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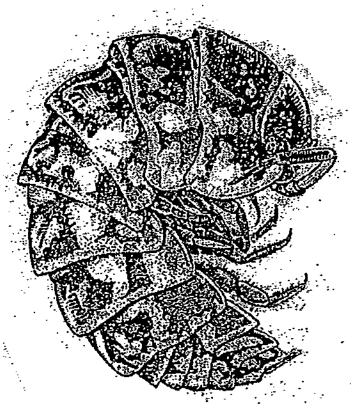
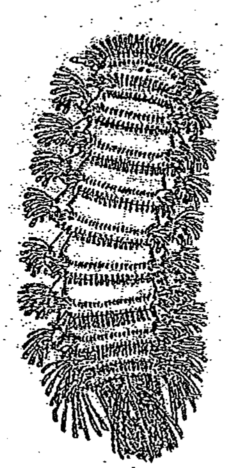
BULLETIN of the BRITISH MYRIAPOD and ISOPOD GROUP

Edited for the Group by
A.D.Barber & H.J.Read





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BULLETIN OF THE BRITISH MYRIAPOD AND ISOPOD GROUP
Volume 18
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EDITORIAL

2001 has seen the loss of Gordon Blower, describe elsewhere in this Bulletin as "the father of modern myriapodology in Britain" and many of us will remember him not just for his Senior Service, his tea drinking and his encyclopaedic knowledge of myriapods and much else besides but as a really nice person, supportive, helpful and positive in his comments who had an influence on "professional" and "amateur" myriapod workers alike.

Gordon was, of course, the founder of the British Myriapod Group and a few of us still remember that first meeting at Brendon on the edge of Exmoor when a miscellaneous collection of individuals, all sharing some interest in these many legged arthropods met for the first time, finding a new centipede for Britain and, as I recall, enjoying the local cider. In 1972, to coincide with the congress in Manchester, the first volume of the Bulletin of the British Myriapod Group appeared, edited for the group by J.Gordon Blower. After 1983 the Group was fairly quiescent although the millipede and centipede recording schemes, launched at the 1971 meeting continued to be active.

There was not to be another formal meeting until 1982 but the fact that this took place was, in fact, due to Gordon's influence. Ron Daniel had met Gordon whilst on a sabbatical year (keeping him in cigarettes, so he claimed!) and Ron, having become enthusiastic about millipedes, was to be the inspiration and organiser of that Plymouth meeting. In 1983 the first BMG Newsletter appeared, edited by Doug Richardson.

From then on, annual meetings jointly with the Isopod Study Group took place and in 1985 the second volume of the Bulletin finally appeared. And, as they say, the rest is history.... It took a few years of informal discussions before the two groups came together "officially" and the Bulletin took on its new name in 2001.

Apart from the heartfelt tributes to Gordon, the present volume contains a wide selection of topics which, we hope, will be of interest. David Scott-Langley, who took over as recorder for Gloucestershire from Keith Alexander, contributes an article on isopods and myriapods from Mull, an island little recorded before, especially for the centipedes and millipedes. Indeed there are rather few myriapod records from the Scottish islands as a whole. Detailed studies with maps of this sort are always welcome.

We also have an article from Wallace Arthur's Sunderland group on ecological and behavioural studies of the two recently separated species *Geophilus carpophagus* and *Geophilus easoni* and are alerted to the need to check all our records for what was previously called *G.carpophagus*. A further article from the same source looks at eggs and early development of *Strigamia maritima*. Another new millipede species, *Cylindroiulus salcivorus*, is recorded from the British Isles and John Lewis looks at unusual coloration in geophilomorphs. John Harper contributes short articles on *Lithobius piceus* and *Haplothalamus montivagus* from Wales and *Haplothalamus danicus* from Scotland and we have reports on species collected during the 2001 Dingle meeting kindly put together by Steve Gregory.

We have one or two possible papers for Volume 19 but please do keep them coming in. Our best memorial to Gordon Blower is not only to have a glass of whisky in his memory, but to keep both the BMIG and its Bulletin going for many years to come.

Bulletin of the British Myriapod and Isopod Group 18 (2002)

OBITUARY

JOHN GORDON BLOWER
1923-2001

Gordon Blower was born in Bolton on 12 December 1923. He lived as a child in Farnworth, a cotton town near Bolton in Lancashire. His early days were rather unsettled as his mother had died when he was very young and he lived with his father in several temporary homes in the town. His early education was gained at Plodder Lane Council School where he had his first introduction to science through a student teacher who gave a lesson about magnetism. However, he failed his eleven plus exam and so proceeded to Harper Green Central School for a year where practical subjects such as gardening were taught as well as academic ones. At the end of the year he was able to take a twelve plus exam which he passed and so the remainder of his secondary education took place at a Junior Technical School in Worsley, to which he travelled on the train each day. Here he studied technical drawing and chemistry as well as the usual subjects. After leaving school he obtained a job at Kearsley Power Station hoping to further his interest in magnetism and electricity. Unfortunately the work was not what he expected it to be and he spent most of his time adding up how much coal had been burned each day. So, with encouragement from relatives, he started a matriculation course at Bolton Municipal Technical College in the evenings and in 1940 gained the School Certificate. Two years later he gained his Higher School certificate.

In 1942 Gordon started his university education at the University of Manchester and gained a B.Sc. in the Honours School of General Science. Following this he did eighteen months of war service in the Navy as a Sub-Lieutenant (Special Branch) with the Mobile Malaria Control Unit as a medical entomologist investigating the control of malaria and other insect-borne diseases in Ceylon, Hong Kong and China.

After a short time as a part time Demonstrator in Zoology back at Manchester University, he was appointed Assistant Lecturer in 1948, later to become Lecturer and finally Reader in Ecology in 1959, the post he held until he retired in 1982.

Like many Manchester zoology graduates of the time, the first research work that Gordon Blower carried out was on invertebrate cuticle structure, and indeed his first published paper (in *Nature*) was on this subject. An interest in myriapods soon developed and he quickly became the national authority on millipedes and an international authority on their life history and ecology. Perhaps the best known piece of work for many people will be his book *British Millipedes* published in the Synopses of the British Fauna series. The New Series version of this, published in 1985 and substantially revised since the original 1958 version, has helped make millipedes accessible to many people, professionals and amateurs alike. The hallmark of this book is the intricate and accurate illustrations that make it such a pleasure to use. Partly assisted by a series of post-graduate students, his other major contribution to myriapodology was the detailed information gained about some of the British species of millipede, in particular their life cycles and post-embryonic development.

Work on myriapods included a secondment to University College of Njala, Sierra Leone in 1973, and later during several visits to Madeira. In Britain Gordon encouraged the formation of the British Myriapod Group, supported the project to map the distribution of British millipede species and was editor of the *Bulletin of the British Myriapod Group* from the first edition in 1972 until 1994. He regularly attended the International Congresses and was President of the 5th International Congress at the University of Radford in Virginia, USA. He also attended the British Myriapod Group field meetings each Easter and his love of tea at any time and whisky in the evening became an essential part of those meetings, a tradition that has continued today – at least that of the whisky! Gordon's sweet tooth meant that some sort of cake or biscuit was an essential accompaniment for the tea.

In addition to his work on millipedes he was interested in soil and leaf litter organisms in general and established a special soil laboratory at Manchester University to better study them. He also contributed substantially to development of ecological techniques including mark release recapture as a method of estimating population size. He co-authored the book *Estimating the Size of Animal Populations* explaining this method in detail.

Every student taught by Gordon Blower will remember him for his wide and extensive knowledge of all aspects of ecology and of the British fauna. He was one of the 'old school' of scientists, not only skilled in their own disciplines but also able to understand and teach in a wider context. Though through the field courses that he initiated, there was also opportunity to learn more about millipedes and centipedes. His lectures were always a joy to listen to and his tutorials informative and thought provoking. Gordon's use of English and ways of expressing himself were unique and made all discussions and lectures memorable experiences. His influence on fieldwork at Manchester was incalculable and he undoubtedly inspired a large number of students, both undergraduates and post-graduates, including many who had little interest in millipedes.

After retiring from the University, Gordon moved to Levens in the Lake District, a part of England that he had loved all his life. In his new house he enjoyed gardening, welcomed visitors and became involved in the local community, especially that of the church. During this time he developed his skills as a landscape artist, a natural progression from his earlier pen and ink illustrations. He always enjoyed hearing news of myriapodologists, meetings and conferences, although he did not continue much active work himself. For many of us Gordon will always be the father of modern myriapodology in Britain.

Aside from his scientific work, his interests included literature, music (especially Mozart) and Bolton Wanderers Football Club. His wife, Mary, died 13 years ago, but he leaves two sons and eight grandchildren. His family intend to scatter his ashes on Causey Pike in the Lake District, a spot that Gordon had long enjoyed and where he was thrilled to experience a heavenly Brochen Spectre one day in 1990.

Helen J. Read
With contributions from John Dalingwater, Joan Fairhurst and Phil Wheater.

PERSONAL RECOLLECTIONS

John Lewis:
I first met Gordon in London in the autumn of 1959. He came down to Queen Mary College as the external examiner for my Ph.D. on The life history and ecology of *Strigamia maritima.* Never having met him, or indeed anyone working on myriapods, I was very apprehensive. I expected him to give me a rough ride in the viva and looked to my supervisor Prof. J. E. Smith, an echinoderm functional anatomist, to give me some support. The reverse was the case. Prof. Smith was rather critical but Gordon could not have been nicer. I recall the pleasure of being able to talk for the first time to someone who knew about centipedes. I still have Gordon's list of my Typographical errors etc. written in black ink on a half sheet of Joint Matriculation Board answer paper in his neat small handwriting.

As he made to leave Smith said "I think we can tell Lewis unofficially that all is well, don't you Dr Blower?" "It's 'Mr' actually", Gordon replied. "Ah" said Smith, "I'm sure Lewis won't mind my saying this, but it is rather more distinguished to be 'Mr' these days isn't it?"

Gordon Blower's work in the fifties made me very interested in the water relations of centipedes but by far his most valuable publication for me was Blower, Gordon, Yorkshire centipedes, *Naturalist* October-December 1955:137-146. At that time there was no monograph on British centipedes and this paper provided a checklist and bibliography which when used in conjunction with Brölemann's (1930) *Faune de France* - Chilopodes allowed the diagnosis of the British species. My copy of Yorkshire Centipedes is much worn and has been repaired several times.

Between 1959 and 1961 I worked at Bradford and was therefore able to visit Gordon from time to time in the Zoology Department at Manchester where he had set up a group working on the ecology of litter invertebrates. There was a large battery of Tullgren funnels in the Department and a highly organised system that ensured fortnightly sampling and sorting. On reflection I realise that Gordon must have been very busy but he was always very welcoming and prepared to give up time to read through a manuscript and advise on the spot.

Subsequently we met at Congresses and field meetings of the British Myriapod Group. At one of these I learnt that if you laid an emptied whisky glass on its side enough of the spirit would drain down to provide another sip. At one point I took to smoking Senior Service cigarettes a habit that Gordon acquired from his time in the Navy. His talks/lectures at these meetings quiet, logical and simply delivered and always very interesting, were models for us all.

Gordon was generous and very supportive. I never heard him make a derogatory remark about anyone. After his retirement and move to the Lake District one had to seek him out but then one was always sure of a very warm welcome in his cottage. He threw himself into the life of the village depicting some part, or view in a beautiful pen and ink drawing on the annual Christmas Card. This quality of draftmanship was, of course also seen in his drawings of millipedes, which set such exceedingly high standards.

Gordon Blower will be remembered for his work on the life history and ecology of millipedes. His Linn. Soc. key on millipedes gave great impetus to the study of those animals in the British Isles and it was his drive that brought about the British Myriapod Group that has been a catalyst for work on centipedes and millipedes in this country. But those of us that knew him also remember a delightful personality and good friend.

John Cloudsley-Thompson:
Gordon Blower's many friends and colleagues will miss him greatly. Not only was he unusually good company, but extremely generous in his help, ideas, and academic expertise. I first learned of his existence in May 1950 from Professor Ralph Dennel, the external examiner for my Ph.D on the sensory physiology of millipedes (under the supervision of Dr. V. B. Wigglesworth as he then was). Dennel was always most helpful, friendly and encouraging to junior zoologists. At my *viva voce*, he told me that one of his own research students, Gordon Blower, was completing an M.Sc. in Manchester on the cuticle of myriapods.

Naturally I wrote to Gordon who replied immediately. In those days, nobody else was working on these animals in Britain so, to prevent overlap in our efforts, Gordon suggested that I should concentrate on millipedes while he would stick to centipedes. But my interest had already switched to activity rhythms in woodlice and Gordon remained the sole British myriapodologist at that time. Later, he became universally recognised to be the 'father of modern myriapodology in Britain' as Helen Read aptly dubbed him in her announcement of his death (Newsletter of the British Myriapod and Isopod Group number 3, Autumn 2001).

Throughout the years, Gordon and I kept in touch by correspondence although our paths seldom crossed. The last time we met was in July 1983. Accompanied by Richard Hoffman (University of Virginia), Gordon met me at Piccadilly Station when I came up to Manchester as External Examiner for Henk Littlewood's outstanding Ph.D. thesis, under his supervision, on the chemosensory behaviour of *Lithobius forficatus*. As always, it was a stimulating and thoroughly enjoyable reunion.

Helen Read:
I feel very privileged to have been able to study in Manchester while Mr Blower was on the staff there. To me he always was, and always will be Mister Blower, I'm not sure why but even well after I left I could not bring myself to call him Gordon, somehow it seemed disrespectful to do so.

I was in his tutorial group in my second year and by that time I knew he was an 'invertebrate' person so I was surprised to discover that we spent the first few weeks discussing bird song (particularly that of the chaffinch if I remember correctly). Of course I later discovered how knowledgeable he was on so many different aspects of natural history. The real highlight of being in his tutorial group however was the glass of sherry to celebrate the last one of each term!

His lectures were always a pleasure to attend. The major problem always was that, if not careful, you ended up sitting back and listening and not taking any notes. The lecture that particularly sticks in my mind was one at the end of the autumn term in the ecology course. He was comparing mull and mor soil types in forests and illustrating his talk with a diagram on the blackboard which he was drawing as he spoke. The picture gradually grew, pine trees over the soil profile, the impact of varying degrees of sunlight etc. and when he stood back and wished us a merry Christmas we realised that he had drawn a perfect Christmas tree complete with coloured decorations!

His manner of talking, whether on a one to one basis, in a tutorial or a lecture was very similar. He would always tell a story, gradually bringing in lots of different strands and aspects until, in that final moment of enlightenment it all suddenly slotted into place and became clear. I remember always being frustrated by those of a more impetuous nature who interrupted him before he had got to the point. I always felt cheated at the loss of what might have been.

When I progressed to studying millipedes he was always so patient in explaining the complications of measuring their length, (I was constantly teased about my drawings of 'bananas' by other members of staff) what to look at and how. He made me think about every word I wrote down and what it really meant. On one occasion when I was struggling to see some critical feature down a microscope and he said very gently 'millipedes are blessed with two sides – try looking at the other one'. Sure enough the feature became obvious once the millipede was turned over.

My drawing ability was always rather poor (despite having an artist as a grandfather) but Mr Blower taught me how to draw accurately from a microscope and then to shade areas in by 'making boxes'. I will never have the skill that he had, nor the patience to use a hand lens to place a single dot in exactly the right position, but the fact that my illustrations are passable is entirely due to him.

He introduced me to the community of Myriapodologists by taking me to my first field meeting down in Plymouth. I arrived at his house in Prestbury at (what seemed like) a very early hour and he drove us down. It was my 21st birthday that day and, being close to Easter, he presented me with a tube of Easter eggs and looked after me while I struggled with all these strange people I had never met before. On later field weekends, when he was getting older I was able to repay the debt very slightly by helping him get about, but I have never mastered the art of telling *Ophyiulus pilosus* from *Julus scandinavius* at 50 yards, despite all his tutoring! Somehow the days often ended with tea in a café somewhere!

A very clear vision of Mr Blower will always remain with me. A mixture of his quiet manner of speaking and explaining, his chewed and raw fingers and thumbs, his slightly prehensile upper lip (especially when trying to catch stray cake crumbs), the fact that he always seemed to be wearing the wrong glasses and had forgotten where he had left the right pair. Him sitting with legs tightly crossed (twice?), looking rather uncomfortable and apologetic, of cups of tea, cigarettes, glasses of sherry in the University and whisky on Myriapod meetings; the latter a tradition that continues to the present day. We will raise a glass of whisky at the next meeting to you, Mr Blower, to give thanks to your tremendous contribution to our lives and to Myriapodology.

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J.G. BLOWER

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Bulletin of the British Myriapod and Isopod Group 18 (2002)

MYRIAPODA (CHILOPODA AND DIPLOPODA) AND ISOPODA FROM THE ISLE OF MULL AND ASSOCIATED ISLANDS, SCOTLAND

D.A. Scott-Langley

11 Overhill Road, Cirencester, Gloucestershire GL7 2LG

INTRODUCTION

The purpose of this article is to give details of Myriapods and Isopods collected on the Scottish islands of Mull, Iona, Ulva, Staffa and Lunga during two weeks in July/August of 2001. The Atlases for these groups (Harding & Sutton, 1985; Barber & Keay, 1988; British Myriapod Group, 1988) show very few records from this area: Chilopoda – 3 species from two 10km squares, Diplopoda – 8 species from six 10km squares and Isopoda – more widely recorded but only 5 species from fifteen 10km squares. Enquiries directed to the National Recording Schemes showed that there was no change from the Atlas situation. Having written the first draft of this article, the author was informed that the Scottish Entomologists' Gathering (SEG), and Gordon Corbet in particular, had spent several days on Mull in June, 1997. Corbet's records (pers.comm..) have been incorporated into this report, as they have not been published elsewhere.

AREA OF STUDY

1. **MULL** is an island of the Inner Hebrides group, approximately 40 kilometres North to South by 50 kilometres East to West, with nowhere on the island more than 7 kilometres from the sea. The Scottish mainland is only two kilometres away from Mull in places although this relationship is not shown in the maps used for this article apart from Figure 1. The geology is varied, ranging from granite on the Ross of Mull, sandstones at Gribun and the "trap" landscape of the central hills of the island made up of volcanic lava flows and intrusions. The most recent shaping of the landscape took place during the last Ice Age, producing some of the characteristic "U" valleys and lochs. The highest point is Ben More at 966 metres. The climate is mild although rainfall is high at around 2000mm per year. The vegetation is naturally grassy with small areas of heather. There are small woods and thickets of native oak, birch, ash and hazel, sometimes mixed and sometimes single species, that

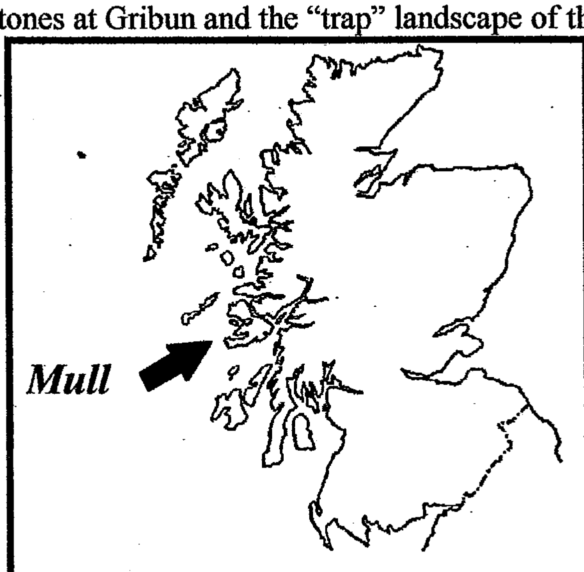


Figure 1. The Island of Mull in relation to the Scottish mainland.

cling to hillsides and old scree slopes beneath cliffs and in sheltered bays. Some of the glens and much of the eastern coastal plain have been planted with larch and sitka spruce by the Forestry Commission. The coastal areas provide a wide variety of habitats, ranging from beaches of sand, shingle and boulders, cliffs, raised beaches and river mouths with attendant marshy areas (Boyd & Boyd, 1990).

2. **IONA** lies one kilometre west of the Ross of Mull, and is 5.5 kilometres north to south and 2 kilometres east to west. Geologically, Iona is completely different from the rest of Mull: Lewisian gneisses and granites are overlain by Torridonian sandstones and the west and north coasts are studded with bays of white shell sand, which have given rise to 'machair' grassland in the dunes behind that are rich in wild flowers. Elsewhere in the interior there is lush grassland with *Calluna* on the more exposed rock outcrops. The highest point on the island is Dun I at 101 metres.

3. **ULVA** is separated from Mull by less than 500 metres of sea, and is similarly built up from successive lava flows, showing the trap landscape when viewed from across Loch na Keal. Vegetation is principally grassland although there is a certain amount of woodland – different types consisting of native oak and birch, a few small, mature conifer plantations, and "policy" woodlands of oak, beech, pine and larch planted in the 19th century. There is also some improved agricultural land around Ulva Ferry at the eastern end of the island. Ulva is 7.5 kilometres west to east and 2.5 kilometres north to south and the highest point is Beinn Chreagach at 313 metres.

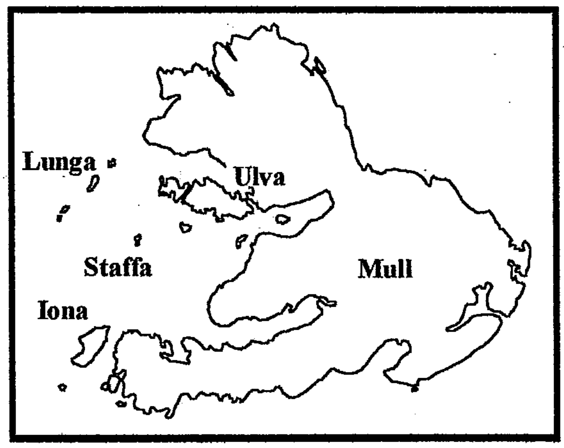


Figure 2. Map showing the islands of Mull that were visited in July 2001

4. **STAFFA**, best known as the site of Fingal's Cave, is made up entirely of Tertiary columnar basaltic lava flows with unstable volcanic tufa above and below. The vegetation is all grassland with very little loose rock material. The island is 1 kilometre north to south and 0.5 kilometre west to east and lies about 12 kilometres NNE of Iona.

5. **LUNGA** is the largest of the Treshnish Isles, a small linear group of islands running northeast to southwest and lying approximately 10 kilometres due west of Ulva. Lunga is 2 kilometres north to south by 0.5 kilometres west to east and, like the rest of the group, is now uninhabited and managed by the Hebridean Trust as a bird reserve and seal sanctuary. The vegetation is largely rich grassland with some areas of bracken. The highest point is Cruachan at 103 metres.

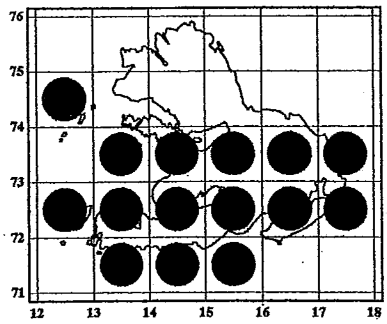


Figure 3. Map of Mull showing the 10km squares visited in July 2001.

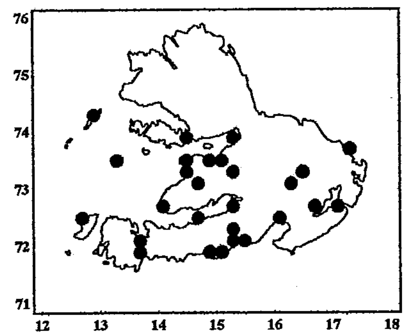


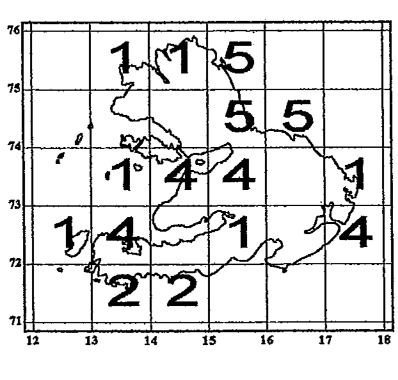
Figure 4. Map of Mull showing the location of sites visited in July 2001.

The island of Mull and its immediate neighbours, described above, make up the Watsonian vice-county no.103, and also fall completely within the 100 kilometre square NM(17). A total of thirty-two sites were visited in 15 ten-kilometre squares over the two weeks. The 10-kilometre squares visited were: NM22, NM24, NM31, NM32, NM33, NM41, NM42, NM43, NM51, NM52, NM53, NM62, NM63, NM72 and NM73 as shown in Figure 3. NM21, NM23 and NM61 were not visited because of remoteness, difficulty of access and/or lack of time. The following 10-kilometre squares in the northern part of Mull were not surveyed in 2001: NM34, NM35, NM44, NM45, NM54, NM55 and NM64. The sites (shown in Figure 4) varied from seashore, through machair dune, boulder grassland, forestry plantation, a variety of woodlands to high mountain (the summit cairn of Ben More at 966 metres). Not all of the sites produced Myriapods and Isopods but did yield Collembola and/or Opiliones which were also being collected.

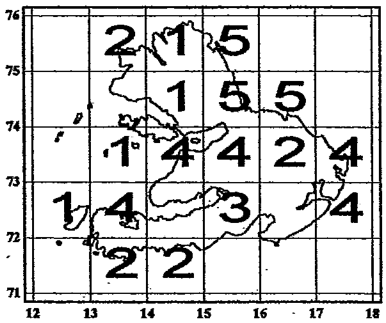
METHODS

Hand searching was the principal method used, turning over stones, boulders and logs, sorting through grass and other low vegetation and sieving litter. This was backed up by thirty-six pitfall traps distributed over five sites and also litter samples subjected to Tullgren extraction on return from Scotland.

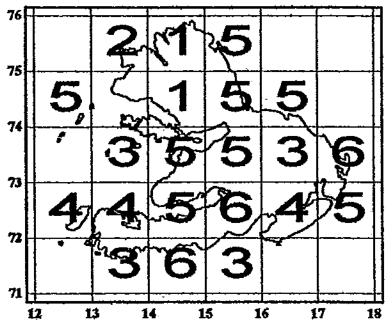
RESULTS – 1. ISOPODA: ONISCIDEA (TERRESTRIAL WOODLICE)



Number of Oniscid species recorded per 10km square up to 1985 (extracted from Harding & Sutton, 1985)



Number of Oniscid species recorded per 10km square up to 1997 (Harding & Sutton, 1985 and Corbet, pers. comm.)

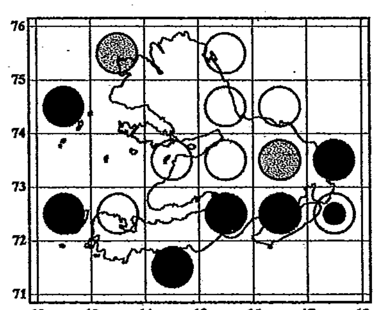


Number of Oniscid species recorded per 10km square as of August 2001

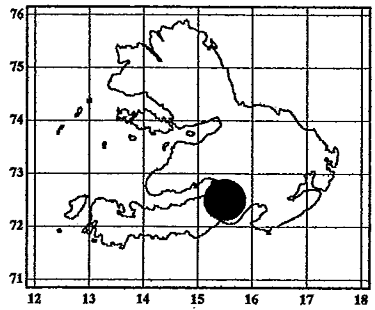
Key to symbols used in the following Distribution Maps

- 2001 records (Scott-Langley)
- 1997 records (Corbet)
- Atlas records (see text for dates)
- Atlas + 2001 records
- 1997 + 2001 records
- Atlas + 1997 records
- Atlas + 1997 + 2001 records

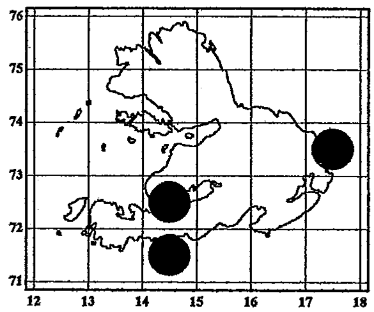
Ligia oceanica (Linn.) - Common round the British coast and likely to be recorded from the whole Mull coastline in due course. Atlas records for NM32, 43, 53, 54, 55, 64 and 72. Corbet records for NM35 and 63. Found at seven sites in 2001, in squares NM22, 24, 41, 52, 62, 72 and 73.



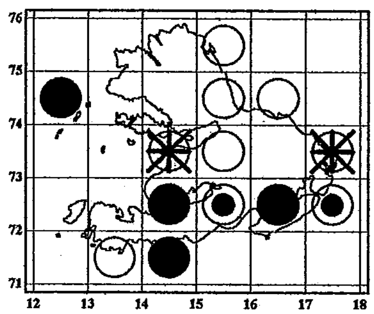
Androniscus dentiger Verhoeff – **New Vice County Record.** A predominantly English species with very few records north of Glasgow, although it has been more recently reported as common on parts of the mainland east of Mull. Recorded from two sites in 2001, in square NM52.



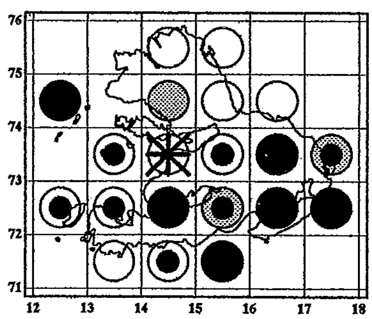
Trichoniscoides saeroeensis Lohmander – **New Vice County Record.** A coastal species, recorded from over seventy sites around Britain. Found at four sites in 2001, in squares NM41, 42 and 73.



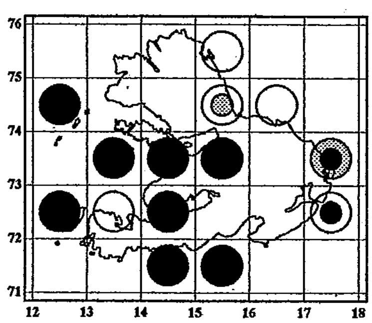
***Trichoniscus pusillus* ff** Brandt – A ubiquitous British species found in most types of habitat. Atlas records for NM33, 42, 72 and 73. Corbet records for NM43 and 73. Found at thirteen sites in 2001, in squares NM24, 41, 42, 43, 52, 62, 72 and 73.



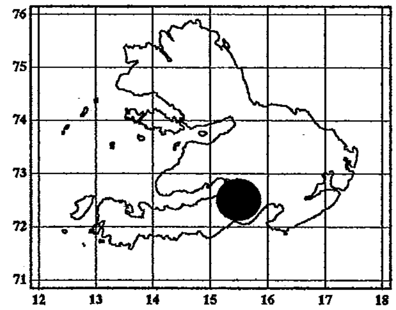
Oniscus asellus Linn. – The most widely distributed British woodlouse, both in terms of range and variety of habitats occupied. Atlas records for NM22, 31, 32, 33, 41, 43, 45, 53, 54, 55 and 64. Corbet records for NM43, 44, 52 and 73. Found at twenty-two sites in 2001, in squares NM22, 24, 32, 33, 41, 42, 43, 51, 52, 53, 62, 63, 72 and 73.



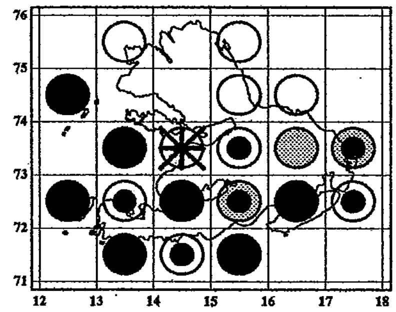
Philoscia muscorum (Scopoli) – Another widespread British species but commoner in the south than the north. Atlas records for NM32, 54, 55, 64 and 72. Corbet records for NM54 and 73. Found at ten new sites in 2001, in squares NM22, 24, 33, 41, 42, 43, 51, 53, 72 and 73.



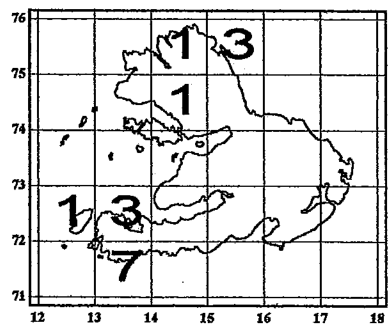
Cylisticus convexus (De Geer) - **New Vice County Record.** A widely scattered species, often coastal and often synanthropic, and in this case both. Found at one site in 2001, in square NM52.



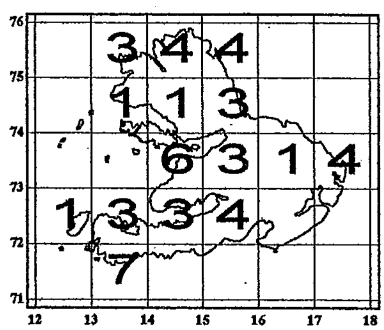
Porcellio scaber Latreille – The second most widely distributed woodlouse after *Oniscus*. Atlas records for NM32, 35, 41, 43, 53, 54, 55, 64 and 72. Corbet records for NM43, 52, 63 and 73. Found at twenty-one sites in 2001, in squares NM22, 24, 31, 32, 33, 41, 42, 43, 51, 52, 53, 62, 72 and 73.



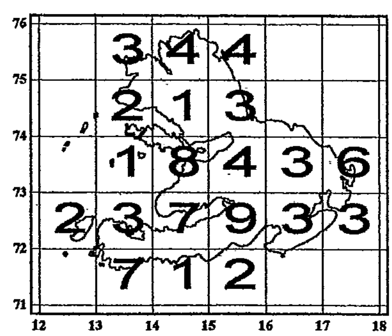
RESULTS – 2. DIPLOPODA (MILLIPEDES)



Number of Diplopod species recorded per 10km square up to 1988 (extracted from British Myriapod Group, 1988)

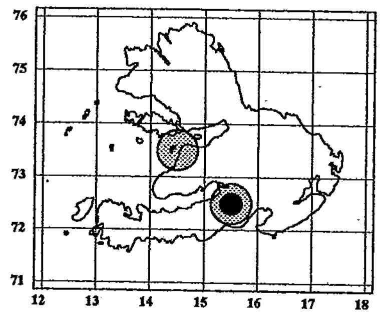


Number of Diplopod species recorded per 10km square up to 1997 (British Myriapod Group, 1988 and Corbet, pers. comm.)

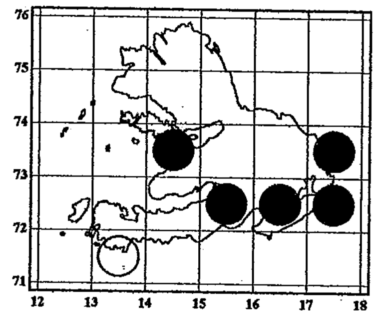


Number of Diplopod species recorded per 10km square as of August 2001.

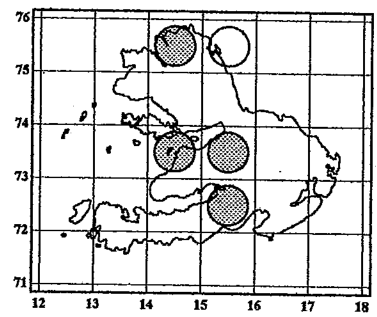
Nanogona polydesmoides (Leach) Widely recorded throughout the British Isles although few records from Scotland. Corbet records for NM43 and 52 (**New Vice County Record**). Found at one site in 2001, in square NM52.



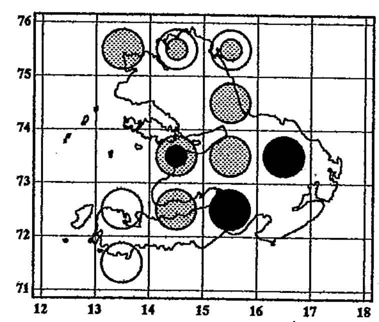
Proteroiulus fuscus (Am Stein) – A widespread species, often found in woodlands under bark of rotten logs. Atlas record for NM31. Found at six sites in 2001, in squares NM43, 52, 62, 72 and 73.



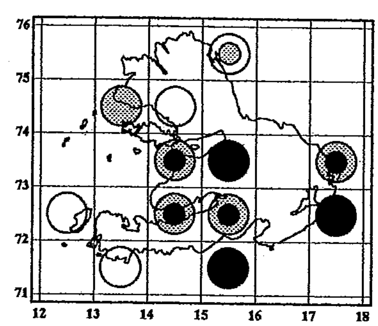
Ommatoiulus sabulosus (Linn.) – A widely-recorded species with a preference for sandy sites, often coastal. Atlas record for NM55. Corbet records for NM43, 45, 52 and 53. Not found in 2001.



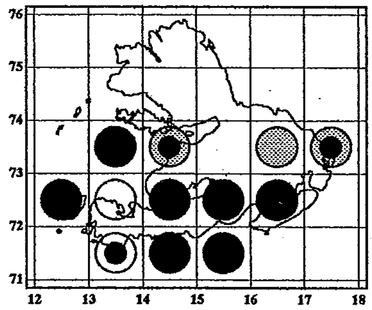
Tachypodoiulus niger (Leach) – The second most widely recorded species in the British Isles. Atlas records for NM31, 32, 45 and 55. Corbet records for NM35, 42, 43, 45, 53, 54 and 55. Found at five sites in 2001, in squares NM43, 52 and 63.



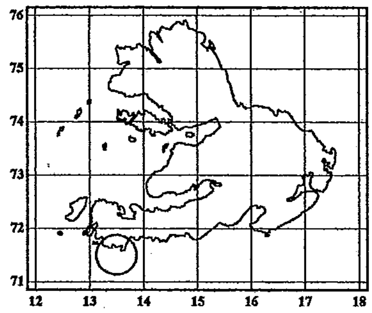
Cylindroiulus punctatus (Leach) – The most widely recorded species in the British Isles. Atlas records for NM22, 31, 44 and 55. Corbet records for NM34, 42, 43, 52, 55 and 73. Found at nine sites in 2001, in squares NM42, 43, 51, 52, 53, 72 and 73.



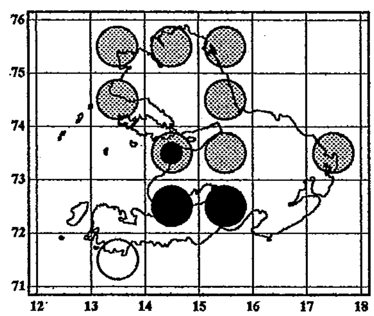
Cylindroiulus latestriatus (Curtis) – A generally coastal species and widely distributed around British shores but, also occasionally inland. Atlas records for NM31 and 32. Corbet records for NM43, 63 and 73. Found at ten sites in 2001 (males were found at most sites confirming identification), in squares NM22, 31, 33, 41, 42, 43, 51, 52, 62 and 73.



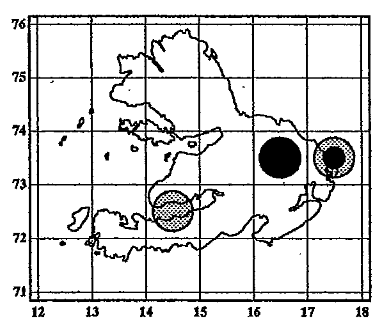
Julus scandinavius Latzel – Widespread records across the British Isles, a woodland and coastal species. Atlas record for NM31. Not found in 2001.



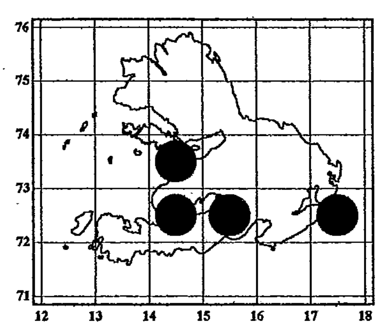
Ophyiulus pilosus (Newport) – Another widespread species, often found with the last species. Atlas record for NM31. Corbet records for NM34, 35, 43, 45, 53, 54, 55 and 73. Found at five sites in 2001, in squares NM42, 43 and 52.



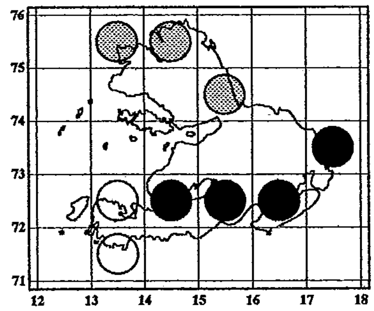
Polydesmus angustus Latzel - The third most commonly recorded millipede in Britain. Corbet records for NM42 and 73 (**New Vice County Record**). Found at two sites in 2001, in squares NM63 and 73.



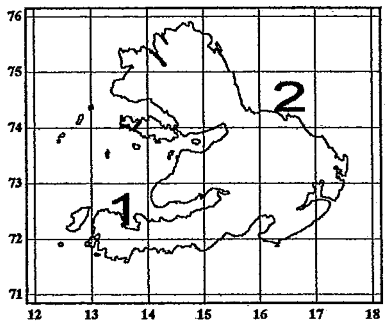
Polydesmus inconstans Latzel – **New Vice County Record.** Scattered records from across Britain with very few from Scotland and these are mostly coastal. Found at four sites in 2001, in squares NM42, 43, 52 and 72.



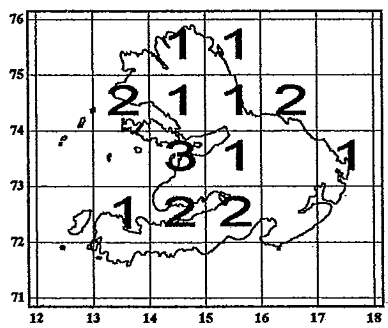
Brachydesmus superus Latzel – A fairly widely distributed species although there are very few records north of the Scottish border. Atlas records for NM31 and 32. Corbet records for NM35, 45 and 54. Found at four sites in 2001, in squares NM42, 52, 62 and 73.



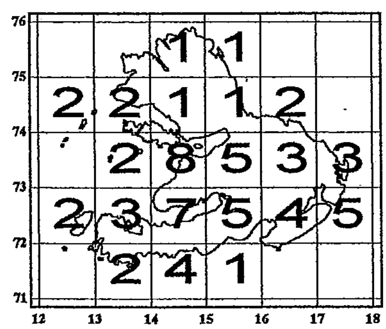
RESULTS – 3. CHILOPODA (CENTIPEDES)



Number of Chilopod species recorded per 10km square up to 1988 (extracted from Barber & Keay, 1988)

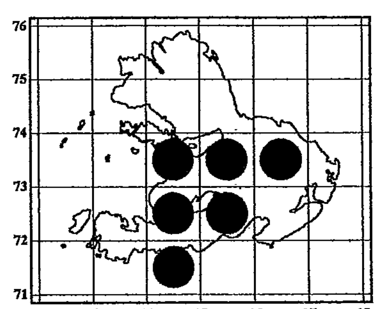


Number of Chilopod species recorded per 10km square up to 1997 (Barber & Keay, 1988 and Corbet, pers. comm.)

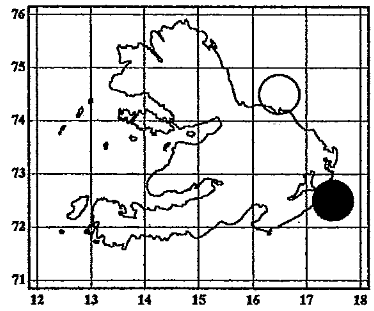


Number of Chilopod species recorded per 10km square as of August 2001

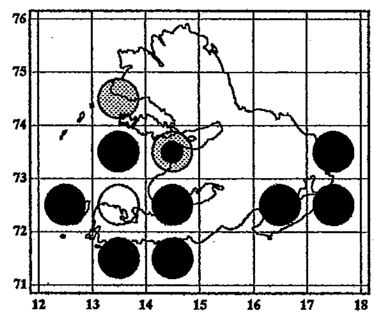
Schendyla nemorensis (C.L.Koch) – **New Vice County Record**. A small widespread species, more abundant in the south with very few records north of the Scottish border. Found at eight sites in 2001, in squares NM41, 42, 43, 52, 53 and 63.



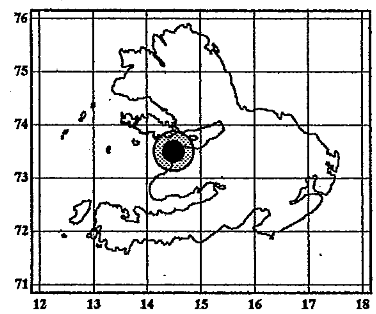
Strigamia maritima (Leach) – A species of the seashore, sometimes found in large numbers under boulders around high tide mark. Atlas record for NM64. Found at one site in 2001, in square NM72.



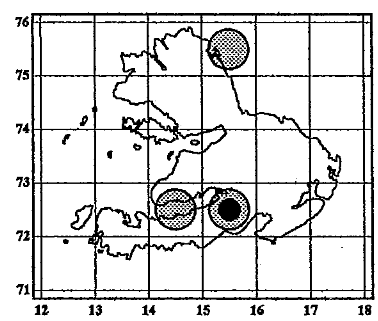
Geophilus carpophagus Leach – A larger species, widespread and found in a wide variety of habitats. Twenty-four mature specimens were collected from various sites in 2001 and all were of the short form of this species (Lewis). Atlas record for NM32. Corbet records for NM34 and 43. Found at eleven sites in 2001, in squares NM22, 31, 33, 41, 42, 43, 62, 72 and 73.



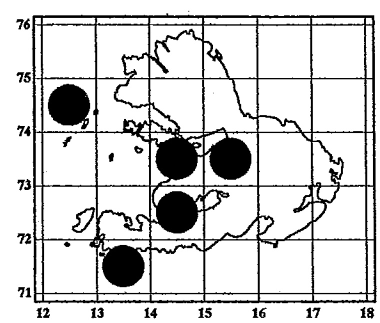
Geophilus insculptus Attems A widespread species with northerly and easterly tendencies in England, though few records from Scotland. Corbet record for NM43 (**New ViceCounty Record**). Found at two sites in 2001, in square NM43.



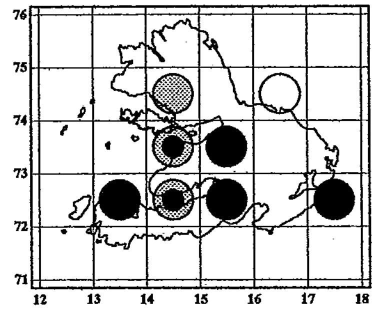
Necrophloeophagus flavus (De Geer) A widespread and common species. Corbet records for NM42, 52 and 55 (**New Vice County Record**). Found at one site in 2001, in square NM52.



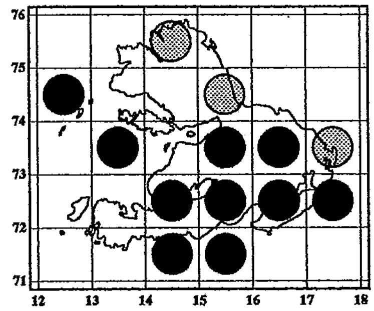
Brachygeophilus truncorum (Bergsoë & Meinert) – **New Vice County Record**. A small species, widespread and common, often found in woodland, but also moorland and bracken. Found at six sites in 2001, in squares NM24, 31, 42, 43 and 53.



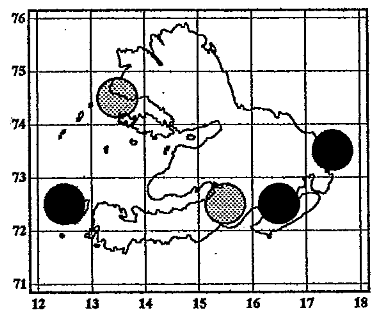
Lithobius variegatus Leach – A widespread and common species with a southern and western tendency. Atlas record for NM64. Corbet records for NM42, 43 and 44. Found at six sites in 2001, in squares NM32, 42, 43, 52, 53 and 72.



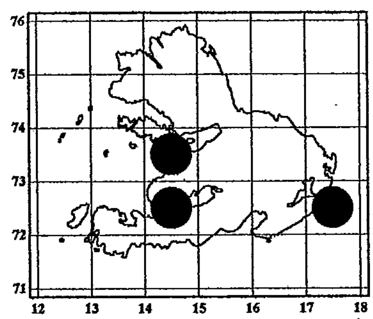
Lithobius forficatus (Linn.) A very common species over most of the British Isles. Corbet records for NM45, 54 and 73 (**New Vice County Record**). Found at eleven sites in 2001, in squares NM24, 33, 41, 42, 51, 52, 53, 62, 63 and 72.



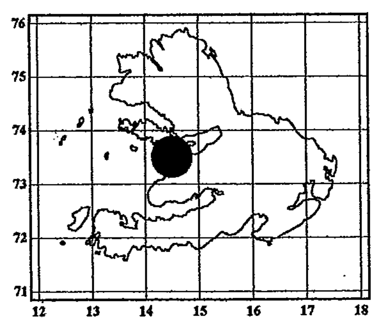
Lithobius melanops Newport A widespread species often associated with seashores. Corbet records for NM34 and 52 (**New Vice County Record**). Found at three sites in 2001, in squares NM22, 62 and 73.



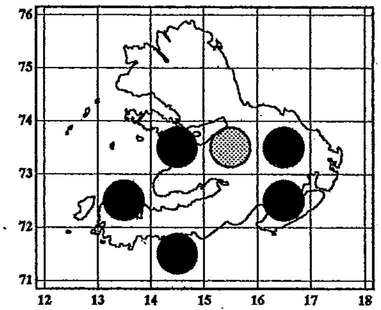
Lithobius borealis Meinert – **New Vice County Record**. A widespread species although with fewer records between southwest England and northern Scotland. Found at three sites in 2001, in squares NM42, 43 and 72.



Lithobius crassipes L.Koch – **New Vice County Record**. A widespread species with a northerly and easterly distribution. Found at one site in 2001, in square NM43.



Lamyctes fulvicornis Meinert. An extremely wide ranging species, introduced to other parts of the world. Corbet record for NM53 (**New Vice County Record**). Found at six sites in 2001, in squares NM32, 41, 43, 62 and 63.



DISCUSSION

1. General – With the exception of Corbet and SEG, the Mull group of islands would appear not to have been worked for these three groups in the past, judging by the distribution of previous records as extracted from the distribution atlases that, admittedly, are now some thirteen or more years old. Correspondence with scheme organisers suggests that this situation has hardly changed.

2. Isopoda – This group was previously the most widely recorded of the three on these islands, with a list of five common and very widely distributed species. Corbet did not add any new species to the list in 1997. Searches in 2001 added three further species to the Vice County list. *Trichoniscoides saeroeensis*, not previously seen by the author, was found at four sites that were no more than ten metres from the high tide line, three of which were grassland with embedded rocks. There is a reasonable distribution of this habitat over the island so it would not be surprising to see further records of this species in due course. Harding & Sutton (1985) show only two records for this species along the entire west coast of Scotland, one near Dumfries and one on Harris in the Outer Hebrides. *Androniscus dentiger* and *Cylisticus convexus* were not totally unexpected, and were found at remote synanthropic sites.

3. Diplopoda – The millipedes were previously represented by eight species although most of the 10km squares appear to be random finds with the possible exception of NM31 which had seven species. Information was not available at the time of writing but there is a Site of Special Scientific Interest at Ardalanish and an invertebrate survey may have been done there. Corbet added two species to the list in 1997, and one further species was added to the Vice County list in 2001, *Nanogona polydesmoides, Polydesmus angustus* and *Polydesmus inconstans* respectively, none of them entirely unexpected although *Nanogona* and *P. inconstans* records are very sparse in Scotland and the latter almost entirely coastal. The two species of *Cylindroiulus* were the most widely distributed and frequent species in 2001, followed by *Proteroiulus.* There were two species previously recorded but not seen in 2001, *Julus scandinavius* and *Ommatoiulus sabulosus.* The only 10km square in this survey that did not produce millipedes was NM24, the island of Lunga, but this was most likely a combination of lack of time (only two hours on the island) and pouring rain.

4. Chilopoda – Previously, the most poorly represented group on these islands with only three species, each with a single record, so it was not difficult to add to the Vice County list. Corbet (pers. comm..) added five new county records in 1997, and then four more species were added to the Vice County list in 2001. *Geophilus carpophagus* and *Lithobius forficatus* were the most frequently seen, at eleven sites each. *Lamyctes fulvicornis*, predictably, turned up at a number of grassland sites. *Lithobius variegatus*

and *L. forficatus* were found together at a number of sites but more usually, either one species or the other was present. *G. carpophagus, Schendyla nemorensis* and *Brachygeophilus truncorum* were often found with eggs or young. The woodlands on the east end of Ulva, having the widest variety of tree species encountered during this survey, also produced the most species of centipedes for any 10km square in the Vice County. All the species recorded for the area are those that might be expected.

5. Voucher specimens have been retained by the author for all the sites.

ACKNOWLEDGEMENTS

I am particularly grateful to Gordon Corbet for allowing me to incorporate his unpublished records into this report.

I would like to thank my son Tom, who acted as cook, co-driver and part-time field assistant and whose presence allowed me more time in the field. I also wish to thank Nick Price of Bibury Landscape Contractors who made a vehicle available for the duration of the trip. Distribution maps were produced using Alan Morton's DMAP system.

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ECOLOGICAL AND BEHAVIOURAL CHARACTERISTICS OF *GEOPHILUS EASONI* ARTHUR ET AL. AND *G. CARPOPHAGUS* LEACH

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INTRODUCTION

Eason (1979) described 'long' and 'short' forms of *Geophilus carpophagus* Leach based on (a) different maximum body lengths, (b) non-overlapping distributions of segment number and (c) a difference in habitat. Eason's specimens of the short (or typical) form male had 45-49 trunk segments, while his sole long form male had 53. The equivalent numbers for Eason's females were 47-53 (short) and 55-57 (long). Eason regarded the long form as a resident of urban and domestic localities, which as a generalization is incorrect (see below). He postulated that the difference in segment number between the two forms was due to an environmental factor - perhaps temperature - having a direct effect on the phenotype. However, other possibilities remained open, and Lewis (1985) suggested that the two forms might be distinct species. The recent confirmation of this (Arthur *et al.* 2001) was based on both morphological and molecular evidence. The former included not only segment number and body length, but also pigmentation, number of coxal pores, and number of teeth on the mid-piece of the labrum. The latter included six metabolic enzymes (out of nine studied) that were diagnostic in that the populations of *G. easoni* and *G. carpophagus* studied were fixed for different alleles. Because Leach's (1815) original description relates to three type specimens in the Natural History Museum that are 'long' (55/57 trunk segments), this form, which is by far the less common of the two, is *G. carpophagus*, while the common 'short' form is *G. easoni*.

Here, we add some information on ecological and behavioural differences between the two species. This information is less clear-cut than its morphological or molecular counterpart, and should not be regarded as diagnostic on its own. However, it should be particularly useful to field workers, in conjunction with those morphological differences that can readily be observed in the field - principally body length and pigmentation. (*G. carpophagus* is usually greenish grey or brownish grey in contrast to *G. easoni*'s typical tan or chestnut colour.) Ironically, we mainly focus here on *G. carpophagus*, as most existing information on distribution and ecology (e.g. Eason 1964, Barber & Keay 1988) is now seen to relate to *G. easoni*.

HABITATS AND GENERAL ECOLOGY

Leach's (1815) original specimens of *G. carpophagus* were collected from somewhere in Devon or Cornwall, but neither the exact locality nor the habitat were given. Subsequently, specimens of this species have been collected from at least ten British localities (see Table 1). These include the two sampled by Eason (1979), others sampled by various workers over the last two decades, and further sites described for the first time in the present paper. There are three themes running through this list of sites.

1. Many sites are coastal. *G. carpophagus* is often found on cliffs and other rocky areas within about 100m of the high tide mark. It is emphatically not an intertidal species, like *Hydroschendyla submarina,* nor even a littoral fringe species, like *Strigamia maritima* (Lewis 1962) which is largely confined to a narrow band around the high tide mark. Nevertheless it has a clear association with the coast. Individuals living in these coastal cliff/rock sites are typically found at heights ranging from 1-3 metres above the base of the cliff. Of course, in the case of tall cliffs they may also be found higher up, but this has not been investigated. No inland sites inhabited by *G. carpophagus* have yet been found north of Gloucestershire.

2. In the non-coastal sites, the association with climbing behaviour and living 1m or more above the ground remains. These inland sites all involve rocks, walls, buildings or trees (including elm, pine and yew). Eason's (1979) view that his 'long form', i.e. what we now recognize as *G. carpophagus* sunsu stricto, lived in urban and domestic localities, was an overgeneralization based on two collection sites, one being his own farm outbuildings in Gloucestershire, the other a towpath by the Thames in Mortlake, Greater London. The 'domestic' and 'urban' labels can now be seen to emphasize the wrong aspect of the sites, especially in the latter case, where the specimens were found "under elm bark" (height not specified). Occupation of such a microhabitat clearly involves climbing behaviour. Even in the case of Eason's Gloucestershire farm, where the individuals collected were from the ground floor of the buildings, Eason describes one individual as "presumably having come up the waste pipe" - i.e. again a link with climbing behaviour. Also, we have noticed a peculiar characteristic of *G. carpophagus* that may well be associated with its tendency to climb. Individuals crawling over one's hand are very difficult to shake off. They often have to be 'peeled' off, and their adhesive power can be clearly felt while doing so. In contrast, individuals of *G. easoni,* like those of other British geophilomorph species, can be shaken off with ease.

3. All sites where *G. carpophagus* has been found, both coastal and inland, tend to be much drier than the sites used by *G. easoni*, the latter typically being found both in woodland leaf litter and in semi-decayed vegetation under stones in moorland areas. In fact, the *G. carpophagus* sites that we have sampled seem drier than those of British geophilomorphs generally. Admittedly this is based on subjective assessment of field sites, and needs to be confirmed by measurement of relative humidities in the microhabitats themselves. Nevertheless, the characteristic dryness of most *G. carpophagus* sites is so striking that we are confident that objective confirmation will follow. It is possible that there is a link between this dryness and the reduced number and size of coxal pores of *G. carpophagus* compared to *G. easoni*. However, this is merely a hypothesis, especially given that the function of the coxal pores remains debatable (see Littlewood 1991 and references therein) and the degree to which they contribute to water loss remains unquantified.

TABLE 1

SAMPLE SITES IN GREAT BRITAIN FROM WHICH SPECIMENS OF *GEOPHILUS CARPOPHAGUS* HAVE BEEN COLLECTED

Site	Habitat description	Source
Mortlake, Greater London	Under elm bark on the Thames towpath	Eason (1979)
Bourton Far Hill, Gloucs.	Farmhouse and outbuildings	Eason (1979)
Horton, Gower Peninsula, West Glamorgan	Trunks of pine trees; garden wall	Blower (1987)
St. Margaret's at Cliffe, Dover	Inside houses, including upstairs rooms; on apple tree; under bark	Lewis (1985)
Taunton and Williton, Somerset	Inside farm and school buildings	Lewis (1989)
Gunwalloe, Cornwall	Coastal cliffs, well above the high tide mark	This paper
Moreton and Bobbingworth, Essex	Under bark of yew and Scots pine, in churchyards	This paper
Kincraig Cliffs, Fife	Coastal cliffs, well above high tide mark	This paper[1]
Isle of May, Fife	Rocky, disturbed area	This paper[1]
Inchcolm Island, Fife	Coastal cliffs, well above high tide mark	This paper[1]

[1]Collected by Gordon Corbet

BEHAVIOUR IN THE LABORATORY

Over the last two years, we have kept cultures of both species in the laboratory. These have been collected from several sites, and have been maintained for varying periods. The largest and longest-surviving laboratory cultures were established from collections at Doddington, Northumberland (*G. easoni*) and Kincraig, Fife (*G. carpophagus*). These cultures consist mostly of adults, but also a few juveniles. Females of both species have produced broods (typically of 10-20 eggs) in the laboratory, which have often then been deserted or eaten, possibly due to disturbance. However, one *G. carpophagus* brood hatched, producing live young. We report on two aspects of behaviour below: brooding and defence. In the former case, the observations were accumulated in a casual way over long periods; in the latter case, they are quantified and result from a single experiment.

Aspects of brooding behaviour

We have noticed two differences in brooding behaviour between the two species. These all relate to adult females kept in transparent plastic boxes (approx. 14 x 8 x 5 cm) containing only moistened kitchen roll and a food source (*Drosophila*). First, *G. carpophagus* females have a distinct tendency to rip up the kitchen roll in an apparent attempt to dig a brood cavity. The broods are then produced in the ripped-up area. Second, they are much more persistent in their attempts to protect their eggs than either *G. easoni* or other species that we have observed in this respect, such as *Strigamia maritima.* They are unique in that mothers that have been deliberately disturbed and have left their brood will often return to it and coil around it again. We have never observed this behaviour in any other species.

Aspects of defensive behaviour

We performed a replicated experiment designed to simulate attempted attack by a predator (e.g. a bird) as follows. A centipede was placed on a tray and left to settle for 30 seconds. It was then tapped on the head with a paintbrush every 30 seconds for 10 repetitions. The response was classified as follows. (a) Recoil (= negative) response, given values of -0.5 (pause), -1.0 (drew back front half of body), -1.5 (drew back entire body) and -2.0 (drew back and changed direction). (b) Neutral (= zero) response. (c) Aggressive (= positive) response, given values of +1.0 (head rears up bearing poison claws) and +2.0 (as before, but posterior end rears up simultaneously). Each individual centipede was given a mean score. Various sample sizes were used, reflecting availability of each species, and the whole experiment was repeated a second time. We included *Haplophilus subterraneus* and *Strigamia maritima* as well as the two *Geophilus* species. It is worth noting that *H. subterraneus* is an inland species, *S. maritima* a coastal one.

The results of this experiment are shown in Figure 1. Clearly, there are repeatable differences between the species, with the two inland species exhibiting aggressive responses, the two coastal (or predominantly coastal) ones exhibiting recoil responses. It is particularly interesting that the two *Geophilus* species are so different to each other, and that each is rather similar to a more distantly-related species with which it shares a broad habitat type. One possible reason for this overall pattern may be convergent evolution of behaviour in response to different types or levels of predation between coastal and inland habitats.

FUTURE STUDIES

The discovery that *G. easoni* and *G. carpophagus* are distinct species raises many questions. As already noted (Arthur *et al.* 2001), one of the main tasks ahead is to determine the taxomonic status of populations recorded previously as *G. carpophagus* from mainland Europe, North Africa and offshore islands such as the Canaries. However, even within the British Isles many questions remain. Both species are found from southern England to at least central Scotland. But how far north do they

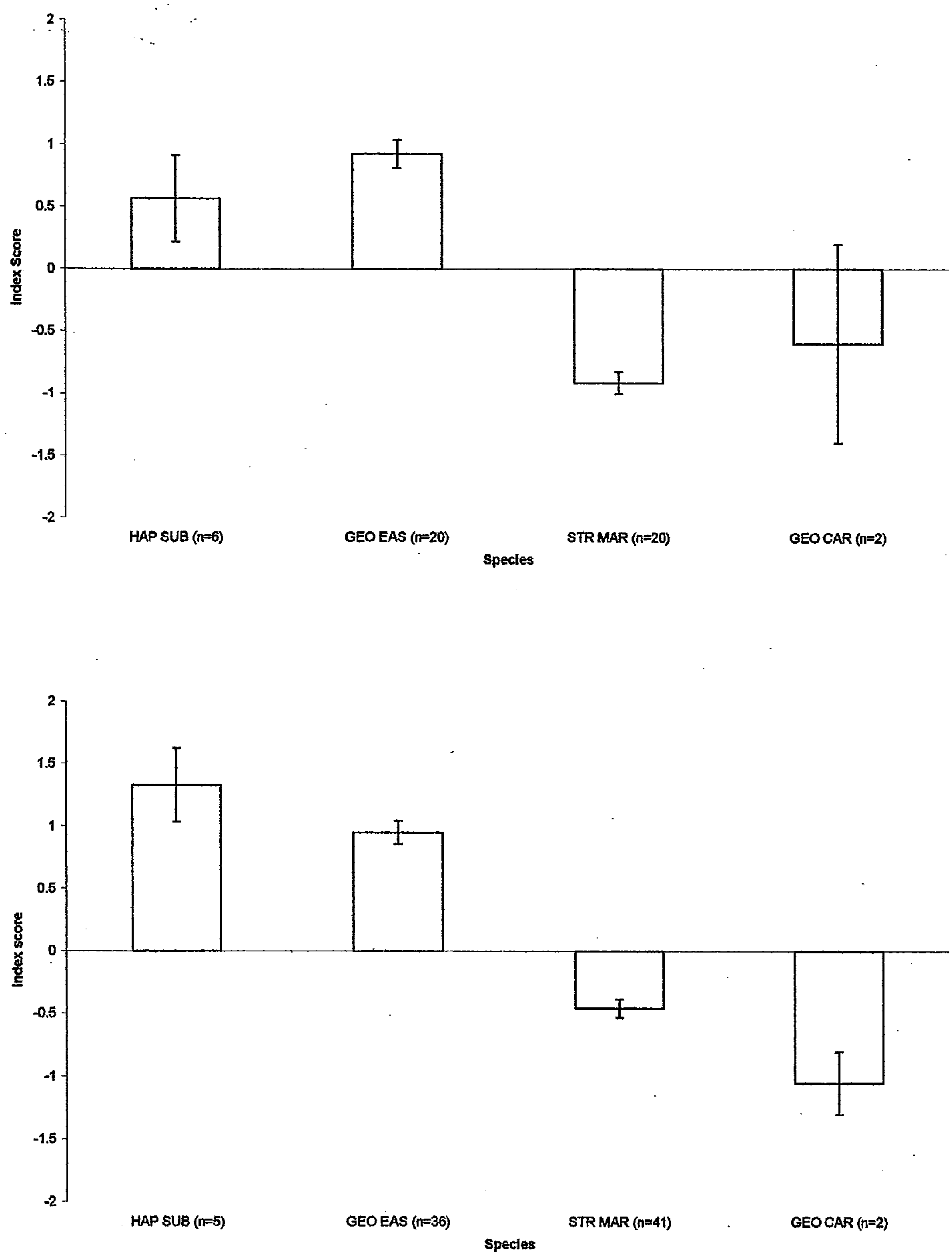

FIGURE 1

Results of experiment on defensive behaviour. For explanation of index score, see text. Bars are standard errors. Top panel - original experiment; bottom panel - repeat experiment conducted two weeks later to test for consistency of results. Sample sizes of *H. subterraneus* and *G. carpophagus* are too small to allow signficance testing, but *G. easoni* and *S. maritima* differ at the $p<0.001$ level (χ^2 on the ratio of positive to negative index scores).

go? There are distributional records for northern Scotland (Barber & Keay 1988), but it is not clear whether these represent *G. easoni*, *G. carpophagus*, or both. Also, the situation in Ireland will need to be clarified. There are very few records for Ireland, and most of these are rather old (pre-1939; Barber & Keay 1988).

Ecological information is only meaningful against a background of known taxonomy, so the first task is to re-check museum specimens where possible, to re-sample areas from which previously-collected specimens are no longer available, and to sample new areas. This way, a picture of the distribution of the two species will be gradually built up. It will be important to monitor several characters rather than just the primary one of segment number, especially in Irish and European samples. The reason for this is that although the distributions of segment number for British *G. easoni* and *G. carpophagus* are virtually non-overlapping (Arthur *et al* 2001), the situation may well be different elsewhere. Latitudinal clines in geophilomorph segment number have been demonstrated in other species (Kettle & Arthur 2000, Arthur & Kettle 2001), with segment number increasing in more southerly locations; and "*G.carpophagus*" specimens from the Canaries have more segments than either British species (Arthur & Kettle 2001). Is a 61-segment female from the Canaries a very elongated *G. easoni*, a slightly elongated *G. carpophagus* or another species altogether? The answer is not yet clear.

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OBSERVATIONS ON THE EGGS AND EARLY POSTEMBRYONIC STAGES OF *STRIGAMIA MARITIMA*

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INTRODUCTION

Although there are more than 20 species of geophilomorph centipedes in the British Isles (Barber & Keay 1988) and more than 1000 worldwide (Lewis 1981), very little is known of their reproduction, or of their embryonic or early postembryonic development. The main reason for this is that broods of most species are very hard to find, and almost never occur in appreciable numbers within any given area. Broods brought back to the laboratory for study are often abandoned by the mother and subsequently die. In other cases, disturbance causes the mother to eat the brood. Several species will lay eggs in the laboratory if collected in the field at the right time of year (April/May). However, these also are often abandoned or eaten, especially if there is any disturbance, as there always must be if detailed observations are to be made.

The only exception known so far to the rule that geophilomorph broods are sparsely distributed and very difficult to find in substantial numbers is the coastal species *Strigamia maritima* (Leach). Thus is it no surprise that the only detailed study to date on this subject was carried out on this particular species. Lewis (1961) studied a population at Cuckmere Haven in Sussex, and gave detailed information on the location of brooding sites and the timing of developmental stages. This information is very valuable because of our general lack of knowledge about geophilomorph reproduction and early development. However, since it was restricted to a single locality on the south coast of England (with a small amount of data from another site on the south coast (Lewis 1962)), the question remains of the extent to which there is variation between populations, particularly those living in widely separated areas under quite different environmental conditions. Here, we examine this issue by providing information on a population of *S. maritima* at Whitburn, Tyne and Wear, more that 400 km to the north of Cuckmere Haven, and also a little information on two Scottish populations. We also give size data for adolescens I specimens collected from the Whitburn population and maintained in the laboratory for more than four months.

FIELD SITES AND METHODS

The main site we used consisted of a stretch of muddy cliffs and shingle some 1.5 km in length running from the northern outskirts of Sunderland up towards Whitburn. Although occasional isolated broods were found in various parts of this study site, the data presented below derive from a very small area (less than 20m long x 3m from seaward to landward). This small study area was located at about the centre of the overall study site (grid ref. NZ 414619). It is easy to relocate as it is at the base of a flight of wooden steps leading down the cliffs.

Our two Scottish sites are at North Berwick, near Edinburgh (grid ref. NT 610845), and Brora, north of Inverness (grid ref. NC 871011). The habitats at both of these sites are rather different to Whitburn: flat rocks overlying a mixture of sand and grit (North Berwick) and a shingle bank some 2-3m in depth (Brora).

We made single visits to the Scottish sites and multiple visits to Whitburn. In each case, having located the brooding area, we removed complete broods (mother and all eggs/young) and took them to the laboratory. We noted the sizes of broods, counted segment numbers of mothers and offspring for the purpose of investigating heritability of this character (Kettle *et al.* 2002) and cultured adolescens I individuals from Whitburn for up to 20 weeks to see whether they would moult and/or grow.

These adolescens I cultures were maintained in clear plastic boxes (dimensions 14 x 8 x 5 cm) at two temperartures: 10°C and 17°C. Adult *Drosophila* (frozen, then defrosted) were provided as food on a weekly basis, and the cultures were kept humid. Males and females were cultured separately. The experiment started on 10th September 2001 and finished on 28th January 2002. Head width, body length and weight were recorded. This experiment was designed to test three things: (i) whether there might be an additional moult between those known at the beginning and end of the Adolescens I stage, something on which there has been some speculation (J.G.E. Lewis pers. comm.); (ii) whether elevated temperature can accelerate the transition to Adolescens II, which in the wild takes a considerable time - about 10 months (Lewis 1961); and (iii) whether any growth might occur in the absence of moults, given (a) the insubstantial and flexible nature of the cuticle at this early stage; and (b) the recent finding that in other moulting animals closely related to arthropods not all growth is associated with moults (Knight *et al.* 2002).

RESULTS

(a) Location, nature and size of broods in the field

At Whitburn, broods were typically found in cavities excavated from soft substrate underneath stones at a depth of 5-20 cm. At North Berwick, brood cavities were found under single flat rocks, only 5-10 cm below the surface. At Brora, the brood cavities were found in those parts of the shingle bank where stones had become embedded in a soft substrate consisting of decayed seaweed and other detritus, usually some 5-15 cm in depth. In all cases, broods were found in a very narrow band roughly 2m wide (dependent on slope), its lower border being the spring high tide mark, as indicated by the highest line of decaying seaweed.

The nature of broods is very consistent both within and between sites. The mother is invariably coiled around the eggs with her ventral surface outwards. Broods can be very close together. In the most densely packed brooding areas the distance between neighbouring broods can be as little as the diameter of a single brood (about 1 cm). However, at Whitburn broods were typically at least 10 cm apart. The number of young per brood at Whitburn varied up to a maximum of 20. The brood size frequency distribution is shown in Figure 1. We did not quantify brood sizes at the other sites. It should be borne in mind, when interpreting Figure 1, that most broods were sampled after hatching, and the number of eggs laid may have been higher.

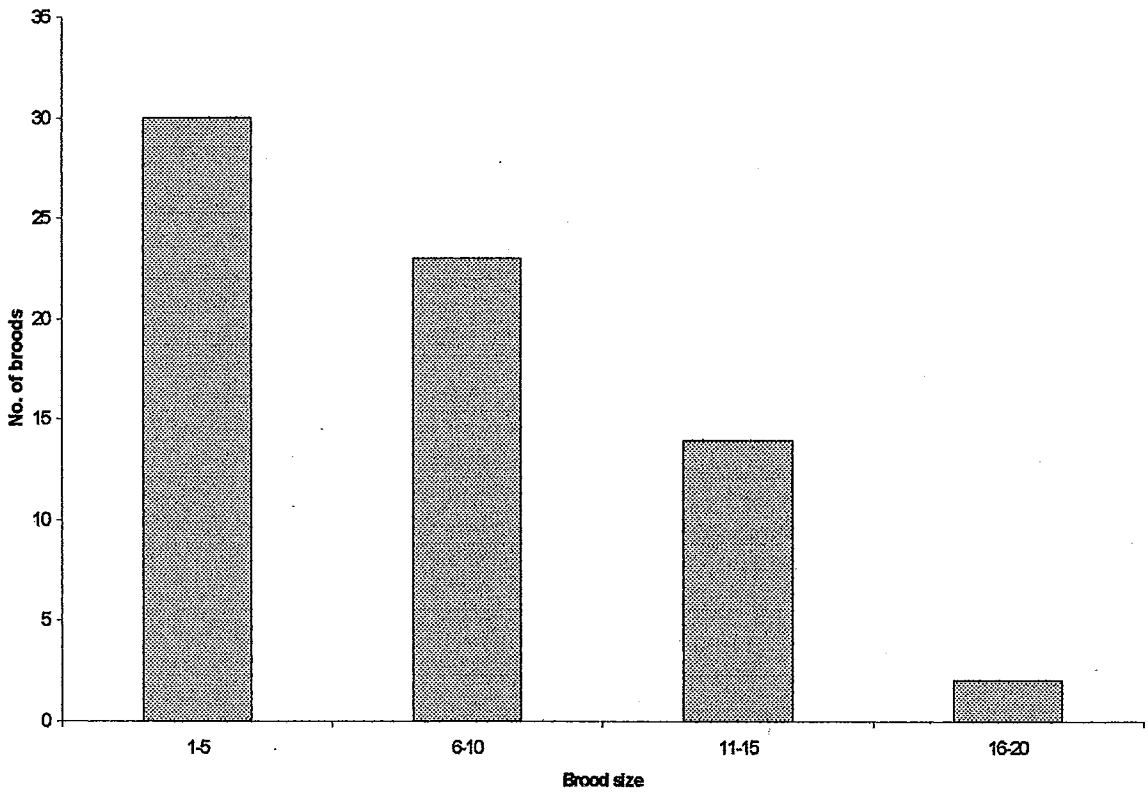

FIGURE 1

Frequency distribution of brood size in the Whitburn population

(b) Timing of egglaying and duration of early postembryonic stages

The stages present on each sampling occasion at Whitburn are shown in Table 1, using a similar format to that of Lewis (1961) to facilitate comparison. However, even with similar formats, direct day-to-day comparison is not possible as the precise dates we used did not correspond with those used by Lewis. To get around this problem, a broader picture is presented in Table 2 with the data grouped into half-months. Since most half-months from the mid-May until mid-August were sampled in both surveys, the data are comparable at that coarser scale. No difference in timing between the two localities is discernible from Table 2, so either there is no difference at all or there is a slight difference that it is not detected with half-monthly time periods.

TABLE 1

STATE OF DEVELOPMENT OF BROODS AT WHITBURN 2001

Date	Broods at egg stage	Broods at peripatoid stage	Broods at Foetus stage	Broods at adolescens I stage
04 June	2			
05 July		1	9*	
16 July			7	
25 July			9	8**
30 July				8
03 August				6
13 August				18
14 August				15

*one of these broods contained 1 peripatoid along with 11 foetuses
**one of these broods contained 1 foetus along with 8 adolescens I's

TABLE 2

COMPARISON OF THE TIMING OF DEVELOPMENTAL STAGES IN POPULATIONS AT CUCKMERE HAVEN, SUSSEX AND WHITBURN, TYNE AND WEAR

Locality	**Late May 16th-30th**	**Early June 1st-15th**	**Late June 16th-30th**	**Early July 1st-16th**	**Late July 17th-31st**	**Early August 1st-14th**
Cuckmere	e	e	e/p	p/f	f/a	a
Whitburn	?	e	?	p/f	f/a	a

Note: e = egg; p = peripatoid; f = foetus; a = adolescens I; ? = not known because not sampled during this period.

(c) Laboratory cultures of adolescens I

These cultures were started with 244 individuals, but there was considerable mortality so that this number declined, in an approximately exponential manner, to 6 individuals over the 20 weeks that we maintained the cultures. This was despite regular feeding, the absence of predators or external parasites, and the maintenance of a high humidity throughout. The declining numbers over time are shown in Table 3. Despite the problem of accumulating mortality, the experiment gave clear answers to two of the three questions posed (see Methods); but the answer to the third remains elusive.

TABLE 3

THE DESIGN OF THE ADOLESCENS I CULTURING EXPERIMENT AND THE NUMBERS SURVIVING AT SELECTED TIME-POINTS

			Number of individuals[2]			
Sex	**Temp.**	**No. of boxes[1]**	**Week 0**	**Week 6**	**Week 14**	**Week 20**
Male	10°C	6	64	17	6	1
Male	17°C	6	61	16	8	2
Female	10°C	6	59	18	5	2
Female	17°C	6	60	17	7	1
TOTALS	-	**24**	**244**	**68**	**26**	**6**

1. The number of individuals per box at the outset was typically 10, but with a range of 9-13.
2. Survivorship is given for weeks 0, 6, 14, and 20, which are respectively the start of the experiment, the week when we first recorded weights, the last reliable data-set (n ≥5 in all treatments), and the week in which the experiment was terminated.

No moult occurred in any of the 244 individuals up to either their death or the termination of the experiment at 20 weeks. Also, the number of coxal pores, which was checked at the beginning, in the middle and at the end of the experiment, was always one on each side. It is clear from this combination of observations that: (a) no 'cryptic moult' to a previously unrecognized stage occurs; and (b) the moult to adolescens II does not occur within 20 weeks, even with a constant temperature of 17°C, which is broadly equivalent to providing a continuation of summer conditions.

The question of whether any growth occurred without moults is harder to answer for two reasons. First, because although the three measures of size generally increased (Table 4), the increases were small; and second, because in batch culture with unmarked individuals it is impossible to distinguish between growth and selective mortality, both of which would produce an increasing mean value over time. So, further experimental work with all individuals either marked or kept in separate containers will be necessary to resolve this issue.

TABLE 4

BODY SIZE MEASUREMENTS IN THE ADOLESCENS I CULTURES

(a) Head Width (mm)

Sex	Temperature	Week				Direction of change
		0		14		
		Mean	+/- SE	Mean	+/- SE	
Male	10°C	0.35	0.004	0.38	0.007	↑
Male	17°C	0.37	0.004	0.39	0.004	↑
Female	10°C	0.35	0.004	0.37	0.010	↑
Female	17°C	0.37	0.003	0.39	0.006	↑

(b) Body Length (mm)

Sex	Temperature	Week				Direction of change
		0		14		
		Mean	+/- SE	Mean	+/- SE	
Male	10°C	12.12	0.121	12.42	0.473	↑
Male	17°C	12.37	0.136	13.06	0.371	↑
Female	10°C	12.54	0.136	12.40	0.534	↓
Female	17°C	12.48	0.143	13.21	0.286	↑

(c) Weight (mg)

Sex	Temperature	Week				Direction of change
		6		14		
		Mean	+/- SE	Mean	+/- SE	
Male	10°C	1.45	0.043	1.47	0.084	↑
Male	17°C	1.44	0.070	1.73	0.092	↑
Female	10°C	1.22	0.035	1.58	0.132	↑
Female	17°C	1.52	0.058	1.77	0.094	↑

DISCUSSION

The sort of microhabitats in which broods were found at our study sites were broadly similar to those found by Lewis (1961) at Cuckmere Haven. However, our broods were generally found closer to the high tide line than Lewis's. This feature is probably determined by the nature of the available habitat. At Whitburn, a very steep slope, in some places nearly vertical, is encountered only a metre or so after the strand line indicating the extent of the most recent spring high tide. At North Berwick and Brora the shingle gives way abruptly to grassy terrestrial habitat about 3m from the high tide line. None of our three sites had a shingle bank which it was possible for the animals to go behind, as was possible at Cuckmere. The distribution of brood sizes at Whitburn was generally in the lower half of the overall distribution (3-44 eggs) given by Lewis (1981). However, since Lewis's figures are for mature oocytes per female whereas ours are for eggs or young per brood, the two are not directly comparable, and the difference between them is probably explicable through the effects of 'perinatal' mortality.

The timing of egg-laying and hatching, and the progress through the early postembryonic stages to adolescens I at Whitburn was remarkably similar to that described by Lewis at Cuckmere, despite the difference in latitudes, as shown in Table 2. Our single samples from each of the two Scottish sites also corresponded with the Cuckmere and Whitburn timing pattern (Brora - all broods at the egg stage in late June; North Berwick - all broods at the Adolescens I stage in early August). However, without daily sampling at all localities over a 3-month period, which is hardly a practical proposition, small differences could go un-noticed. Økland (1984) states that in Norwegian populations (near Bergen), eggs are laid in late June, though he gives no data to support this statement. So perhaps there is a slight rather than nonexistent effect of latitude. Of course, it would help if we knew what environmental factor(s) induced egg-laying. We have tried to make *S. maritima* produce broods in the laboratory by varying temperature and photoperiod, both separately and together; but none of the combinations of conditions we have tried so far have worked.

It is interesting that our laboratory-reared adolescens I specimens did not moult to the adolescens II stage, especially in the case of those few that survived for 20 weeks at 17°C. It seems likely that in the field developmental processes will operate very slowly under the low-temperature conditions that typically prevail from October/November through to about March/April. So we might expect that although the adolescens I stage lasts from August to the following June in the wild (Lewis 1961), most of the internal changes necessary to enable the transition to adolescens II would occur in the period between about March and June. Our temperature of 17°C is clearly higher than the average that would occur in field habitats during that period, which approximately corresponds in timespan to the maximum period for which we kept individuals at 17°C (i.e. 20 weeks).

As will be clear from the above, there are still many gaps in our understanding of the reproductive and developmental biology of *S. maritima*. Nevertheless, it is clearly the best 'model system' species within the Geophilomorpha. Thus it is worth persevering; and there is no shortage of questions for future work on this system to address.

ACKNOWLEDGEMENTS

We thank John Lewis for advice and information, Chris Kettle for assistance in the field and for allowing us access to unpublished data, and NERC for financial support.

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Bulletin of the British Myriapod and Isopod Group 18 (2002)

CYLINDROIULUS SALICIVORUS VERHOEFF 1908: A MILLIPEDE NEW TO BRITAIN

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INTRODUCTION

Back in 1988 a new species of millipede to Britain was reported in the Newsletter of the British Myriapod Group (9) from a greenhouse of the Royal Botanic Gardens in Edinburgh. To date this species has not been properly described in the British literature and the find not fully reported.

Cylindroiulus salicivorus was found in greenhouses at Edinburgh Botanic Gardens by Charles Rawcliffe, who subsequently found it there on several further occasions. Gordon Corbet found it in the same locality in 1998 and also in St Andrews Botanic Gardens in the same year. Adrian Rundle reported to Doug Richardson (then the millipede recorder) by telephone that he had found a new *Cylindroiulus* species in the fern and orchid houses at Edinburgh Botanic Gardens just prior to this but the details of the records are not available.

Details of the dates and localities are listed below:

Royal Botanic Gardens, Edinburgh
2.11.1987 Greenhouse number 6 at a temperature of 19°C. Among bark chips. Together with *Oxidus gracilis* and *Choneiulus palmatus*. C. Rawcliffe leg.
13.11.1987 As above, greenhouse number 5 among bark chips. C. Rawcliffe leg.
4.12.1987 As above. C. Rawcliffe leg.
2.11.1988 As above (temperature 21°C). C. Rawcliffe leg.
18.3.1998 1 male, 1 female, 1 juvenile. Greenhouse 5. Temperate houses mainly containing ferns, with limestone and lots of stones. Together with *Blaniulus guttulatus*, *Choneiulus palmatus*, *Nopoiulus kochii*, *Cylindroiulus britannicus*, *Polydesmus inconstans*, *Macrosternodesmus palicola* and *Oxidus gracilis*. G. Corbett leg.

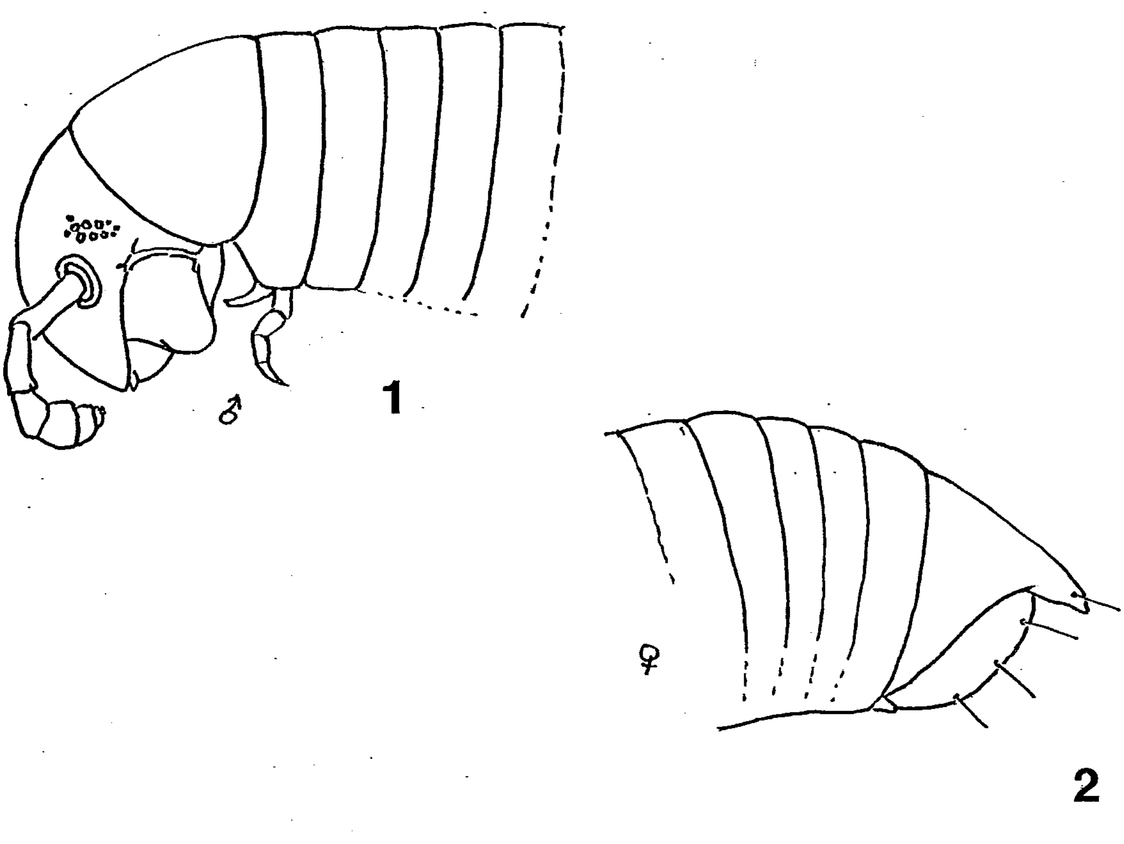
St Andrews Botanic Gardens
1.3.1998 1 male and 1 female. In temperate but heated greenhouse. Under flagstones laid directly onto soil. Together with *Blaniulus guttulatus*, *Choneiulus palmatus*, *Cylindroiulus britannicus* and *Ophyiulus pilosus*. G. Corbet leg.

13.3.1998 1 male, 2 females. As above (illustrated here). 1 male *Cylindroiulus vulnerarius* was also found in a (hotter) greenhouse.
4.5.2001 1 female as above.

Glasgow Botanic Gardens
Cylindroiulus vulnerarius was found in Glasgow Botanic Gardens by Adrian Rundle (12.3.1988) and Gordon Corbet (18.11.96); on the latter occasion it was both inside greenhouses and outside.

Appearance
Cylindroiulus salicivorus is very similar to *Cylindroiulus vulnerarius* and some of the first specimens found in Britain were originally thought to be the latter species with eyes. The most obvious difference between the two species is that *C. vulnerarius* is completely eyeless; *C. salicivorus* does have ocelli but these are considerably reduced in number in comparison to most other *Cylindroiulus* species.

Verhoeff (1908) described details of *C. salicivorus* from Italy as follows:
Male 14mm with 79 leg pairs and 4 apodous segments; Females 14.5-16.5mm with 87 leg pairs and 3 apodous segments; the eyes consisting of 7-11 ocelli on each side (see figure 1), pigmented on some specimens and not on others. The projection on the telson is strong and slightly bent as in *C. vulnerarius* (see figure 2).

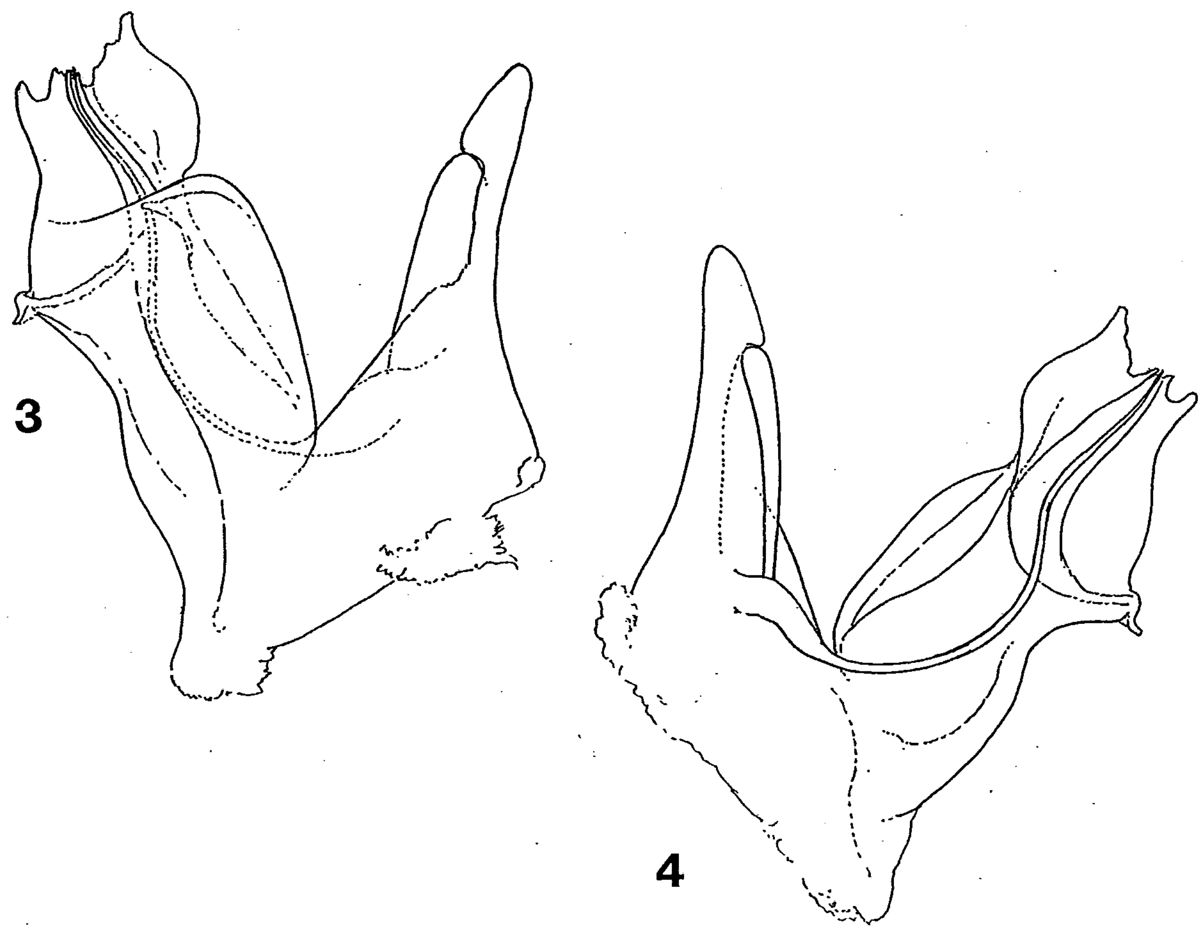


Figures 1-2. *Cylindroiulus salicivorus* from St Andrews Botanic Gardens 13.3.1998 G. Corbet leg.
1) Head of male. 2) Telson and apodous segments of female;

The gonopods are illustrated in figures 3 and 4. Verhoeff (1908) described various differences mostly concerned with the hind gonopods, notably that the distal margin of the brachite is concave in *C. salicivorus*. The orientation of the solenomerite also seems to be more ventrally directed in *C. salicivorus* than in *C. vulnerarius*.

Verhoeff (1908) originally placed *C. salicivorus* in the sub genus *Allotyphloiulus* along with *C. vulnerarius* and mentions that it forms a 'pretty transition' between those species with numerous ocelli and those with none. For some reason he refers to it as subgenus *Castaneoiulus* in the later check list (1932).

Verhoeff (1908) recorded that the type specimen was found at the end of April 1907 near Laveno, on Lagansee in Mulm, in muddy meadows and on trees nearby. In a later checklist of northwest Italy (1932) he recorded *C. salicivorus* from Langensee and Biella. The most recent checklist of Italian millipedes lists the species from northern Italy (Foddai, 1995).



Figures 3-4. *Cylindroiulus salicivorus* from St Andrews Botanic Gardens 13.3.1998 G. Corbet leg.
3) Left gonopod, external view. 4) Left gonopod, internal view.

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Many thanks are due to Charles Rawcliffe for providing information about the specimens that he found. Mike Rock helped with German translations of Verhoeff's papers.

ON BLUE GEOPHILOMORPH CENTIPEDES WITH COMMENTS ON OTHER UNUSUAL COLORATION

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In a note in the last Bulletin (2001), Paul Whitehead recorded a sky blue specimen of *Necrophloeophagus flavus* (De Geer) from Little Comberton, Worcestershire. He quoted comments of Dr J. M. Demange that the colour might be related to the luminous secretion containing hydrogen cyanide produced by some geophilomorphs (from the sternal glands) or might be the effect of infection (Whitehead, 2001).

Under the microscope Whitehead's specimen was an opalescent cerulean blue with a shimmer of cobalt blue highlights. The first eight segments were more normally coloured and from the ninth the segments were more tumid than usual.

Three specimens of *Geophilus osquidatum* Brölemann collected in Somerset appear to have shown a similar condition to that of the *N. flavus*. Details from my field notes are:
G. osquidatum in garden soil, Manor Mill Farm, Halse, Taunton, Somerset (Grid ref. ST142283), 5.v.1985. Two specimens.

1. More or less moribund, movement of anterior legs only. Anterior segments normal, posterior two-thirds white with duck-egg blue sheen.
2. First third active, posterior two-thirds swollen. Pale duck-egg blue. Some leg movement.

The specimens were kept in soil until 7.v.1985 when they were found to be dead and decomposed.

G. osquidatum in garden soil, Manor Mill Farm, 22.x.1998.
One specimen 33 mm, 59 pairs of legs, posterior two-thirds pale milky blue and swollen.

The condition of these specimens was clearly pathological and Dr Steve Hopkin, with whom I discussed this, suggested that it was due to an iridovirus. The distribution of the blue coloration suggests that it is the mid-gut that is involved. Presumably the blue specimens of *G. osquidatum* found in the Avon Gorge near Bristol in March 1984 by A. D. Barber and A. N. Keay (Whitehead, 2001) were similarly infected.

Other examples of unusual coloration in individual geophilomorphs are a bright red *Geophilus linearis* C. L. Koch collected near Woodmansterne, Surrey by Andy Keay in 1993 (Lewis and Keay, 1994) and a male *Geophilus electricus* (Linn.), length 46 mm, with 67 pairs of legs collected from beneath brick floor of old pigsty, Manor Mill Farm, Halse, Somerset on 4.xii.1997. In this the head capsule was brownish yellow, the anterior 20 segments orange yellow the trunk brownish (pompeian) red and the posterior eight segments light yellow. The red colour was due to the mid-gut. This specimen, however, appeared to be normal. Currently there is no explanation for the development of this red pigmentation.

Blower in a letter dated 8.xi.1980 wrote "I have repeatedly noted that the sternal gland secretion of very young stadia of several geophs is purple/violet." In the tropical geophilomorph genus *Ballophilus* the sternal glands are often pigmented. In *Ballophilus ramirezi* Perreira, Foddai & Minelli from Argentina the body is greenish brown but the ventral glands are bright purple (probably lithobioviolin). In some geophilomorphs for example *Henia vesuviana* (Newport) the pigmented fat body is seen as a dark band on either side of the heart but this and the pigmented sternal glands of *Ballophilus* appear to be the normal physiological condition in these species.

Little is known of the nature and function of coloration in centipedes or of the causes of colour variation and physiological and biochemical studies are much needed in this field.

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NOTES ON *LITHOBIUS PICEUS* L. KOCH, 1862 NEW TO WALES

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A *Lithobius* was collected with many other specimens on 2.11.2001 from the partially wooded floor of a small limestone quarry at Abersychan in the valley of the Afon Lwyd, north of Pontypool, Torfaen (G.R. SO2703) in vc35 Monmouthshire (in the company of Mike Kilner). First appearances were that it was a subadult *L. forficatus* but leg 15 clearly had a double claw and spine 15VaC. At last, had my persistence at looking at innumerable specimens paid off; was it *L. piceus*? As *Lithobius* can occur with extra or missing spines or claws, I acquired two more for confirmation as tabulated below:

Date collected	Age/sex	Length	Ocelli	Antennal articles	15 VaC	14 VaC	Coxal pores
2.11.2001	subadult M	18mm	14L 14R	56L 59R	L and R	R only	4, 5, 5, 4
6.11.2001	immature M	9mm	5L 5R	38L 37R	L only	no	2, 2, 2, 2
23.11.2001	adult F	25mm	12L 13R	56L 57R	L and R	no	6, 7, 7, 6

Notes on table: M = male; F = female; length, preserved in 70% ethanol; L = left; R = right; VaC = diagnostic spine on rear legs; coxal pores of legs 12, 13, 14, 15.

Reference to Barber's (1996) key and Eason (1964) showed that the specimens were indeed *Lithobius piceus*. Tony Barber (pers. comm.) has confirmed that this is the first recorded occurrence of the species in Wales. Its previous known range in Britain was a relatively small area of Surrey, Sussex and Hampshire where it is locally quite common, typically from woodland. In that, the Abersychan quarry site is similar being just within ancient woodland. At the same time it is adjacent to an old mining/industrial conurbation which may explain the presence also of both *L. forficatus* and *L. variegatus*. As I said of *Haplophthalmus montivagus*, (Harper 2002), I have little doubt that the *Lithobius piceus* is native to the area and the two species represent relict populations together with other ancient woodland indicator invertebrates such as the molluscs *Limax tenellus*, *L. cinereo-niger* and *Phenacolimax major*.

Using Barber's (1996) key and referring to Eason (1964), the information may be insufficient to confirm identification of sub-adult specimens. Eason's drawings are based upon subspecies *L. piceus verhoeffi* from Italy (Barber, 1969) and the leg spinulation upon one English specimen. Barber's (1969) paper does give further useful information but may not be readily available so I summarise some of the points that I found helpful:-

i) The double claw of the 15th leg is diagnostic (also for *L. peregrinus*), but the very similar *L. forficatus* occasionally has it on one leg so there must a chance of finding a specimen in which both legs will show it.
ii) Spine 15VaC is diagnostic for *L. piceus* (and *L. peregrinus*) but may be missing in immatures. Whereas the ventral spines on the leg articles (distal to the coxa) are close to the ventral angle of the article, VaC (on the coxa) is much higher, just below the chitinised hinge/pivot (midway between dorsal and ventral), and is short and stumpy.
iii) 14VaC was present on one side in one specimen above which would be misleading if one followed the key too slavishly.
iv) In the female above there are three gonopods on each side - diagnostic for *L. piceus*; also the gonopod claw has a very clear side lobe as drawn by Barber (1969), quite unlike that drawn by Eason from Italian material.
v) The coxal pores of legs 12 to 15 are often used for diagnosis but they are pretty misleading, except as an indication of age, perhaps! I find sub-adult *L. forficatus* have round or oval pores which become strikingly slit-shaped in older, larger animals; just the same occurs with *L. piceus* - while the sub-adult male above had slightly oval pores, the female's were markedly slit-shaped rather than the round ones shown in Eason.
vi) The number of ocelli is very characteristic being far fewer, at a given age, than in *L. forficatus*.
vii) The teeth of the forcipular coxosternite help to key the specimens in the right direction but seem quite variable; for above specimens they are, in order, 4L 5R, 3L 4R, and 5L 4R.

As with many Lithobiid specimens, the ones above had their share of peculiarities:
a) In the female above, there is the normal complement of ventral prefemur spines 15VaP, VmP,
and VpP, but there is an additional spine just above VpP on the left leg; and spine 15DpF is bifid.
b) The hinge point on the coxal anterior edge (where a peg on the trochanter/prefemur pivots) is normally darkly chitinised; in the sub-adult male above, the chitinised hinge is missing on the right legs 14 and 15 as are the legs themselves beyond the coxae; I suspect that the legs were lost before the latest moult so there was no stimulus at moulting to develop hinge joints properly; exactly the same is shown by the adult female which is missing left leg 12.

ACKNOWLEDGEMENTS

I gratefully thank Steve Williams, Abersychan naturalist, for encouraging me to investigate the site and to Tony Barber for information, discussion and a copy of his 1969 paper. Also to Mike Kilner for his local knowledge in helping to find the site.

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HAPLOPHTHALMUS MONTIVAGUS VERHOEFF 1941 NEW TO WALES

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On 2nd November 2001, in the company of Mike Kilner, I investigated a small limestone quarry at Abersychan, in the valley of the Afon Lwyd, north of Pontypool, Torfaen (G.R. SO2703) and in vice county 35 (Monmouthshire). Within a radius of 20m all three species of *Haplophthalmus* were found, namely *H. danicus, H. mengei* and *H. montivagus.*

This would seem to be the first record of *H. montivagus* from Wales. The nearest previous site is given by Hopkin (1991) as near Bath; Oxford and Luton; also further sites near Oxford (Gregory & Campbell, 1995).

At least eight characters of the male 7th pereopod and the 1st endopod were used to confirm the identity as described in Hopkin (1991) and Oliver and Meechan (1993). Particularly useful were the lateral view of the pereopod, the tapered (not bulbous) spines on the ventral side of the propodus and the absence of the prominent bulbous spine on the posterior face of the carpus; these could be seen in seconds once the animal had been aligned suitably in transmitted light under the x40 binocular; otherwise the identification of all the males would have been tedious. The differences in the ventral distal bulge of the carpus in the Abersychan specimens was best represented in Oliver and Meechan's figures.

As the three species are found in such close proximity at this site, I have commenced a study into their comparative ecology, and have notes on about 60 *H. mengei* males, 110 *H. montivagus* males plus 190 females, while *H. danicus* is less common at 30 individuals.

Preliminary observations suggest that *H. danicus* is largely associated with wood as I would expect from extensive experience with this species; however, they were with an equal number of *H. montivagus*. The rest of the *H. mengei/montivagus* occurred in apparently similar situations (under stones or wood, plus the top 1cm of soil where the majority were found) but appeared mutually exclusive.

Previous statements (Hopkins, 1991) have suggested that *H. mengei* and *H. montivagus* are not found in the same habitat. However Gregory and Campbell (1995) do record both together at a riverside woodland at Little Wittenham near Oxford. Clearly, at the Abersychan quarry, all three species occur in the same habitat, and microhabitats overlap to some extent; that *H. mengei* and *H. montivagus* behave exclusively to one another within a few metres (at least in the autumn) is interesting.

One point that does agree with previous reports (*op. cit.*) is that the Abersychan limestone quarry is just within extensive ancient woodland with several molluscan ancient woodland indicators such *Limax tenellus, L. cinereo-niger* and *Phenacolimax* *major*. Thus, it is likely that *H. montivagus* may have been present for a long time rather than to be a recent introduction. The same I would argue for *Lithobius piceus*, (see also Harper 2002) which I found on the same day within a few metres.

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Particular thanks go to Steve Williams, Abersychan naturalist, who encouraged me to investigate the invertebrates at this site; and to Steve Gregory for very helpful discussion.

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HAPLOPHTHALMUS DANICUS BUDDE-LUND, 1880 IN SCOTLAND

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The UK distribution of *Haplophthalmus danicus* as recorded in Harding and Sutton (1985) has been extended considerably in England and Wales but it remains a scarce animal in northern England, apart from one 10km square NY35 near Carlisle (per Steve Gregory). In Scotland there are records in only two squares, NS56 in Glasgow and NS84 near Lanark, but they are both pre-1970.

It was not until the 1999 BMIG field meeting (Ford Castle, Northumberland) that it turned up again in Scotland, in vice county 81 Berwickshire; and at three further sites in 2001, in vice county 83 Edinburgh:

i) 10.4.1999	Entrance to The Hirsel, Coldstream, NT835395.
ii) 24.4.2001	East bank of the River Almond at Cramond, NT182762 (the west bank, 10m away, is in vice county 84 West Lothian, and I would be surprised if the species was not there as well).
iii) 24.4.2001	Old parkland to the east of the Cramond kirk, NT192768.
iv) 4.5.2001	Beeslack Wood on the banks of the River North Esk, Penicuik, NT244613, a different river catchment to the Almond.

All the four recent sites were in woodland with plenty of dead wood, also clearly synanthropic with houses and gardens nearby. I strongly suspect that the *H. danicus* has been introduced as the result of gardening activity, the surprise being that it has not been noticed before, since *H. mengei* has been recognised several times in the Lothians over the last few years, both synanthropically and "wild". A map showing the current known distribution is given in Figure 1.

However, *H. danicus* was not found (nor was *H. mengei*) during the Lothian "Secret Garden Survey" organised by the Lothian Wildlife Information Centre (1997) and Bob Saville (pers.comm.) of LWIC has none on his database. Initially in the mid-1990s, records were sent in by the public from 170 gardens in the Lothians; from these, 16 selected gardens across the region were surveyed in more detail over 18 months. Interestingly, *Trichoniscus pusillus* was recorded in 15 of the 16 gardens while *T. pygmaeus* was just once, although I find the latter quite frequently around Edinburgh. It may be that slow-moving, small white woodlice are simply mistaken as impossible-to-identify invertebrates or the young of larger woodlice.

ACKNOWLEDGEMENTS

I would like to thank Steve Gregory for up-to-date information on distribution and Bob Saville of LWIC for information and discussion.

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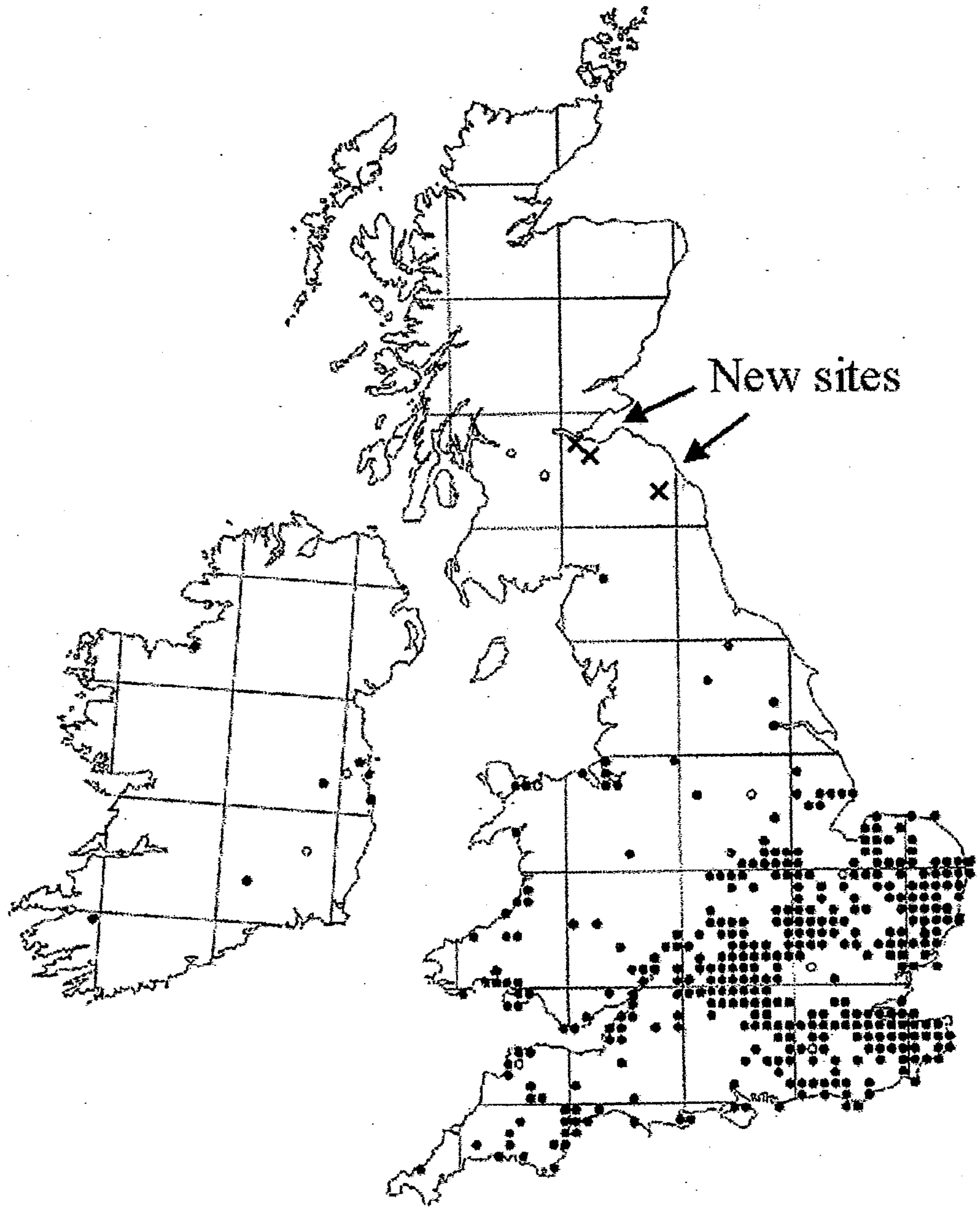

Figure 1
The current distribution of *H. danicus*

REPORT ON THE 2001 FIELD MEETING IN IRELAND: CENTIPEDES AND MILLIPEDES

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INTRODUCTION

The annual BMIG field trip was postponed from the usual Easter slot, due to the outbreak of foot and mouth disease, and was rescheduled from 10th to 14th October 2001. The trip was based at the Dingle peninsular (North Kerry) in the south-western Ireland. This report is based on the records contributed by K. Alexander, G. Corbet, S. Gregory, J. Harper, J. Lewis, H. Read, P. Richards and D. Scott-Langley.

Historically the Irish centipedes have not been well recorded. Barber and Keay (1988) list just 21 species from Ireland and comment that the majority of records are more than 50 years old. However the last decade has seen an increase in interest. This has resulted in many species being added to the Irish list (e.g. Jones 1992; Cawley 2001a) and a considerable number of new vice-county records for all species. 29 centipede species are currently recorded from Ireland (pers comm A.D.Barber).

The Irish millipedes are relatively better known and 29 species are listed in the preliminary atlas of the British Isles (BMG 1988). As with the centipedes there has been an upturn in interest in the last decade. The review by Doogue et al (1993) included many new species and 38 millipedes are listed in Barber and Jones (1996). Species continue to be added to the Irish list and a considerable number of new vice-county records are reported by Cawley (1997 and 2001b).

RESULTS OF THE FIELD MEETING

Although the majority of collecting was undertaken within North Kerry (H2), records were made from eight Watsonian vice-counties (H2, H4, H5, H6, H8, H9, H12 & H20), within 24 10km national grid squares, across southern and central Ireland. During the field meeting 18 species of centipede (Table 1) and 22 species of millipede (Table 2) were recorded.

Lithobius forficatus and *Necrophloeophagus flavus* were the most commonly encountered centipedes, proving almost ubiquitous. *Brachygeophilus truncorum*, *Lithobius melanops* and *Lithobius variegatus* were also common and found in a wide variety of sites, both inland and on the coast. It was interesting to observe that *L. forficatus* was much more abundant than *L. variegatus*, a characteristically abundant species in western Britain. The only other frequently found centipede was *L. borealis*; again with no preference for disturbed, coastal or inland sites. Not unexpectedly, *Strigamia maritima* was found at several sites on the coast.

The remaining centipedes were only recorded at four sites or less. In the case of *Haplophilus subterraneus, Schendyla nemorensis, Geophilus insculptus* and *Lithobius microps* this is perhaps unexpected considering the relatively high proportion of Irish records for these species (Barber & Keay 1988). *H. subterraneus*, in particular, is a conspicuous animal and is unlikely to have been over-looked. *Geophilus electricus* was found at one coastal site and *Cryptops parisi* was caught at Fermoy town centre. *Lithobius crassipes* was not seen at all and is perhaps absent from the south of Ireland.

Geophilus carpophagus was only found twice, reinforcing the opinion of Jones (1992) that it may be uncommon in Ireland. Fortunately both species of the newly split *Geophilus carpophagus* aggregate (Arthur *et al.* 2001) were found. Gordon Corbet took two females (55 leg pairs) of the 'long' form (now re-described as the true *Geophilus carpophagus*) on the coast of the Dingle peninsular. Here it was found with the scarce millipede *Choneiulus palmatus.* John Lewis found the 'short' form (the newly described *Geophilus easoni*) in coniferous woodland at Ballinastoe, Co. Wicklow (female; 51 leg pairs). These sites are very much in keeping with the preference for disturbed sites and rural sites, respectively, for these two forms.

Ophyiulus pilosus, Blaniulus guttulatus, Cylindroiulus punctatus and *C. latestriatus* were the most frequently recorded millipedes. The prominence of the latter no doubt reflecting the high proportion of coastal sites sampled. The other three, although found in a wide array of habitats, were by no means ubiquitous.

The elusive *Ophiodesmus albonanus* was widely recorded in coastal locations and (as predicted by Jones 1992) seems to be fairly common in the areas searched. *Choneiulus palmatus* was found at two coastal locations, apparently occupying the same habitat as observed in Fife, Scotland (pers comm G.B.Corbet). *Cylindroiulus londinensis* was also found on the coast at Inch Spit. *Chordeuma proximum* was collected from the edge of a reedbed at Reen Point. Females, probably of this species, were also collected in Lismore city. Synanthropic sites produced scattered of records for other apparently rare Irish millipedes, such as *Archiboreoiulus pallidus, Boreoiulus tenuis, Macrosternodesmus palicola, Cylindroiulus britannicus and C. caeruleocinctus*

The forests of Killarney National Park produced the only records for *Glomeris marginata* and *Polyxenus lagurus*. The former was common in the forest, but only one population of *P. lagurus*, under loose bark on an old conifer, was seen. *Nemasoma varicorne* was also found under tree bark in this area.

All species collected at the field meeting have been previously recorded from Ireland, although some have only been recorded on a few occasions in the last decade. Other than the rare and elusive coastal or synanthropic geophilomorphs all the expected centipedes were collected. A few millipedes, such as *Ommatoiulus sabulosus, Julus scandinavius* and the three *Polydesmus* species; *inconstans, gallicus (coriaceus)* and *denticulatus,* could be expected to be present in areas examined. It is possible that October is not the ideal time to sample for these species. Certainly it was apparent at most sites surveyed that virtually all the *Polydesmus* specimens collected were immature or sub-adult and could not be reliably determined. None the less, the records make a valuable addition to the knowledge of the Irish fauna.

ACKNOWLEDGEMENTS

Thanks to all those who submitted records from the meeting and to Martin Cawley for providing up to date information on the status of centipedes and millipedes in Ireland.

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ADDENDUM

Centipedes :

Geophilus osquidatum: Lay-by near Ma

TABLE 1: RECORDS OF CENTIPEDES FROM THE 2001 IRELAND FIELD MEETING

Location:	7	8	24	3	4	18	19	5	9	10	28	13	11	12	14	2	15	16	27	29	26	21	30	25	1	17	23
Vice-county:	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	5	6	6	8	9	9	9	9	9	12	12	20
10km grid square:	Q 30	Q 30	Q 51	Q 60	V 39	V 39	V 39	V 49	V 49	V 49	V 79	V 79	V 98	V 98	W 59	W 89	X 09	X 09	R 44	R 09	R 28	M 00	M 10	M 12	S 73	T 10	T 32
Brachygeophilus truncorum	+	+	+	+	+		+	+	+		+	+	+	+													
Cryptops hortensis			+		+										+												
Cryptops parisi																+											
Geophilus carpophagus 'short'																											+
Geophilus carpophagus 'long'					+																						
Geophilus electricus								+																			
Geophilus insculptus																								+			
Haplophilus subterraneus								+								+	+		+								
Lamyctes fulvicornis																		+								+	
Lithobius borealis					+		+	+					+	+													+
Lithobius forficatus	+	+	+	+	+		+	+	+				+	+	+	+	+					+		+	+	+	+
Lithobius melanops	+	+		+				+	+	+			+	+				+		+				+	+	+	
Lithobius microps		+			+								+												+		
Lithobius variegatus		+	+			+	+	+					+	+			+				+		+	+			+
Necrophloeophagus flavus				+	+		+	+	+	+			+	+	+		+	+							+		+
Schendyla nemorensis								+							+												
Strigamia crassipes																									+		
Strigamia maritima	+	+			+			+																			
Location:	**7**	**8**	**24**	**3**	**4**	**18**	**19**	**5**	**9**	**10**	**28**	**13**	**11**	**12**	**14**	**2**	**15**	**16**	**27**	**29**	**26**	**21**	**30**	**25**	**1**	**17**	**23**

Location details: 1 - MacMurrough Hostel, S7330, H12; 2 - Fermoy Town, W8198, H5; 3 - Inch Sand Spit, Q6401, H2; 4 - Dunmore Head/Slea Head, V3198, H2; 5 - Eask Tower/An Scoth, Dingle, V4599, H2; 6 - Dingle Town, Q4401, H2; 7 - Ventry Bay, Q3800, H2; 8 - Smerwick Harbour, Q3505, H2; 9 - Trabey Beach, V4898, H2; 10 - Seacrest Hostel, Lispole, V4998, H2; 11 - Kilarnie NP - meeting of waters, V9484, H2; 12 - Kilarnie NP - Galway Bridge, V9180, H2; 13 - Reen Point, V7698, H2; 14 - River Blackwater, nr Mallow, W5298, H4; 15 - Lismore Cathedral, X0498, H6; 16 - Lismore Castle, X0499, H6; 17 - Carne Beach , T1305 H12; 18 - Dingle way, South Ventry, V3698, H2; 19 - Mount Eagle, V3498, H2; 20 - Creegh Village, R0367, H9; 21 - Poulsallagh, M0802, H9; 22 - Spanish Point, R0278, H9; 23 - Ballinastoe, T3120, H20; 24 - Brandon Point, Dingle, Q5217, H2; 25 - Burren, nr Ailladie/Fanare, ; M1120, H9; 26 - Inchiquin Lough, Carofin, R2789, H9; 27 - Adare, R4545, H8; 28 – R. Laune, Castlemaine Harbour, V7799, H2; 29 - Cliffs of Moher, R0492, H9; 30 - Cregg, M1409, H9.

TABLE 2: RECORDS OF MILLIPEDES FROM THE 2001 IRELAND FIELD MEETING

For details of locations see Table 1.

Location:	**7**	**8**	**6**	**3**	**4**	**5**	**9**	**10**	**13**	**11**	**12**	**14**	**2**	**15**	**16**	**27**	**21**	**20**	**22**	**26**	**31**	**1**	**17**
Vice-county:	2	2	2	2	2	2	2	2	2	2	2	4	5	6	6	8	9	9	9	9	9	12	12
10km grid square:	Q 30	Q 30	Q 40	Q 60	V 39	V 49	V 49	V 49	V 79	V 98	V 98	W 59	W 89	X 09	X 09	R 44	M 00	R 06	R 07	R 28	R 37	S 73	T 10
Archiboreoiulus pallidus											+												
Blaniulus guttulatus			+	+		+	+				+		+	+		+						+	+
Boreoiulus tenuis															+								
Brachydesmus superus					+			+		+								+		+			
Brachyiulus pusillus	+			+														+					+
Choneiulus palmatus					+		+																
Chordeuma proximum									+														
Chordeuma sp. Female															+								
Cylindroiulus britannicus												+		+	+								
Cylindroiulus caeruleocinctus														+									
Cylindroiulus latestriatus	+	+		+	+	+	+	+							+		+		+				+
Cylindroiulus londinensis				+																			
Cylindroiulus punctatus	+			+		+				+	+	+		+	+							+	
Glomeris marginata										+	+						+						
Macrosternodesmus palicola											+												
Nanogona polydesmoides				+				+		+		+			+							+	
Nemasoma varicorne											+				+								
Ophiodesmus albonanus	+					+	+															+	
Ophyiulus pilosus	+							+		+	+	+		+	+			+			+	+	
Polydesmus angustus							+								+								
Polyxenus lagurus										+													
Proteroiulus fuscus										+	+	+		+	+								
Tachypodoiulus niger										+		+			+								
Location:	**7**	**8**	**6**	**3**	**4**	**5**	**9**	**10**	**13**	**11**	**12**	**14**	**2**	**15**	**16**	**27**	**21**	**20**	**22**	**26**	**31**	**1**	**17**

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REPORT ON THE 2001 FIELD MEETING IN IRELAND: WOODLICE

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INTRODUCTION

The annual BMIG field trip was based at the Dingle peninsular (North Kerry) in south-western Ireland. The event was postponed from the usual Easter slot, due to the outbreak of foot and mouth disease, and was rescheduled from 10th to 14th October 2001.

Woodlice have been relatively well recorded in Ireland. Doogue and Harding (1982) provide an Irish distribution atlas listing 28 species considered to be native or naturalised. Recently the known ranges of many Irish woodlice have been increased considerably (e.g. Cawley 2001a) and one species, *Armadillidium depressum*, has been added to the Irish list.

RESULTS OF THE FIELD MEETING

Although the majority of collecting during this field trip was undertaken in North Kerry (H2), records were made from six Watsonian vice-counties (H2, H4, H5, H6, H9 & H12), within 14 10km national grid squares across southern and central Ireland. 18 species of woodlice were recorded (Table 1). Records contributed by K. Alexander, G. Corbet, S. Gregory, J. Harper, H. Read, P. Richards, D. Scott-Langley and I. Wilde.

Oniscus asellus was by far the most abundant species, reflecting the predominance of lime-deficient substrates examined. Many of the *Oniscus asellus* seen, particularly in urban situations, were rather brightly marked and some what reminiscent of *Oniscus asellus* ssp. *occidentalis* (Bilton 1994) that occurs widely in south-west England. Males were collected at most sites so it would be interesting to take a closer look at these one day.

As expected, *Porcellio scaber* and *Trichoniscus pusillus* also proved common and ubiquitous, but *Philoscia muscorum* was typically found in much smaller numbers. Doogue & Harding (1982) have previously noted that this species is less abundant in lime-poor areas. At many sites *P. muscorum* was associated with large numbers of *Porcellionides cingendus*, which may partially replace it in south-western areas. *Ligia oceanica* proved to be numerous on the rocky shoreline of the Dingle peninsular.

Although readily found at the few sites surveyed in the south-east, *Armadillidium vulgare* was rarely found at the many apparently suitable sites examined around the Dingle peninsular in the south-west. *Platyarthrus hoffmannseggi* was even more restricted to the south-east with just two records in county Wexford. This is very much in keeping with the south-eastern Irish distributions for these species described in Doogue & Harding (1982).

Another predominantly south-eastern species is the Irish speciality *Oritoniscus flavus*. A torch light survey at MacMurrough hostel found several specimens under stones in a damp grassy hollow within the adjoining farmyard. There is an old record for this woodlouse on the Dingle peninsular. Paul Harding re-located the site, which appeared suitable habitat, but it was not found. Several specimens of *Porcellio dilatatus*, *Porcellio spinicornis* and *Cylisticus convexus* were also found in the farmyard at MacMurrough. Further specimens of *C. convexus* were later collected from a street in Dingle. These two sites for *C. convexus* are very much in keeping with the preference for synanthropic sites reported in Cawley (2001).

Two frequent Trichoniscids were *Trichoniscus pygmaeus* and *Androniscus dentiger*. Both were found equally in coastal habitats and at inland urban sites. Unfortunately, most of the *Haplophthalmus 'mengei'* specimens collected were female, but the few males collected were all *H. mengei*. These were either on the coast or occupying synanthropic sites inland. Despite careful searching *Haplophthalmus danicus* was only recorded at two sites, both within Lismore city centre. Cawley (2001) reports that it is significantly more widespread in Ireland than previously thought so perhaps we were unlucky. *Trichoniscoides saeroeensis* was collected at a single site, under stones at the edge of an eroding coastal bank.

Several specimens of *Trichoniscoides albidus* were found by Paul Richards under turf in a small churchyard in Killarney Forest. This is apparently very rare in Ireland, but Cawley (2001) suggests it may be under-recorded. This is almost certainly the case and it would be worth searching some of the larger river valleys for this notoriously elusive animal (This field meeting did not find it in the Blackwater). Other species found at this churchyard included *T. pygmaeus*, *A. dentiger*, *H. mengei* and several elusive millipedes. Quite a contrast to the surrounding forest where all but the most ubiquitous woodlice were found.

All species collected at the field meeting have been previously recorded from Ireland, although some have only been recorded on a few occasions. Other than a few rare coastal species, such *Miktoniscus patience* or *Armadillidium album*, all the expected woodlice were collected. The records make a valuable addition to the knowledge of the Irish fauna.

ACKNOWLEDGEMENTS

Thanks to all those who submitted records from the meeting and to Martin Cawley for providing up to date information on the status of woodlice in Ireland.

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TABLE 1: RECORDS OF WOODLICE FROM THE 2001 IRELAND FIELD MEETING

Location:	7	8	6	3	4	18	19	5	9	10	13	11	12	14	2	15	16	20	22	21	1	17
Vice-county:	2	2	2	2	2	2	2	2	2	2	2	2	2	4	5	6	6	9	9	9	12	12
10km gird square:	Q 30	Q 30	Q 40	Q 60	V 39	V 39	V 39	V 49	V 49	V 49	V 79	V 98	V 98	W 59	W 89	X 09	X 09	R 06	R 07	M 00	S 73	T 10
Androniscus dentiger			+					+		+			+			+	+	+			+	+
Armadillidium vulgare	+			+												+			+		+	+
Cylisticus convexus			+																		+	
Haplophthalmus danicus																+	+					
Haplophthalmus mengei males									+				+									
Haplophthalmus 'mengei' s.l.					+			+						+		+				+		
Ligia oceanica		+	+		+			+														
Oniscus asellus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+
Oritoniscus flavus														+							+	
Philoscia muscorum	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+		+		+	+
Platyarthrus hoffmannseggi																					+	+
Porcellio dilatatus														+							+	
Porcellio scaber	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+
Porcellio spinicornis			+																		+	+
Porcellionides cingendus	+		+	+		+		+	+	+		+		+		+	+					
Trichoniscoides albidus													+									
Trichoniscoides saeroeensis		+																				
Trichoniscus pusillus	+	+	+	+	+			+	+	+	+	+	+	+		+	+				+	+
Trichoniscus pygmaeus		+			+			+	+			+	+	+	+	+	+				+	
Location:	**7**	**8**	**6**	**3**	**4**	**18**	**19**	**5**	**9**	**10**	**13**	**11**	**12**	**14**	**2**	**15**	**16**	**20**	**22**	**21**	**1**	**17**

Location details: 1 - MacMurrough Hostel, S7330, H12: 2 - Fermoy Town, W8198, H5: 3 - Inch Sand Spit, Q6401, H2: 4 - Dunmore Head/Slea Head, V3198, H2: 5 - Eask Tower/An Scoth, Dingle Bay, V4599, H2: 6 - Dingle Town, Q4401, H2: 7 - Ventry Bay, Q3800, H2: 8 - Smerwick Harbour, Q3505, H2: 9 - Trabey Beach, V4898, H2: 10 - Seacrest Hostel, Lispole, V4998, H2: 11 - Kilarnie NP - meeting of waters, V9484, H2: 12 - Kilarnie NP - Galway Bridge, V9180, H2: 13 - Reen Point, V7698, H2: 14 - River Blackwater/nr Mallow, W5298, H4: 15 - Lismore Cathedral , X0498, H6: 16 - Lismore Castle, X0499, H6: 17 - Carne Beach , T1305, H12: 18 - Dingle way, South Ventry, V3698, H2: 19 - Mount Eagle, V3498, H2: 20 - Creegh Village, R0367, H9: 21 - Poulsallagh, M0802, H9: 22 - Spanish Point, R0278, H9.

MISCELLANEA

THE DR EDWARD EASON COLLECTION

The British myriapod collection of the late Ted Eason was recently donated to the Hope Entomological collections, Oxford University Museum of Natural History by his daughter Mrs Daunt. There are approximately 1000 spirit preserved specimens, plus a large archive of reprints, manuscripts and original artwork.

We also have other collections, including the material of R.S. Bagnall and G. Newport.

Anyone wishing to visit or use the collections please contact me at the address below:

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SOME LIGHT ENTERTAINMENT
(CONTRIBUTED BY PAUL HARDING/MARK TELFORD)

This bloke was getting on a bit and living alone, and was very sad and lonely. So he went to the pet shop and asked the assistant for a pet that would keep him company through his twilight years whilst not needing too much care and attention itself. The shop assistant said 'I have just the thing, quite special you know' and produced a cardboard box.

Inside was a millipede. 'What's so special about that?' asked the man. The assistant replied 'It's a talking millipede'. The man was mightily impressed and bought the myriapod.

Back at home the guy thought 'let's see what this is all about then' and opened the box. He asked the millipede 'Shall we go to the pub then?' but got no reply. He asked the question again but still his new pet said nothing.

He sat back and pondered his acquisition and considered taking it back to the pet shop, but decided to give it one more attempt at least. Looking into the box he asked again 'Are we going to the pub then?' The millipede replied 'Alright, for Christ's sake, I'm just putting my shoes on!'

BOARDED BY CENTIPEDES.

An account comes from New York of a strange adventure which happened recently on board of the schooner Lucy T. Harvey, which was sailing from Port Prince to Philadelphia. The schooner was manned by a crew of negroes. She had left Port Prince some days, when the captain and the crew were all surprised to see the deck invaded by hundreds of centipedes, insects whose bite is as dangerous as that of scorpions. They succeeded, however, in killing them all with boiling water. Some days later the steward ran from the hold with cries of terror, saying that it swarmed with centipedes and scorpions. Some of the crew provided with lanterns descended into the hold, and the insects, frightened by the light, came on deck by thousands. The sailors, again frightened, sought refuge on the masts, and the captain could not make them descend. For two days the centipedes swarmed on the deck, and not one of the sailors would take the risk of quitting his refuge. A Newfoundland dog who was chained in front, having been bitten, died in a few seconds. The captain and the mate, who remained at their posts, tried to destroy the insects by placing here and there pans of burning sulphur, but they only killed hundreds, and there were still thousands. At last a tempest, which under other circumstances would have been thought a great nuisance, arose, and the sea swept the deck, and soon the insects which had not been carried off by the waves died of cold. The schooner had a cargo composed of wood for building, and cedar, of which much was wormeaten, and in the interior of which the centipedes had probably made their nests.

From the Tavistock Gazette, 18 March 1887