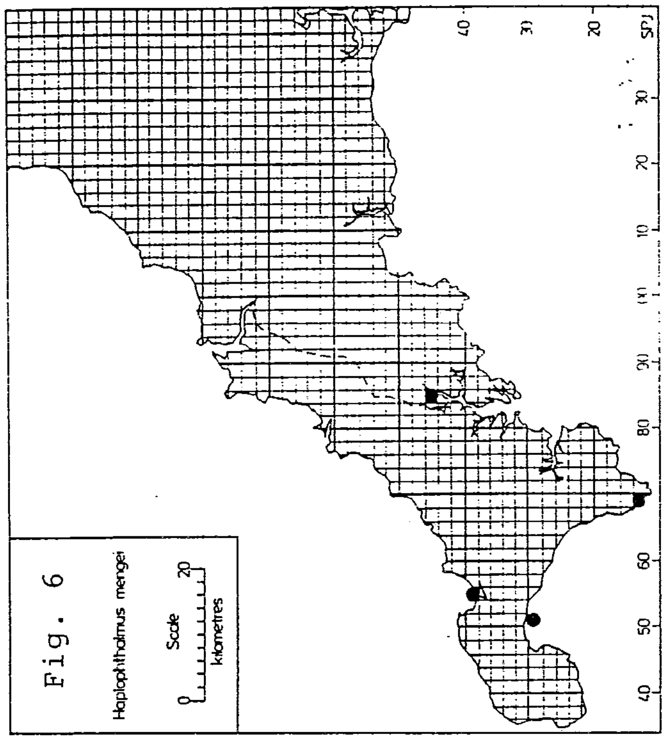
Fig. 6
Haplophthalmus mengei
Scale
0
20
kilometres
SPJ

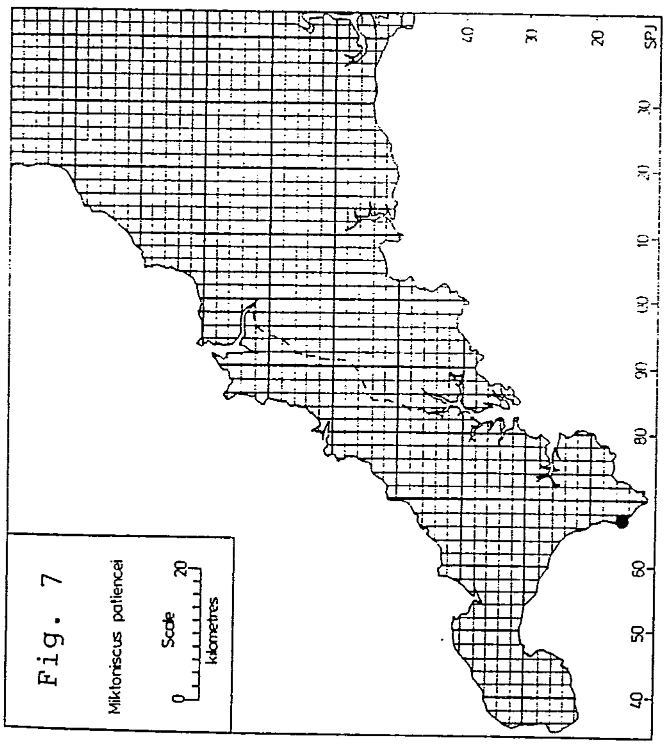

Fig. 7

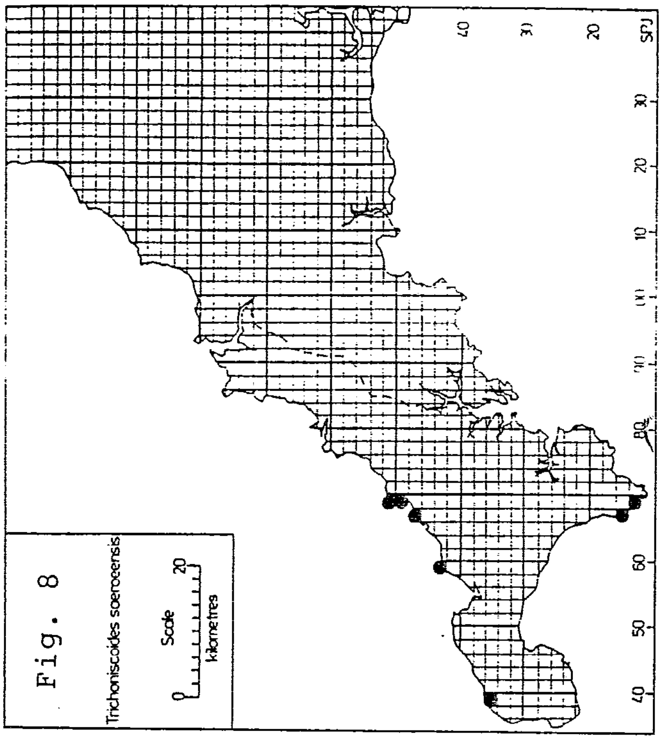

Fig. 8

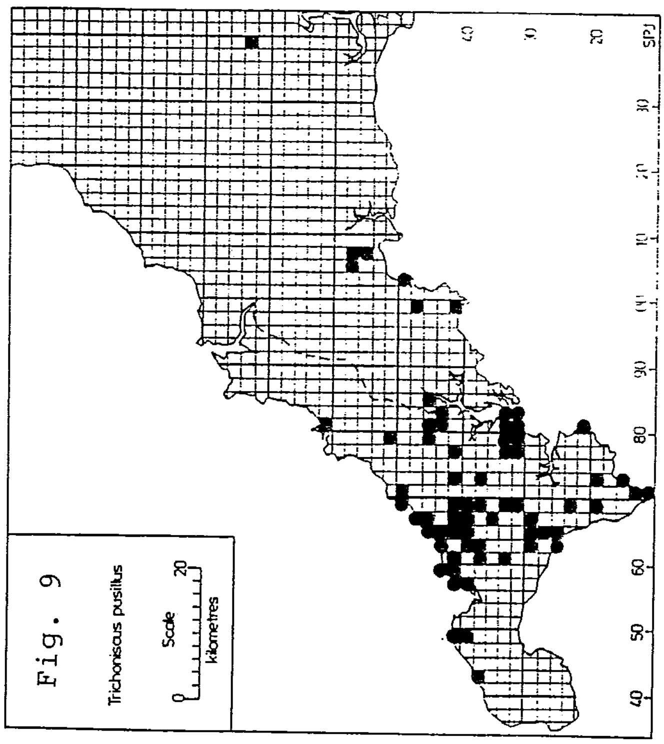

Fig. 9

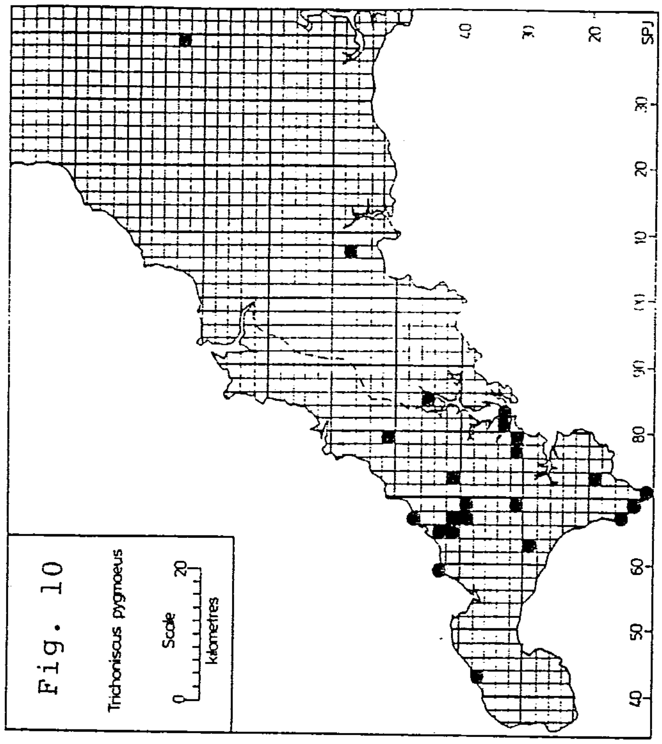

Fig. 10

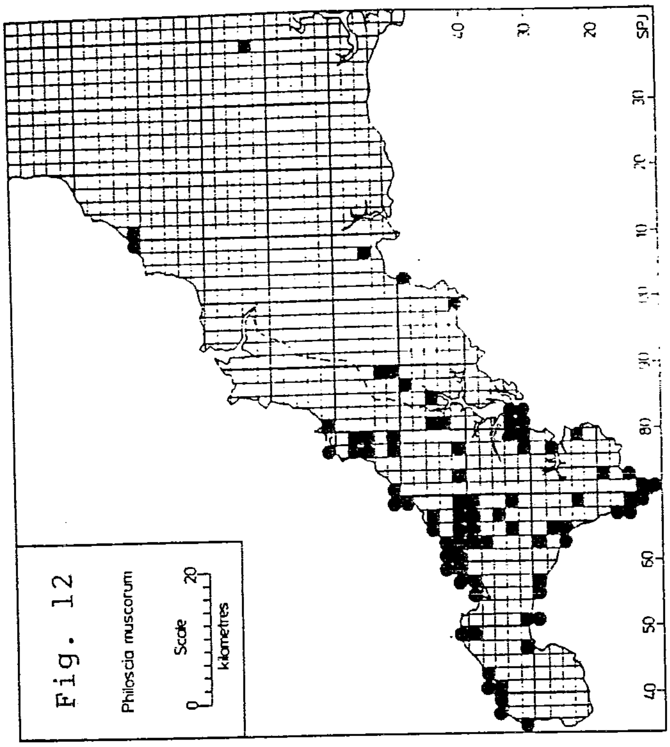

Fig. 12

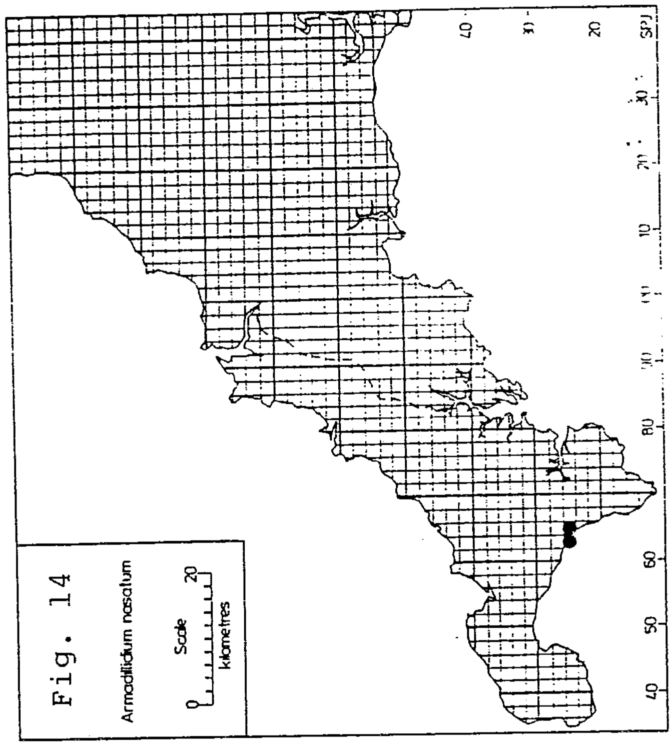

Fig. 14

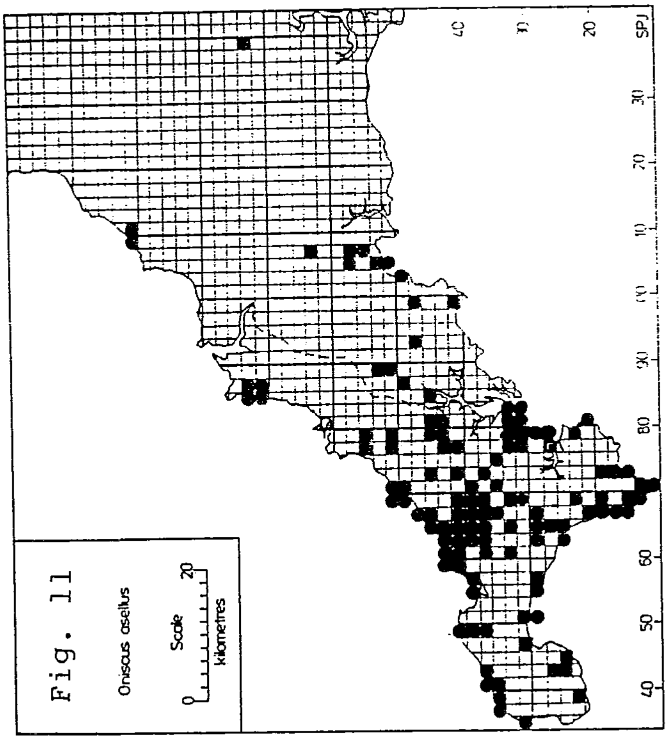

Fig. 11

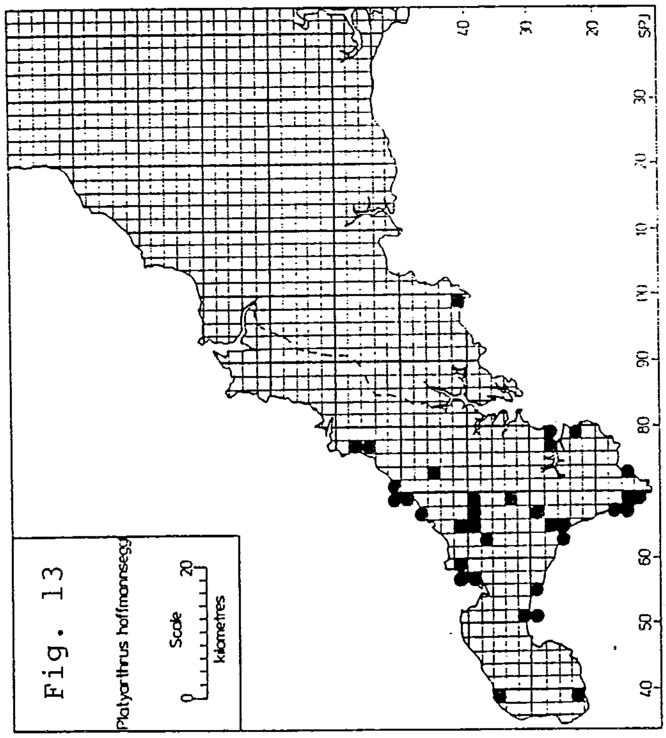

Fig. 13

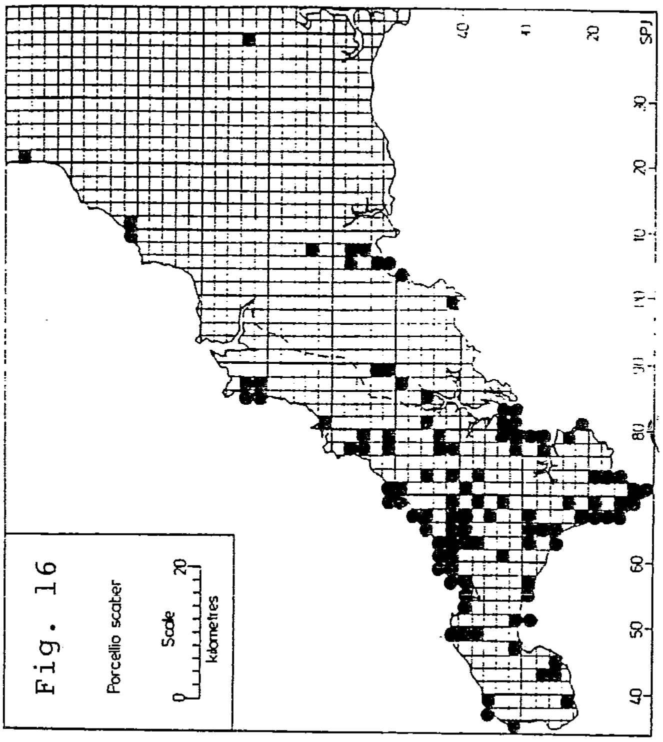

Fig. 16 *Porcellio scaber*

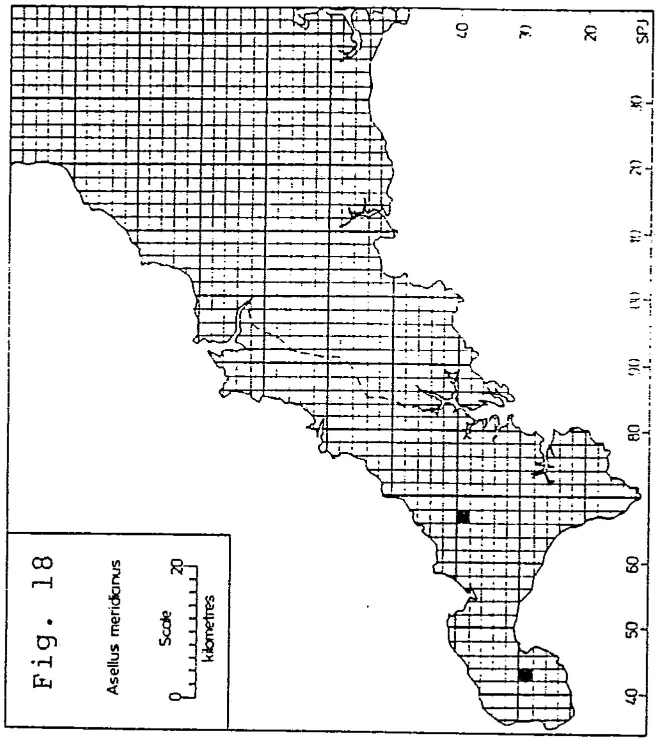

Fig. 18 *Asellus meridianus*

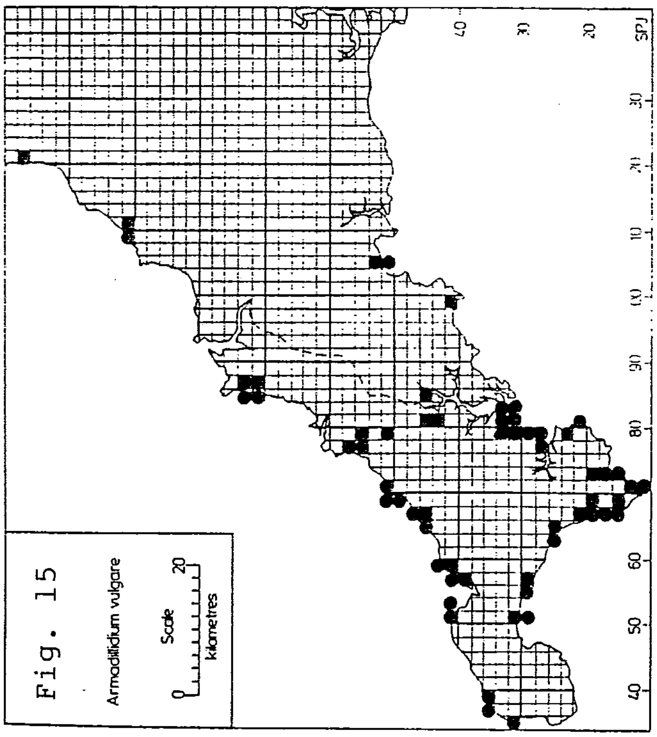

Fig. 15 *Armadillidium vulgare*

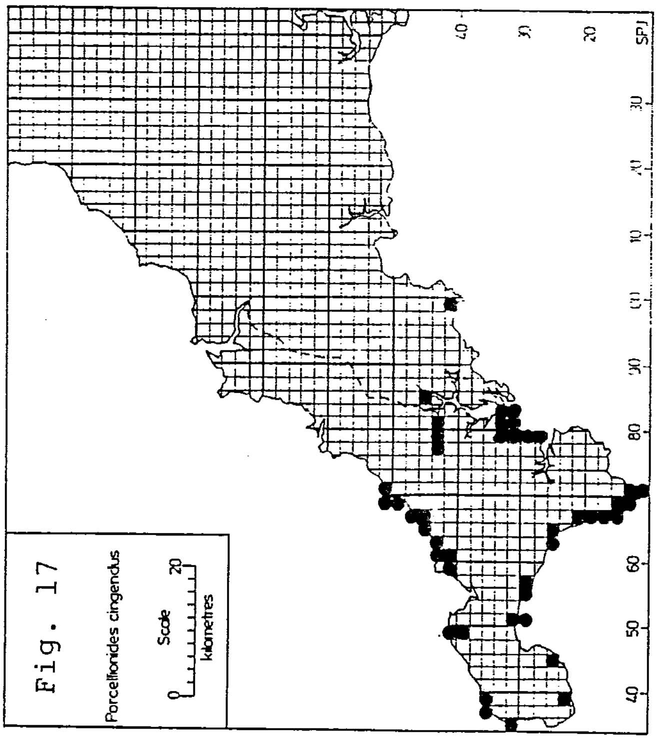

Fig. 17 *Porcellionides cingendus*