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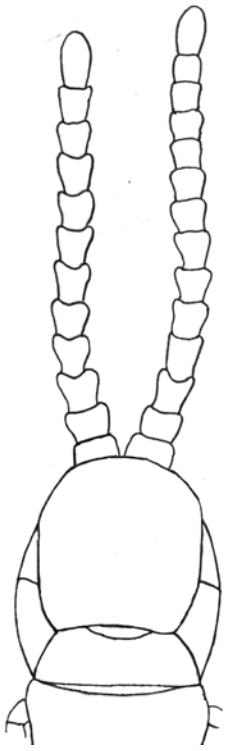

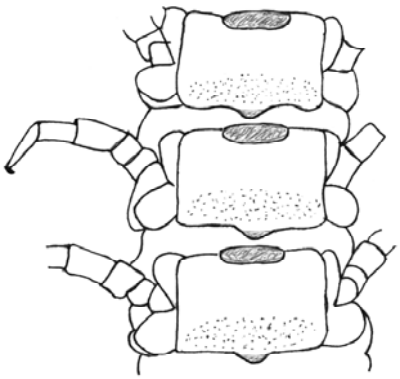

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Cover illustration: *Geophilus carpophagus* sensu stricto © Tony Barber/Steve Gregory

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EDITORIAL

After a year of not having enough material to put together a Bulletin, 2010 has turned into a bumper year. We are glad to have a good number of contributors and a variety of different topics covered in volume 24.

The last two years seems to have been productive in terms of books on our groups. Several are reviewed in this Bulletin but there are a few other important publications to mention all by members of the BMIG. We are especially pleased to have the recent Aidgap key and new Synopsis covering British centipedes. No longer are centipedes poorly catered for in the current British literature and we look forward to the resurgence of interest arising from these publications. In addition we welcome the publication of the woodlouse atlas. Although *Woodlice in Britain & Ireland* was produced some years ago (1985), this new publication is enlivened by the inclusion of colour photographs and includes substantially more information and data; a welcome addition to the BRC fold of atlases. Further publications are in the pipeline; the centipede atlas will complete the trio of atlases and a great deal of work is currently being undertaken to try to obtain as many records as possible from all sources, and in this respect local record centres have been very helpful. There is also a clear need for a millipede key and this is being addressed (though perhaps not as quickly as the authors would like!).

Field meetings are a regular feature of the BMIG and this Bulletin includes reports from several of the Easter meetings as well as a visit to the Royal Horticultural Gardens at Wisley. Botanic gardens and glasshouses have proved exciting places to collect Myriapods and Isopods in recent years, and the most productive in terms of new species is undoubtedly the Eden project in Cornwall. Collections made previously added two millipedes to the British list but when visited as part of the annual field meeting in 2009, a further two were encountered (*Brachyiulus lusitanus* and *Amphetomeus attemsi*) and in July Tony Barber found *Pseudospirobolellus avernus* which is new not only to Britain but to Europe. A full report on the finds and descriptions of the species will be included in a later Bulletin. The one outstanding field meeting report, for south Wales, is well underway and will also be published in the next Bulletin.

We hope that the next field meeting in north Wales will prove as productive and look forward to seeing many of you there. As ever, we also anticipate the next flurry of articles ready for the Bulletin in 2011.

Dr C.A.W. Jeekel

As the Bulletin was going to print we received the sad news that Casimir (Cas) A. W. Jeekel from The Netherlands, had passed away at the age of 88.

Dr Jeekel devoted his scientific life to myriapodology and published numerous papers, including in the BMIG Bulletin. From 1950 onwards he published more than 130 papers on millipedes and centipedes from around the world whilst not neglecting the fauna of his homeland. A series of papers on millipedes and centipedes from different regions of the Netherlands culminated in his atlases for centipedes (1977) and millipedes (1978) and were some of the earliest national atlases to be published and established a tradition which, via Matty Berg's atlases of 1995, led to the present atlas for myriapods and woodlice reviewed in this Bulletin.

A full obituary will be published in the next Bulletin but in the mean time we send our condolences to his wife and family.

OBSERVATIONS OF A POPULATION, INCLUDING JUVENILES, OF *GEOPHILUS CARPOPHAGUS* LEACH, 1815, SENSU STRICTO FROM OXFORDSHIRE

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ABSTRACT

Geophilus carpophagus sensu lato has been split into two species; *G. carpophagus* sensu stricto and *G. easoni* (Arthur *et al*, 2001). Previously published descriptions of *G. carpophagus* s.l. in Britain primarily refer to the more widespread *G. easoni* and little is known of *G. carpophagus* s.s. in Britain. This paper presents observation of 20 specimens of *G. carpophagus* s.s., representing all stadia, collected from Oxfordshire, southern England. Differences between British examples of *G. carpophagus* s.s. and *G. easoni*, including pigmentation, structure of labrum, distribution of coxal pores, proportions of the articles of walking legs and of the apical claws, are highlighted. First and second stadia juveniles of *G. carpophagus* s.s. are described. Outline habitat preferences and distribution in Britain and Ireland are presented. It is suggested that *G. carpophagus* s.s. has a more central European distribution, while *G. easoni* has a strict Atlantic distribution. Problems of identification of material outside north-west Europe are discussed.

INTRODUCTION

Eason (1979) noted that *Geophilus carpophagus* sensu lato (s.l.) from urban habitats had more podous segments and reached a greater length than those found in rural habitats. Although Lewis (1985) suggested that the two forms might be sibling species, records were not differentiated by the Provisional Centipede Atlas (Barber & Keay, 1988). On the basis of morphological characters and molecular evidence, Arthur, Foddai, Kettle, Lewis, Luczynski and Minelli (2001) concluded that the two forms were indeed distinct species. Since Eason's long 'urban' form conformed to Leach's type specimen of *G. carpophagus*, the short 'rural' form was described as a new species, *G. easoni* Arthur *et al*.

In Britain the two species are readily distinguished by the number of trunk segments (leg pairs), the number and visibility of the coxal pores, the form of the labrum and the body pigmentation (Arthur *et al*, 2001; Barber, 2009). The ecology and behaviour of the two species is different (Arthur, Johnstone & Kettle, 2002). *G. carpophagus* s.s. is a climbing species that inhabits a variety above ground microsites. *G. easoni* seems to be the more widespread species (Barber, 2009), typically occurring at ground level.

Although Eason (1964) acknowledged the existence of a long form, reaching 60 mm in length and with up to 55 trunk segments, the text and figures describe typical *G. easoni* (Arthur *et al*, 2001). This, and probably other descriptions of *G. carpophagus* s.l. previously published in Britain, refer to *G. easoni*. This study stems from the need of one author (TB) for specimens of *G. carpophagus* s.s. for illustrations. Arthur *et al* (2001) highlight the distinctions between the two species and Arthur *et al* (2002) report rearing *G. carpophagus* s.s. in laboratory culture. However, little is known of the various age classes of this species and this paper presents observations of a population, consisting of juveniles and adults, from Oxfordshire.

METHODOLOGY

Twenty specimens of *G. carpophagus* s.s. were collected from a garden wall at Hill Farm, Little Wittenham, Oxfordshire (OS grid reference SU563927; vc22, Berks; 90m asl). Specimens were collected from beneath stones capping a mortared wall about 1.5 m high on 11th November 2008. The mortar was old and weathered and, although tight fitting, the capping stones were easily lifted. A selection of individuals representing the

full range of size classes present was readily collected. The Bristly Millipede *Polyxenus lagurus* (Linné) was common in the same microsite and the occasional specimen of *Lithobius melanops* Newport was observed.

For each specimen, preserved in 70% alcohol, the following data were recorded:

- Body colour and pigmentation patterns; noted in live and preserved specimens.
- Body length (excluding antennae and rear legs); measured using a millimetre ruler.
- Sex of the specimen; male, female or juvenile.
- Number of trunk segments; i.e. the number of leg pairs.
- Maximum body width, head length, head width and length of antennae; measured using a microscope graticule.
- Number of antennal articles.
- Sternites bearing carpophagus fossae.
- Maximum width of carpophagus fossae (i.e. on sternite 8 or 9) and the width of its associated sternite; measured using a microscope graticule.
- Shape and position of the sternal pore groups.
- Number of pores present on the coxae of the last pair of legs; specimens cleared in clove oil.
- The labrum was dissected from a specimen and illustrated; cleared in clove oil.
- Apical claws of walking legs: length, width of base, width of claw tip (i.e. diameter of circle required to cover tip of claw); measured using a microscope graticule.
- Walking legs: length and width (mid-point) of metatarsus/tarsus, tibia, femur and prefemur of legs from trunk segment 10, 25 and c. 40 were examined in 2 male and 2 female specimens (and 2 male and 2 female of *G. easoni*); measured using a microscope graticule.

RESULTS

The data for the twenty specimens is presented in Tables 1 and 2.

Field observations

Unlike most centipedes, *G. carpophagus* s.s. appears to be gregarious and in this study small groups of individuals were readily found beneath most capping stones lifted. Specimens typically cling to the substrate and are difficult to dislodge. Arthur *et al* (2002) also noted this clinging behaviour and suggest that this may be an adaptation for climbing.

Colour

Head, forcipular segment and posterior end are a uniform reddish-brown, which contrasts against the greenish-grey to brownish-grey trunk segments. Fresh specimens were typically mottled with concentrations of purple pigment, visible through the cuticle, which forms a regular pattern either side of the gut and around the leg insertions (Figure 1). Although this was quite apparent in live specimens, this pattern became increasingly diffuse and the pigment was ultimately lost in preserved specimens (leaving the uniform greenish-grey to brownish-grey background). Arthur *et al* (2001) noted that DNA samples from *G. carpophagus* s.s. extract this purple pigment (while those of *G. easoni* remain clear).

Live and fresh specimens of *G. easoni* are a uniform reddish-brown colour throughout, which fades following preservation (Barber, 2009).

Body length

Adult males in this study varied in body length from 27 to 39mm (Table 1), the largest female reached 55mm. In our collection females reach a much larger size than males and the majority of females were larger, both in terms of body length and head width, than all males examined. *G. carpophagus* s.s. is reported to reach 60mm (Eason, 1979). In Britain, *G. easoni* rarely exceeds 40mm.

TABLE 1: Data for twenty specimens of *Geophilus carpophagus* s.s. collected from Little Wittenham
J1 = First stadium, J2 = Second stadium, M = male, F = female
Measurements in millimetres * Cephalic shield removed, no data

Sex or stage	No. leg pairs	Body length	Number coxal pores	Body width	Head length	Head width	Number antennal articles	Max length antennae	Sternites with fossae	Max. fossae width	Sternite width
J1	55	12	0 + 0	0.64	0.39	0.39	14 + 14	1.21	4 - 13	0.10	0.30
J1	53	12	0 + 0	0.64	0.46	0.43	14 + 14	1.18	4 - 13	0.10	0.28
J1	53	15	0 + 0	0.75	0.43	0.43	14 + 14	1.21	4 - 13	0.10	0.28
J2 M	51	17	2 + 3	0.79	0.68	0.64	14 + 14	1.68	5 - 12	0.18	0.40
J2 M	53	20	2 + 2	0.89	0.68	0.64	14 + 14	1.61	3 - 13	0.18	0.40
J2 F	55	21	2 + 2	0.86	0.64	0.61	14 + 14	1.86	4 - 13	0.15	0.38
M	53	27	3 + 3	1.21	0.79	0.75	14 + 14	2.21	3 - 14	0.23	0.53
M	53	30	3 + 4	1.18	0.82	0.79	14 + 14	2.04	4 - 13	0.28	0.60
M	53	31	3 + 3	1.32	0.82	0.79	14 + 14	2.25	4 - 13	0.28	0.60
M	53	32	3 + 3	1.43	0.96	0.89	14 + 12	2.79	4 - 14	0.30	0.73
M	53	33	3 + 3	1.29	0.89	0.89	14 + 14	2.32	4 - 13	0.33	0.63
M	53	39	4 + 4	1.50	0.89	0.89	14 + 13	2.86	3 - 14	0.35	0.65
F	57	28	3 + 4	1.07	0.79	0.75	14 + 14	1.96	4 - 14	0.25	0.53
F	53	37	5 + 6	1.61	*	*	*	*	3 - 13	0.25	0.55
F	55	40	7 + 7	1.68	1.04	1.00	14 + 14	3.21	4 - 14	0.35	0.78
F	55	43	6 + 6	1.57	1.00	0.93	14 + 4	2.96	4 - 14	0.35	0.75
F	55	46	7 + 7	1.71	0.96	0.96	14 + 12	2.64	4 - 14	0.33	0.73
F	55	49	5 + 5	1.86	1.14	1.14	14 + 14	3.54	4 - 14	0.40	0.78
F	55	50	6 + 6	1.89	1.21	1.14	11 + 10	3.61	4 - 13	0.43	0.88
F	55	55	8 + 8	2.21	1.18	1.14	14 + 14	3.46	4 - 15	0.40	0.90

TABLE 2: Body proportions (ratios) for data presented in Table 1

Sex or stage	Body length mm	Body length to width	Antennae length to body length	Antennae length to head width	Head length to body length	Head length to head width	Fossae to sternite width
J1	12	18.7	0.11	3.4	30.5	1.00	0.33
J1	12	18.7	0.10	2.8	25.8	1.08	0.36
J1	15	20.0	0.08	2.8	35.0	1.00	0.36
J2 M	17	21.6	0.10	2.6	25.1	1.06	0.44
J2 M	20	22.4	0.08	2.5	29.5	1.06	0.44
J2 F	21	24.5	0.09	3.1	32.7	1.06	0.40
M	27	22.2	0.08	3.0	34.4	1.05	0.43
M	30	25.5	0.07	2.6	36.5	1.05	0.46
M	31	23.5	0.07	2.9	37.7	1.05	0.46
M	32	22.4	0.09	3.1	33.2	1.08	0.41
M	33	25.7	0.07	2.6	37.0	1.00	0.52
M	39	26.0	0.07	3.2	43.7	1.00	0.54
F	28	26.1	0.07	2.6	35.6	1.05	0.48
F	37	23.0	*	*	*	*	0.45
F	40	23.8	0.08	3.2	38.6	1.04	0.45
F	43	27.4	0.07	3.2	43.0	1.08	0.47
F	46	26.8	0.06	2.7	47.7	1.00	0.45
F	49	26.4	0.07	3.1	42.9	1.00	0.52
F	50	26.4	0.07	3.2	41.2	1.06	0.49
F	55	24.8	0.06	3.0	46.7	1.03	0.44

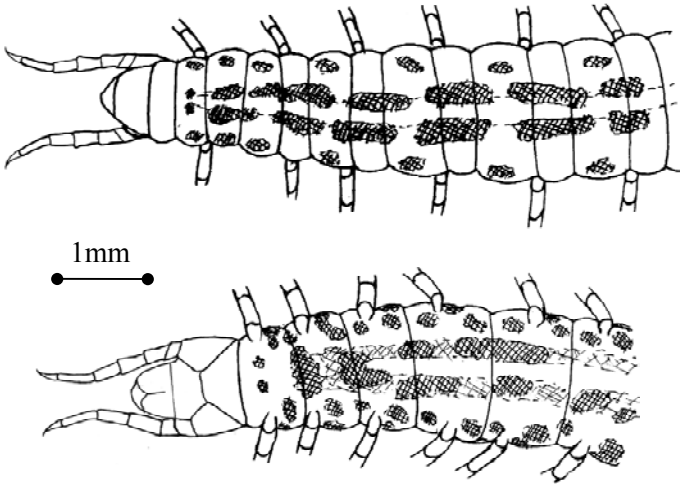


FIGURE 1: *Geophilus carpophagus* s.s., Little Wittenham
Posterior region showing typical pattern of internal pigmentation seen in live specimens.
Female, 46mm length. Above dorsal view, below ventral view

Body proportions

Figure 2 indicates that in adults the body length remains more or less proportional to body width irrespective of sex or size of specimen. Males vary between 22-26 times longer than width, whilst females are possibly slightly more slender at 23-27 times (Table 2). Juveniles are relatively stout, being approximately 19-24 times longer than width.

Eason (1964) gives dimensions of 28-30 times longer than broad, which probably refers to *G. easoni*.

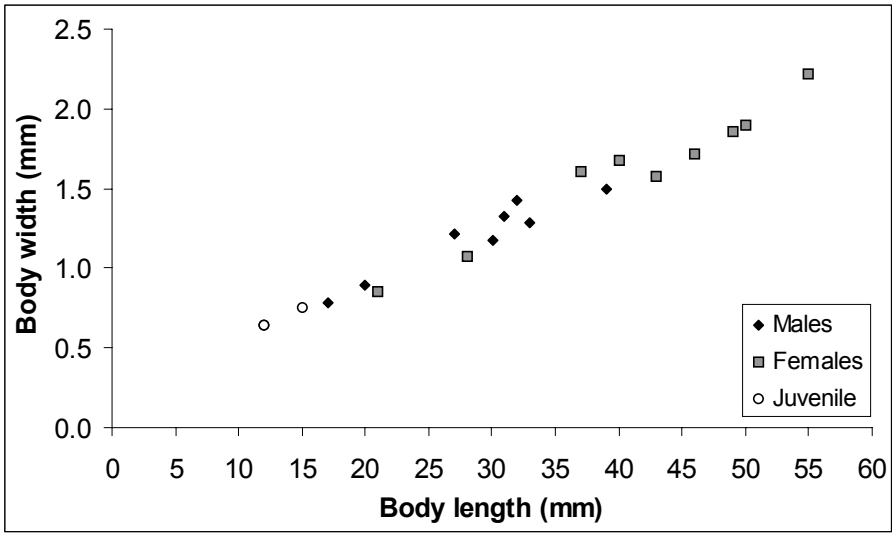


FIGURE 2: *Geophilus carpophagus* s.s., Plot of body length against body width.
Males and female are plotted separately, except for first stadia juveniles.

Number of trunk segments

The frequency distribution of the number of leg pairs within the sample is shown in Figure 3. There was very little variation within this one population. Males predominantly have 53 leg pairs (one specimen with

51), whereas females mainly have 55 (one each with 53 and 57). This is similar to the frequency distribution found in British material examined by Haswell, Enghoff and Arthur (2006). The sex of three first stadium juveniles could not be determined.

The number of leg pairs in *G. easoni* in Britain is quoted as being 47-49 (males) and 49-51 (females) (Barber, 2009).

Ratio of males to females

Although the sample size is small, the eight males and nine females collected suggest that the population studied comprised approximately equal numbers of both sexes. Since the specimens were specifically chosen to provide a representative selection of size classes, and were not a random sample, it is not possible to comment on the age structure of the population.

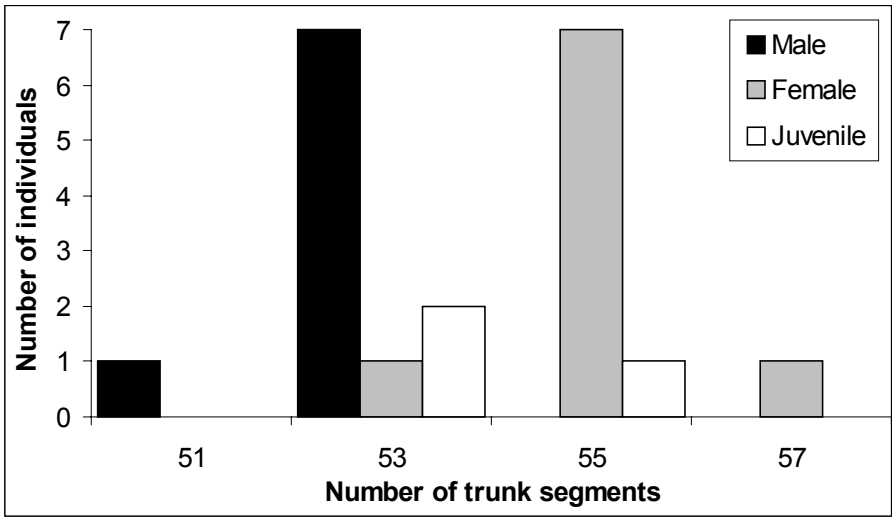


FIGURE 3: *Geophilus carpophagus* s.s., Frequency distribution of trunk segments (leg pairs) within the sample. Males and female are plotted separately, except for first stadia juveniles.

Antennae

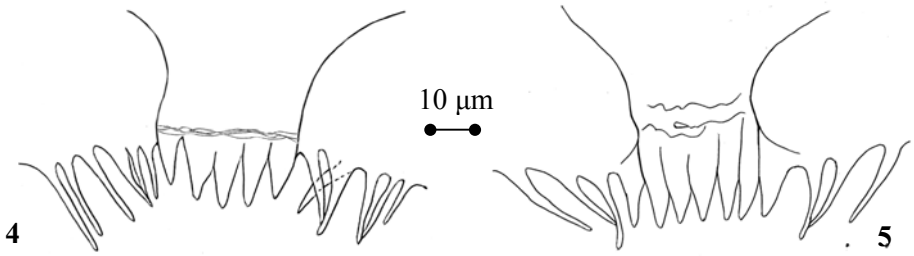
The length of the antennae was about 2.5 to 3.2 times the width of the head irrespective of body length or sex (Table 2). In adults the antennae were between 6% to 9% of the total body length. This is similar to that seen in *G. easoni.* The antennae were relatively longer in juveniles (stadia 1 and 2), around 8% to 11% of body length, and appear relatively broad when compared those of adults.

The antennae of geophilids are invariably composed of 14 articles (Eason, 1964). It is apparent that 25% of all specimens collected had either damaged or apparently regenerated antennae (Table 1). One specimen had 14+13 articles, two 14+12 (Figure 6) and one 11+10. Another large female had recently had one of its antennae severed just above the forth segment, which had healed with black scarring.

Labrum

Two specimens were examined. The teeth of mid-piece of the labrum, which numbered three or five, were relatively elongate and tapered to a rounded point (Figure 4). This agrees with Haswell *et al* (2006) (Figure 5). The mid-piece was more or less similar in colour to the adjacent side-pieces of the labrum. Our two examples had 24 and 27 fimbriae projecting from the side-pieces, respectively. Haswell *et al* (2006) report 12-19 fimbriae in the British material they examined.

This differs from *G. easoni* where the teeth of the mid-piece are close set, stout and bluntly rounded, often appearing truncated (Haswell *et al* (2006), Figure 6). The mid-piece has a dark reddish colouration that contrasts with the adjacent side-pieces (Arthur *et al*, 2001; SG, pers. obsv.). The number of fimbriae on the side-pieces is typically in the range of 30-40 (Haswell *et al*, 2006), but the type specimen (Arthur *et al*, 2001) had c. 12 fimbriae each side (i.e. about 24 total). This suggests considerable variation in this character.



FIGURES 4 - 5: *Geophilus carpophagus* s.s. Labrum, central region
4. Female, 37mm, Little Wittenham
5. British specimen, redrawn from Haswell *et al* (2006)

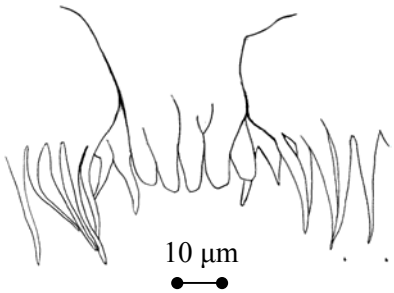


FIGURE 6: *Geophilus easoni,* Labrum, central region
British specimen, redrawn from Haswell *et al* (2006)

Forcipular tergite

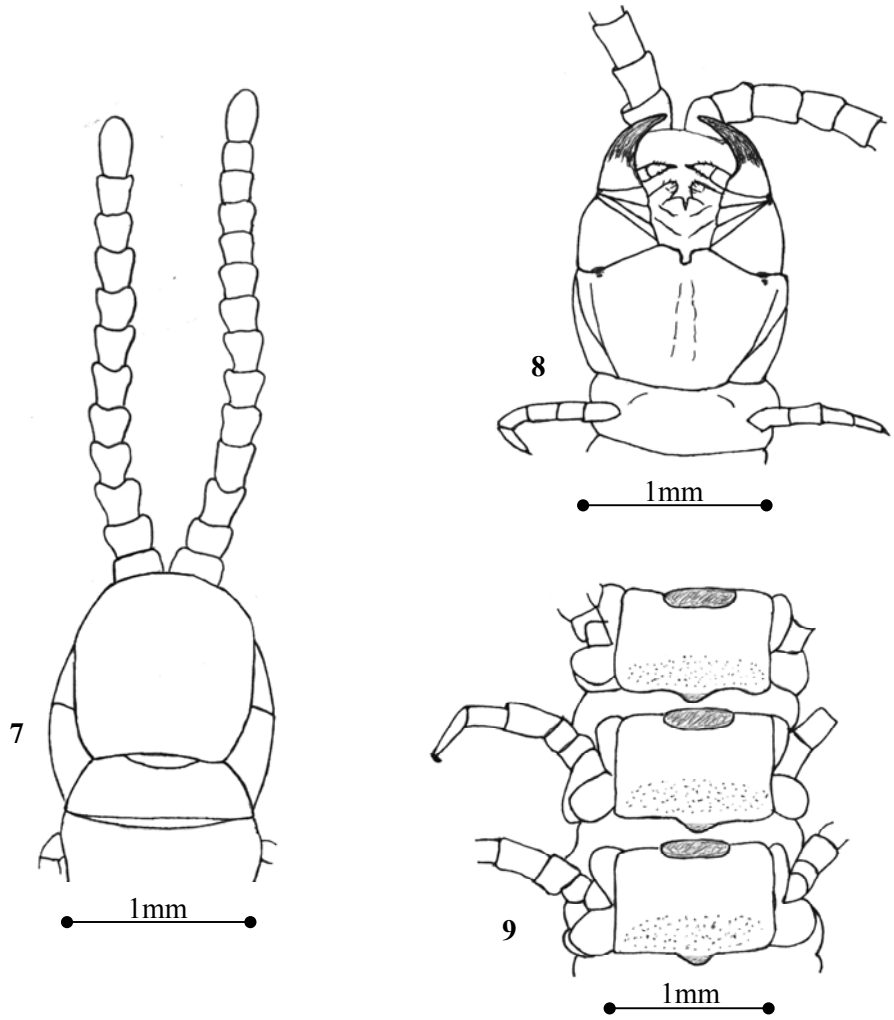
The forcipular tergite was trapezoidal, with the posterior margin distinctly broader than the anterior and distinctly broader than the head. The lateral margins were slightly concave (Figure 7). This is similar to that of *G. easoni.*

Sternites bearing fossae

A series of fossae, apparent as dark brown oval depressions, are present along the anterior margin of the anterior sternites (Figure 9). These begin to appear at sternite 3 or 4 and increase in width to become very distinct by sternites 8 or 9, before becoming less prominent and had completely disappearing by sternite 14 or 15. In adults, the fossae occupy a maximum of 41% to 54% of the width of the sternite. They are less well developed in juveniles, being in the order of 33% to 44% the width of the sternite. In terms of size, shape and colour these fossae are indistinguishable from those of *G. easoni.*

Sternal pores

On the more anterior segments the sternal pores are arranged in a diffuse band along the posterior edge of the sternite and are quite prominent on fossae bearing segments (Figure 9). On subsequent sternites the band splits to form two ovoid groups that became progressively smaller and more restricted towards the posterior corners of the sternites. The pore groups persist until the penultimate segment. This is similar to the pattern seen in *G. easoni*.



FIGURES 7 - 9: *Geophilus carpophagus* s.s., Little Wittenham
7. Anterior region, dorsal view. Note left hand antenna composed of 12 articles, probably as a result of damage and imperfect regeneration. 8. Anterior region, ventral view.
9. Anterior trunk sternites 8-10 showing carpophagus fossae. Note also sternal pores groups.

Coxal pores

In live and freshly preserved specimens the pores present on the ventral surface of the coxae of the last pair of legs were readily observed. The pores were distributed in one or two rows along the edge of the metasternite and were partially obscured beneath the lateral edge of the sternal plate. Following preservation the coxal pores soon became indistinct and in preserved adult specimens it proved virtually impossible to accurately observe the position and number of coxal pores. It was necessary to clear specimens (by immersion in clove oil) before accurate observations could be made.

As in other members of the Geophilidae, the number of coxal pores increases with body length (Figure 10), which approximately equates to age. The earliest juveniles had no coxal pores, with subsequent stadia showing increasing number of such pores. There are clear differences in the numbers of coxal pores observed between the two sexes. The majority of the adult males had 3+3 coxal pores (maximum 4+4) (Figure 11). The number of coxal pores was much more variable in females (Figures 12 & 13), which typically have more than males of the same body length, and reached a maximum of 8+8 in the largest (55mm) female examined. Arthur *et al* (2001) also records a maximum of 8 coxal pores in this species. Females with higher numbers of pores typically had about 4 or 5 large pores, with a few much smaller ones that were less easily seen.

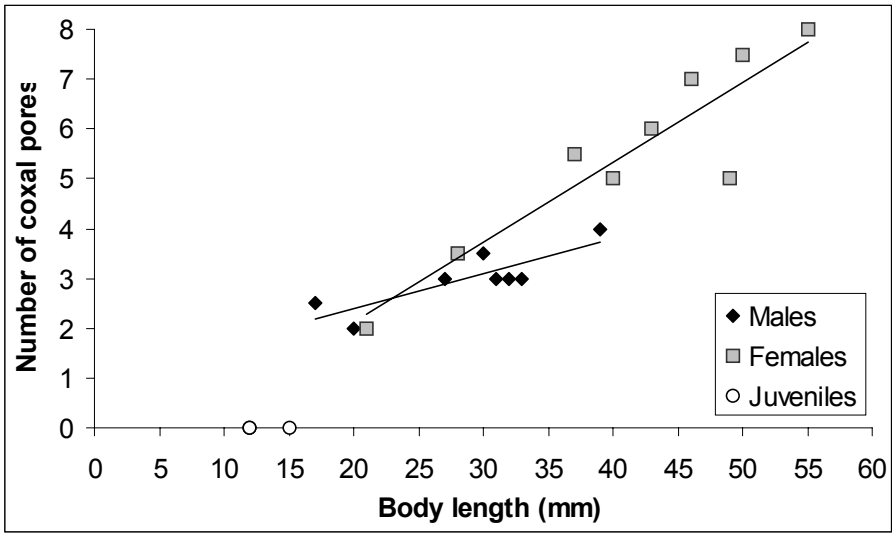
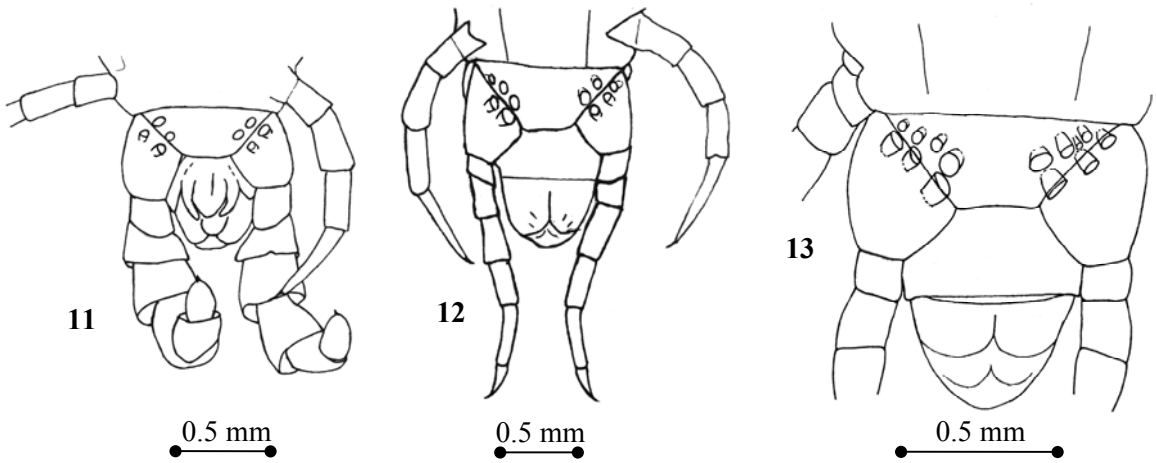


FIGURE 10: *Geophilus carpophagus* s.s., Number of coxal pores (averaged for the two coxae) plotted against body length. Males and females are plotted separately, except first stadia juveniles.

This differs from *G. easoni*, where the larger coxal pores are typically apparent, even in uncleared preserved material, and they tend to be much more numerous with up to 12 on each coxa (Figure 14 & 15). Eason (1964, figs. 163 & 164) also illustrates typical *G. easoni* where the male has 5+6 coxal pores and the female 10+11.



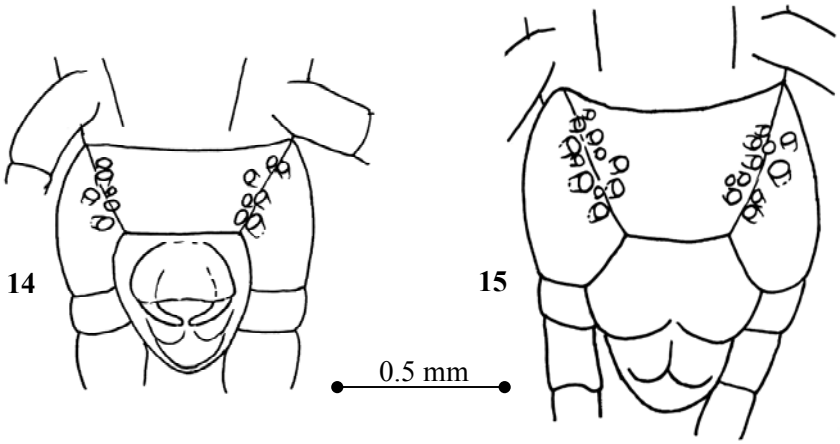
FIGURES 11 - 13: *Geophilus carpophagus* s.s., posterior region, ventral view. Little Wittenham.
11. Male, 40 mm length, 4+4 coxal pores.
12. Female, 49mm length, 5+5 coxal pores. 13. Female, 46mm length, 7+7 coxal pores.

Anal pores

A pair of anal pores was easily seen in juvenile specimens (Figures 16 & 17), but they were inconspicuous in well-pigmented adults, even in cleared specimens.

Terminal legs

The terminal legs of males were distinctly swollen (Figure 11), as seen in *G. easoni*. This sexual dimorphism became apparent from the second stadium onwards (Figure 18).



FIGURES 14 & 15: *Geophilus easoni*, posterior region, ventral view. Sidlings Copse, Oxfordshire.
14. Male, 30mm length, 6+7 coxal pores.
15. Female, 35mm length, 11+10 coxal pores (Compare to Figs. 11 - 13 above)

Walking legs

Preliminary results (Gregory, in prep.) indicate that each article of the walking legs (metatarsus/tarsus, tibia, femur and prefemur) of *G. carpophagus* s.s. are approximately the same width as those of *G. easoni*, but are relatively greater in length (Gregory, in prep.). Thus, the legs of *G. carpophagus* s.s., which in the sample measured are about 7 to 10.5 times longer than wide, are proportionately longer than those of *G. easoni*, where the length is about 5.5 to 8 times the width (Table 3).

TABLE 3: Relative dimensions of leg length and apical claws in *Geophilus carpophagus* s.s. (Little Wittenham) and *G. easoni* (Sidlings Copse, Oxon)

Species	Leg: ratio length / width	Claw: ratio width of tip / width of base	Claw: ratio width of tip / length
G. carpophagus s.s	7.0 - 10.4	0.09 - 0.13	0.03 - 0.05
G. easoni	5.5 - 7.9	0.14 - 0.19	0.04 - 0.06

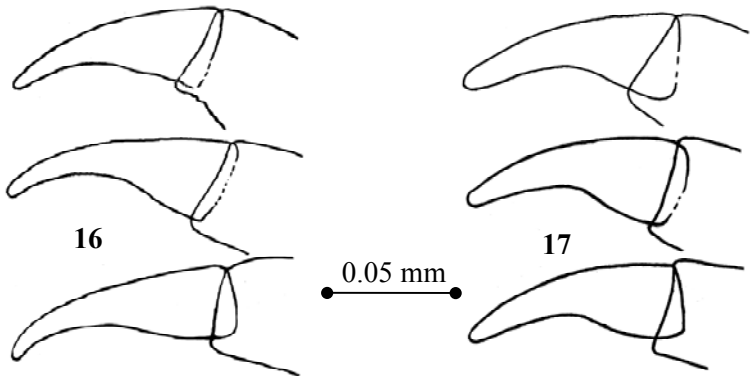


FIGURE 16 & 17: Apical claws of walking legs 10, 25 & c.40
16. *Geophilus carpophagus* s.s., female, 40mm, Little Wittenham, Oxfordshire
17. *Geophilus easoni*, female, 33mm, Sidlings Copse, Oxfordshire

Apical claws

These provisional data (Gregory, in prep.) also indicate that on the walking legs of *G. carpophagus* s.s. the width of the tip of the apical claws is between 9-13% of the width of the base of the claw, compared to the 14-19% observed in *G. easoni* (Table 3). Thus, the apical claws of *G. carpophagus* s.s. (Figure 16) are relatively longer and tapered to a sharper point than those of *G. easoni* (Figure 17).

First stadium juveniles

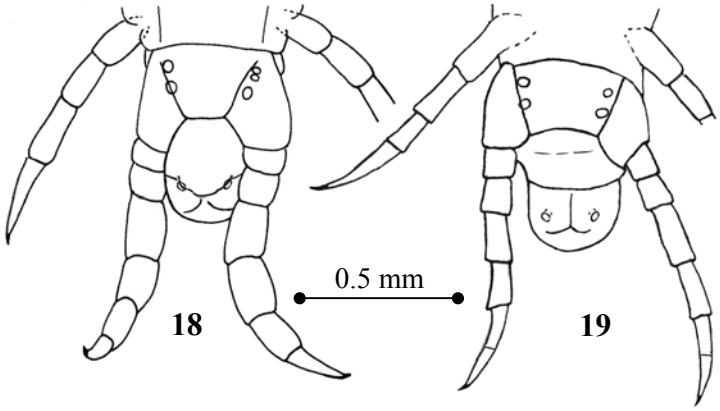
Three specimens were collected. These were 12-15mm in length and were slightly stouter than adults, being approximately 19 - 20 times longer than width. Coxal pores were absent, but a pair of anal pores was apparent. The antennae were relatively long, between 8% - 11% of body length. The carpophagus fossae were poorly developed, appear purplish in colour, and occupy 33% - 36% of the width of the sternite. Head and antennae were pale orange, while the body, including the last trunk segments, was poorly pigmented and appeared pale grey. It was not possible to distinguish the sexes. Arthur *et al* (2001) also records two specimens of *G. carpophagus* of length 12mm and 14mm without coxal pores.

Eason (1964) reports the absence of coxal pores in his description of the first stadium of *G. carpophagus* sensu lato, which probably refers to *G. easoni*. G.B. Corbet (pers. comm.) reports lengths of 8-14 mm for juveniles, but this may include 2nd stadium individuals.

Second stadium juveniles

Three specimens, between 17-21mm in length, were collected. At 21.5 - 24.5 times longer than wide the body proportions lie at the lower end of the range observed in adults. Two had distinct 2+2 coxal pores (Figure 19). The third specimen, upon close examination with a light transmission microscope, had 2+3 coxal pores (Figure 18). In this example, it was apparent that what appeared to be a single normal sized pore was actually two much smaller pores lying adjacent to each other. The anal pores were less distinct than seen in the first stadium. The antennae remain relatively long, between 8% to 10% of length of body. The carpophagus fossae are more conspicuous and occupy 40% to 44% of the width of the sternite. The last pair of legs of the two male specimens are beginning to show a slight swelling at this stage (Figure 18). Pigmentation of head and body was more or less as seen in adult specimens.

Two specimens of *G. easoni* of this stadium collected in Oxfordshire are both 12mm in length and have 2+2 and 2+3 coxal pores (SG pers. obsv.), the latter as in Figure 18.



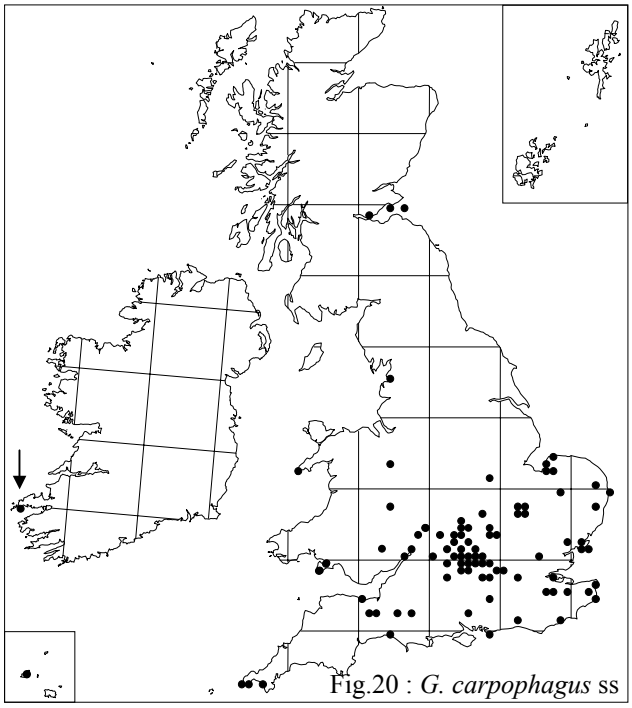
FIGURES 18 & 19: Geophilus carpophagus s.s., second stadia, posterior region, ventral view
18. Male, 20 mm length, 2+3 coxal pores. Note slight swelling of last legs.
19. Female, 21mm length, 2+2 coxal pores. Note pair of anal pores

BRITISH AND EUROPEAN DISTRIBUTION

Geophilus carpophagus s.s.

The provisional distribution map (Figure 20), based on verified records (Barber, in prep.), indicates that *G. carpophagus* s.s. is most frequent, and probably common, across south-eastern England, at least south of the Severn to the Wash. Further north and west it becomes increasingly coastal (i.e. Cornwall, Wales, Lancashire and south-eastern Scotland). In Ireland it is restricted to the south coast (M. Cawley, pers. comm.). Inland it occurs as a synanthrope, typically in above ground micro-sites, such as beneath bark on tree trunks or under stones on walls up to 10m above ground level (e.g. Blower, 1987; Gregory & Campbell, 1996; Whitehead, 2004). It has been frequently reported inside houses. At coastal sites it is often associated with sea cliffs, where it has been found within crevices or within hollow plant stems (G.B. Corbet, pers. comm.).

The few confirmed records outside of Britain indicate that this species has a wide distribution across north-western and central Europe (Figure 22). It is widely distributed across France (Geoffroy & Iorio, 2009), including the Channel Islands (Barber, 2006), and occurs in Switzerland (E. Stöckli, pers. comm.), Belgium (K. Lock, pers. comm.), the Netherlands (Berg *et al*, 2008), and extending northwards into southern Scandinavia; Denmark, southern Norway, Sweden and Finland (Andersson *et al* 2005, G. Andersson, pers. comm.). There are known occurrences in eastern Germany (N. Lindner, pers. comm.) and Poland (Kaczmarek, 1979; M. Leśniewska pers. comm). Matic (1972) reports *Geophilus carpophagus* from Romania, but with leg numbers 47-57 (males) and 49-59 (females) and 3-9 coxal pores but it is possible that his description was, at least in part, derived from elsewhere and its status needs clarification.



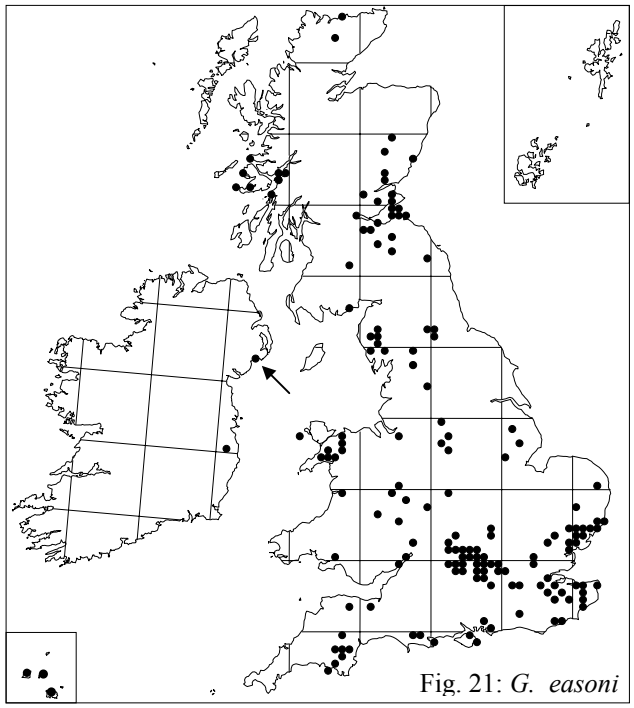


FIGURE 20 & 21: Provisional distribution maps for Britain and Ireland (confirmed records only) for *Geophilus carpophagus* s.s. (left) and *Geophilus easoni* (right) (Barber, in prep.)

Geophilus easoni

Confirmed records of *G. easoni* occur from southern England to northern Scotland (Figure 21). The majority of unconfirmed records (i.e. for *G. carpophagus* s.l., not plotted here) from Ireland and northern England,

north to Orkney, are likely to be of this species (Barber, in prep.). It is usually found in rural sites, such as woodland, heathland or moorland, typically at ground level beneath logs and stones.

On current evidence *G. easoni* has a strict Atlantic distribution (Figure 22). Beyond Britain its range extends southwards from the Channel Islands (Barber, 2006) through western France (Geoffroy & Iorio, 2009; SG, unpublished data), into north-west Spain and penetrating into at least northern Portugal (SG, unpublished data). Specimens collected south of the Pyrenees may have up to 57 leg pairs, making confusion with *G. carpophagus* s.s. possible, but they have up to 18 coxal pores (each side).

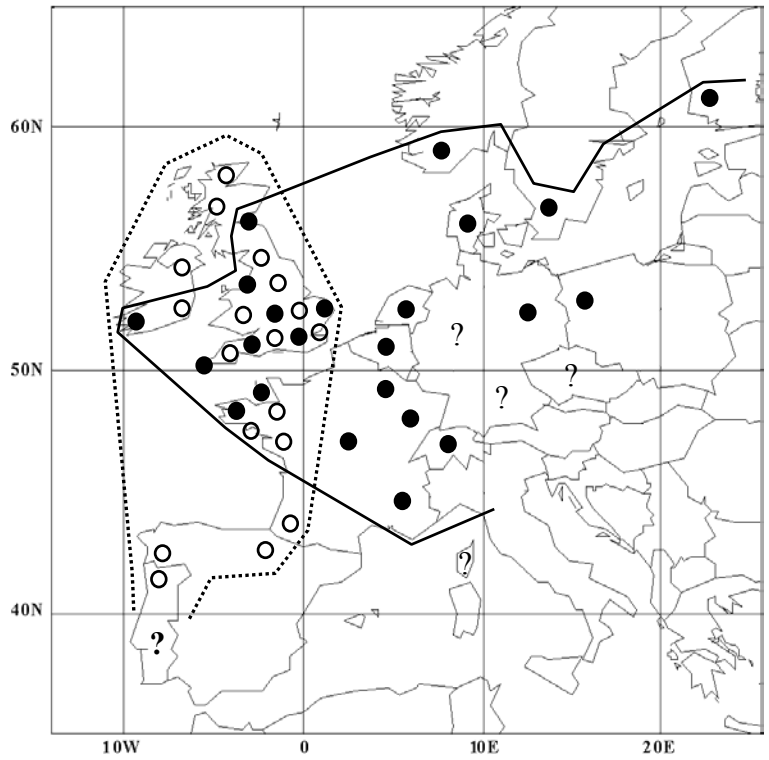


FIGURE 22: Outline distribution in Europe for *Geophilus carpophagus* s.s. (solid dots, solid line) and *G. easoni* (open circles, dotted line)
? indicates non-specific European occurrences of *G. carpophagus* s.l.

DISCUSSION

It is apparent from the data that there are noticeable differences in body length and number of coxal pores between adult male and female specimens of *G. carpophagus* s.s.. The sample is too small to be clear whether this is true sexual dimorphism, with females growing proportionately more rapidly than males or a result of sampling bias, where younger males and older females were collected. Some millipede species (e.g. *Cylindroiulus punctatus*) are iteroparous: the males die in the first season after reaching maturity, whereas females continue to breed, and grow, in subsequent seasons (Blower, 1985). Although this is a possible explanation for the data presented here, this breeding strategy does not appear to occur in other centipedes within the family Geophilidae. Ideally, the species would be bred and reared in laboratory culture so that growth and ecdysis could be followed for known stadia of each sex.

The fact that 25% of all specimens collected had either damaged or apparently regenerated antennae is of note. It is the larger specimens that are affected (Table 1), suggesting that likelihood of damage to the antennae is a function of age. It is not clear whether this damage is primarily aggression between individuals of this 'gregarious' species or due to confrontation with a predator. Other than a few specimens of *Lithobius*

melanops, no other potential predators were observed during sampling, although many species may not be active in November when the specimens were collected.

The characters described herein for *G. carpophagus* s.s. agree with those presented by Haswell *et al* (2006). Although the number of trunk segments (leg pairs) is diagnostic in separating British examples of these two species (and probably also those from north-west Europe), it is clear that *G. carpophagus* s.s. and *G. easoni* are morphologically very similar. *G. carpophagus* appears to be consistently larger than *G. easoni*, from early juvenile stadia through to fully grown specimens. However, this is of no use in distinguishing between animals that undergo continuous growth and ecdysis. More helpful is that mature specimens of *G. carpophagus* have consistently fewer coxal pores than specimens of *G. easoni* of comparable body size. Arthur *et al* (2001) show that for a given body length *G. carpophagus* has approximately half the number of coxal pores relative to *G. easoni*. Arthur *et al* (2002) suggest that the reduced number of coxal pores in *G. carpophagus* may be an adaptation resulting from the preference of this species for much drier microsites than is typically seen in other geophilomorphs. However, it should be borne in mind that the number of coxal pores increases with each ecdysis and that there is considerable variation between individuals of the same stadium. Thus, there is much variation, and much potential overlap between these two species, in both body length and the number of coxal pores.

Preliminary studies suggest that the apical claws of the walking legs of *G. carpophagus* are tapered to a much sharper point than those of *G. easoni*. Possessing sharper claws is clearly beneficial to a climbing species and may explain the observed 'clinginess' of this former species on its substrate (e.g. Haswell *et al*, 2006). There also appear to be differences in the relative lengths and widths of the leg articles, with *G. carpophagus* having proportionately longer legs than *G. easoni*. Whilst, shorter legs are more typical of burrowing species (e.g. millipedes (Blower, 1985)), longer legs are often characteristic of fast moving animals, and the advantage to a climbing species such as *G. carpophagus* is not clear.

FUTURE WORK

There remain problems in determining material from outside north-west Europe. Haswell *et al* (2006) highlight the variability of the number of fimbriae projecting from the side-pieces of the labrum, particularly in non-British material and suggest the possibility of additional cryptic species occurring outside north-west Europe. Specimens of *G. carpophagus* sensu lato collected from northern Portugal and northern Spain (SG, unpublished data) have females with up to 57 leg pairs and 55 mm in length, but on the basis of other characters described in this paper appear to be *G. easoni* (and are plotted in Fig. 22 as that species). An increase in the number of trunk segments is typically observed in more southerly populations of other geophilomorph species (Arthur & Kettle, 2001) so this is perhaps not unexpected. Other characters for separating the two species may be found, such as clypeal setae, antennal sensilla and structure of the poison glands (which are described for *G. easoni* by Arthur *et al* (2001)).

In light of the measurable differences between the walking legs of *G. carpophagus* s.s. and *G. easoni* highlighted above (Table 3) it is intended (by SG) to examine in more detail the relative dimensions of individual articles of the walking legs, apical claws and associated spines of both species. A selection of individuals from populations from across the full breath of Britain will be examined and will be the subject of a subsequent paper.

ACKNOWLEDGEMENTS

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CENTIPEDES AND MILLIPEDES OF BURGUNDY

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ABSTRACT

Fifteen species of centipedes from two almost unsampled departments (Nièvre and Yonne) of the Burgundy region (France) have been identified. A total of 30 valid taxa of centipedes have been found in Burgundy at present. *Lamyctes emarginatus* (Newport, 1844) and *Geophilus osquidatum* Brölemann, 1909 are reported for the first time in north eastern France. Some data on the morphology of *G. osquidatum* and *G. truncorum ribauti* Brölemann, 1908 are given. Altogether 35 species of millipedes have been recorded in Burgundy. Nine are reported for the first time from the departments of Nièvre, Saône-et-Loire and Yonne. The newly recorded species are: *Anthogona variegata* Ribaut, 1913, *Chamaesoma broelemanni* Ribaut & Verhoeff, 1913, *Chordeuma proximum* Ribaut, 1913, *Chordeuma sylvestre* C.L. Koch, 1847, *Cylindroiulus caeruleocinctus* (Wood, 1864), *Leptoiulus bruyanti* Ribaut, 1951, *Ommatoiulus rutilans* (C.L.Koch, 1847), *O. sabulosus* (Linnaeus, 1758) and *Orthochordeumella pallida* (Rothenbühler, 1899).

INTRODUCTION

Burgundy is a large region just east of Central France, almost 250km across from north to south and 200km from west to east. Its altitude varies from about 55m in the valley of the Yonne, a tributary of the Seine, to 901m in the granitic hills of the Morvan. However, most of the region is comprised of a large array of sedimentary rocks and recent deposits; limestone escarpments are a prominent feature of the landscape. This gives a large range of different biotopes. The pivotal position of Burgundy is indicated by the fact that its rivers drain into the Atlantic (via the Loire Basin), the English Channel (via the Seine Basin) and the Mediterranean (via the Rhône-Saône Basin). The western edge of Burgundy is about 375km from the Bay of Biscay, the northern edge is about 250km from the English Channel and the southern edge about 300km from the Mediterranean Sea.

The map (Figure 1) shows the four administrative departments included in Burgundy. They sit astride the Atlantic and Central European biogeographical zones and the eastern departments have a more continental climate than those in the west. It follows that Burgundy contains species representative of these different zones.

Even though the centipedes of north eastern France have been the subject of several recent studies (Iorio, 2003, 2005b, 2007; Spelda, 2005), there remain many gaps in the knowledge of them in this area which is constituted of the regions of Champagne-Ardennes, Lorraine, Alsace, Franche-Comté and Burgundy; several departments of some of these regions are still almost unsampled. With regard to centipedes, in Burgundy only the Côte-d'Or department has been the subject of a detailed study (Ravoux, 1948) and the other departments of this region (Nièvre, Yonne, Saône-et-Loire) remain almost unknown for them; some brief data are quoted by Ravoux (1948), Demange (1959) and Iorio & Geoffroy (2004a, 2007a, 2007b). Likewise for the diplopods, most of the old records came from the Côte d'Or (Brolemann, 1923; Ravoux, 1951; Demange, 1959, 1981) while Jawlowski visited the Nièvre and produced a paper in 1933. The aim of the present work is thus to give a contribution on the myriapods of the less-known departments of Burgundy.

We wish also to indicate the state of knowledge of these arthropods in the Burgundy region and to show in how many of the four departments each species has been found.

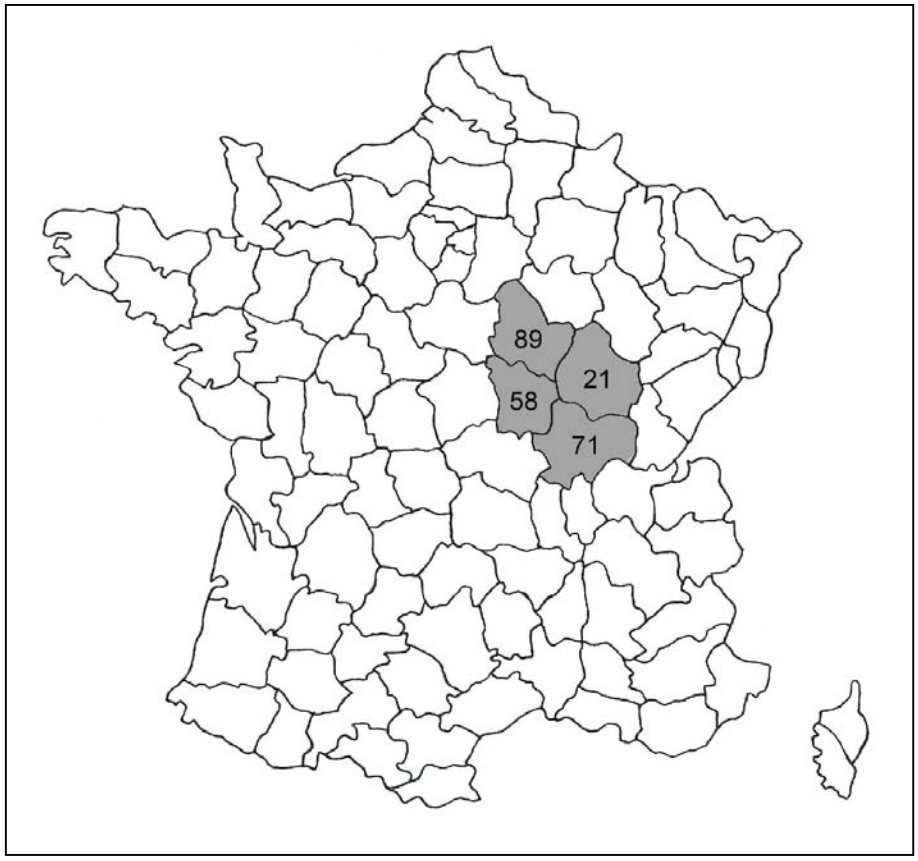

FIGURE 1: Map of France with limit of all departments. Burgundy and its departments are in grey.

MATERIAL AND METHODS

More than one hundred specimens of Chilopoda were collected by a French colleague (Dr. Nuria Ruiz-Camacho) during May 2001 from localities in the Nièvre and Yonne departments and were identified by the second author (E. Iorio) during the year 2003. The Diplopoda and a few Chilopoda were collected and identified over a period of about thirty years during periodical visits to the Burgundy region by the first author (R. D. Kime).

For each species we give our own unpublished records and we quote previous data published by other authors. We present an updated list of the Chilopoda of Burgundy in Table 1 and of the Diplopoda in Table 2. French administrative departments are numbered in alphabetical order and for the sake of brevity we use these numbers in the following account. In Burgundy they are as follows (also see Figure 1): **21:** Côte d'Or; **58:** Nièvre; **71:** Saône-et-Loire; **89:** Yonne.

CHILOPODA – LIST OF IDENTIFIED SPECIES

Scutigeromorpha

SCUTIGERIDAE

Scutigera coleoptrata (Linnaeus, 1758)

21: Dijon, Quartier de Montchapet, in a cellar; Plombières-les-Dijon, in a cellar (Ravoux, 1948). Dijon, in appartments; Montbard, houses (Iorio & Geoffroy, 2007a).

58: Corbigny, in a cellar of house; Garchy (Centre CNRS); Pouilly-sur-Loire, in cellars; Saint-Pierre-le-Moutier, houses (Iorio & Geoffroy, 2007a).
71: Autun, in the town, on the pavement; Mâcon, houses; Sivignon, wall and cellar of house (Iorio & Geoffroy, 2007a).

Lithobiomorpha

HENICOPIDAE
Henicopinae

Lamyctes emarginatus (Newport, 1844)

58: Saint-Didier, grassland: 4 females.
89: Rouvray, field of wheat: 1 female.

This species is reported for the first time in Burgundy and more widely in north-eastern France (Iorio, 2007).

LITHOBIIDAE
Lithobiinae

Lithobius (Lithobius) agilis C. L. Koch, 1847

21: Asnières-les-Dijon, carrière souterraine d'Asnières (Demange, 1959). Ravoux (1948) has found *L. (L.) agilis* in several localities in Côte-d'Or but he has perhaps confused it sometimes with *L. (L.) tricuspis*: Plombières-les-Dijon, near Ferme de Champmoron, forest on limestone escarpment; Bois de Champlaran, under dead wood; Route de Pasques near Ferme de Failly, under dead leaves; near Ferme de Contard in forest, in the soil under dead leaves; Prenois, Bois des Muliers and Bois des Sablées, under dead leaves; Lantenay, in forest under stones and under dead leaves; Darois, Bois du Chêne, in the soil under dead leaves; Villy-le-Moutier, Forêt de Borne, in the soil under mosses; Urcy, under a stump; Marsannay-la-Côte; Ancey, in forest.

Lithobius (Lithobius) calcaratus C. L. Koch, 1844

21: Plombières-les-Dijon, in forest near Ferme de Contard, under stones; Talant, uncultivated field, under stones; Lamargelle, under stones (Ravoux, 1948).

Lithobius (Lithobius) dentatus C. L. Koch, 1844

21: Lantenay, under dead leaves in a beech forest; Forêt de Citeaux, in the soil under dead leaves; Villy-le-Moutier, Forêt de Borne, in the soil under dead leaves; Plombières-les-Dijon, in forest near Ferme de Contard, at feet of trees; Bois de Champlaran, in the soil under dead leaves; Prenois, Bois des Sablées (Ravoux, 1948).
89: Quarre-les-Tombes, beech/oak forest: 1 male, 1 female.

Lithobius (Lithobius) forficatus (Linnaeus, 1758)

21: Plombières-les-Dijon, Bois de Champlaran, under stump; Prenois, Bois des Sablées, under dead leaves; Messigny, under stone near a fountain; Arcelot, forest, under mosses; Dijon, quartier Montmuzard, in a garden; Forêt de Citeaux; Gevrey-Chambertin; Lamargelle; Flacey; Corgoloin, Bois de Bornotte; Talant; Saint-Seine-l'Abbaye (Ravoux, 1948).
58: Saint-Didier, grassland: 1 male; Montambert, Forêt Domaniale de Buremont, 9.iv.1994: Azy-le-Vif, Forêt du Perray, Oak/Hornbeam forest on heavy loam, 250m, 25.iii.1998.
71: Azé, grotte de la Balme, grotte d'Azé, grotte de Rizerolles (Demange, 1959). Originally described as *L. forficatus* var. *biunguis* Demange, 1959 which is synonymous with the typical form (Eason, 1970).
89: Nuits-sous-Ravières, under stone near a road (Ravoux, 1948).

[*Lithobius (Lithobius) latro* Meinert, 1872]

21: The record of this species in Plombières-les-Dijon by Ravoux (1948) is uncertain (Iorio, 2007).

Lithobius (Lithobius) macilentus L. Koch, 1862

21: Prenois, Bois des Muliers and Bois des Sablées, in the soil under dead leaves and dead wood; Plombières-les-Dijon, Bois de Champlaran near Fontaine des Tuileries, in a dead trunk; Darois, Bois du Chêne, under dead leaves; Val-Suzon, in a hole under dead leaves; Fixey; Velars (Ravoux, 1948).

Lithobius (Lithobius) melanops Newport, 1845

21: Prenois, Bois des Muliers, under dead leaves; Plombières-les-Dijon; Neuvon, near l'Ouche, plant fragments in the trunk of a willow; Fontaine-les-Dijon, plant fragments; Marsannay-la-Côte, beech forest under dead leaves; Gevrey-Chambertin; Flacey; Talant, under stones (Ravoux, 1948).

Lithobius (Lithobius) muticus C. L. Koch, 1847

89: Nuits-sous-Ravières, under stone near a road (Ravoux, 1948).

Lithobius (Lithobius) piceus piceus L. Koch, 1862

21: Prenois, Bois des Muliers, under dead leaves; Plombières-les-Dijon, Bois de Champlaran, under dead leaves; Marsannay-la-Côte, beech forest of the Combe du Pré, in the soil; Saint-Seine-l'Abbaye; Lamargelle; Bois de Pasques (Ravoux, 1948). Saint-Victor-sur-Ouche, grotte des Rochers de Matre; Meursault, carrière souterraine de Porée Piarde (Demange, 1959).
58: Larochemillay, Les Corseries, Beechwood with Chestnut and Hornbeam, 495m, 10.v.2001
71: Auxy, Bois de Repas, mixed deciduous forest, mull on brown earth, 400m, 11.v.2001.

Lithobius (Lithobius) tenebrosus Meinert, 1872

21: Plombières-les-Dijon, Route de Pasques near Ferme de Failly, in forest under dead leaves; Bois de Champlaran near Fontaine des Tuileries, under mosses and dead leaves; near Ferme de Contard (Ravoux, 1948).

Lithobius (Lithobius) tricuspis Meinert, 1872

21: Forêt de Citeaux, under dead leaves at foot of tree; Marsannay-la-Côte, beech forest, under dead leaves; Plombières-les-Dijon, under leaves (Ravoux, 1948). Norges-la-Ville, carrière souterraine de Malpertuis (Demange, 1959).
58: Dun-les-Places, fir forest: 6 males, 3 females; Villapourçon, Bois de Lissard, Oak, Beech and Holly wood, 10.iv.1994,
89: Quarre-les-Tombes, beech/oak forest: 11 males, 3 females; Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001.
71 : Antully, Forêt Domaniale de Planoise-les-Feullies, Pine and beech forest, 540m, 11.v.2001

Lithobius (Monotarsobius) aeruginosus L. Koch, 1862

21: Prenois, Bois des Muliers and Bois des Sablées, under dead leaves; Marsannay-la-Côte, beech forest of the Combe du Pré; Mont-Afrique, under dead leaves of a beech forest (Ravoux, 1948).
89: Nuits-sous-Ravières, under stone near a road (Ravoux, 1948).

Lithobius (Monotarsobius) crassipes L. Koch, 1862

21: Plombières-les-Dijon, Bois de Champlaran, under mosses; Darois, Bois du Chêne, in the soil under dead leaves; Ancey, in the ground at the foot of a tree; Prenois, Bois des Muliers, under dead wood; Forêt de Citeaux, in dead leaves; Villy-le-Moutier, Bois de Borne, in dead leaves (Ravoux, 1948). Asnières-les-Dijon, carrière souterraine d'Asnières (Demange, 1959).
58: Dun-les-Places, fir forest: 1 female.
71 : St. Prix, La Croisette, mixed forest.
89: Quarre-les-Tombes, beech/oak forest: 2 males, 2 females.

Lithobius (Sigibius) microps Meinert, 1868

21: Talant, in an uncultivated field, under stones; Prenois, in an uncultivated field, under stone (Ravoux, 1948).
58: Dun-les-Places, fir forest: 2 males, 1 female; Montambert, Forêt Domaniale de Buremont, 9.iv.1994.
89: Rouvray, field of wheat: 3 males, 3 females.

Scolopendromorpha

CRYPTOPIDAE

Cryptops anomalans Newport, 1844

21: Dijon, in a garden near Fontaine de Suisse; Plombières-les-Dijon, garden near the river l'Ouche; Flacey; Velars, field near the river l'Ouche and limestone field; Montchapet, garden (Ravoux, 1948; Iorio & Geoffroy, 2007b).

Cryptops hortensis (Donovan, 1810)

21: Ravoux (1948) has found this species in several places in Côte-d'Or, but this author does not describe the aspect of the labrum in his descriptions and it is difficult to be sure of the validity of all his data (Iorio & Geoffroy, 2007b). The localities quoted by Ravoux (1948) are: Plombières-les-Dijon, Bois de Champlaran; Arcelot, Forêt de Citeaux; Prenois, Bois des Sablées; Saint-Seine-l'Abbaye; Bois de Pasques; Carrières de Corgoloin; Flacey; Talant; Dijon. It is, however, confirmed in Côte-d'Or department by Iorio & Geoffroy (2008).

58: Dun-les-Places, fir forest: 2 specimens; Azy-le-Vif, Forêt du Perray, Oak/Hornbeam forest on heavy loam, 250m, 25.iii.1998; Narcy, Forêt Domaniale de Bertranges (Oak and Hornbeam), 255m, 8.iii.2001.

71: Autun, south of Croix de la Liberation, Beech/ Oak/ Chestnut woodland with Silver Birch and Rowan on granite, 580m, 11.v.2001

89: Quarre-les-Tombes, beech/oak forest: 6 specimens; Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001

Cryptops parisi Brolemann, 1920

21: Abbaye de Fontenay; Flavigny-sur-Ozerain; Saint-Seine l'Abbaye (Iorio & Geoffroy, 2004a). For the following places in which Ravoux (1948) has found this species, same remark as above for *C. hortensis*: Forêt de Citeaux; Lantenay, beech forest; Plombières-les-Dijon, Route de Pasques near Ferme de Failly; Bois de Champlaran, near Fontaine des Tuileries; near Ferme de Contard; Prenois, Bois des Sablées; Forêt de Borne; Marsannay-la-Côte.

58: Garchy (Centre CNRS) (Iorio & Geoffroy, 2004a). Dun-les-Places, fir forest: 4 specimens; Saint-Didier, grassland: 2 specimens; Narcy, Forêt Domaniale de Bertranges (Oak and Hornbeam), 255m, 8.iii.2001.

71: Auxy, Bois de Repas, mixed deciduous forest, mull on brown earth, 400m, 11.v.2001.

89: Quarre-les-Tombes, beech/oak forest: 12 specimens; Arces-Dilo, Forêt Domaniale des Rajeuses, Mixed forest, 260m, 9.iii.2001; Merry-la-Vallée, Forêt de Merry-Vaux, Oak/Hornbeam woodland, Upper Cretaceous, 240m, 8.iii.2001.

Geophilomorpha

HIMANTARIIDAE

Stigmatogaster subterranea (Shaw, 1789)

89: Nuits-sous-Ravières, under stone (Ravoux, 1948).

DIGNATHODONTIDAE

Henia (Chaetechelyne) vesuviana (Newport, 1845)

21: Perrigny-les-Dijon; Prenois, Bois des Sablées, in the sand; Velars, near l'Ouche; Plombières-les-Dijon, Bois des Pisseux, in the ground, under leaves and near Ferme de la Pérouse; Chenôve; Lantenay; Lamargelle; Flacey (Ravoux, 1948).

SCHENDYLIDAE

Schendyla nemorensis (C. L. Koch, 1837)

21: Saint-Apollinaire, under bark of *Platanus*; Arcelot, under wood, ground, mosses at feet of trees; Plombières-les-Dijon; near Ferme de Champmoron, under leaves; Larrey-les-Dijon, under stone near the brook; Lantenay, beech, under leaves; Prenois, Bois des Sablées, under leaves; Marsannay, Combe du Pré, under leaves; forêt de Citeaux, at feet of trees; Chenôve; Talant; Bevy; Ternant; Corgoloin, Bois de Bornotte (Ravoux, 1948).

58: Dun-les-Places, fir forest: 2 males, 8 females; Montambert, Forêt Domaniale de Buremont, 9.iv.1994 ; Narcy, Forêt Domaniale de Bertranges (Oak and Hornbeam), 255m, 8.iii.2001.

89 : Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 26.ix.1992; Merry-la-Vallée, Forêt de Merry-Vaux, Oak/Hornbeam woodland, Cretaceous, 240m, 8.iii.2001.

GEOPHILIDAE

Geophilus carpophagus Leach, 1815 s. str.

21: Fontaine-les-Dijon, in the soil near a road; Flacey (Ravoux, 1948).

The number of leg-bearing segments quoted by Ravoux (1948) allow confirmation that his specimens correspond to *G. carpophagus* s. str.

Geophilus electricus (Linnaeus, 1758)

21: Prenois, Bois des Sabliers, dead wood; Plombières-les-Dijon, near Ferme de la Pérouse; Dijon, in a garden (Ravoux, 1948).

Geophilus flavus (De Geer, 1778)

21: Daix, under stone of a small wall; Forêt de Citeaux, under trunk; Forêt de Borne, in the soil at foot of tree; Prenois, Bois des Muliers, under leaves; Velars-sur-Ouche, near l'Ouche river; Plombières-les-Dijon, ground of a garden near l'Ouche; near Ferme de Contard; Chenôve; Marsannay, under leaves in the beech forest of the Combe du Pré; Dijon, at the foot of a tree, and in a garden; Flacey; Saint-Seine-l'Abbaye (Ravoux, 1948).
58: Saint-Didier, grassland: 4 males, 8 females.
89: Rouvray, field of wheat: 4 males, 10 females; Quarre-les-Tombes, beech/oak forest: 1 female.

Geophilus insculptus Attems, 1895

21: Val Suzon, in the ground at the foot of a tree in the Val Courbe; Hauteville, in the forest near Ferme de Champ-Rouge; Plombières-les-Dijon, forest near Ferme de Contard (Ravoux, 1948).
58: Dun-les-Places, fir forest: 1 male, 2 females.
89: Quarre-les-Tombes, beech/oak forest: 1 female.

Geophilus osquidatum Brölemann, 1909

89: Quarre-les-Tombes, beech/oak forest: 2 females; Rouvray, field of wheat: 2 females.

This species is reported for the first time in Burgundy and more widely in north eastern France. In the south, it is known in the Hautes-Alpes department and even in Italy but not in the Balkan Peninsula (Geoffroy, 1981; Stoev, 1997; Zapparoli & Minelli, 2006). It seems to be more common in western France than in eastern France even if it is perhaps under recorded (Brolemann, 1930; Iorio, 2006). Finally, it is interesting to note that *G. osquidatum* is not known in south western Germany (Spelda, 1999, 2005) and that it has not been recorded in France for more than twenty years. We detail some morphological aspects below.

Two females have 55 leg-bearing segments, one female 57 leg-bearing segments, and one female 59 leg-bearing segments. Three females have 3 + 3 coxal pores on the last pair of legs, and one female has 2 + 3 coxal pores on the last pair of legs; when 3 pores are present on the coxa, the most anterior pore is smaller than the 2 other pores. When *G. osquidatum* has 2 + 2, 2 + 3/3 + 2 or 3 + 3 coxal pores on the last pair of legs we think that the number of coxal pores could help the recognition of *G. osquidatum* in comparison with *G. seurati* Brolemann, 1924 (= *G. gracilis* Meinert, 1870) with the number of crenulations on the concavity of the poison claw, a character used in recent dichotomous keys for north western France and United Kingdom (Iorio, 2006; Barber, 2009). The number of 4 + 4 coxal pores quoted by Eason (1964) and Barber (2009) for this species seems to be uncommon because it was never seen on French specimens (Brölemann, 1909, 1930; this study) and is occasional in UK specimens after Eason (1964). On the other hand, *G. seurati* has at least 4 + 4 coxal pores on the last pair of legs, or even sometimes 5 + 5 coxal pores. Finally, this latter is a halobiontic species contrary to *G. osquidatum*.

Geophilus truncorum ribauti Brölemann, 1908

21: Marsannay-la-Côte, under leaves in the beech forest of the Combe du Pré; Talant, under stone (Ravoux, 1948).
58: Dun-les-Places, fir forest: 2 males, 3 females; Saint-Didier, grassland: 1 male, 1 female.

The morphology of these individuals corresponds well with *G. truncorum ribauti* which differs from *G. truncorum truncorum* Bergsö & Meinert, 1866 by its fewer number of leg-bearing segments (less than 37 pair of legs in males, less than 39 pair of legs in females) and its higher number of coxal pores on the last pair of legs (3 or 4 on each coxa instead of 2). Our three males have 33 pair of legs, and our four females have 35 pair of legs; their numbers of pores on last coxae are 3 + 3, 3 + 4 and 4 + 4. After Brölemann (1908, 1930), there are a fewer number of teeth on mid-piece of the labrum of *G. truncorum ribauti* than on the same piece in *G. truncorum truncorum* (2 or 3 instead of 5 or 6); all our specimens have 2 teeth except one which has 3 teeth. As Iorio (2005a) has written, the distribution of both taxa seems also to be different; in our country, *G. truncorum truncorum* is only recorded in regions of north western France and is clearly an occidental species while *G. truncorum ribauti* is present in all mountainous areas of France (Pyrenees, Alps and Pre-Alps, Morvan mountains and hills near Dijon in Burgundy, and Vosges mountains) (Brölemann, 1908, 1930; Ravoux, 1948; Iorio, 2007; Geoffroy & Iorio, 2009). Even if all these data justify the validity of the taxa *ribauti*, it is still difficult to determine its precise status (species or subspecies) and we quote here the original rank of Brölemann (1908).

CHECKLIST OF CENTIPEDE SPECIES RECORDED IN EACH DEPARTMENT OF BURGUNDY REGION

TABLE 1: Centipede species recorded in each department of Burgundy

Species	Côte d'Or	Nièvre	Yonne	Saône-et-Loire
Scutigera coleoptrata	X	X		X
Lamyctes emarginatus		X	X	
Lithobius aeruginosus	X		X	
Lithobius agilis	X		X	
Lithobius calcaratus	X			
Lithobius crassipes	X	X	X	
Lithobius dentatus	X		X	
Lithobius forficatus	X	X	X	X
Lithobius latro [(1)]	X			
Lithobius macilentus	X			
Lithobius melanops	X			
Lithobius microps	X	X	X	X
Lithobius muticus			X	
Lithobius piceus piceus	X	X		X
Lithobius tenebrosus tenebrosus	X			
Lithobius tricuspis	X	X	X	X
Cryptops anomalans	X			
Cryptops hortensis	X	X	X	X
Cryptops parisi	X	X	X	X
Stigmatogaster subterraneus			X	
Henia vesuviana	X			
Schendyla nemorensis	X	X	X	
Geophilus carpophagus s. str.	X			
Geophilus electricus	X			
Geophilus flavus	X	X	X	
Geophilus insculptus	X	X	X	
Geophilus osquidatum			X	
Geophilus truncorum ribauti	X	X		
Strigamia acuminata	X	X	X	
Strigamia crassipes	X			

[(1)] This species is quoted in Bourgogne by Ravoux (1948), but its presence in this area needs to be confirmed.

DIPLOPODA – LIST OF IDENTIFIED SPECIES

Polyxenida

POLYXENIDAE

Polyxenus lagurus (Linnaeus,1758)

No new records. This small Holarctic species has been reported from all four departments (M. Nguyen-Duy, pers. comm.)

Glomerida

GLOMERIDAE

Glomeris intermedia (Latzel,1884)

21: Corcelles-les-Citeaux, Bois des Perreaux (Oak & Hornbeam wood), 205m, 12.ix.1978.

58: Fâchin, Les Buteaux, Beechwood with Holly, Broom, Bracken and heathers, 750m, 4.viii.1979; Narcy, Forêt Domaniale de Bertranges (Oak and Hornbeam), 255m, 8.iii.2001; Larochemillay, Les Corseries, Beechwood with Chestnut and Hornbeam, 495m, 10.v.2001; Villapourçon, Le Puits, Beechwood with Oak and Holly, 595m, 10.v.2001.

71: Authumes, Forêt d'Authumes, Oak and Hornbeam with Pine, Robinia and Hazel, mull on heavy brown earth, 210m, 28.ix.1999; St-Prix, Forêt Domaniale on Haut Folin, Beech, Spruce and Fir with *Myrtillus edulis*, 873m, 10.v.2001; Broye, Oak and Beech forest with holly on granite, 560m, 11.v.2001; Antully, Forêt Domaniale de Planoise-les-Feuillies, Pine and Beech forest, 540m, 11.v.2001 ; Auxy, Bois de Repas, Mixed deciduous forest, mull on brown earth, 400m, 11.v.2001.

89: Asquins, Bois de Vaux-Lannes, deciduous woodland on Jurassic limestone, 230m, 3.xi.1985 ; Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 280m, 26.ix.1992; Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001.

This Western European species is found from the North of Spain to Western Germany including apparently most parts of France. It is almost always in woodland.

Glomeris marginata (Villers, 1789)

21: There are several old records in the Paris database (Geoffroy, pers. comm.)

58: St-Amand-en-Puisaye, deciduous forest, 260m, 15.v.1988; Alligny-en-Morvan, Beech, Oak, Birch and Hazel woodland on granite, 480m, 10.iv.1994; Oudan, Forêt Domaniale d'Arcy, Oakwood with deep litter, 280m, 8.iii.2001; Larochemillay, Les Corseries, Beechwood with Chestnut and Hornbeam, 495m, 10.v.2001; Larochemillay, Mont Beuvray, Beech forest with Holly, 800m, 10.v.2001; Villapourçon, Le Puits, Beechwood with Oak and Holly, 595m, 10.v.2001.

71: Chagny, Oak forest with Hornbeam on heavy soil, 200m, 28.ix.1999; Champrougier, Oakwood, 218m, 28.ix.1999; St-Prix, Forêt Domaniale on Haut Folin, Beech, Spruce and Fir with *Myrtillus edulis*, 873m, 10.v.2001; Roussillon-en-Morvan, mixed forest, 555m, 10.v.2001; Autun, south of Croix de la Liberation, Beech/ Oak/ Chestnut woodland with Silver Birch and Rowan on granite, 580m, 11.v.2001; Antully, Forêt Domaniale de Planoise-les-Feullies, Pine and beech forest, 540m, 11.v.2001; Auxy, Bois de Repas, mixed deciduous forest, mull on brown earth, 400m, 11.v.2001.

89: Asquins, Bois de Vaux-Lannes, deciduous woodland on Jurassic limestone, 230m, 3.xi.1985; Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 280m, 26.ix.1992; Chichée, Oakwood on Jurassic limestone,155m, 27.ix.1992; Joigny, Oak/Hornbeam woodland, 220m, 9.iii.2001; Arces-Dilo, Forêt Domaniale des Rajeuses, Mixed forest, 260m, 9.iii.2001.

A West European species, very common in France, especially in woodland.

Polyzoniida

POLYZONIIDAE

Polyzonium germanicum Brandt, 1831

21: Reported from Marsannay-la-Côte by Ravoux (1951).

58: Alligny-en-Morvan, Beech, Oak, Birch and Hazel woodland on granite, 480m, 10.iv.1994.

Julida

BLANIULIDAE

Blaniulus guttulatus (Fabricius, 1798)

21: Reported from around Dijon (Brolemann, 1923). This common synanthropic species should be found in all four departments of Burgundy.

Nopoiulus kochii (Gervais, 1847)

58: Reported from greenhouses in Nevers by Jawlowski (1933).

Proteroiulus fuscus (Am Stein, 1857)

58: Reported from a forest near La Charité by Jawlowski (1933).

The Blaniulidae are undoubtedly under-recorded in Burgundy, probably because of their synanthropic tendencies. Most collecting has been done in rural situations, especially in forests. In addition to the three species above there are two other common species for which we have not yet found records. These are *Archiboreoiulus pallidus* and *Choneiulus palmatus* both of which occur in surrounding regions.

NEMASOMATIDAE

Nemasoma varicorne C.L.Koch, 1847

58: Raveau, forest (Jawlowski,1933)

A subcorticole European species.

JULIDAE

Allajulus nitidus (Verhoeff, 1891)

21: Corcelles-les-Citeaux, Bois des Perreaux (Oak & Hornbeam wood), 205m, 12.ix.1978.
71: Authumes, Forêt d'Authumes, Oak and Hornbeam with Pine, Robinia and Hazel, mull on heavy brown earth, 210m, 28.ix.1999 ; Champrougier, Oakwood, 218m, 28.ix.1999.
89: Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre-coloured clay, 280m, 26.ix.1992.

A Central European species almost at the western end of its range.

Cylindroiulus caeruleocinctus (Wood, 1864)

89: Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001.

A common species found in grassland and in association with habitation. It should occur in all four departments.

Cylindroiulus latestriatus (Curtis, 1845)

58: Nevers, woodyard (Jawlowski, 1933).

A mainly coastal species which occurs synanthropically inland.

Cylindroiulus londinensis (Leach, 1815)

58: Guérigny (Jawlowski, 1933).

An Atlantic species found in the west and centre of France, northern Spain, Britain and Ireland.

Cylindroiulus parisiorum (Brölemann & Verhoeff, 1896)

58: Nevers, gardens and woodyards (Jawlowski, 1933).

A largely synanthropic species associated with dead wood. It has been found in semi-natural sites in England, Belgium and Switzerland.

Cylindroiulus truncorum (Silvestri, 1896)

58: Nevers, greenhouses (Jawlowski, 1933).

Another largely synanthropic species with isolated records in Western Europe.

While there is no especial reason to doubt the records of the tailless species of *Cylindroiulus* made by Jawlowski it should perhaps be mentioned that there has been some past confusion about them. Finding three such species in a woodyard in Nevers must be unique. Interestingly, among these tailless species, *Cylindroiulus britannicus,* plentiful in Britain, has not yet been recorded in France.

Equally interesting is the fact that the very common Western European *Cylindroiulus punctatus* has not yet been recorded in Burgundy. While common in western areas of France it is rare in the more continental eastern parts of the Country.

Julus scandinavius Latzel, 1884

58: Oudan, Forêt Domaniale d'Arcy, Oakwood with deep litter, 280m, 8.iii.2001.
71: St-Prix, Forêt Domaniale on Haut Folin, Beech, Spruce and Fir with *Myrtillus edulis,* 873m, 10.v.2001.
89: Bussy-en-Othe, Forêt de l'Abbesse,Oakwood with Hornbeam, 240m, 9.iii.2001.

A common Central European species at its western limit.

Leptoiulus belgicus (Latzel, 1884)

21: In Paris database.
58: Tracy-sur-Loire, below wood on sand on the east bank of the Loire, next to deciduous woodland with rank undergrowth, 150m, 8.viii.1985.

A Western European species not yet found further east in France.

Leptoiulus bruyanti Ribaut, 1951

58: Larochemillay, Mont Beuvray, Beech forest with Holly, 800m, 10.v.2001; Villapourçon, Le Puits, Beechwood with Oak and Holly, 595m, 10.v.2001.
71: St-Prix, Forêt Domaniale du Haut Folin, Beech, Spruce and Fir with *Myrtillus edulis,* 873m, 10.v.2001; Antully, Forêt Domaniale de Planoise-les-Feullies, Pine and Beech forest, 540m, 11.v.2001.

An endemic French species now recorded from four departments. The other two departments are Puy-de-Dôme (Ribaut, 1951, type locality) and Lozère (Kime, previously unpublished): Le Massegros, Causse de Sauveterre, in litter under a few trees, 900m, 4.xi.1981.

All the sites are montane. In the Morvan mountains they were all forests with Beech trees.

Ommatoiulus rutilans (C.L.Koch, 1847)

58: Tracy-sur-Loire, below wood on sand on the east bank of the Loire, next to deciduous woodland with rank undergrowth, 150m, 8.viii.1985.

A thermophile species mainly found in open sites in Western Europe.

Ommatoiulus sabulosus (Linnaeus, 1758)

71: Roussillon-en-Morvan, mixed forest, 555m, 10.v.2001.

Another thermophile species widespread in Europe. There should be more records in Burgundy.

Tachypodoiulus niger (Leach, 1815)

21: Corcelles-les-Citeaux, Bois des Perreaux (Oak & Hornbeam wood), 205m, 12.ix.1978.
58: Alligny-en-Morvan, Beech, Oak, Birch and Hazel woodland on granite, 480m, 10.iv.1994; Azy-le-Vif, Forêt du Perray, Oak/Hornbeam forest on heavy loam, 250m, 25.iii.1998.
71: Authumes, Forêt d'Authumes, Oak and Hornbeam with Pine, Robinia and Hazel, mull on heavy brown earth, 210m, 28.ix.1999; Chagny, Oak forest with Hornbeam on heavy soil, 200m, 28.ix.1999; Champrougier, Oakwood, 218m, 28.ix.1999; Autun, south of Croix de la Liberation, Beech/ Oak/Chestnut woodland with Silver Birch and Rowan on granite, 580m, 11.v.2001.
89: Asquins, Bois de Vaux-Lannes, deciduous woodland on Jurassic limestone, 230m, 3.xi.1985; Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001; Merry-la-Vallée, Forêt de Merry-Vaux, Oak/Hornbeam wood-land, Upper

Cretaceous, 240m, 8.iii.2001; Bussy-en-Othe, Forêt de l'Abbesse,Oakwood with Hornbeam, 240m, 9.iii.2001; Arces-Dilo, Forêt Domaniale des Rajeuses, Mixed forest, 260m, 9.iii.2001.

A very common species in the woodlands of Western Europe.

Callipodida

CALLIPODIDAE

Callipus foetidissimus (Savi, 1819)

21: Demange (1981)

A Mediterranean species which extends northwards through France.

Chordeumatida

CHORDEUMATIDAE

Chordeuma proximum Ribaut, 1913

58: St-Amand-en-Puisaye, deciduous forest, 260m, 15.v.1988; Oudan, Forêt Domaniale d'Arcy, Oakwood with deep litter, 280m, 8.iii.2001.

An Atlantic species replaced by the following species further east.

Chordeuma sylvestre C.L.Koch, 1847

58: Larochemillay, Mont Beuvray, Beech forest with Holly, 800m, 10.v.2001; Alligny-en-Morvan, Beech, Oak, Birch and Hazel woodland on granite, 480m, 10.iv.1994.
71: Champrougier, Oakwood, 218m, 28.ix.1999; St-Prix, Forêt Domaniale on Haut Folin, Beech, Spruce and Fir with *Myrtillus edulis*, 873m, 10.v.2001.
89: Asquins, Bois de Vaux-Lannes, deciduous woodland on Jurassic limestone, 230m, 3.xi.1985.

A Central European species at its western limit.

Melogona gallica (Latzel, 1884)

21: Plombières (Ravoux, 1951).
58: St-Amand-en-Puisaye, deciduous forest, 260m, 15.v.1988.
89: Mailly-la-Ville, woodland near Château de Bruyères, 200m, 3.xi.1985; Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 280m, 26.ix.1992; Chichée, Oakwood on Jurassic limestone, 155m, 27.ix.1992; Merry-la-Vallée, Forêt de Merry-Vaux, Oak/Hornbeam woodland, Upper Cretaceous, 240m, 8.iii.2001; Joigny, Oak/Hornbeam woodland, 220m, 9.iii.2001; Arces-Dilo, Forêt Domaniale des Rajeuses, Mixed forest, 260m, 9.iii.2001.

A fairly common Western European species, especially in the northern half of France and neighbouring countries.

Orthochordeumella pallida (Rothenbühler, 1899)

58: Narcy, Forêt Domaniale de Bertranges (Oak and Hornbeam), 255m, 8.iii.2001; Oudan, Forêt Domaniale d'Arcy, Oakwood with deep litter, 280m, 8.iii.2001.
89: Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 280m, 26.ix.1992.

A species with a most unusual distribution. In France it has been found almost entirely in the Massif Central and in some north-eastern departments, continuing through the Belgian Ardennes and Luxemburg to the Rhineland. In Central Europe it is found in the Alps. These are the first records from Burgundy.

ANTHOGONIDAE

Anthogona variegata Ribaut, 1913

89: Druyes-les-Belles-Fontaines, Forêt de Frétoy, mixed woodland, Beech, Oak, Pine, *Cornus mas*, Upper Jurassic, 300m, 8.iii.2001.

The most easterly record of this species which is found in the Pyrenees and the western half of France as far north as Calvados on the coast of the English Channel.

CHAMAESOMATIDAE

Chamaesoma broelemanni Ribaut &Verhoeff, 1913

89: Chailley, Forêt d'Othe, Oak, Hornbeam, Beech, silty soil on ochre clay, 280m, 26.ix.1992.

This has a similar distribution to *Anthogona variegata* but extends further east into Lorraine.

CRASPEDOSOMATIDAE

Nanogona polydesmoides (Leach, 1814)

21 : St-Victor-sur-Ouche (Demange, 1959).

Found in many parts of France except the East, the Pyrenees and the far South-west. Many records are from caves, especially in the South. There are five other endemic species of Nanogona in South East France.

Rhymogona hessei (Ravoux in Brolemann, 1935)

21: Ancey, Beaune, Lantenet, Prenois, Vernot (Spelda, 1999).

An endemic species apparently confined to the French departments of Côte d'Or, Jura, Doubs and Haute-Saône to the west of Switzerland.

Polydesmida

POLYDESMIDAE

Brachydesmus superus Latzel, 1884

21: Corcelles-les-Citeaux, Bois des Perreaux (Oak & Hornbeam wood), 205m, 12.ix.1978.
58: St-Amand-en-Puisaye, deciduous forest, 260m, 15.v.1988.
89 : Asquins, Bois de Vaux-Lannes, deciduous woodland on Jurassic limestone, 230m, 3.xi.1985.

Common in much of Europe.

Polydesmus angustus Latzel, 1884

21: Forêt de Citeaux, Corgoloin, Flacey, Velars (Geoffroy, pers.comm., Paris Database)
58: Tracy-sur-Loire, below wood on sand on the east bank of the Loire, next to deciduous woodland with rank undergrowth, 150m, 8.viii.1985; Alligny-en-Morvan, Beech, Oak, Birch and Hazel woodland on granite, 480m, 10.iv.1994; Larochemillay, Les Corseries, Beechwood with Chestnut and Hornbeam, 495m, 10.v.2001; Larochemillay, Mont Beuvray, Beech forest with Holly, 800m, 10.v.2001.
71: Roussillon-en-Morvan, mixed forest, 555m, 10.v.2001: Autun, south of Croix de la Liberation, Beech/Oak/Chestnut woodland with Silver Birch and Rowan on granite, 580m, 11.v.2001; Antully, Forêt Domaniale de Planoise-les-Feullies, Pine and beech forest, 540m, 11.v.2001; Auxy, Bois de Repas, mixed deciduous forest, mull on brown earth, 400m, 11.v.2001.
89: Joigny, Oak/Hornbeam woodland, 220m, 9.iii.2001; Arces-Dilo, Forêt Domaniale des Rajeuses, Mixed forest, 260m, 9.iii.2001; Bussy-en-Othe, Forêt de l'Abbesse, Oakwood with Hornbeam, 240m, 9.iii.2001.

One of the commonest Western European millipedes.

Polydesmus denticulatus C.L.Koch, 1847

89: Arcy-sur-Cure (Ribaut, unpublished, Paris database)

This common European species should occur throughout the region.

Propolydesmus germanicus (Verhoeff, 1896)
21: Baulme-la-Roche, Dijon (Paris database)

An infrequently recorded species from Western and Central Europe, usually on limestone.

Propolydesmus helveticus (Verhoeff, 1894)

21: Antheuil, Bligny-sur-Ouche (Ribaut, Paris database).
58: Prémery (Jawlowski, 1933).

A West Alpine species which extends into parts of France.

Propolydesmus testaceus (C.L.Koch, 1847)

21: Antheuil, Velars (Paris database); Bèze, Meursault (Demange, 1959); Savigny-les-Beaune (Mauriès, pers.comm.).

A West European and calcicole species. Much of the Côte d'Or is limestone.

CHECKLIST OF MILLIPEDE SPECIES RECORDED IN EACH DEPARTMENT OF BURGUNDY REGION

TABLE 2: Millipede species recorded in each department of Burgundy

Species	Côte d'Or	Nièvre	Yonne	Saône-et-Loire
Polyxenus lagurus	X	X	X	X
Glomeris intermedia	X	X	X	X
Glomeris marginata	X	X	X	X
Polyzonium germanicum	X	X		
Blaniulus guttulatus	X			
Nopoiulus kochii		X		
Proteroiulus fuscus		X		
Allajulus nitidus	X	X	X	X
Cylindroiulus caeruleocinctus			X	
Cylindroiulus latestriatus		X		
Cylindroiulus londinensis		X		
Cylindroiulus parisi		X		
Cylindroiulus truncorum		X		
Julus scandinavius		X	X	X
Leptoiulus belgicus	X	X		
Leptoiulus bruyanti		X		X
Ommatoiulus rutilans		X		
Ommatoiulus sabulosus				X
Tachypodoiulus niger	X	X	X	X
Nemasoma varicorne		X		
Callipus foetidissimus	X			
Chordeuma proximum		X		
Chordeuma sylvestre		X	X	X
Melogona gallica	X	X	X	
Orthochordeumella pallida		X	X	
Anthogona variegata			X	
Chamaesoma broelemanni			X	X
Nanogona polydesmoides	X			
Rhymogona hessei	X			
Brachydesmus superus	X	X	X	
Polydesmus angustus	X	X	X	X
Polydesmus denticulatus			X	
Propolydesmus germanicus	X			
Propolydesmus helveticus	X	X		
Propolydesmus testaceus	X			

DISCUSSION

While some of the species present in Burgundy occur throughout much of Western Europe there are some Central European species there, which do not reach Western France, and some Atlantic species, which do not reach Eastern France. In addition a few species are largely Mediterranean in origin and as far as we can see from our present knowledge of distribution one or two more appear to be endemics confined to central and eastern parts of France.

With the first discoveries of *Lamyctes emarginatus* and *Geophilus osquidatum* in Burgundy, 30 species of centipede have been recorded in this region and 42 in the whole area of north eastern France (see Iorio (2007) for a complete list). North eastern France contains, in addition to species with wide distribution, several taxa, mainly central-European (*Lithobius (Lithobius) dentatus*, *L. (L.) pelidnus* Haase, 1880, *L. (L.) pygmaeus* Haase, 1880, *L. (L.) subtilis subtilis* Latzel, 1880, *L. (L.) tenebrosus tenebrosus*, *L. (Monotarsobius) aeruginosus* and *Strigamia transsilvanica* (Verhoeff, 1928)), which become rarer or absent westward (Iorio & Geoffroy, 2004b; Iorio, 2006, 2008; Iorio & Tiberghien, 2007; Barber, 2009). As Atlantic species we can quote *Stigmatogaster subterranea* which is much more common in western France, UK and other western countries, and also *Geophilus osquidatum* (Spelda, 1999; Iorio, 2006, 2008; Iorio & Tiberghien, 2007; Lindner, 2007; Barber, 2009). It is also remarkable to note that *Cryptops parisi* is much more common than *C. hortensis* in north eastern France (Iorio & Geoffroy, 2008). Moreover, in this latter region there are some taxa which highly prefer mountainous environments (*Geophilus studeri* Rothenbühler, 1899 and *G. truncorum ribauti*) and it is notable that records of "*Geophilus carpophagus*" belong to *G. carpophagus* Leach, 1815 s. str. The centipede fauna of north eastern France is thus constituted by an assembly of species of diverse origins, but it seems to be characterized by a closer resemblance to the central-European fauna than with the Atlantic fauna.

With regard to the millipedes 35 species have been recorded in the region and 63 in the whole of North-eastern France. Several species, which occur in surrounding regions, have not yet been found and, as there are both Central-European and Atlantic species in Burgundy we might expect to find at least 50 in due course. There are shades of atlanticism from those species which occur only within a relatively short distance from the Bay of Biscay to those that inhabit a large part of Western Europe. According to present records some of these species are really confined to the west and do not even reach Burgundy whereas others occur in the northern departments of France and extend eastwards sometimes as far as Scandinavia, e.g. *Cylindroiulus punctatus* a species not yet recorded in Burgundy, although it probably will be as it occurs just across the Loire in the Cher Department.

Because of the continental climate away from the sea (Bay of Biscay, English Channel, North Sea) the eastern boundary of the Atlantic species tends rather to run north-east from Central France (see the maps in Kime, 1999; 2001). The Central-European species, on the other hand, have western boundaries which run from south-east to north-west from the Alps to the North Sea or further west along the English Channel as far as Normandy so that some of these Central species which occur as far west as Britain and Ireland may not occur in Burgundy, e.g. *Craspedosoma rawlinsi* which has not been recorded as far west as the River Seine in France. It should show a north-eastern orientation in Britain, which it does, if less clearly than in the obvious case of the Central-European *Allajulus nitidus*. It is informative to compare the British and Irish distributions with those on the Continent.

Chordeuma proximum and *C. sylvestre* are allopatric and both occur in Burgundy and Normandy. The former is Atlantic and this shows up well in its British distribution; the latter is Central-European and Lee (2006) has commented on this. It is tempting to relate these diagonal boundaries to temperature, especially in the unfavourable winter months.

There are fairly large differences between the faunas of the East and the West of France. According to present data the proportion of Central European millipedes in Burgundy is rather less than for the centipedes. It would be interesting to continue the study of myriapods in North East France in the future to explore several almost unsampled sectors of this area and to know better the precise distribution and frequency of the recorded species, as well as to find perhaps other taxa unrecorded in this area.

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AN INTERESTING EXAMPLE OF REGENERATED APPENDAGES IN *LITHOBIUS CRASSIPES* L. KOCH 1862 (CHILOPODA, LITHOBIOMORPHA)

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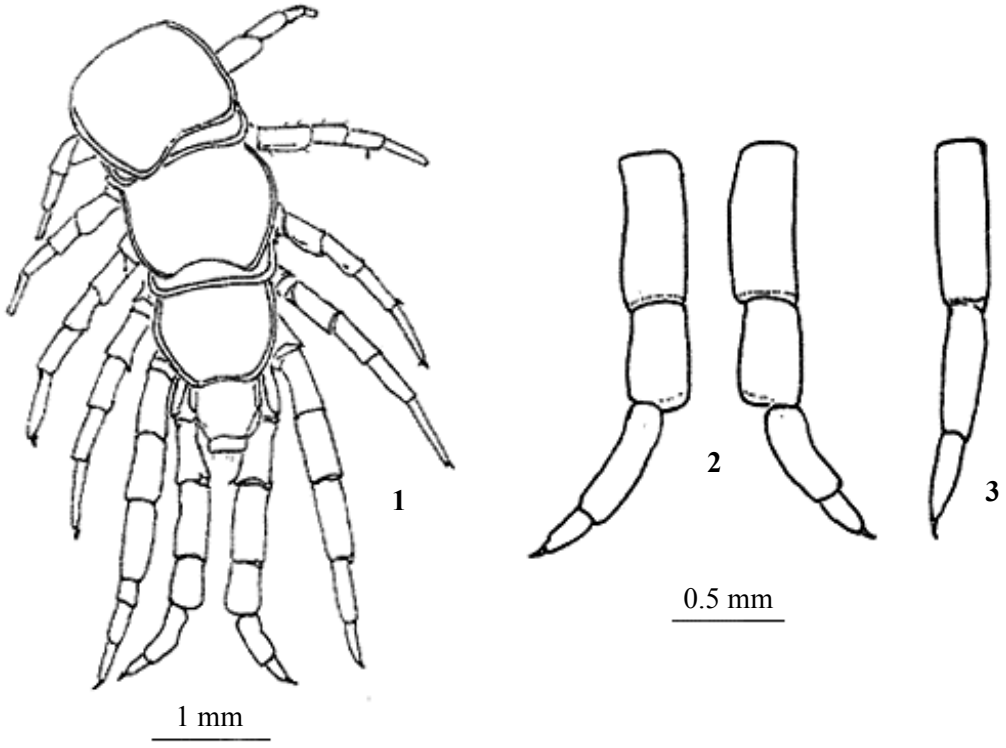
The Braes of Gight nature reserve (Scottish Wildlife Trust) is a gorge woodland on the River Ythan, in Aberdeenshire, Scotland. The woodland is a small oasis in an intensive agricultural desert which has been designated as a Nitrate Vulnerable Zone under the EU Nitrates Directive. However, there is much of natural history interest on the reserve and, for those with historical interests, Gight Castle was the home of Lord Byron's maternal ancestors.

A collection of invertebrates was made on 1st June 2006 (at NJ818288) and after all the identifications were completed one unusual male *Lithobius sp.* was left over. This specimen caused some difficulty because both hind legs had equally inflated tibiae and outwardly-curving tarsi and meta-tarsi, initially suggesting perhaps some sort of secondary sexual character. This specimen is illustrated in Figures 1 & 2.

The specimen was referred to A.D. Barber and J.G.E. Lewis who concluded that this was an abnormal specimen of *Lithobius crassipes*, further normal specimens of which had been collected on the same day at this location. The terminal segments of the hind leg of a normal male *L. crassipes* are shown in fig. 3 for comparison.



FIGURES 1-3: *Lithobius crassipes*
1. Dorsal view of terminal segments of male showing deformed hind legs.
2. Enlarged view of the deformed hind legs showing tibia tarsus and meta-tarsus.
3. Terminal segments of right hind leg of normal male for comparison.

Eason (1964) notes that centipedes are able to regenerate lost or broken appendages, with the replacement appendages becoming better developed with each moult. He warns of the importance of recognising the possibility of regeneration, since a regenerated appendage may show abnormal features. Lewis (1981) gives several examples of regenerated appendages within the Chilopoda and provides further literature references for this phenomenon.

It is concluded that that this specimen of *L. crassipes* has suffered bilateral damage at some stage during its development, resulting in a deformed but relatively symmetrical pair of appendages in the adult. No further specimens like this have been found.

ACKNOWLEDGEMENTS

I am grateful to Tony Barber and John Lewis for examining the specimen and for their expert advice on its probable identification.

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NANOGONA POLYDESMOIDES (LEACH, 1815) – NEW FOR THE GERMAN FAUNA (DIPLOPODA, CHORDEUMATIDA, CRASPEDOSOMATIDAE)

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Nanogona polydesmoides is an Atlantic millipede species that is commonly found in Great Britain, Ireland (Blower 1985), France (Brolemann 1935, Schubart 1960) and Belgium (Kime 2004). There are also some records for the Scandinavian countries Norway and Sweden (Andersson *et al*. 2005). In alpine Italian caves an isolated subspecies *N. polydesmoides italica* (Manfredi, 1931) exists.

N. polydesmoides is an annual winter active woodland species with a preference for calcareous soils (Blower 1985). It has also been found on non-calcareous soils where is concrete or mortar due to human impact (in litt. H. J. Read).

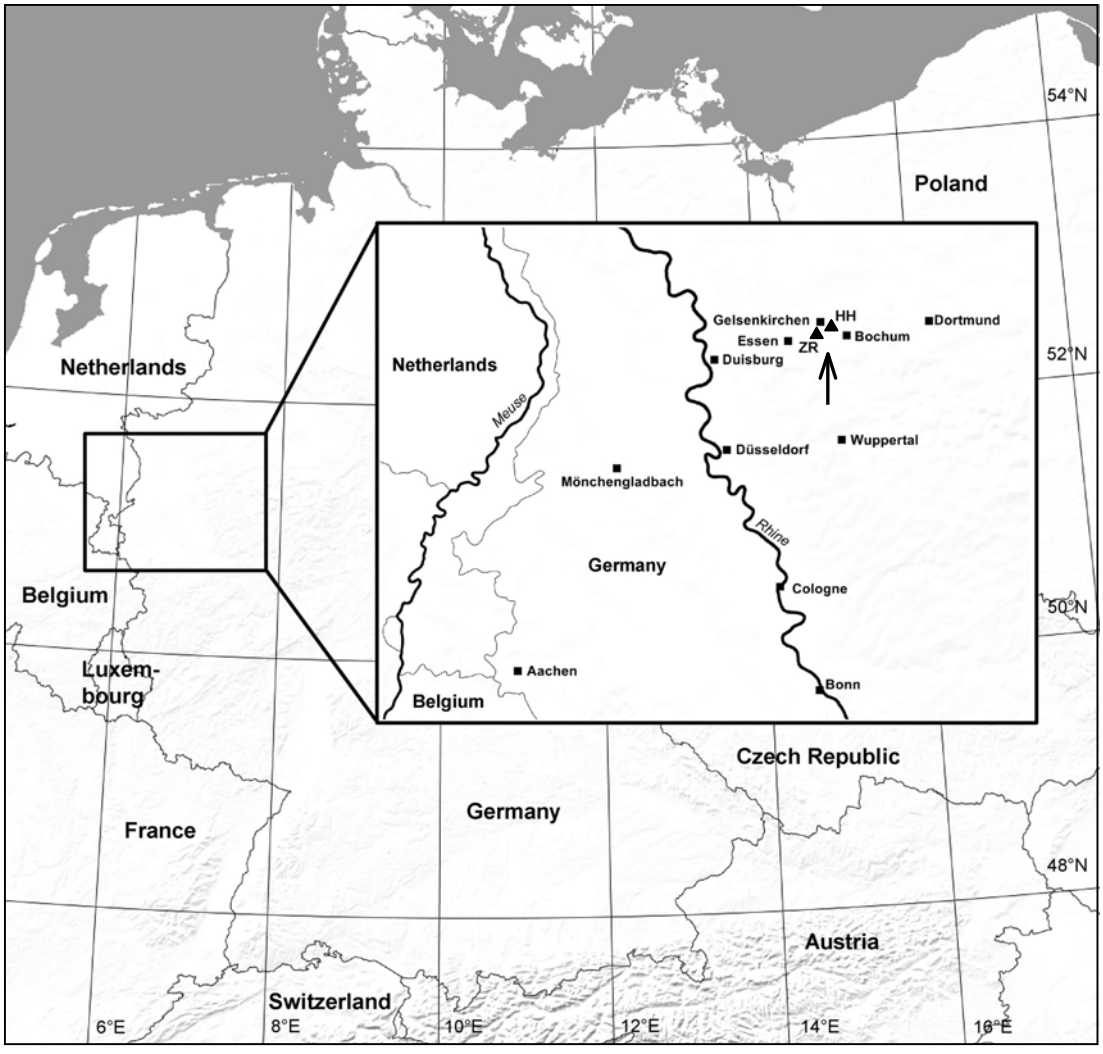

FIGURE 1: Location of the findings of *Nanogona polydesmoides* (black triangle) on the colliery spoil heaps Zeche Rheinelbe (ZR) and Halde Hannover (HH) in Germany.

Investigations of the myriapod fauna were made at the afforested colliery spoil heaps Zeche Rheinelbe (ZR) in Gelsenkirchen-Ueckendorf (51°29'N, 7°06'E) and Halde Hannover (HH) in Bochum-Hordel (51°30'N, 7°09'E) in the Ruhr Valley Area (West Germany, North Rhine-Westphalia, see Figure 1) by pitfall traps (06.iv.2007 - 25.vii.2007). There was one specimen of a juvenile of the family Craspedosomatidae on 25.vii.2007 (HH) that was certainly not known for the fauna of North Rhine-Westphalia before and could not be definitely determined to genus or species level. Only one juvenile could be found again at this site by hand collecting by the authors on 23.iii.2008. Finally two adult females were collected in the leaf litter at Halde Hannover on 19.x.2008. Surprisingly, by the investigation at Zeche Rheinelbe on 18.x.2008 found 5 males, 23 females and one subadult juvenile of this Craspedosomatidae species, also by hand collecting. All these specimens were determined using Brolemann (1935) and Blower (1985) as *Nanogona polydesmoides*. These are the first records of this species for North Rhine-Westphalia and Germany. There are unpublished records of this species by Schüsseler (1991) in the vicinity of Aachen (North Rhine-Westphalia, see Figure 1) near the Dutch border. These are however doubtful because the material is no longer available (Schüsseler in litt.).

The two colliery spoil heaps have a highly synanthropic character. These sites are also used by the residents for the disposal of garden waste. This could be one potential way for the introduction of this species. The possibility of the displaced ground material or seedlings due to renaturalisation of these sites is also conceivable. So it is probable that *Nanogona polydesmoides* occurs on further colliery spoil heaps in the Ruhr Valley Area too.

The synanthropic character in both heaps shows a rich diversity of millipedes and centipedes species on Zeche Rheinelbe (25 species) and Halde Hannover (31 species).

There was a high number of synanthropic species occurring in the Ruhr Valley Area such as *Stigmatogaster subterranea* (Shaw, 1789), *Geophilus alpinus* Meinert, 1870, *Archiboreoiulus pallidus* (Brade-Birks, 1920), *Blaniulus guttulatus* (Bosc, 1792), *Choneiulus palmatus* (Nemec, 1895), *Cylindroiulus britannicus* (Verhoeff, 1891) (only HH), *Cylindroiulus parisiorum* (Brölemann & Verhoeff, 1896) (only HH), *Cylindroiulus truncorum* (Silvestri, 1896), *Unciger foetidus* (C.L. Koch, 1838) (only ZR), *Brachyiulus pusillus* (Bosc, 1792), *Brachydesmus superus* Latzel, 1884 and *Polydesmus inconstans* Latzel, 1884 (only HH). The records of *C. parisiorum* and *G. alpinus* are the first published for North Rhine-Westphalia but are known to the authors from several other locations too.

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NORTHERLY EXTENSIONS OF THE KNOWN U.K. RANGES OF THE PILL-WOODLICE *ARMADILLIDIUM VULGARE* (LATREILLE, 1804) AND *ARMADILLIDIUM PULCHELLUM* (ZENCKER, 1798)

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INTRODUCTION

It would be fair to say that, for many invertebrate taxa, Scotland is fairly poorly recorded and this is also true for woodlice. The pill-woodlice (*Armadillidium* spp.) are certainly not thought of as being typically Scottish species, given their need for calcium and the acid nature of much of the geology. *Armadillidium vulgare* (Latreille, 1804) has a decidedly S.E. distribution in the British Isles, becoming most commonly coastal in the north of its range. Harding and Sutton (1985) show the northern-most limit for this species as being the coast of Fife, in Scotland. Collis (2006) updated the Scottish distribution with additional records from West Scotland and this appeared to reconfirm the northern limits of this species' distribution as the Clyde Estuary in the west and the Tay in the East.

Many animals are limited by the availability of calcium, including birds which require it for their egg shell and nestling development. An interesting study by Bures & Weidinger (2003) linked the breeding success of collared and pied flycatchers in Central Europe to the availability of isopods and millipedes. They showed, by experiment, that these invertebrates provided up to 3 times more calcium than the snail shells which were also found in their natural diet. The breeding performance of captive birds increased 2-3 times when woodlice were added to their diet and this confirmed their importance in the diets of wild birds.

It is generally assumed that the distribution of at least the isopod species with the heavier exoskeletons is largely governed by the availability of calcium in their environment (Sutton, 1972). This is either obtained via their food from the soil or recovered by ingestion of their own cast skins. The greater restriction of these species to the coast in northern regions probably relates both to the availability of calcium from marine derived sediments and spray, and also to the milder climate.

ARMADILLIDIUM VULGARE

It was surprising then, while on a visit to the coastal village of Johnshaven in N.E. Scotland (NO800671; V.C. 91, Kincardineshire) on 6th September 2005, to find a population of *A. vulgare*. They were living amongst builder's rubble, deposited between the top of the shingle beach and the access road on top of the raised beach. This site is approximately 50-60km further north than previous records (Figure 1). Other woodlice found along with *A. vulgare* at this site were: *Oniscus asellus* Linnaeus, 1758, *Philoscia muscorum* (Scopoli, 1763), *Porcellio scaber* (Latreille, 1804) and *Trichoniscus provisorius* Racovitza, 1908.

Its occurrence in builder's rubble, as well as probably providing a suitable source of lime, perhaps indicates that the species has been imported to this site. Sutton (1972) highlights the association of isopods with the artificial environment provided by lime-rich building materials. Another possible linked explanation for this northern range extension, is the location's use as a Travelling Peoples' stance and their traditional involvement in road building and other construction work, as well as the transport of waste materials as they travel the countryside. Various other species are suggested as having been translocated intentionally by Travelling People, e.g. freshwater pearl mussels and varieties of willow (for basketry; Wilkinson & Vedmore, 2001) and no doubt other species of plant and animal have been similarly moved accidentally over the centuries. A perhaps less romantic dispersal mechanism involves the construction or operation of the nearby disused railway line (Gregory 2009).

It subsequently turned out that this was not the first record of *A. vulgare* from this location – having first been recorded here by S.J. McWilliam on 8th August 1998, also at NO800671 (S. Gregory, pers. comm.).

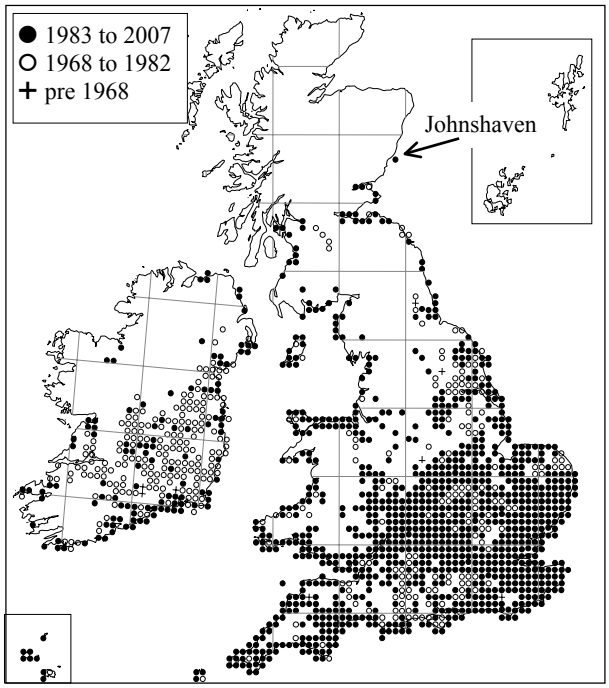

FIGURE 1: *Armadillidium vulgare.* Distribution in Britain and Ireland, highlighting the Johnshaven record (after Gregory, 2009).

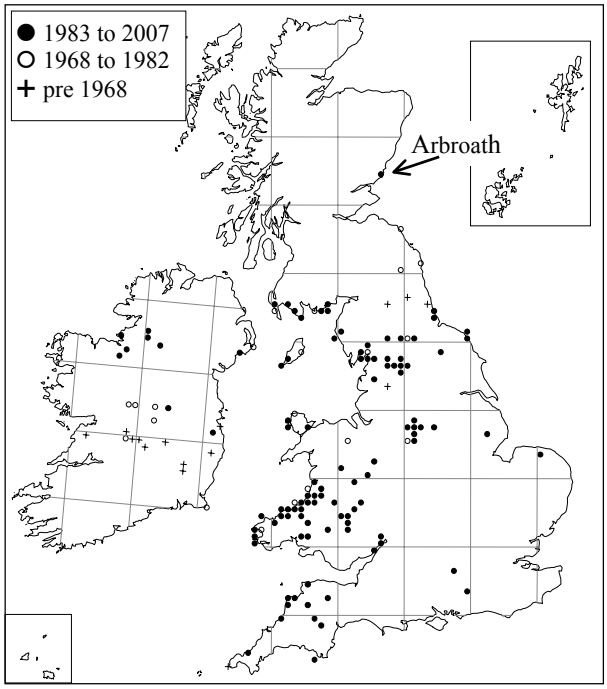

FIGURE 2: *Armadillidium pulchellum.* Distribution in Britain and Ireland, highlighting the Arboath record (after Gregory, 2009).

ARMADILLIDIUM PULCHELLUM

A much more significant record, however, was the discovery of a large population of *Armadillidium pulchellum* (Zencker, 1798) at Seaton Cliffs (Scottish Wildlife Trust Reserve) near Arbroath (NO662412; V.C. 90, Angus) on 17th May 2006. This is approximately 100km north of the pre-1980 record near Berwick (Harding & Sutton, 1985). These small pill-woodlice were found in the dry soil on a warm grass slope on the sandstone cliffs. Other woodlice recorded at this site were *P. muscorum* and *Trichoniscus pusillus* sensu lato.

Gregory and Richards (2008) provide useful supplementary information for the reliable separation of *A. pulchellum*, *Armadillidium pictum Brandt, 1833* and *A. vulgare*; correcting various errors in Oliver and Meechan (1993). They describe *A. pulchellum* as being characteristically associated with rural semi-natural habitats; tolerant of acid substrates, but favouring calcareous soils; *A. pulchellum* also seems tolerant of higher levels of insolation; all of which seem consistent with the conditions at this site. The sandstones and conglomerate rocks of the Seaton Cliffs are from the Devonian Old Red Sandstone series. The derived red soil is sufficiently lime rich in places to support plant species such as clustered bellflower (*Campanula glomerata* L.) and carline thistle (*Carlina vulgaris* L.).

It seems likely that the geology and climate at this site are consistent with this being part of the natural distribution of *A. pulchellum* and that, as it is a small and inconspicuous species, it has been overlooked in the past. Searches along the coast, where the geology and aspect are suitable (at least as far north as the Highland Boundary Fault at Stonehaven) may well produce further populations.

Curiously, a recent casual conversation with a local mollusc expert at a biological recorders' forum led to the discovery of a further record of *A. pulchellum* for the same area of Seaton Cliffs at Arbroath. This was found

by R. Marriott when looking for a rare moss at NO66974182 on 2 March 2009 while walking on moss just below the cliff top. The isopod was on a tuft of moss (Richard Marriott, pers. comm.).

ACKNOWLEDGEMENTS

Thanks to Steve Gregory for confirmation of the *A. pulchellum* specimens, information about the distribution or these *Armadillidium* species and copies of the updated maps, as well as helpful comments on the draft of this paper.

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THE LANDHOPPER *ARCITALITRUS DORRIENI* (HUNT) (CRUSTACEA: AMPHIPODA: TALITRIDAE) UP A PARKLAND TREE IN CORNWALL

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The Australasian landhopper *Arcitalitrus dorrieni* has been known from Cornwall for many years – the species was originally collected and described as 'new to science' from the Isles of Scilly (Hunt, 1925). The earliest mainland record appears to be 1950, from the Penlee Gardens in Penzance; it is now widespread across the county (Erica for Windows, consulted 2009). It also occurs elsewhere across Britain and Ireland (Harding & Sutton, 1988) where the climate is suitable, ie relatively mild, humid and frost free. It is generally regarded as an inhabitant of deep leaf litter on the soil surface, especially in shaded situations, and is best known from long-established gardens and neighbouring woodlands. The local authority on *A. dorrieni*, Dr Peter Smithers (pers. comm.), has set trunk traps for them in Cornwall but with no success.

Two flight interception traps were operated in Lanhydrock Park, near Bodmin, by the author during 2008. One was placed on a fallen sycamore tree at the park edge with plantations while the other was placed in a large old parkland oak in the middle of the pastureland. It is fair to say that one species which was not expected was a flightless terrestrial amphipod. However a large number of *A. dorrieni* were found in the oak trap during the July to September trapping period. An accurate count was not made but numbers exceeded 30 individuals.

The trap comprised four one litre plastic bottles attached to a wooded base and hung with the openings downwards so that the contents were readily emptied by unscrewing the cap. Each bottle had a large window cut into its side to permit access by flying insects. The preservative was commercial antifreeze diluted 50/50 with tap water plus a small amount of commercial washing-up liquid to reduce surface tension and ensure anything falling in would sink. The trap had been hung against the trunk about 2m above ground level and rested against split wood where a major bough had ripped out a year or so previously, leaving a large scar of exposed wood.

Since *A. dorrieni* is incapable of flight, it is assumed that the landhoppers were climbing up the trunk in large numbers, even crossing the exposed bare wood of the scar where the trap was positioned. Climbing the moss and lichen-covered bark seems more feasible for an amphipod than the bare wood but presumably they are able to use the wood fibres for climbing too. Climbing activity is presumably restricted to the hours of darkness. It is interesting that despite considerable exploration of aerial deadwood on trees across Cornwall, the author has never encountered landhoppers in this situation before.

Recent research on the species (Cowling et al, 2003) has found that the critical relative humidity below which the landhopper experiences desiccation stress is very high (95-100%), 'making it completely reliant on the leaflitter/soil microhabitat'. The latter conclusion is now shown to be incorrect.

ACKNOWLEDGEMENTS

I would like to thank Pete Smithers and Tony Barber for their enthusiasm about publishing observations on this species, and also a reviewer for directing me to the 1988 paper by Harding & Sutton.

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Erica for Windows. A software package for biological recording in Cornwall, managed by Dr Colin French.

THE PUZZLING OCCURRENCE OF TWO ELUSIVE CENTIPEDES *SCHENDYLA DENTATA* (BROLEMANN & RIBAUT, 1911) AND *HENIA BREVIS* SILVESTRI, 1896 IN OXFORDSHIRE

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INTRODUCTION

Schendyla dentata and *Henia brevis* are two small soil dwelling centipedes, reaching 12mm and 19mm in length respectively. Both appear to be rare in Britain, but have a reputation of being elusive animals with an affinity for synanthropic sites, such as gardens, churchyards and waste ground. Despite their small size both are distinctive animals under a microscope making for relatively straightforward identification (Barber, 2009).

First collected in Britain in 1968 by Tony Barber (Barber & Eason, 1970), *Schendyla dentata* has been sporadically recorded across southern England from Cornwall to Norfolk (Barber & Keay, 1988; Gregory, 1995; Gregory & Campbell, 1996; Barber & Jones, 1999; Barber, 2000). There are also isolated occurrences from Edinburgh, Scotland (Barber & Jones, *loc. cit*.) and Mid Cork, Ireland (Cawley, 2001). *Henia brevis* has been more frequently recorded in Britain, but restricted to southern England (Barber and Keay, *loc. cit*.; Keay, 1993) and several sites in south-western Ireland (Jones, 1992; Cawley, *loc. cit*.).

Between 1991 and 1995 the author and John Campbell (Oxfordshire BRC, now TVERC) undertook a systematic tetrad survey of the myriapods occurring in Oxfordshire. In addition to semi-natural habitats this survey included about 150 churchyards and several domestic gardens. Subsequent records are also considered.

OBSERVATIONS

The results of the survey indicated that both species were widespread across the county, typically being recorded from old well-established churchyards, occasionally in gardens (Gregory & Campbell, 1996). To date *S. dentata* has been recorded from 12 localities and *H. brevis* from 15. Details of these records are presented in Table 1. The distribution of the two species in Oxfordshire, is given in Figure 2.

Typically singletons of either species were found by carefully searching the underside of large stones (such broken gravestones abandoned in neglected corners) or by sorting the superficial soil layer beneath. As with other geophilomorphs, they often give away their presence by wriggling when disturbed. The preponderance of churchyards in the survey results simply reflects the ease of access to these sites, which are open to the public, unlike private domestic gardens. However, the strong association of both species with synanthropic habitats is very clear.

Barber (1987) reports that most *S. dentata* records are made during the winter months (Oct to April) and this fits precisely with the Oxfordshire data (20th Oct – 19th May, Table 1), which is plotted in Figure 1. In cold frosty weather this normally elusive species was sometimes encountered in superficial microsites, such as beneath a piece of brick resting on the soil surface at Littlemore Churchyard or, in Essex, beneath a seed tray on Christmas day in a domestic garden (Gregory, 1995). In contrast, records for *H. brevis* show a peak in late spring (April to June), with no records made during the depths of winter (Figure 1).

However, the most striking result is that the two species appear to have mutually exclusive distributions across the county (Figure 2), first noted by Gregory and Campbell (1996). *B. dentata* is apparently absent from the south and west of the county where the equally scarce *H. brevis* is widespread. The reason is not clear and would repay further study. Unfortunately, it is not possible to make a comparison with other parts of the British Isles, as there are very few records of the two species from other counties.

TABLE 1: Records for *Schendyla dentata* and *Henia brevis* in the administrative county of Oxfordshire (vc23 & part vc22). Steve Gregory & John Campbell *leg*., Steve Gregory *det*.

Species	Locality	Date	OS Grid Reference	Habitat
Schendyla dentata	Cropredy Church	05 Feb 1992	SP469467	Churchyard
	Church Enstone Church	29 Apr 1992	SP379251	Churchyard
	Tadmarton Church	19 May 1992	SP392379	Churchyard
	Hornton Church	05 Feb 1993	SP393450	Churchyard
	Bucknell Church	12 Mar 1993	SP561257	Churchyard
	Littlemore Church	20 Oct 1993	SP538028	Churchyard
	Great Milton Church	22 Oct 1993	SP628025	Churchyard
	Beckley Church	27 Oct 1993	SP562112	Churchyard
	Charlbury Church	17 Nov 1993	SP354195	Churchyard
	Kiddington Park	02 Dec 1993	SP412229	Ornamental parkland
	Bicester (St. Egburgs) Church	02 Nov 1995	SP583224	Churchyard
	Begbroke Church	02 Dec 2005	SP468139	Churchyard
Henia brevis	Linkside Lake	03 Jul 1991	SP498104	Domestic garden
	North Moreton Church	13 Mar 1992	SU564896	Churchyard
	Shellingford Fish Pond Copse	18 Mar 1992	SU319936	Secondary woodland
	Aston Rowant Church	21 Apr 1992	SU727990	Churchyard
	Shiplake Church	15 Jun 1992 17 Feb 1993	SU767783	Churchyard
	Kingham Church	17 Jun 1992	SP258238	Churchyard
	Ashbury Church	16 Feb 1993	SU265849	Churchyard
	Broadwell Church	24 Mar 1993	SP253042	Churchyard
	Sparsholt Church	24 Sep 1993	SU346875	Churchyard
	Salford Church	14 Oct 1993	SP286281	Churchyard
	Fyfield Church	14 Mar 1994	SU423989	Churchyard
	Brightwell Baldwin Church	22 Mar 1994	SU653950	Churchyard
	Great Coxwell Church	23 Mar 1994	SU270934	Churchyard
	Grey Eaves , Burford	10 Apr 1994	SP256113	Domestic garden
	Hill Farm, Little Wittenham	21 Apr 1994	SU563925	Domestic garden

DISCUSSION

H. brevis is a predominantly Mediterranean species at the edge of its range in Britain (Barber & Keay, 1988). While this explains the southern distribution in Oxon, it does not explain the lack of records of *S. dentata* from this area, since this latter species is also well known in southern England. Perhaps there is some competition between the two species. Certainly, *H. brevis* is the larger of the two and perhaps it out-competes *S. dentata* in the southern parts of the county. Unfortunately, due to the paucity of records little is known of the biology of these two species. However, they seem to be mature (or at least, easier to find) at differing times of the year, suggesting that they have different life cycles and/or exhibit differing behavioural patterns. It may be that the Mediterranean *H. brevis* retreats deep into the soil during cold weather, whereas *S. dentata,* which is known from the high Pyrenees, is able to tolerate cold conditions.

In keeping with other soil dwelling fauna, it is likely that soil conditions are the most important factor in determining the distribution of the two species. The distribution map (Fig. 2) also indicates the underlying geology across Oxfordshire. This consists of three limestone ridges (oolites, corallian and chalk) running

roughly south-west to north-east across the county, separated by two low lying clay vales (Powell, 2005). This to appears to conflict with the apparent north-east and south-west distributions of these two centipedes.

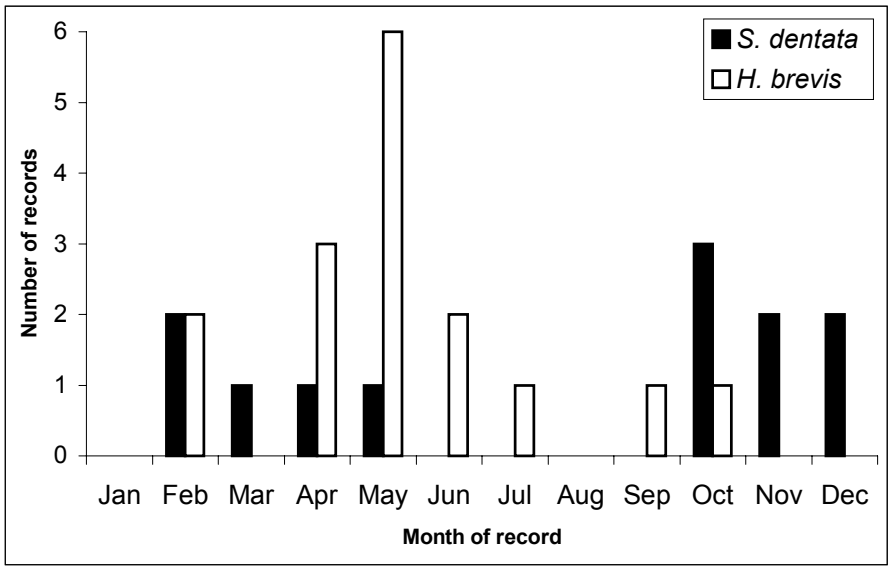

FIGURE 1: Number of Oxfordshire records of *S. dentata* and *H. brevis* made per month. Details of species records are given in Table 1.

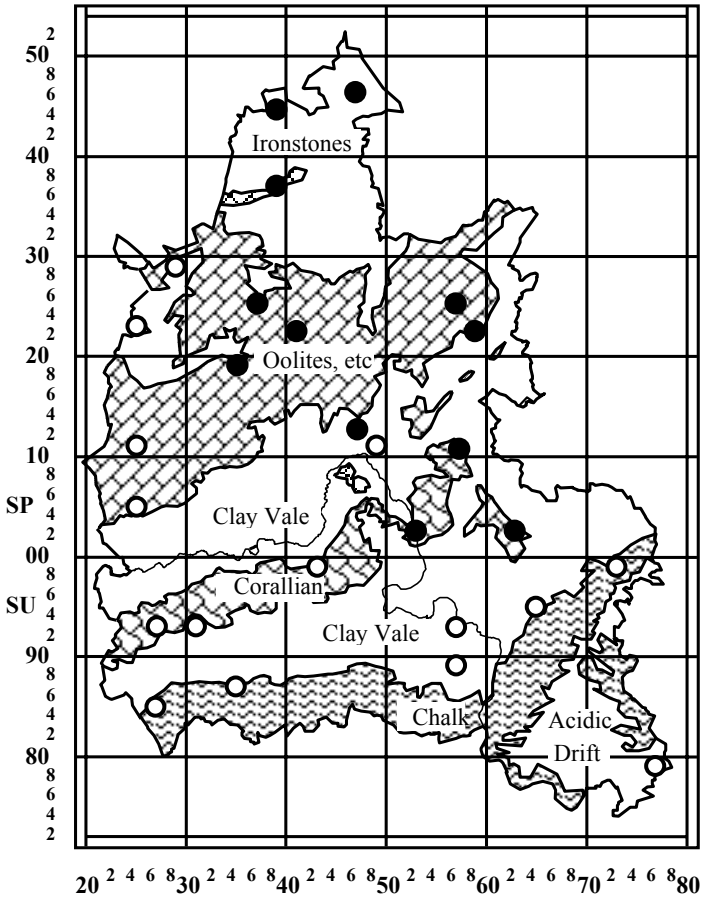

FIGURE 2: Distribution of *Schendyla dentata* (●) and *Henia brevis* (O) in the administrative county of Oxfordshire (vc 23 and part 22) in relation to the underling geology. Species records are plotted at tetrad (2km) resolution.

Observations in Oxfordshire suggest that *S. dentata* favours sandy or friable calcareous soils (Gregory & Campbell, 1996). Barber & Eason (1970) also report that friable substrates (mixed loam with grit, stones, broken glass and chalk particles) may be important for *S. dentata*. Many of the Oxfordshire localities for *S. dentata* are on the corallian, oolitic or ironstone limestone beds in the northern parts of the county, which locally contain sandy partings or weather to produce light soils. In contrast many of the *H. brevis* records in the south are from lower chalk or the band of upper greensand that lies at the base of the chalk escarpment (i.e. the southern edge of the adjacent clay vale). These typically weather to produce heavier silt-clay soils. It is apparent that neither species shows an affinity for the heavy, poorly drained, soils of the clay vales.

To conclude, there has been sufficient field-work in Oxfordshire to suggest that *S. dentata* and *H. brevis* are likely to be very under-recorded elsewhere for the following reasons:

- Both are very elusive and easily overlooked because of their small size.
- Few recorders routinely survey churchyards (instead favouring semi-natural habitats).
- Records of *S. dentata* are predominantly made in mid-winter when many recorders stay indoors.

The mutually exclusive distribution between these two centipedes in Oxfordshire appears to be real:

- *S. dentata* seems to favour lighter, more sandy, soils in the northern parts of the county.
- *H. brevis* is tolerant of the heavier silt-clays of the south.
- Both species avoid the heavy soils of the clay vales.

If searched for both species will probably prove widespread in urban areas, within their respective ranges across Britain, if not Ireland too, wherever soil conditions are suitable.

ACKNOWLEDGEMENTS

I am grateful to John Campbell (Oxfordshire Biological Records Centre) for his encouragement and for providing access and transport to otherwise inaccessible parts of Oxfordshire.

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DISCOVERY OF *TRACHYSPHAERA LOBATA* (RIBAUT, 1954) IN WALES

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On 21st March 2007 I looked for the woodlouse *Oritoniscus flavus* (Budde-Lund, 1906) at its only site in the UK, discovered by Ian Morgan at Bynea, Llanelli, Wales in 1994. Within a few minutes of sieving moss and plant litter many *Oritoniscus* were located and my appreciation was mentally extended to Ian and others who had encouraged me to look there. Also, almost immediately I became aware of another speciality - a relatively large white microglomerid with heavy transverse ridges that stood out against the silty soil darkened with coal dust - *Trachysphaera lobata* (Ribaut, 1954) at its first site in Wales, and second in the UK. The first site in the UK was discovered in 1984 on the Isle of Wight by Dick Jones and Andy Keay (Jones & Keay, 1986) who give an excellent description and drawing of the species. According to Jean-Paul Mauriès (communication to Paul Lee in June 2005) the precise identity of the species present in the UK is not completely certain since the telopods (in the male) of the UK specimens do not seem to match the published description of *T. lobata*; it and closely related species in western Europe may be in need of revision. However, the telopods from the three British sites appear similar, referring to Dick Jones' drawing of those from the Isle of Wight. The source of the population is open to question but it is likely to have been an introduction from western Europe; both the Isle of Wight and Llanelli have or had coastal ports nearby. The question will be considered in a later paper.

The site at Bynea (SS54829851, vc44, Alt.6m asl.) is a patch of scrub with a small clearing containing brambles and ruderal herbs, bounded on all sides by reens or ditches; a footpath runs along one edge (Fig. 1). The site is immediately north of a transport corridor with the A484 road and the main coast railway line; there is an extensive network of drains and historic reens as the area, including the *Trachysphaera* site, is reclaimed marsh (originally salt marsh) and the water table seems to be carefully controlled within narrow limits about a metre below the surface. This seems to be an important factor in the suitability of the site for *Trachysphaera* (for *Oritoniscus* also) as the soil, of silt darkened with coal dust and enriched with humus, is relatively shallow (10 - 15cm) on top of clay or hard compacted mine spoil from the immediately adjacent and abandoned coal mine, the only obvious remnant being the tall brick chimney. A branch railway line served the mine, marked by the remaining embankment across the marshes and grazing fields.

Although studies on the ecology of *Trachysphaera* at the Llanelli site are ongoing, a few notes on their densities may be of interest: they ranged from zero or very low at the fringes of the one hectare site to what was an extreme, a very localised concentration in which 140 were counted from 1.1L of soil from under a rotten, partly buried log in humus-rich soil next to a reen - a density of 127 per litre (127,000 per m^3). A typical sample or an average of many samples though would surely contain considerably less: for example one from near the centre of the study area on 26th February 2008 contained 180 specimens in 4L (45 per litre, 45,000 per m^3). It should be noted that the densities quoted per m^3 are largely meaningless since the soil depth is only of the order of 10 - 15cm, but they are given for comparison with Lee *et al*. (2005). As sampling technique and experience improved, an increasing proportion of the immature stadia (probably all except for stadium I) were found.

For comparison, at East Cliff, Bembridge, Isle of Wight in 1984, Jones & Keay (1986) found densities of 28 *Trachysphaera* per 0.005m^3 (5.6 per litre, 5600 per m^3), seemingly commonest at a depth of 15cm. Lee *et al.* (2005) found densities in 2005 of 2.18 per litre (2180 per m^3) and remarked that the species seems to have declined in numbers at East Cliff (figures from their table of results have been averaged). In all cases samples were not random being taken from sites selected for the likelihood of obtaining positive results.
The conservation of the Bynea site and its special fauna is hopefully assured by the local Carmarthenshire County Council although there is extreme pressure for infilling and development on the surrounding marshes and fields, being on the edge of Llanelli and on the flat coastal belt of south Wales. The site is owned by the local council, at one end of an area designated for the protection of the Water Vole - a BAP species. However, the site is likely to become further surrounded by industrial development, housing and amenity areas - subject to pollution incidents from the road and into the watercourses, and from fly tipping. Careful

maintenance of the water table must be assured and any conservation activities carefully monitored to prevent soil compaction, burning of cleared vegetation, over-zealous scrub clearance and inappropriate use of herbicides and insecticides. In addition any damaging footpath operations and demolition or reconstruction work on the historic mine chimney needs to be closely controlled. Otherwise the site and its important fauna are critically vulnerable.

FIGURE 1: The *Trachysphaera lobata* locality at Bynea

It came as a considerable surprise to the author to find the species again on 5th April 2009 under a hedge at the edge of the churchyard of the sparse and remote village of Llanwrtyd in mid Wales (SN86354780, vc42, Alt. 220m asl) apparently far removed from mining or industrial connections as a source of introduction. The question naturally arises - is *Trachysphaera lobata* actually a native species that has been seriously overlooked? This is actually difficult to countenance as it is a relatively large and obvious animal to anyone studying small soil organisms, using a variety of methods; soil invertebrate studies have been carried out extensively by university students at all levels and by agricultural research organisations up and down the country for many years.

However the timber export industry might be a possibility; viz. the railway 2.5km away at Llanwrtyd Wells runs directly to Llanelli on the coast (or lorries, or a combination of the two may have been involved) and trucks returning to pick up more timber for pit props or for export, from the extensive forests surrounding Llanwrtyd, may have carried the species in adhering mud. Also noteworthy is the fact that the *Trachysphaera* site at Llanelli is 100m from the present day main coastal railway line, 600m from the branch line to Llanwrtyd Wells and, more pertinently, is actually on the terminus site of the historic branch line to the long-closed coal mine.

The single male and four female mature specimens were found among moss at the surface and in the friable, structured and well-drained soil up to 5cm down. Shaded by the hedge, the soil in the very small area examined was moist (even after several weeks of dry weather) and central Wales is well endowed with

rainfall through most of the year. The soil habitat accords with that at Llanelli - a structured crumble, rich in humus, with many cavities, that is shaded, and neither dries out nor becomes waterlogged.

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My thanks go to Ian Morgan and others for encouraging me to look at the Llanelli site, to Jean-Paul Mauriès for his opinion on the identification problems, to Paul Lee and Andy Keay for sharing this information and to Dick Jones for a drawing of the telopods of an Isle of Wight male; additionally to Paul Lee for information on the Bembridge site.

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POLYXENUS LAGURUS (LINNÉ) IN TRADITIONAL ORCHARDS

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A previous paper (Alexander, 2006) reviewed personal data on the habitat associations of the bristly millipede *Polyxenus lagurus*. Recent work on the invertebrate fauna of traditional orchards across southern Britain has produced new records and raised further questions about its habitat preferences.

During 2004 the author was involved in a large research project commissioned by English Nature to investigate the biodiversity of a suite of traditional orchards (Lush *et al*, 2009). The study sites were in Devon (3 sites), Cambridgeshire and Kent (one site each). Interestingly, *Polyxenus lagurus* was found to be present (in abundance) in just one of these five orchards: Colston Farm (SX750648), S. Devon. Its apparent absence from Luscombe Farm Orchards (SX748637) was particularly striking as these two sites are within 1km of each other and therefore experience similar climatic conditions. As the project brought together a broad set of data on the orchards, it might be instructive to compare and contrast the findings for the two sites.

Some key features of the two orchards are shown in Table 1.

TABLE 1: Comparative data

	Colston	**Luscombe**
Physical environment		
Altitude	30-40m	80-110
Gradient	10%	5-30%
Surface soil	Sandy loam; freely draining, slightly acid, low fertility	Sandy loam, freely draining, slightly acid, low fertility
Aspect	NE to N	E to SE
Biological environment		
Tree age structure (years)	80+, 20-30, & recent plantings	80+ (a few only), 18 (most trees)
Epiphytic lichens	*Usnea articulata* absent, so presumably a less humid environment	The high humidity requiring *Usnea articulata* present on about 10 trees

Both are currently under organic fruit production (apple juice and cider), and both have been orchards for in excess of 100 years. Unfortunately estimates of canopy cover are not available – the Colston Farm orchard had a more open aspect and was notably well-lit, in contrast to the Luscombe Farm orchard which was more enclosed within a well-wooded stream valley. This may well explain the presence/absence of the lichen *Usnea articulata*, which requires high humidity levels, and perhaps also provides clues about *Polyxenus lagurus*. None of the other features appear to provide a better explanation. Does *P. lagurus* favour relatively sun-exposed sites with moderate humidity levels?

The author has also found *P. lagurus* in other traditional orchards in Devon and more widely in Forest of Dean District, West Gloucestershire, but the millipede is by no means a regular or predictable feature (Table 2). Unfortunately most of these visits have been relatively brief and the level of site survey very restricted in comparison to the 2004 study.

These records suggest that *P. lagurus* is widespread in traditional orchards in the west of England (Devon and especially West Gloucestershire) but has not been found in any further east – Cambridgeshire and Kent sites were included in the 2004 study, and the author has also been working in a large number of Kent

orchards, as well as in East Gloucestershire, Herefordshire and Worcestershire, in recent years. Examination of the distribution map (Lee, 2006) shows that the species is actually present in these areas and it may be that the local orchards do not meet its exacting requirements under the different climatic conditions.

TABLE 2: Records from other traditional orchards

Location	Date of record (s)	Tree species	Situation where found
South Devon			
Castle Orchard, Compton, Marldon (SX8664)	11/ix/2007	Apple	Knocked from branches
West Gloucestershire			
Broadway Farm Orchards, Westbury-on-Severn (SO7514)	25/v, 26/vi, 15/vii/2003	Apple	Knocked from branches & also found in dry brown-rotten heartwood in the trunks
Denny Hill Orchard, Minsterworth (SO7516)	13/iv/2002	Apple	
Pear Tree Farm Orchards, Pope's Hill, Blaisdon (SO684152)	28/ix/2006	Plum	Abundant (>100 individuals) on trunk of a standing dead tree
Placket Pool Orchard, Minsterworth (SO7616)	13/iv/2002	Pear	Tree stump
Tibbs Cross, Green Bottom, Blaisdon (SO6715)	23/vi/2002	Plum	Brown rot in old standing trunk
Woodend Farm orchards, Twyning (SO8935)	24/x/2007	Plum	Colony on trunk

Humidity patterns are clearly an important factor determining the presence of *P. lagurus* but the relationship appears very complex. Lee (2006) mentions that the millipede is best sought on stone walls at night, especially in humid conditions, but the permanently humid conditions required by the lichen *Usnea articulata* (see above) appear inimical. Perhaps wide fluctuations in humidity is the key? - relatively drying conditions most of the time, discouraging luxuriant plant growth on the bare surfaces, but with intermittent periods of high humidity to permit exploration and feeding?

ACKNOWLEDGEMENTS

The English Nature 2004 study was organised by Just Ecology, while other records reported here arose mainly from work commissioned by the People's Trust for Endangered Species, plus contracts for English Nature (Ledbury Office) and the Devon & Cornwall Regional Office of the National Trust.

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NEW RECORDS AND OBSERVATIONS OF GLASSHOUSE MILLIPEDES IN ABERDEEN

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On a visit to the David Welch Winter Gardens at the Duthie Park in Aberdeen (NJ937045) on 6th November 2009, I noticed the curled up corpses of a flat-backed millipede caught in the cobwebs along the window sills. Three of these were taken for examination and provisionally identified as *Oxidus gracilis* (C.L.Koch, 1847).

A further visit was made on 20th November 2009, when searches were made below the staging in the potting-up glasshouses, which are not open to the public. These proved to be disappointingly tidy - but there was a sufficient amount of timber, brick, plastic sheeting and pots to yield a number of interesting finds. The following four species are new records for Aberdeenshire.

Oxidus gracilis – one adult male and a number of immature specimens below a sheet of plastic
Cylindroiulus vulnerarius (Berlese, 1888) – one male in some leaf litter in the main glasshouse
Choneiulus palmatus (Nimec, 1895) – numerous males and females
Nopoiulus kochii (Gervais, 1847) – a single male

Several *Oxidus gracilis* (including one adult male) were found almost immediately, under a plastic sac on soil. The first UK record of *Oxidus* was in a glasshouse at Morningside, Edinburgh, in 1898 (Evans, 1900) with several, more recent, records at the Botanic Gardens in Edinburgh and a 1912-13 record by R.S. Bagnall at the Glasgow Botanic Garden.

A medusa-like aggregation of *Choneiulus palmatus* was found, apparently devouring the remains of a snail. It was assumed that they were consuming an already dead corpse. This species is normally associated with gardens and glasshouses in Scotland (Lee, 2006). *Choneiulus* is the most commonly recorded of these species in Scotland – mostly between the Lothians, Fife and Angus.

A single live male *Cylindroiulus*, tentatively identified as *C. vulnerarius,* was collected from some leaf litter. The millipedes were stored in a container in the fridge for two days but unfortunately the *C. vulnerarius* died and partly disintegrated in that time. Although the head was missing the gonopods and tail end allowed confirmation of its identity. There is the possibility that the *Choneiulus* (already potential suspects in the death of the snail) played a role in its rapid demise. *C. vulnerarius* has previously been found in the Botanic Gardens in Glasgow, Edinburgh and St. Andrews.

One of the "*Choneiulus*", which had been set aside, proved to be a male *Nopoiulus kochii*. This species has previously been found in Edinburgh, Fife and Berwickshire. It is generally associated with buildings or waste ground (Lee, 2006) and has been found in the Edinburgh Botanic Gardens. Examination of the gonopods was slightly more difficult than for *Choneiulus*, but in both cases a combination of dark-field sub-stage and incident illumination made the structures visible without dissection.

ACKNOWLEDGEMENTS

I am grateful to Alan Findlay, manager of the Winter Gardens, for permission to search behind the scenes. Information on previous Millipede Recording Scheme records was provided by Paul Lee and details retrieved from the National Biodiversity Network Gateway.

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ARMADILLIDIUM PICTUM BRANDT, 1833, DISCOVERED IN STAFFORDSHIRE, AND COMMENTS ON ITS HABITAT ASSOCIATIONS

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Gregory (2009) suggests that *Armadillidium pictum* may have been overlooked in areas within its British range. It is now possible to add Staffordshire to the counties where it has been found, extending its known distribution at the southern end of the Pennines. It was found on two occasions in one small area in Dimmings Dale in Staffordshire Moorlands District. This dale is a wooded ravine, a tributary stream of the River Churnet cutting through the Bunter Sandstone and exposing several outcrops of the harder Keuper rocks (according to the SSSI citation). The precise location of the records lies on the south side of the ravine, but on the east-facing slope of a small re-entrant valley (SK054428), within Threap Wood. While the slopes are generally heavily wooded with oak *Quercus*, this particular patch is very open, more of a large and apparently permanent glade with bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* agg. the dominant vegetation, with much climbing corydalis *Ceratocapnos claviculata*. While beating this vegetation over a sweep net in search of corydalis weevils, a single *A. pictum* was found in the net on 2 June 2009 and again on 6 August 2009, in virtually the same place. The first specimen was retained as a voucher and identified with the help of Gregory & Richards (2008) .

Gregory's (2009) habitat description – the presence of suitable rocky terrain, such as talus slopes with accumulations of scree, rocks or boulders – is close but in this case the talus slopes are derived from Sandstone and are of a fine sandy material. The species seems to favour sheltered, humid situations, on friable and free-draining soils, but tree canopy does not seem to be important. The species has been provisionally classified as belonging to the *F3 shaded field and ground layer assemblage* in Natural England's developing Invertebrate Species and habitat Information System (ISIS) (Drake *et al*, 2007)[i] but this clearly is incorrect as shade does not appear to be essential – soil drainage characteristics are perhaps the single most important factor for many terrestrial invertebrates and this factor needs greater prominence in ISIS.

The conservation issues here relate to forestry and rhododendron. The site is now owned and managed by Forest Enterprise, although this small re-entrant area appears to be under minimum-intervention management. Rhododendron has been controlled elsewhere in the Dale but this small area has just a few isolated bushes and has not yet been affected. It is not known whether the disturbance caused by rhododendron control would be damaging to the woodlouse, through soil disturbance and/or compaction, but too much rhododendron would probably be worse. Much of the Dale has been designated a SSSI, including the woodlouse site.

ACKNOWLEDGEMENTS

The Dimmings Dale survey was commissioned by the local office of Natural England.

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[i] ISIS is a computer application that Natural England is developing for the recognition and scoring of invertebrate assemblage types. In particular it addresses the analytical methods needed to interpret survey results, including Natural England's method for implementing the Common Standards Monitoring of invertebrates on designated Sites of Special Scientific Interest. The assemblage classification is intended to reflect the structural features of the habitat requirements of invertebrates, to link the species with conservation management rather than vegetation types per se. Thus for *A. pictum*, soil drainage and air humidity at ground level are more important than the plant species which form the vegetation, and so lack of disturbance is the key conservation objective - to classify this species as a shade-demanding species misses the point and could potentially lead to damaging conservation management operations.

SHORT COMMUNICATIONS

A FEW MYRIAPOD RECORDS FROM PICARDIE, NORTHERN FRANCE

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During a brief visit to Picardie in April 2008 a few myriapod records were made and, in view of the paucity of published records from the area it seems useful to list these. All the sites were in the Somme Département, a number of the millipedes were kindly identified or confirmed by Helen Read.

Quend Ville:
Waste ground, near church (09.iv.08):
Geophilus electricus f
Grounds of ruined château (08 & 09.iv.08):
Henia vesuviana m, *Geophilus flavus* m
Lithobius forficatus ffii, *L. melanops* m, *L. microps* m
Cylindroiulus caeruleocinctus 1m 6f, *C. punctatus* m
Allaiulus/*Leptoiulus* sp. 6f, *Polydesmus* sp. f,i

Parc Ornithologique du Marquentaire:
Under wood by path (08.iv.08):
Lithobius forficatus, *Ommatoiulus sabulosus*

St. Valery sur Somme:
Grassland at HWS, Cap Hornu (10.iv.08):
Henia vesuviana mfff, *Geophilus flavus* f

Crécy-en-Ponthieu area:
Battlefield area (11.iv.08):
Under stones by road: *Henia vesuviana* mm
Wood on grass: *Polydesmus angustus* f
Forêt de Crécy by D111, (11.iv.08), deciduous woodland, under wood, bark, etc:
Geophilus truncorum 4, *Cryptops hortensis* 2, *Lithobius crassipes* mf
Glomeris marginata, *Cylindroiulus punctatus* 3, *Polydesmus angustus* f

Searches were made at St. Valery & elsewhere on the Baie de Somme on saltmarsh and other areas for littoral species, all completely unsuccessful. It would be useful to have records of such species from this area of coast for comparison with those of Southern England and those known from Brittany.

POLYDESMUS ANGUSTUS IN WEB OF *META MENARDI* IN THE FOREST OF DEAN

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While visiting Hopewell Colliery in the Forest of Dean, Gloucestershire with my daughter and family on 28th May 2003 I noticed a dead specimen of *Polydesmus angustus* Latzel 1884 suspended in a web of a female of the Cave Spider *Meta menardi* (Latreille 1804). Smithers (1996 & 2004) does not mention any of the Polydesmus species as being prey of this spider in Devon.

The observation was in the twilight zone, about 50m in from the gated exit which opened into woodland. The *Polydesmus* could have crawled in from the entrance or down through the fissured rock strata from the

surface several metres above. The specimen (male) was dead but appeared not to have been damaged, digested or decomposed, so there was no indication whether it had simply fallen into and been suspended by the web, or whether it really was a prey item to be consumed later. The web was at about head height (just under 2m) at an angle to the vertical where the wall curved irregularly to the roof of the tunnel. The spiders *Metellina merianae* and *M. mengei* were also present in the tunnel, in webs nearer to the gate.

The mine is beside the B4226 Speech House Road between Coleford and Speech House, at SO604115, vc34, Alt.110m asl. It is a small family-run business which is both a working mine and a show mine open to the public on payment of a fee.

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FURTHER OBSERVATIONS OF *BUDDELUNDIELLA CATARACTAE* IN WALES

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Another inland site in Wales has been located for *Buddelundiella cataractae* Verhoeff 1930 to add to that reported by Harper (2004) in the Clydach Gorge, Abergavenny. On 2nd April 2009 I found a singleton of the species five kilometres downriver from the previous site, on the alluvial plain close to where the River Clydach joins the River Usk, by the village of Gilwern - this time among soil crumbs under pots of Passion Vine in my backyard (SO247153; vc42; Alt. 65m asl); five more were found there on 21st April. There would appear to be no obvious link between the two sites except perhaps transfer on dirty boots; or perhaps the species is generally distributed in the area from its industrial past of iron and coal mining, iron smelting, limestone quarrying, lime burning and the associated canal and railway links from the welsh coastal ports - Newport, Cardiff and Barry being the nearest. At the time I was looking for tiny Collembolans to feed a very small subadult Theridiid spider which accounts for my concentration on minute invertebrates. *B. cataractae* has a very close resemblance to a grain of sand when rolled up, in colour, translucency and size, which makes detection difficult, but in warm weather and a damp situation the animal readily uncurls and moves slowly within about 20 seconds if one observes a small area for long enough.

In 2008 two further sites for the species were discovered on the coast of south Wales, the species' stronghold in the UK, during the BMIG field weekend based on Swansea. I am grateful to Steve Gregory and Ian Morgan for allowing me to include the records here:

28th March 2008: Steve Gregory found four specimens at Bracelet Bay, Mumbles, Swansea (SS630872 vc41) - under stones embedded within a clay bank above high water mark of a shingle beach.

29th March 2008: Ian Morgan found one individual only at North Dock, Llanelli (SS 499999 vc44) - under plant material deposited by a very high spring tide at the edge of a river, adjacent to a former industrial / dock area (now next to a road). The grid ref was extremely difficult to ascertain as the site lies at the junction of four 10km squares. It could be at SN499000 (ie. the next one north).

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MILLIPEDES FROM SHROPSHIRE: A REPORT ON THE 2007 FIELD MEETING

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INTRODUCTION

Myriapod fossils from Late Silurian rocks in Shropshire (Jeram *et al.,* 1990) have attracted much attention but there has been relatively little work on the modern millipede fauna of the county. There are only 100 millipede records from VC40 included in the data set for the millipede atlas (Lee, 2006). My own visits to Preston Montford between 2004 and the present day have produced another 40 records and a handful of other records are held by CCW in their databases.

THE GROWTH OF THE SHROPSHIRE CHECKLIST

The first modern record for Shropshire appears to be *Julus scandavius* collected from Prees Heath by Hilda Brade in 1916 (Brade & Brade-Birks, 1917). Blower (1972) indicates that by 1972 only one more species, *Polydesmus angustus*, had been added but gives no details and there is no corresponding record in the BMIG dataset. A collection of millipedes made by H. Hooper from Walford in 1974 was identified by Colin Fairhurst and increased the county list to nine species with the addition of *Brachydesmus superus, Polydesmus denticulatus, Nemasoma varicorne, Ophyiulus pilosus, Cylindroiulus punctatus, Brachyiulus pusillus* and *Tachypodoiulus niger*. Four more species were recorded for the first time the following year. In June 1975, Colin Fairhurst, collecting at Adderley, discovered *Proteroiulus fuscus* and *Cylindroiulus britannicus*. Later, in September, Mrs M. Fogan collected a number of millipedes during a visit to Shropshire and passed them to Adrian Rundle for identification. Amongst her specimens were the first county records of *Glomeris marginata* from Comley and of *Nanogona polydesmoides* from Much Wenlock. A set of undated Fairhurst records, including *Cylindroiulus latestriatus*, from Weston-under-Redcastle probably dates from around this time. There was little more activity by myriapologists in the county until the 1980's when Tony Barber collected the first *Blaniulus guttulatus* and Keith Alexander collected the first *Ommatoiulus sabulosus*. The next additions came in 1990 when an unknown collector recorded *Stosatea italica* and *Cylindroiulus caeruleocinctus* amongst other species from Preston Montford Field Centre. The Preston Montford record of *Stosatea italica* remains the only one of this species from Shropshire. CCW's Welsh Invertebrate Database holds a record of *Ophiodesmus albonanus* collected from Wenlock Edge in 1994 but again the recorder is not given. The twentieth species, *Macrosternodesmus pallicola*, was added to the county list by Tony Barber in 2001 when he collected the millipede at Bishops Castle.

RECORDS FROM THE 2007 MEEING IN LUDLOW

The BMIG field weekend in April 2007 was based at the Bishop Mascall Centre, Ludlow. Over the weekend thirty seven different locations were visited covering fifteen 10km grid squares from which 21 species of millipede were collected. Details of the sites visited are given in Table 1 and of species collected in Table 2.

The locations with the most diverse millipede fauna were Downton Gorge and Tugford church but even here the species richness reached just 13 taxa. As at Tugford, many of the sites visited were churchyards or other locations where a significant synanthropic element to the fauna would be expected to add to the diversity. Most of the natural and semi-natural sites such as the upland acid moors on Stiperstones and the Long Mynd were very species poor. Downton Gorge was an exception, a semi-natural location with reasonable species richness but it was also the site subject to the greatest recorder effort.

Notable finds from the meeting included Mike Davidson's records of *Cylindroiulus parisiorum* from Ludlow and Stoke Bliss. These are the first and second records for VC 40 and it is remarkable that Mike was the

only person to find the millipede despite the fact that several recorders, myself included, were working with him at Stoke Bliss. Steve Gregory's record of *Brachychaeteuma melanops* from Tugford church was also new to the county although Helen Read did collect a female *Brachychaeteuma* from Stoke Bliss that could have belonged to this species. Specimens of *Melogona scutellaris, Polydesmus coriaceus* and *Archiboreoiulus pallidus,* were all collected from several locations by a variety of recorders but, surprisingly, none of these three species had been noted previously from Shropshire.

TABLE 1: Details of sites visited during BMIG Ludlow meeting in 2007

Site no.	Site name	Grid ref.	Site no.	Site name	Grid ref.
1	Ashford Bowdler church	SO5170	**20**	Ludlow	SO5174
2	Bedstone church	SO3675	**21**	Ludlow	SO5175
3	Berrington church	SJ5306	**22**	Ludlow, Whitcliffe	SO5074
4	Brampton Bryan cemetery	SO3772	**23**	Millichope Park	SO5388
5	Bromfield church	SO4876	**24**	Much Wenlock church	SJ6200
6	Brown Clee picnic site	SO6087	**25**	Mynd Scrubs	SO3575
7	Carding Mill Valley	SO4494	**26**	Nortoncamp Wood	SO4482
8	Caynham church	SO5573	**27**	Presthope	SO5797
9	Cleobury North church	SO6287	**28**	Presthope, Knowle Quarry	SO5897
10	Downton Gorge	SO4474	**29**	Stiperstones, Nipstone Rock	SO3597
11	Easthope Wood	SO5796	**30**	Stiperstones, The Bog	SO3597
12	Hanley Dingle	SO6866	**31**	Stoke Bliss	SO6562
13	Hanley William church	SO6766	**32**	Titley church	SO3360
14	Hughley	SO5697	**33**	Tugford church	SO5587
15	Kingsland church	SO4461	**34**	Wenlock Edge, Blakeway Hollow	SO6099
16	Knowle Wood	SO5973	**35**	Wenlock Edge, Harley Hill	SJ6000
17	Long Mynd, Long Synalds	SO4294	**36**	Wenlock Edge, Harley Hill	SO6199
18	Long Mynd, nr. Pole Cottage	SO4193	**37**	Wilderhope Manor	SO5492
19	Ludlow	SO5074			

In addition to the new vice-county records reported above, the 2007 field meeting was successful in improving the recorder coverage of the region. Five new county records resulted although four species on the county list, all widespread nationally, were not recorded on this occasion. Table 3 lists all twenty five of the millipede species now known from Shropshire and the 10km squares from which they have been recorded. Those species collected during the BMIG meeting and the 10km squares from which they were recorded are highlighted.

Fig. 3 in the millipede atlas (Lee, 2006) shows a low species richness for the Welsh border regions in general. Although this may have been considered to be a result of low recording effort in the region, the records from the Ludlow meeting, at least as far as Shropshire is concerned, appear to support the existence of a real trough in millipede diversity.

ACKNOWLEDGEMENTS

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TABLE 2: List of species recorded during BMIG Ludlow meeting in 2007. Table 1 gives site details.

Site number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Glomeris marginata					X	X		X		X	X	X				X			X
Nanogona polydesmoides								X				X				X			
Melogona scutellaris					X	X		X		X									X
Brachychaeteuma melanops																			
Brachydesmus superus						X				X		X		X					X
Polydesmus angustus				X	X					X		X					X	X	
Polydesmus coriaceus						X				X				X	X	X			
Macrosternodesmus palicola			X							X			X	X					
Ophiodesmus albonanus			X						X										
Proteroiulus fuscus						X			X	X		X		X					
Blaniulus guttulatus	X	X			X				X	X				X					X
Archiboreoiulus pallidus										X				X					
Julus scandinavius						X		X										X	
Ophyiulus pilosus	X		X					X	X	X		X				X			X
Cylindroiulus britannicus					X					X				X		X			X
Cylindroiulus caeruleocinctus	X		X		X									X					X
Cylindroiulus parisiorum																			
Cylindroiulus punctatus	X					X		X	X	X	X	X	X	X		X			X
Brachyiulus pusillus																			
Ommatoiulus sabulosus			X																
Tachypodoiulus niger			X		X	X	X	X	X	X		X	X	X		X	X	X	X

Site number:	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Glomeris marginata			X			X		X	X			X			X	X	X	
Nanogona polydesmoides																		
Melogona scutellaris			X	X										X		X		
Brachychaeteuma melanops														X				
Brachydesmus superus	X	X			X			X						X				X
Polydesmus angustus			X	X		X					X	X						
Polydesmus coriaceus	X							X				X			X			X
Macrosternodesmus palicola	X													X				
Ophiodesmus albonanus	X			X										X				
Proteroiulus fuscus								X			X	X	X	X		X		
Blaniulus guttulatus	X	X		X	X			X				X	X	X	X	X		
Archiboreoiulus pallidus															X	X	X	
Julus scandinavius														X				
Ophyiulus pilosus		X	X	X					X			X		X	X	X	X	
Cylindroiulus britannicus			X									X	X	X	X	X	X	
Cylindroiulus caeruleocinctus			X					X						X	X			
Cylindroiulus parisiorum		X										X						
Cylindroiulus punctatus		X		X					X			X	X	X	X		X	X
Brachyiulus pusillus		X																
Ommatoiulus sabulosus									X									
Tachypodoiulus niger	X	X		X			X	X		X	X	X	X	X	X	X		X

TABLE 3: Species list for VC40 (Watsonian Shropshire).

Species	Date of first record	10km squares with records
Glomeris marginata	1975	SO27, **37**, **47**, 49, **57**, **59**, **66**, **68**, **69**, SJ22, 40, 41, 50, 51, 52, **60**
Nanogona polydesmoides	1975	SO38, 48, **57**, **66**, 69, SJ40, 60
**Melogona scutellaris*	2007	SO**47**, **57**, **58**, **68**, SJ22, **60**
**Brachychaeteuma melanops*	2007	SO**58**
Sosatea italica	1990	SJ41
Brachydesmus superus	1974	SO27, **47**, **57**, **58**, **59**, **66**, **68**, SJ40, 41, 42, **60**
Polydesmus angustus	pre 1972	SO**37**, 38, **39**, **47**, **49**, **57**, **58**, **66**, SJ40, 42, 43, 52, 53, 60, 63
**Polydesmus coriaceus*	2007	SO**46**, **47**, **57**, **59**, **66**, **68, 69**
Polydesmus denticulatus	1974	SO38, SJ42, 43
Macrosternodesmus palicola	2001	SO38, **47**, **57**, **58**, **59**, **66**, SJ**50**
Ophiodesmus albonanus	1994	SO38, **57**, **58**, 59, **68**, SJ**50**
Proteroiulus fuscus	1975	SO**36**, 38, **39**, **47**, 49, **58**, **59**, **66**, **68**, SJ40, 43, 50, 52, 53, **60**, 63
Blaniulus guttulatus	1983	SO**36**, **37**, 38, **47**, **57**, **58**, **59**, **66**, **68**, **69**, SJ40, **60**
**Archiboreoiulus pallidus*	2007	SO**47**, **59, 69**, SJ**60**
Nemasoma varicorne	1974	SO38, 49, 59, SJ40, 42, 50, 63
Julus scandinavius	1916	SO**49**, **57**, **58**, **68**, 77, SJ40, 42, 43, 53
Ophyiulus pilosus	1974	SO39, **47**, **57**, **58**, **66**, **68**, **69**, 77, SJ40, 42, 43, **50**, 52, 53, **60**, 63
Cylindroiulus britannicus	1975	SO**36**, **47**, **57**, **58**, **59**, **66**, **69**, SJ40, **60**, 63
Cylindroiulus caeruleocinctus	1990	SO**47**, **57**, **58**, **59**, **69**, SJ41, **50**
Cylindroiulus latestriatus	1970s ?	SJ52
**Cylindroiulus parisiorum*	2007	SO**57**, **66**
Cylindroiulus punctatus	1974	SO27, **36**, 38, **47**, 49, **57**, **58**, **59**, **66**, **68**, **69**, 79, SJ22, 30, 40, 42, 43, 50, 52, 53, 60, 63
Brachyiulus pusillus	1974	SO**57**, SJ42
Ommatoiulus sabulosus	1985	SO59, SJ40, 43, **50**, 52, 53
Tachypodoiulus niger	1974	SO**36**, 38, **39**, **47**, **48**, **49**, **57**, **58**, **59**, **66**, **68**, **69**, SJ22, 40, 41, 42, 43, **50**, 52, **60**, 63

Species added to county checklist during BMIG Ludlow meeting in 2007 are indicated by an asterisk.

10km squares with records from BMIG meeting are in bold type.

REPORT ON THE WOODLICE RECORDED DURING THE BMIG SPRING FIELD MEETING AT LUDLOW, 2007

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The BMIG spring field meeting was based at the Bishop Maskell Centre in Ludlow from 30th March to 1st April 2007. The area has a mixed geology with outcrops of limestone, such as seen at Wenlock Edge, to the acidic rocks of Long Mynd. A great variety of habitats were sampled. This varied from urban sites (such as Ludlow town centre), a good number of churchyards and a selection of rural habitats, including calcareous grassland, ancient woodland and acidic moorland.

During the course of the meeting woodlice were collected from 28 sites falling within 14 different 10km National Grid squares. These were mainly in Shropshire (vc 40), but a few in Herefordshire (vc 36) and Worcestershire (vc 37) were also visited. Records were submitted by Glyn Collis (GMC), Mike Davidson (MBD), Steve Gregory (SJG), Paul Lee (PL), Paul Richards (JPR), Richard Price (RP) and Mark Telfer (MGT). Details of the sites visited and by whom are shown in Table 1. Species recorded and the sites at which they were found are shown in Table 2.

In terms of woodlice the meeting proved very successful with a total of 16 species recorded, including important discoveries of *Armadillidium pictum* and *Trichoniscoides sarsi*, both of which will be discussed later. The four most frequently record species were the usual suspects. *Philoscia muscorum* was recorded at all 28 sites surveyed, reflecting its general abundance in southern England, while *Oniscus asellus, Porcellio scaber* and *Trichoniscus pusillus* agg. all proved common. *Armadillidium vulgare, Platyarthrus hoffmannseggii* (always associated with ant nests) and *Porcellio spinicornis* (typically on walls) were widely encountered, mainly in churchyards, but the first two also in calcareous grassland.

It is of note that three additional species of *Armadillidium* were recorded during the weekend, in each case associated with the more common *A. vulgare.* In Ludlow town *A. depressum* was found twice, first at the Bishop Maskell Centre and then at Ludlow Castle. At the former site it was first discovered under capping stones on a garden wall, but torchlight surveys that night also revealed specimens, associated with *Porcellio spinicornis*, walking on the outside of walls. A thriving population of *A. nasatum* was discovered in an old limestone quarry on Wenlock Edge. Specimens were readily found under stones scattered among sparsely vegetated ground on the quarry floor.

Perhaps of greatest significance was the discovery of a population of *A. pictum* at Downton Gorge NNR. A few specimens of this rare and elusive woodlouse were laboriously hand-sorted from among limestone debris at the base of a wooded limestone slope (Gregory, 2008). It is of note that *A. vulgare* was also present since the marked north-western range of *A. pictum* rarely overlaps with the south-eastern range of *A. vulgare*. Despite searches of apparently suitable habitat elsewhere at Downton Gorge further populations of *A. pictum* were not discovered.

Seven species of Trichoniscid were recorded, a very respectable haul. The most widely recorded was the ubiquitous *Trichoniscus pusillus* agg. found at 22 sites. Despite the collection of many specimens only Paul Lee managed to collect a male specimen and this proved to be *T. provisorius.* Also widely recorded were *T. pygmaeus* and *Androniscus dentiger*. The former entirely from churchyards, while the latter was found in a variety of synanthropic and semi-natural habitats.

Of particular note was Paul Richards' discovery (on April Fool's Day!) of *Trichoniscoides sarsi* among friable soil at the base of a wall at Ludlow Castle (see Fig. 1, below). The specimens, which thankfully included males, were associated with *Haplophthalmus mengii* seg. and *T. pygmaeus*, both typical inhabitants of friable soils. Previously, *T. sarsi* has proved to be widespread in Kent, Suffolk and Leicestershire, where a

few experienced recorders have been able to find this elusive species (Gregory, 2009). This record in Shropshire is an important discovery and lies equidistant between the known Leicestershire stronghold and the Irish records from Dublin city.

TABLE 1: Sites sampled for woodlice at the 2007 BMIG Ludlow Field Meeting

Site code	Location	10km Square	OS Grid Reference	VC	Date	Recorders
1	Pembridge Churchyard	SO 35	SO390580	36	31/03/2007	GMC
2	Titley Churchyard	SO 36	SO331602	36	31/03/2007	GMC
3	Bedstone Churchyard	SO 37	SO368758	40	30/03/2007	GMC
4	Brampton Bryan Cemetry	SO 37	SO371723	36	30/03/2007	GMC, RP
5	Mynd Scrubs, near Bucknell	SO 37	SO353752	40	30/03/2007	GMC, RP
6	Monkland Churchyard	SO 45	SO460576	36	31/03/2007	GMC, RP
7	Kingsland Churchyard	SO 46	SO446613	36	31/03/2007	GMC, RP
8	Bromfield Churchyard	SO 47	SO482769	40	30/03/2007	GMC, SJG, JPR, MGT
9	Downton Gorge NNR	SO 47	SO442742	36	30/03/2007	GMC, MBD, SJG, PL, RP, JPR, MGT
10	Ludlow Castle, Mill Gate	SO 57	SO510742	40	01/04/2007	JPR
11	Caynham Churchyard	SO 57	SO553733	40	30/03/2007	PL, MGT
12	Knowle Wood	SO 57	SO59-73-	40	30/03/2007	PL, MGT
13	Bishop Mascall Centre, Ludlow	SO 57	SO51-74-	40	31/03/2007	SJG, MGT
14	Tugford Churchyard	SO 58	SO557871	40	30/03/2007	SJG, JPR
15	Easthope wood NT, Nr Presthope	SO 59	SO572967	40	31/03/2007	JPR
16	Hughley Churchyard	SO 59	SO564979	40	31/03/2007	SJG, JPR
17	Wenlock Edge near Presthop, Quarry	SO 59	SO578970	40	31/03/2007	SJG
18	Hanley Dingle	SO 66	SO682660	37	31/03/2007	PL
19	Hanley William Churchyard	SO 66	SO673660	37	31/03/2007	PL
20	Stoke Bliss Churchyard	SO 66	SO651629	37	31/03/2007	PL
21	Cleobury North Churchyard	SO 68	SO623870	40	30/03/2007	SJG, JPR
22	Brown Clee Picnic Area	SO 68	SO608871	40	30/03/2007	SJG
23	Harley Bank	SO 69	SO61-99-	40	31/03/2007	JPR
24	Much Wenlock, Wenlock Edge, NT car park	SO 69	SO612998	40	31/03/2007	JPR
25	Wenlock Edge, west of Much Wenlock, calcareous grassland	SO 69	SO604997	40	31/03/2007	SJG
26	Berrington Churchyard	SJ 50	SJ530069	40	31/03/2007	SJG, JPR
27	Much Wenlock Churchyard	SJ 60	SJ624000	40	31/03/2007	SJG
28	Wenlock Edge, west of Much Wenlock, deciduous woodland	SJ 60	SJ606001	40	31/03/2007	SJG

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TABLE 2: Woodlice species recorded by site – BMIG Ludlow Field Meeting 2007
Site details and recorders are presented in Table 1

Site code:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**No. sites per species**
Vice county:	36	36	40	36	40	36	36	40	36	40	40	40	40	40	40	40	40	37	37	37	40	40	40	40	40	40	40	40	
10km square:	SO 35	SO 36	SO 37	SO 37	SO 37	SO 45	SO 46	SO 47	SO 47	SO 57	SO 57	SO 57	SO 57	SO 58	SO 59	SO 59	SO 59	SO 66	SO 66	SO 66	SO 68	SO 68	SO 69	SO 69	SO 69	SJ 50	SJ 60	SJ 60	
Androniscus dentiger		X				X		X													X						X		5
Haplophthalmus danicus																		X											1
Haplophthalmus mengii seg.										X		X																	2
Trichoniscoides sarsi seg.										X																			1
Trichoniscus provisorius																		X											1
Trichoniscus pusillus agg.	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X				X	X			X	X	X	X	22
Trichoniscus pygmaeus				X					X	X		X	X	X							X		X		X				9
Philoscia muscorum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	28
Platyarthrus hoffmannseggii				X			X							X			X								X	X	X		7
Oniscus asellus	X	X	X	X	X	X	X	X	X		X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	25
Armadillidium depressum										X			X																2
Armadillidium nasatum																	X												1
Armadillidium pictum									X																				1
Armadillidium vulgare	X			X		X	X	X	X	X	X		X	X			X								X	X			13
Porcellio scaber	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X		X	X	X	X	X	25
Porcellio spinicornis				X				X					X	X							X					X	X		7
No. species per site:	5	5	4	8	4	6	6	7	7	7	5	4	8	8	2	4	7	5	3	3	7	4	3	3	7	7	7	4	

REPORT ON THE FIELD MEETING TO WISLEY GARDENS 2008

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INTRODUCTION

On a very wet October day, a small group of people met at the Royal Horticultural Society (RHS) Gardens at Wisley in Surrey (vc 17) to survey the Isopods and Myriapods. The plan had been to hold a committee meeting there in the morning and then spend the afternoon collecting with other members of the group. Unfortunately the combination of the bad weather and other commitments meant that there were just three members present in the afternoon, Eric Philp (ECP), Helen Read (HJR) and Steve Gregory (SJG). We were assisted by Andrew Halstead (AH) of the RHS who allowed us to access some of the glasshouses not normally open to the public and also joined us in some collecting too. Due to the inclement weather we did not spend a great deal of time outside and much of the collecting was undertaken inside glasshouses. A list of locations sampled is given in Table 1. A repeat visit to spend more time in the gardens would, I'm sure, reveal many other interesting species. The glasshouses were very 'clean' and finding specimens was quite difficult, despite this some regular hothouse millipedes were found.

TABLE 1: Details of sampling locations

Locations within Wisley		Habitat Description	OS Grid Reference
1	Glasshouses: Propagation area	Under large pots standing on concrete floor	TQ061583
2	Glasshouses: Arid regions	Under stones & in soil	TQ060583
3	Glasshouses: Humid tropics & temperate	In beds, under fallen leaves & in soil	TQ061583
4	Glasshouses general	As above but location not specified	Probably TQ061583
5	Outside: Near Garden entrance	In shrub planters & flower beds	TQ065582
6	Outside: vegetable garden	Under pots, stones & wood in & around vegetable plots	TQ063582
7	Outside: Far end of gardens	Deciduous woodland near River Wey	TQ062591
8	Outside general	In public gardens, in flower beds and under stones	Probably TQ06 58

ISOPODA

The 8 species of woodlice found (Table 2) are all common and widespread in southern England. Singletons of *Trichoniscus pygmaeus* were under stones, associated with the ubiquitous *T. pusillus* agg. at base hedge (site 6) and in flower bed (site 8). The ant woodlouse *Platyarthrus hoffmannseggii* was observed in the nest

of the yellow ant *Lasius flavus* under a rock in a flowerbed. *Armadillidium nasatum* was mainly recorded inside glasshouses, whether heated or not, but a few were found outdoors too. This species is frequently recorded inside glasshouses and at the northern edge of its range in Britain is more or less confined to them. Despite much of the time being spent searching inside the various heated glasshouses, it was disappointing that no 'alien' woodlice were collected. It would be expected that further collections made in more favourable conditions would turn up additional species (e.g. *Androniscus dentiger* among rubble, *Haplophthalmus danicus* in dead wood and *Porcellionides pruinosus* in compost/manure heaps).

TABLE 2: List of species recorded for each sampling location
All collections were made on 26 October 2008

Species	Location								Recorder
	1	2	3	4	5	6	7	8	
Isopoda									
Trichoniscus pusillus agg.					X	X			SJG
Trichoniscus pygmaeus						X		X	ECP, SJG
Philoscia muscorum					X	X	X		SJG, AH
Platyarthrus hoffmannseggii					X			X	ECP, SJG
Oniscus asellus					X	X	X		SJG, AH
Armadillidium nasatum	X		X		X				SJG
Armadillidium vulgare				X	X				ECP, SJG
Porcellio scaber				X	X		X	X	ECP, SJG, AH
Chilopoda									
Stigmatogaster subterranea					X	X	X		SJG, AH
Geophilus flavus							X		AH
Cryptops hortensis					X	X			SJG
Lamyctes emarginatus	X								SJG
Lithobius melanops	X	X							SJG
Lithobius forficatus	X						X		SJG, AH
Diplopoda									
Oxidus gracilis	X	X	X	X					ECP, HJR, SJG
Brachydesmus superus					X	X			ECP, SJG
Polydesmus angustus							X		AH
Polydesmus coriaceus					X	X			SJG, HJR
Polydesmus inconstans					X			X	ECP, SJG
Choneiulus palmatus	X		X	X					ECP, SJG, HJR
Proteroiulus fuscus							X		AH
Ophyiulus pilosus					X				SJG
Cylindroiulus britannicus			X				X		HJR, SJG, AH
Cylindroiulus caeruleocinctus						X		X	ECP, HJR, SJG
Cylindroiulus latestriatus	X	X							HJR, SJG
Cylindroiulus parisiorum	X								HJR, SJG
Cylindroiulus punctatus							X		AH
Cylindroiulus cf vulnerarius	X								HJR
Tachypodoiulus niger						X	X		SJG, AH

CHILOPODA

Some six species were recorded (Table 2), mostly those that might be expected. No "hot house exotics" (such as *Tygarrup javanicus*) were collected; in fact no centipedes were found at all in the humid tropics / temperate (Site 3) where such would be most likely to occur. *Geophilus flavus*, *Stigmatogaster subterranea* and *Cryptops hortensis*, all found in outdoor locations (Sites 5 – 7), are widespread in Surrey with the latter species often but by no means exclusively in synanthropic sites (Barber, 1969). *Lithobius forficatus* is

extremely common in many habitats so its occurrence in both the propagation area (Site 1) and outside (Site 8) is not unexpected. *Lithobius melanops* tends to be a species regularly recorded from gardens and inside buildings, and is often seen in greenhouses (it also occurs on the sea shore) and this may indicate a moderate degree of desiccation tolerance.

Lamyctes emarginatus is an interesting species; it is a parthenogenetic type with what appears to be an annual life cycle. Damper situations are said to be characteristic and it has been found in quite large numbers by pitfall-trapping in some river gravels in Wales. The combination of humidity and substrates in propagating areas (Site 1) would seem to fit in with this predilection for damp sites and its small size and breeding habits would make it an ideal candidate for opportunist situations.

DIPLOPODA

The number of species found was 15 and included several regular glasshouse inhabitants such as *Oxidus gracilis* and *Choneiulus palmatus* (Table 2). Three species of *Polydesmus* were found, which is also quite interesting. *P. coriaceus* and *P. inconstans* were found in the gardens, while *P. angustus* was found in deciduous woodland. Two very pale Julids found together in the propagation area of the glass houses turned out to be two different species, one a white *Cylindroiulus parisiorum* and the other a blind *Cylindroiulus* with a downward pointing tail that appeared like *C. vulnerarius*. Unfortunately there was only one female of the latter so it was difficult to confirm the species.

ACKNOWLEDGEMENTS

We are very grateful to Andrew Halstead of the RHS for allowing us to collect in the gardens and spending so much time with us during the day; also to Marzio Zapparoli who confirmed the identification of *Lamyctes emarginatus* and *Lithobius forficatus* from inside the glasshouses.

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REPORT ON THE AUTUMN MEETING IN THE OBAN AREA, 2007, DIPLOPODA: ADDITIONAL RECORDS

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A report on millipedes found during the meeting in the Oban area was published in the last Bulletin (**23**: 47-49). The following additional records are based on specimens from the meeting identified by Paul Lee to whom thanks:

Code	Site	Date	Species
8	Ledaig	02.x.2007	*Nanogona polydesmoides* *Julus scandinavius* *Allajulus nitidus* *Cylindroiulus latestriatus*
12	Lismore Island	04.x.2007	*Cylindroiulus britannicus*
15	Dunstaffinage Castle	05.x.2007	*Ophyiulus pilosus*

REPORTS ON THE 2009 BMIG SPRING MEETING IN CORNWALL

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INTRODUCTION AND DETAILS OF SITES

Myriapods and woodlice have been reported from Cornish sites since the 19th Century with F.A.Turk being especially interested in centipedes and millipedes in the 1940s and 1950s but overall recording has been patchy for the area depending mostly upon individuals, often from outside the county. A considerable number of records are held by ERCCIS (Environmental Record Centre for Cornwall and the Isles of Scilly) on their ERICA database.

Records from the Isles of Scilly were published by Jones & Pratley (1987a; b) and a report on Cornish woodlice by S.P.Jones the same year (Jones, 1987). In 1998 the then British Myriapod and British Isopod Study Groups met at Chyvarloe near Helston and recorded specifically for these groups in the area. A report on the woodlice found appeared in *BISG Newsletter* issue 41 (Gregory, 1998) whilst reports for centipedes and millipedes were in *BMG Newsletter* issues 29 and 30 (Barber, 1998; Lee, 1998, 1999). Subsequently, in the *Bulletin,* Gregory & Jones (1999) documented the first mainland occurrence of the centipede *Arenophilus peregrinus*, while Barber (2000) gives a detailed report of the centipedes. There are also accounts of various species in the first and second editions of the Red Data Book for Cornwall & the Isles of Scilly (Spalding, 1997, Benallick *et al*, 2009).

Sixteen members of the group, including Monica Farfan from Columbus, Ohio (who was working on introduced julids and gave us a talk on her studies) met at Woodland Valley Farm during the period 16th – 19th April 2009. Various visits were organised to the Eden Project (where we were joined by other Cornish naturalists), Kilminorth Woods LNR, Trelissick and Glendurgan gardens (both National Trust) and Devichoys Wood (CWT). In addition, collections were made around Woodland Valley Farm and elsewhere by individual recorders.

We are grateful to Chris Jones of Woodland Valley Farm, to Tim Petitt and the other staff of the Eden Project and to Janet Lister and the various site staff of the National Trust for both access and for permission to collect at the various locations; also to the Cornwall Wildlife Trust for a permit to collect on their reserves including Devichoys Wood. We are especially grateful to Sue Scott of ERCCIS who first suggested a meeting at Woodland Valley, was invaluable in suggesting sites, provided us with an introductory talk and enthusiastically came out with us each day.

From the various outdoor sites some 16 species of centipede, 26 of millipede (including one new to Britain from outdoors at the Eden Project), 13 of woodlice and the terrestrial amphipod *Arcitalitrus dorrieni* were collected. Details of sites visited and by whom are shown in Table 1.

Recorders were Keith Alexander (KA), Tony Barber (TB), Glyn Collis (GC), Mike Davidson (MD), Monica Farfan (MF), Jim Flannagan (JF), Angela Lidgett (AL), Peter Nicholson (PN), Eric Philp (EP), Helen Read (HR), Adrian Rundle (AR), Sue Scott (SS), Jo Smith (JS) and Mark Telfer (MT).

Some preliminary findings were recorded in *Wild Cornwall & Wild Scilly* (Issue 109, Summer 2009) under Reserves News; "Rare centipede rediscovered at Devichoys Wood" and in the *CISFBR Newsletter* for

Summer 2009; "The Long and the Short, Two Centipedes at Trelissick". An article on "Centipedes, Millipedes and Woodlice from the Eden Project" appeared in the *Bulletin of the Peninsular Invertebrate Forum* 19 (October, 2009) and included reference to the BMIG visit. The present report deals primarily with the "outdoor" species. Although species from the Eden biomes are mentioned herein, a further report specifically on these animals (including two species of millipede new to Britain) will be published later.

TABLE 1: Sites recorded for myriapods, terrestrial isopods and terrestrial amphipods.

Site Code	Location	NGR	Date	Nature of Site	Collectors
1	Woodland Valley Farm	SW 9051	16 – 18.iv.2009	Farm, Woodland, etc.	KA, GC, MD, JF, AL, PN, EP, AR, JS, MT
2	Eden Project (outdoors)	SX 0455	17.iv.2009	Educational / ornamental gardens	JF, HR, MT
3a	Kilminorth Woods: woodland & grassland	SX 2453	17.iv.2009	Local nature reserve on edge of creek	GC, MD, MF, PN, JS
3b	Kilminorth Woods: woodland	SX 2354	17.iv.2009	Local nature reserve on edge of creek	KA
3c	Kilminorth Woods: woodland	SX 2454	17.iv.2009	Local nature reserve on edge of creek	MD, AL
3d	Kilminorth Woods: Upper shore	SX 2453	17.iv.2009	Upper shore, strandline, rocks, etc	TB, GC, JF, PN, JS
3e	Kilminorth Woods: Saltmarsh area	SX 2454	17.iv.2009	Upper shore & saltmarsh, rocks, etc	TB, MD, JF, AL
4a	Trelissick Gardens: Garden	SW 8339	18.iv.2009	Ornamental gardens with exotic plants (NT)	KA,TB, GC, MD, JF,AL, PN, EP,AR, SS, JS, MT
4b	Trelissick Gardens: Parkland	SW 8339	18.iv.2009	Parkland (NT)	KA
4c	Trelissick: Seashore	SW 8339	18.iv.2009	Rocky shore	GC via TB
5	Devichoys Wood	SW 7737	18.iv.2009	Ancient woodland: mixed woodland (CWT reserve)	TB, GC, MD, MF, JF, PN, EP, AR, MT
6a	Glendurgan Garden: Garden	SW 7727	18.iv.2009	Ornamental gardens with exotic plants (NT)	TB,GC, MD, JF, AL, PN, EP, AR, JS, MT
6b	Glendurgan: Seashore	SW 7727	18.iv.2009	Rocks and shingle	TB, GC
7	Ladock Village	SW 8950	18.iv.2009	Village	GC
8	Lost Gardens of Heligan	SX 0046	18.iv.2009	Ornamental Gardens	GC
9	Lostwithiel	SX 1059	16.iv.2009	Car park & waste ground	TB
10	Pendennis Castle, Falmouth	SW 8431	15.iv.2009	Walls of castle	MD
11	St.Mary's Church, Truro	SW 8245	16.iv.2009	Churchyard	MD
12	Trewithen Gardens	SW 9147	16.iv.2009	Ornamental gardens	MD
13	Gyllngvasse Beach, Falmouth	SW 8131	15.iv.2009	Sea shore	MD
14	Restormel Park	SX 1061	16.iv.2009	Parkland	KA
15	Carmears Wood, Luxulyan	SX 0756	17.iv.2009	Mixed Woodland	KA
16	Sowden's Bridge	SX 2255	17.iv.2009	N. of Kilminorth, West Looe River	KA
17	Talland Cliff	SX 2251	17.iv.2009	Cliffs near Polperro	KA
18	Tredinnick	SX 2266	17.iv.2009	N. of Sowden's Bridge	KA

CENTIPEDES

A total of 16 species of centipede were collected, several of them rare or absent in other parts of Britain, and including four seashore species. Collecting in the Moist Tropics Biome at the Eden Project yielded two further, exotic species, *Cryptops doriae* and *Tygarrup javanicus* which had previously been recorded there. Collecting sites are shown in Table 1 and the species recorded from them in Table 3. The general nature of the local centipede fauna proved somewhat different to that of other parts of Britain with *Stigmatogaster subterranea* being widespread and common in all sorts of habitats (as elsewhere in the South West) and the large brown *Lithobius* being mostly not *L. forficatus* but *L. pilicornis*, here not as an occasional synanthrope in urban areas, but as a woodland and garden species. Also present were more familiar rural species such as *Lithobius variegatus*, *L. microps*, *Cryptops hortensis*, *Geophilus truncorum* and *Geophilus flavus*.

A visit specifically to Devichoys Wood (CWT Reserve) was arranged as this was one of the two known sites for the species now known as *Stigmatogaster souletina*. This had first been found (and described as *Nesoporogaster souletina brevior*) from Carclew by Ted Eason back in 1962 (Eason, 1962), its nominate form (*Nesoporogaster souletina souletina*) being known from the Pyrénées. Devichoys Wood is about 2km from the original site and specimens had been found there, unexpectedly, during the BMIG/BISG meeting in 1998 (Barber, 2000). It closely resembles *Stigmatogaster subterranea* from which it is most easily distinguished by the larger number of trunk segments and the characteristic sternal pits. It proved possible, with suitable magnification, to clearly see these pits in live animals on trunk segments approximately 44 - 48 (females) or 42 - 46 (males) by holding the specimen flat in a plastic envelope and easier to do than counting legs in a live geophilomorph with more than 80 pairs.

TABLE 2: Data for *Stigmatogaster souletina*
B.(1930) = Brolemann, 1930; E.(1962) = Eason, 1962: EHE = E.H.Eason
* trace of pit on sternite 47

Location	Date	Coll.	Det.	Sex	Length mm	Trunk segments	Pits on sternites
Pyrénées	B.(1930)	-	-	ff	88	103-107	45/49 – 50/54
		-	-	mm	69	99-101	43/44 - 48
Carclew Estate	E.(1962)	EHE	EHE	ff	68	97-101	44 – 48/49
		EHE	EHE	mm	45	93-95	40/41 – 45/46
Trelissick Gardens	18.iv.2009	GC	TB	f	60	99	44 - 49
		TB	TB	f	61	99	44 - 50
		TB	TB	m	68	93	40 – 46*
Devichoys Wood	18.iv.2009	AR	AR	2ff	-	97	-
		AR	AR	4ff	-	99	-
		AR	AR	f	-	101	-
		EP	EP	f	52	99	-
		MF	TB	f	52	99	44 - 48
		TB	TB	f	63	97	43 - 48
		TB	TB	m	48	99	42 - 47
		TB	TB	m	58	97	41 - 45
		TB	TB	m	64	99	43 - 47
		TB	TB	m	57	97	41 - 45
		TB	TB	m	47	97	42 - 46

As it happened, we had, unknowingly, already collected the species that day at Trelissick, a location about 6 km from Devichoys / Carclew. It would be interesting to search in other sites in the area to see where else it might occur. It has always been considered to be an "introduced" species, possibly brought in with exotic plants such as rhododendrons. Whatever its status, it is clearly well established in that area of Cornwall including in an ancient woodland reserve (and apparently nowhere else in NW Europe). Its scarcity, along with being the British geophilomorph with the greatest number of legs makes it an interesting member of the Cornish fauna. Eason (1962) gives trunk segment numbers of between 93 and 95 for males (with pits on

sternites 40/41 to 45/46) and 97 to 101 for females (pits on sternites 44 to 48/49). Data from 2009 is similar except that males with up to 99 leg pairs are recorded from Devichoys Wood. Data is shown in Table 2.

TABLE 3: Centipede species recorded by site – BMIG Cornwall Field Meeting 2009
Site details and recorders are presented in Table 1

Site Code:	1	3a	3b	3c	3d	3e	4a	5	6a	6b	9	10	11	12	13	14	15	16	No. sites per species
10 km square:	SW 95	SX 25	SX 25	SX 25	SX 25	SX 25	SW 83	SW 73	SW 72	SW 72	SX 15	SW 83	SW 84	SW 94	SW 83	SX 16	SX 05	SX 25	
Stigmatogaster subterranea	X	X		X			X	X	X		X		X	X					9
Stigmatogaster souletina							X	X											2
Schendyla nemorensis		X				X													1
Schendyla peyerimhoffi						X													1
Hydroschendyla submarina										X									1
Strigamia maritima					X	X				X									3
Geophilus flavus				X															1
Geophilus gracilis						X				X									2
Geophilus truncorum	X						X	X						X					4
Geophilus osquidatum							X												1
Stenotaenia linearis									X										1
Eurygeophilus pinguis							X												1
Cryptops hortensis	X			X			X	X	X		X	X	X						8
Lithobius variegatus	X	X	X					X					X			X	X	X	8
Lithobius pilicornis	X						X	X				X	X	X	X				7
Lithobius forficatus								X	X										2
Lithobius melanops														X					2
Lithobius microps	X													X					2
No. of centipede species:	6	3	1	3	1	4	7	7	4	3	2	2	4	5	1	1	1	1	

Trelissick, however, had another surprise. When records started to come in, two recorders Angela Lidgett and Eric Philp both, independently, reported *Eurygeophilus pinguis* from the garden. This has possibly the smallest number of leg pairs of any of our geophilomorphs with only 35 recorded previously in males found in Britain (as it happens, Eric's specimen was a male with 37 leg pairs). The species has an unusual distribution being, apparently well established in a variety of sites in North Devon. Outside Britain, it is recorded from the Alps, Pyrénées and Picos. Conceivably the Trelissick animals had been brought in from North Devon e.g. from another National Trust property such as Arlington Court from where it has also been recorded. However it is possible that more recording in Cornwall might find it in other sites.

Of other species of interest, three of our littoral forms, *Strigamia maritima*, *Geophilus gracilis* and *Schendyla peyerimhoffi* were all found along the estuary-side at Kilminorth Woods. A fourth, *Hydroschendyla submarina* was found in some numbers at Glendurgan beach by Glyn Collis's use of the time-honoured procedure for finding this species of "crowbar-ing" rocks open (he did not actually use a crowbar but the effect was similar).

The total number of species recorded was surprisingly small but the Cornish meeting in April 1998 had similarly found only 15 species. What that meeting had found but were not collected in 2009 were *Schendyla dentata*, *Geophilus carpophagus* and *Arenophilus peregrinus*. The first of these is small and more or less synanthropic and few churchyards had been searched and *Arenophilus*, another small species, easily missed, has only been found twice on the Cornish mainland, at Lamorna Cove in 1998 (Gregory& Jones, 1999) and inland in woodland near Stithians in 2007 (Barber, 2008). The centipede data in the ERICA database of ERCCIS lists a number of other species recorded from Cornwall, *Henia brevis*, *Henia vesuviana*, *Strigamia crassipes*, *Geophilus electricus*, *Geophilus pusillifrater*, *Geophilus truncorum*, *Cryptops parisi*, *Lithobius borealis*, *Lithobius calcaratus* and *Lamyctes emarginatus*. At least some of their records of "*Geophilus carpophagus*" are known to relate to *Geophilus easoni*. There may be a number of reasons why these were not found at the 20009 meeting including season (*Lamyctes*), limited searching of urban habitats (*Henia* species, *Geophilus electricus*, *Cryptops parisi*), small size and genuine difficulty in finding (*Geophilus pusillifrater*). On the other hand, species such as *Geophilus truncorum* and *Lithobius borealis* might be expected to be widespread in suitable habitats.

Other species that could turn up in Cornwall are *Strigamia acuminata*, *Cryptops anomalans* (in urban sites) and *Lithobius tricuspis* (quite widespread in South Devon). Two smaller species of *Lithobius*, *L. curtipes* and *L. macilentus* which are widespread in Britain have not been reliably recorded from Devon or Cornwall and the only records of *L. crassipes* are two made by Adrian Rundle on The Lizard a number of years ago (Rundle, 1977).

MILLIPEDES

When BMIG last visited Cornwall, eleven years ago, at Easter 1998, we recorded 22 different species of millipede. This total was exceeded during the 2009 meeting at Ladock when a total of 26 species were collected from outdoor sites. The 26 species collected in 2009 and the locations they were collected from are given in Table 4. One additional species (*Choneiulus palmatus*) was collected from the Warm Temperate Biome of the Eden Project and another four from the Humid Tropics Biome (*Amphitomeus attemsi*, *Paraspirobolus lucifugus*, *Cylindrodesmus hirsutus* and *Oxidus gracilis*) giving a total of 31 species recorded during the meeting. On a later visit, TB also collected another species subsequently identified by Helen Read and Henrik Enghoff as *Pseudospirobolellus avernus*, a species from a family (Pseudospirobellelidae) not previously recorded from Europe. This total constitutes almost half of the species of millipede recorded from Britain and includes three species new to the country.

The Eden Project continues to be a source of interesting material. Read (2008) detailed the millipedes found there up to that time and described *Paraspirobolus lucifugus* and *Rhinotus purpureus* as new to Britain (although the latter had in fact been found earlier at Kew by Adrian Rundle but had gone unrecognised). *Rhinotus* was not re-found in 2009 but *Amphitomeus attemsi* was collected for the first time. *Amphitomeus attemsi* is described and illustrated in the Encylopedia of the Swedish Flora and Fauna (Andersson *et al*,

TABLE 4: Millipede species recorded by site – BMIG Cornwall Field Meeting 2009
Site details and recorders are presented in Table 1

Site code	1	2	3a	3b	3c	3e	4a	4b	5	6a	6b	7	9	10	11	12	13	14	15	16	18	No.sites per species
10 km square:	SW 95	SX 05	SX 25	SX 25	SX 25	SX 25	SW 83	SW 83	SW 73	SW 72	SW 72	SW 85	SX 15	SW 83	SW 84	SW 94	SW 83	SX 16	SX 05	SX 25	SX 26	
Glomeris marginata	X		X	X					X	X		X		X					X	X		9
Chordeuma proximum			X																			1
Brachychaeteuma melanops	X						X								X							3
Brachydesmus superus	X				X		X			X						X						5
Polydesmus angustus	X		X		X		X		X	X				X		X						8
Polydesmus denticulatus									X													1
Polydesmus coriaceus	X																					1
Ophiodesmus albonanus							X			X					X							3
Brachydesmus superus	X				X		X			X						X						5
Proteroiulus fuscus	X		X	X				X	X	X				X		X		X		X		10
Blaniulus guttulatus	X									X						X						3
Nemasoma varicorne	X									X										X		3
Julus scandinavius			X		X		X		X													4
Haplopodoiulus spathifer							X															1
Ophyiulus pilosus	X		X		X		X		X				X			X	X					8
Leptoiulus kervillei										X												1
Allajulus nitidus							X															1
Cylindroiulus britannicus	X	X					X			X	X					X						6
Cylindroiulus caeruleocinctus										X												1
Cylindroiulus latestriatus		X												X								2
Cylindroiulus londinensis							X			X												2
Cylindroiulus parisiorum																X						1
Cylindroiulus punctatus	X		X	X	X	X	X	X	X	X				X		X		X	X	X		14
Brachyiulus lusitanus		X																				1
Brachyiulus ?pusillus							X									X						2
Ommatoiulus sabulosus		X	X	X	X		X			X						X						7
Tachypodoiulus niger	X		X	X	X		X							X		X					X	8
No. species per site:	13	4	9	5	8	1	15	2	7	14	1	1	1	6	2	12	1	2	2	4	1	

2005) but descriptions of the Eden specimens of this and another new hothouse alien, *Pseudospirobolellus avernus,* will be published separately. More surprisingly, *Brachyiulus lusitanus*, an outdoor species new to Britain, was collected from the vegetable garden at the Eden Project also. This discovery means that all previous records of *Brachyiulus* from Britain, including those from Trelissick and Trewithen, will have to be referred to an aggregate taxon, at least until we have a better idea of the distributions of the two species. *B. lusitanus* may be a recent introduction with records currently restricted to Eden or to Cornwall or to botanic gardens or to some other subset of locations but further work will be needed to establish the situation. Existing voucher specimens may help but it is likely that more material will need to be collected from across the country to confirm the relative distributions of the two species. With this in mind, when *Brachyiulus* is encountered in future, specimens (ideally male) should be collected and retained for checking. Further details on separation of the two *Brachyiulus* species will be published separately.

In addition to the Eden Project, BMIG members collected millipedes from 15 other sites between 16th and 19th April 2009. Three of these locations had been visited previously to collect millipedes, Devichoys Wood in 1998, Glendurgan in 1998 and 2007 and Trelissick in 2007. The most species diverse sites visited in 2009 appeared to be Trelissick (16 species) and Glendurgan (14 species) but species diversity is very sensitive to recorder effort. Without standardised sampling procedures, generalisations about the importance of the millipede fauna at these sites should be avoided. It is worth noting that even at Glendurgan and Trelissick, species recorded on earlier visits were not re-found on this occasion. These included relatively large and easily recognisable millipedes such as *Leptoiulus belgicus* and *Julus scandinavius*.

In 2009 the National Trust gardens at Trelissick were visited specifically to search for *Haplopodoiulus spathifer* which had been collected there in 2007 (Barber, 2008). Trelissick is an exception to the only other three known British sites for this species (Kew, Bedgebury and Wakehurst Place) in not being in the South East nor having an obvious Kew connection. It is of course possible, as was suggested in conversation by one of the Trust staff, that Trelissick could have been the original place of introduction from which the millipede has subsequently spread with plant transfers to Kew rather than the other way round as has been assumed.

At Glendurgan, *Cylindroiulus caeruleocinctus* was collected by Angela Lidgett. This millipede is common enough in the South East but much scarcer further west and seems never to have been found this far down in Cornwall before.

Despite the diversity of species found, none of the characteristic south-western species such as *Enantiulus armatus* and *Chordeuma sylvestre* were collected. Even *Leptoiulus belgicus,* which is widespread in Devon and Cornwall, was not found despite the fact that it had been collected at both Trelissick and Glendurgan in 2007 (Barber, 2008). Even more surprising was the absence of records of *Polyxenus lagurus*, *Nanogona polydesmoides* and *Polydesmus inconstans,* relatively common species that were recorded on the BMIG visit in 1998.

WOODLICE AND TERRESTRIAL AMPHIPODS

Of the 40 species of woodlice found in Britain at least 24 have been recorded from Cornwall. The county is relatively under-recorded and it is likely that other species await discovery, maybe even a woodlouse new to Britain. However, the predominantly acidic nature of the underlying geology means that it can be hard work to find many species that favour more calcareous conditions. At the 2009 meeting at Ladock 13 species of woodlouse, and the terrestrial amphipod *Arcitalitrus dorrieni*, were collected from eleven 10km Grid Squares. Outdoor sites and the collectors that worked them are listed in Table 1 and the species recorded in Table 5.

The most diverse sites for woodlice were Trelissick Gardens, St.Mary's Churchyard in Truro (which both turned up 8 species) and Pendennis Castle (with 7 species). It is perhaps of significance that all 3 are synanthropic localities, although it is equally likely to be a reflection of more effort having been put into surveying these sites. Most of the species recorded are common and familiar species. *Porcellio scaber*, *Oniscus asellus* and *Trichoniscus pusillus* agg. were by far the most commonly encountered species.

TABLE 5: Woodlice species and *Arcitalitrus* recorded by site – BMIG Cornwall Field Meeting 2009
Site details and recorders are presented in Table 1

Site Code:	1	3a	3b	3c	3d	3e	4a	4b	4c	5	6a	6b	7	8	10	11	12	14	15	16	17	No. sites per species
10 km Square:	SW 95	SX 25	SX 25	SX 25	SX 25	SX 25	SW 83	SW 83	SW 83	SW 73	SW 72	SW 72	SW 85	SX 04	SW 83	SW 84	SW 94	SX 16	SX 05	SX 25	SX 25	
Ligia oceanica					X	X			X			X			X	X						4
Androniscus dentiger															X	X						2
Haplophthalmus mengii																X						1
Trichoniscus pusillus agg.	X	X					X			X	X					X	X	X	X	X		10
Philoscia muscorum				X			X	X											X			4
Platyarthrus hoffmannseggii				X	X	X	X				X				X	X						7
Oniscus asellus	X	X	X	X	X		X			X	X			X	X	X	X					12
ssp *asellus*	+	+		+													+					
ssp *occidentalis*	+									+							+					
Armadillidium depressum																X						1
Armadillidium nasatum							X								X							2
Armadillidium vulgare	X						X						X		X	X					X	6
Porcellio scaber	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X		18
Porcellio spinicornis	X																					1
Porcellionides cingendus							X								X							2
No. of species of woodlice:	5	3	2	4	4	2	8	2	1	3	4	2	2	2	7	8	3	2	3	2	1	
Arcitalitrus dorrieni	X	X					X			X	X					X	X					7

Armadillidium vulgare and *Platyarthrus hoffmannseggii* (a common inhabitant of ant nests) were also widely recorded. The other frequently recorded species, *Ligia oceanica*, is exclusively littoral and was found at four coastal sites. Considering its penchant for hard substrates it is not surprising that *L. oceanica* is known to occur all around the rocky Cornish coast.

The species found, and their relative frequency, reflects the south-western location of the meeting. The usually ubiquitous *Philoscia muscorum* was surprisingly thin on the ground, being recorded at just four localities. However, this species does seem to become less frequent in the moist Atlantic climate of the south-west of Britain. *Porcellionides cingendus*, a species, surprisingly found just twice, has a strong Atlantic distribution in Britain and can be locally frequent in Cornwall. The pill-woodlouse *Armadillidium depressum*, a characteristic species of the West Country, was found at Truro Churchyard. Its congener *A. nasatum* was recorded from inside a walled garden at Trelissick Garden and on the walls of Pendennis Castle. Both favour calcareous soils and are typically coastal or synanthropic in Cornwall where the predominantly acidic soils are ameliorated. *Porcellio spinicornis* also favours calcareous substrates and was only recorded once (at Woodland Valley Farm). Although common over much of Britain, *P. spinicornis* is under-recorded in many areas (recorders seem not to survey appropriate microsites, such as exposed rocks, mortared walls or calcareous tree bark). However, it does seem to be genuinely scarce in south-western England.

The distribution and ecology of *Oniscus asellus* in south-west England is complicated by the occurrence of two morphologically distinct taxa which both occur in Cornwall. Only one recorder, Mike Davidson, attempted to separate the two subspecies, ssp. *asellus* and ssp. *occidentalis* and these are shown in Table 5. Genetic studies have indicated that *O.a. asellus* and *O.a. occidentalis* represent genetically distinct taxa of ancient genetic divergence (Bilton, Goode & Mallet, 1999). *O.a. occidentalis* is believed to be a relict form indigenous to the British Isles and in Cornwall it is more characteristic of rural sites. *O.a. asellus* is a competitive form strongly favoured by human activity. Across South Devon and Cornwall morphologically intermediate populations of hybrid origin are most frequent (D.T. Bilton, personal communication). Pure *O. a. occidentalis* could be considered to be our most vulnerable woodlouse taxon.

The number of trichoniscid species recorded is very disappointing. The three species encountered are all common and widespread species. *Trichoniscus pusillus* agg. is ubiquitous across the British Isles and was recorded from ten sites. *Androniscus dentiger* was found at Trelissick Garden and Pendennis Castle, while the rather elusive *Haplophthalmus mengii* was also discovered at the latter site. These two soil dwelling species occur in a wide variety of coastal, inland and synanthropic habitats, throughout Britain. Considering the number of supra-littoral centipedes collected it is surprising that coastal trichoniscids such as *Trichoniscoides saeroeensis* were not found.

Collecting in the Moist Tropics Biome at the Eden Project yielded two further, heated glasshouse, species, *Trichorhina tomentosa* and *Venezillo parvus,* both of which had previously been recorded there. This is the only known site in Britain for the latter species (Gregory, 2009), although it is recorded elsewhere in Europe. There remain several tubes of undetermined material from the Tropical Biome of the Eden Project. These will be written up as a separate paper once the specimens have been identified.

The 1998 field meeting based in Chyvarloe recorded 12 species of woodlice (which are summarised in *BISG Newsletter* **41** (Gregory, 1998). Although this is a similar total to this years tally, some very different species were recorded. Perhaps the best finds in 1998 were *Armadillidium album* from Sennan Cove (a first for Cornwall, but well known in the Isles of Scilly) and *Trichoniscoides saeroeensis* from various coastal locations. This meeting also recorded *Porcellio dilatatus*, another first for Cornwall.

Arcitalitrus dorrieni, our only terrestrial amphipod (familiarly known as the "woodhopper" or "landhopper"), was also frequently found. It is an introduced Australasian species first recorded from the Isles of Scilly in 1924. It is now widespread in the South-West, occurs in the London Area, Wales and as far north as Wester Ross (Inverewe Gardens) on the western coast of Scotland. It is also widespread in Ireland, is found in the Channel Islands and various parts of Europe. Cowling *et al* (2004) argue that low winter temperatures and low habitat sodium concentration may limit its spread in Britain.

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BOOK REVIEWS

MÅNGFOTINGAR MYRIAPODA

Nationalnyckeln till Sveriges flora och fauna

By G. Andersson, B.A. Meidell, U. Scheller, J.-Å.Winquist, M. Osterkamp Madsen, P. Djursvol, G. Budd & U. Gärdenfors

Artdatabanken, Sveriges lantbruksuniversitet (SLU), Uppsala

2005

ISBN 91-88506-53-3

In 2001 ArtDatabanken (The Swedish Species Information Centre) was appointed to direct and co-ordinate the so called "Swedish Taxonomy Initiative", one of the most fundamental components of which was a thorough taxonomic investigation of poorly known groups of organisms. This part of the project aimed to produce a series of identification handbooks with keys to the Swedish plant and animal species – "The Encyclopaedia of the Swedish Flora and Fauna".

This is the volume, published in 2005, covering the four myriapod groups. A beautifully produced, 351 page, large format (21cmx28cm) hardback book from authors well known in world myriapodology. Each species is described in Swedish with an English summary of "Key Facts", drawings showing key features and, in the case of millipedes and centipedes, a colour illustration. There is also an inset map showing distribution in Denmark, Norway, Sweden, Finland and Iceland with indication for Faroes. Illustrated introductions and keys to the species are in both Swedish and English.

Most of the species of centipedes (enkelfotingar) and millipedes (dubbelfotingar) are known to us in Britain but there are some, such as *Lithobius pelidnus*, *Polydesmus complanatus*, *Megaphyllum sjaelandicum*, *Kryphioiulus occultus, Enantiulus nanus, Leptoiulus proximus*, *L.cibdellus*, *Xestoiulus laeticollis*, *Julus scanicus* and *J. terrestris* which we do not see. Recent finds in Britain which are illustrated include *Lithobius lucifugus*, *Lamyctes coeculus*, *Melogona voigtii* and *Paraspirobolus lucifugus*.

What the book includes, as well, however, are sections on Pauropoda (Fåfotingar) and Symphyla (Dvärgfotingar) groups upon which Ulf Scheller was the acknowledged expert, especially on pauropods which many of us have difficulty finding, leave alone identifying. An introduction to these animals is followed by an illustrated key and sixteen species are described with pictures of whole animals for the genera and drawings of characteristic features of all species. The eight species of Symphyla are somewhat similarly covered and anyone wanting to "have a go" at this difficult group, for which the only British key, that of Edwards dates back to 1959, might find Mångfotingar an additional resource.

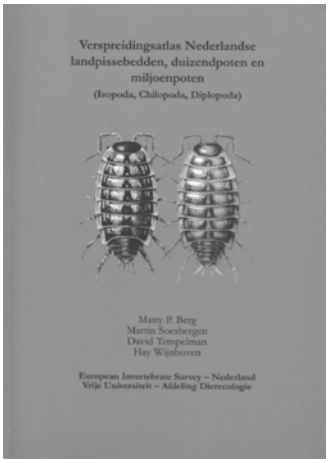
As well as taxonomic and descriptive information, the book contains notes on lifecycles and begins with introductions to both arthropods and myriapods. Interestingly, all the groups and species have been given Swedish names so the Julidae are the kejsardubbelfotingar, *Cylindroiulus punctatus* is Klubbkejsarfoting and *C. caeruleocinctus* is Tigerkejsarfoting - *Pauropus huxleyi* is Spetsfårfoting. Nobody tell Buglife !!!

A.D. Barber

The above book has also been adapted into a small 60 page, roughly A5 sized booklet, Fältnyckeln Mångfotingar by the same authors. Dated 2006 (ISBN: 91-8506-34-7) this is described as an 'easy-to-use booklet for the amateur naturalist' and covers the centipedes and millipedes found in the Nordic countries (78 in total). With three species to a page (6 to view at a time) this is a very attractive book. For each species there is: An illustration of the whole animal; a distribution map; a line illustration of the key part(s)

of the species needed for illustration (e.g. dorsal view of head in Cryptops, coxal pores and last pair of legs in many geophilomorphs, telson shape in Julids) and a short paragraph of text (in Swedish) describing it's habitus and habits. At the end is a key to all the species covered. The abundance of top quality colour illustrations makes this little book very different to other identification guides on these groups, although the summarised information means that identification of tricky species would not be easy.

H. J. Read



VERSPREIDINGSATLAS PISSEBEDDEN, DUIZENDPOTEN EN MILJOENPOTEN (ISOPODA, CHILOPODA, DIPLOPODA)

Matty P. Berg, Martin Soesbergen, David Tempelman & Hay Wijnhoven.

Published by the European Invertebrate Survey, Leiden; 2008 (http://www.naturalis.nl/eis)

192 pp, 17 x 24 cm, 13 figs, 133 distribution maps.

Softback, price € 12.50.

ISBN 978 90 76261 07 2

This distribution atlas of the woodlice, centipedes and millipedes occurring in the Netherlands is of great interest to British recorders. It brings together more than 43,000 species records for 133 species compiled from 450 recorders from 1880 until the end of 2005. Although the text is in Dutch, making it less accessible to British and other European workers, the distribution maps speak for themselves.

A brief introduction to recording in the Netherlands is followed by sections, relevant to each of the three taxa, on taxonomy, biology and ecology and morphology. The next section deals with collection, observation and preparation of specimens. This details equipment and techniques required, including the dissection of woodlice pleopods and millipede gonopods. The species accounts are preceded by a brief history to the recording of the three groups in the Netherlands, including maps showing the extent of species recording. Species records have been made from all corners of the country. However, there are the usual problems of recorder bias, with plenty of records from some areas, notably around Amsterdam and Maastricht, while other areas remain poorly known.

The bulk of the publication comprises species accounts and distribution maps for all native, naturalised and alien species known from the Netherlands. This includes 40 species of woodlice (including *Trichoniscus provisorius*) (27,684 records), 41 species of centipede (7,301 records) and 52 species of millipede (8,830 records). There is one species account per page with a distribution map embedded in the top right corner. No distinction is made between recent and historical records. Each species account has a standard format, with sections listing identification literature (which includes all of our familiar British identification guides), outline distribution in Europe, distribution in the Netherlands, habitat, ecology and conservation status. The book finishes with a systematic checklist of species and a table of species occurrence within each of 12 provinces.

The Netherlands lies on the near continent just across the North Sea from eastern England and, with few exceptions, all of our common and widespread species, and many of our rare ones, occur in the Netherlands. There is a strong central and northern European element to the fauna, which provides an interesting contrast to our Atlantic biased British fauna. The woodlice *Ligidium hypnorum* and *Trachelipus rathkii* just reach our shores, but unfamiliar species include the woodlice *Armadillidium opacum* and *Porcellium conspersum*, the centipede *Geophilus proximus* (which is also known from Shetland) and the millipedes *Enantiulus nanus* and *Xestoiulus laeticollis*. There are a few species widespread in the Netherlands that could be found in Britain.

These include common central European species such as the woodlouse *Hyloniscus riparius* and the centipede *Lithobius erythrocephalus*.

Some interesting comparisons to British distribution patterns can be made and a few are highlighted here. The woodlice *Metatrichoniscoides leydigii* and *Trichoniscoides sarsi* are both common across the low-lying coastal area of the Netherlands (where male specimens have been routinely dissected), but are synanthropic and known from a few inland localities in Britain. This raises the possibility that these two species may occur on the eastern coasts on Britain, interestingly where *T. saeroeensis* (a species not recorded in the Netherlands) has been widely recorded. Of the centipedes, *Pachymerium ferrugineum* is widely recorded (very rare and coastal in Britain) and *Geophilus carpophagus* s.str. is widely recorded, whereas *G. easoni* (our more widespread member of this species aggregate) has not been recorded. The distribution of the millipede genus *Melogona* is also of interest. The most widespread British species *M. scutellaris* is absent in the Netherlands. *M. gallica* (which has a western bias in Britain) occurs mainly in the south, while *M. voigtii* (which is known from south-east Scotland) has a north-western distribution in the Netherlands.

The authors are to be congratulated on achieving a very interesting account of the woodlice, centipedes and millipedes of the Netherlands. The work is not only of great interest to British recorders, but also relevant to those across north-western Europe. It provides a valuable base line on the distribution and ecology of these soil dwelling taxa and, particularly in light of climate change, will provide a basis for future monitoring.

S.J. Gregory

DIE HUNDERTFÜßER

Jörg Rosenberg

With chapters by Karin Voigtländer & Gero Hilken

Die Neue Brehm-Bücheri Band 285

Westarp Wissenschaften, Hohenwarsleben; 2009

ISBN 3 89432 7I2 X
ISBN 978 3 89432 712 5

Inevitably, Jörg Rosenberg's book invites comparison with John Lewis's *The Biology of Centipedes*, published nearly 30 years ago (1981) and recently reprinted. Both are by distinguished centipede researchers, the former mostly in the field of microanatomy, ultrastructure and function, the latter mostly in ecology and especially in taxonomy. The new book is of slightly greater length (524 compared with 476 pages) but both cover a whole range of topics in centipede biology and both have a valuable range of references although, clearly, Die Hundertfüßer is able to make use of work published during the intervening period alongside older material. It also takes advantage of colleagues' specific skills with chapters by Karin Voigtländer and Gero Hilken.

An introduction and colour plates lead into a series of chapters (rather less than half the book) covering external morphology, glandular structures of the integument and elsewhere and the various body systems; digestive, excretory, nervous, sense organs, endocrine, tracheal, vascular. In each of these both generalised features and aspects of the condition in the various orders are described.

A chapter on development, both embryonic and post-embryonic includes the recent work on *Strigamia maritima* by Arthur, Chipman and others along with the anamorphic development of Scutigeromorpha and Lithobiomorpha including the various stages in *Lithobius* and the issues in delineating these. This is followed by an account of reproductive structures, gametogenesis, mating, egg-laying and parental care.

A chapter on segmentation, both inter- and intra-specific includes Chris Kettle's famous *S. maritima* with an even number of leg pairs and concerns itself almost entirely (inevitably) and, one feels perhaps a little briefly, with geophilomorphs.

Poison glands, their structure, the nature of the toxins, their pharmacology and effects is a topic that always comes up when talking to members of the public about centipedes. Does it hurt? What happens? Can they kill you? Certainly we have here some account of what "giant centipede" bites do – and even a short paragraph as to what to do when you are bitten. A search on the web will actually throw up quite a lot about centipede bites.

Wehrdrusen deals with "defensive" glands and is followed by a chapter on bioluminescence. This latter has references going back to the sixteenth century but little later than about 1980. Maybe a field for further work for anyone interested. Sections on coxal and anal organs and of the maxillary organs of *Scutigera* reflect the author's researches into the ultrastuctrure and functions of these

Parasitism and pseudoparasitism looks at endo- and ectoparasitism in centipedes reviewing the relevant literature. The most unusual of these references is to the presence of leeches, *Herpobdella* in the midgut of *Scolopendra morsitans* and *S. cingulata* from India. John Lewis's account of the same report throws doubt upon the nature of the parasites concerned, suggesting they might be gregarines; he also studied more than a thousand *S. amazonica* from Nigeria without finding a single metazoan parasite.

The section on pseudoparasitism throws an interesting light on a curious aspect of human biology/ psychology, reporting historical references to centipedes found in various parts of the human biology ranging from a *Geophilus carpophagus* in the nasal cavities (1695) to an account of a living *Lithobius forficatus* under a tooth crown in the lower jaw of a 38 year old patient (1972).

The chapter on centipede diet is followed by *Verhaltensbiologie* which includes prey capture, cleaning/ grooming, diurnal rhythms and sound production.

Karin Voigtländer's chapter on ecology is a valuable summary of this topic including life-forms, abiotic and biotic factors influencing these animals, ecological strategies, distribution and ecological niches. There is a review of habitats, inevitably with a focus on Central European sites; woodlands of various types, dry habitats, cultivated sites, coastal locations, urban environments, caves and nests.

An inevitably short chapter on fossils is followed by Gero Hilken's account of phylogeny and systematics, discussing the monophyly of Chilopoda and its relationship to the other myriapod groups and the relationships between the five orders of centipedes.

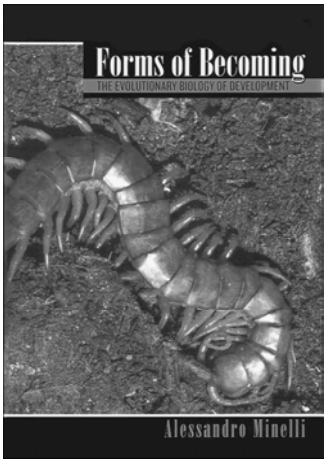
The second of Karin's contributions lists the distribution of 4 scutigeromorphs, 282 lithobiomorphs, 36 scolopendromorphs and 175 geophilomorphs in Europe, including the Azores, Canaries and Madeira. A most helpful resource although there might be the odd typo in it to look out for such as *Arctogeophilus attemsi* Folkmanova, 1956 from UK – presumably UA (Ukraine).

A final chapter deals with collecting, maintaining and breeding these animals.

An important book, packed with lots of information, especially on ultrastucture and systems although a few parts such as that on bioluminescence, presumably as a result of lack of recent research, may not add more to what is in *Biology of Centipedes* and language may, inevitably, be a problem to English speakers. A book of reference, to be kept on the shelf and to be referred to whenever looking at unfamiliar aspects of centipede biology and an invaluable source of references.

[NHBS are asking £80 on the web; the publisher's price is more like €59.95 so it is worth shopping around if you plan to purchase it.]

A.D. Barber



FORMS OF BECOMING – The Evolutionary Biology of Development

Alessandro Minelli (translated by Mark Epstein)

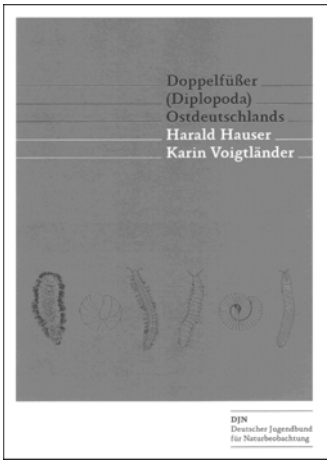
Princeton University Press, Princeton & Oxford; 2009

ISBN 978-0-691-13568-7

Despite the picture of *Scolopendra* on the dust jacket and the fact that it does include the question as to why *Scolopendra* species have 21 or 23 pairs of legs but never 22 (all centipedes have an odd number of pairs), this is not a book about centipedes but, as its subtitle indicates, the evolutionary biology of development (or "evo-devo"). As such it brings together important ideas and questions from the two disciplines of evolutionary and developmental biology. Stimulating and well written by an authoritative writer on the subject (who is also a myriapodologist) with examples from across the animal (and plant) kingdom.

A.D. Barber

NOTICE OF PUBLICATION



DOPPELFUßER (DIPLOPODA) OSTDEUTSCHLANDS

Harald Hauser and Karin Voigtländer

Deutscher Jugendbund für Naturbeobachtung

1990

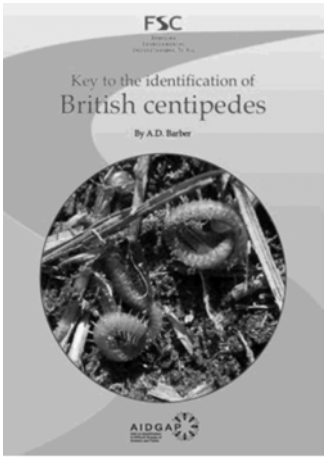
ISBN 978-3-923376-25-1

€15.00

An identification key to the 67 species of millipede recorded from the länder of Berlin, Brandenburg, Mecklenberg-Western Pomerania, Saxony, Saxony-Anhalt & Thuringia. Also in Schleswig-Holstein & Lower Saxony.

A review of this will be published in our next volume.

CENTIPEDE KEYS PUBLISHED

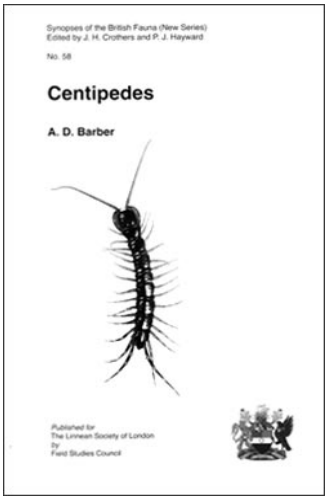


AIDGAP KEY TO THE IDENTIFICATION OF BRITISH CENTIPEDES

A.D. Barber

Date: 2008 Price: £8.00

This AIDGAP identification guide should enable non-specialists to identify the 57 species of centipede found on the island of Britain, including 7 species known only from greenhouses. It includes dichotomous and tabular keys backed up by concise confirmatory notes.



LINNEAN SOCIETY SYNOPSES OF THE BRITISH FAUNA: CENTIPEDES

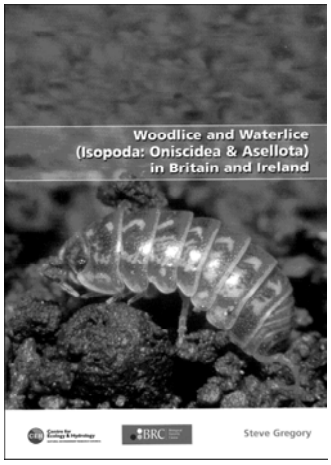
A.D. Barber

Date: 2009 Price: £35.50

Aside from the insects, centipedes (Class Chilopoda) are some of the commonest larger arthropods found in gardens, waste ground, woodland, grassland and moorland. This new *Synopsis of the British Fauna* covers the entire British list. Illustrated keys are given to the four orders and to 61 species, including species which have only been found within heated buildings. There are detailed taxonomic notes on the 10 families and 18 genera.

Both works are available from FSC Publications: http://www.field-studies-council.org/publications/index

ATLAS OF WOODLICE & WATERLICE PUBLISHED



WOODLICE AND WATERLICE (ISOPODA: ONISCIDEA & ASELLOTA) IN BRITAIN AND IRELAND

Steve Gregory

Date: 2009 Price: £19.50

This full-colour atlas represents a comprehensive synthesis of the information available on the 52 species of terrestrial woodlice and four species of aquatic waterlice occurring in Britain and Ireland.

There have been considerable advances in our knowledge of the British and Irish fauna since its predecessor was published in 1985. To the end of 2007, the Non-marine Isopod Recording scheme had received over 150,000 species records. The results are presented as distribution maps for each species embedded within detailed species accounts, which provide details of identification, distribution and habitat preference. Additional sections cover collecting, recording, biology and conservation. This publication is available from Centre for Ecology and Hydrology: http://www.ceh.ac.uk/products/publications/WoodliceandWaterlice2009.html.

ERRATUM: Bulletin of the British Myriapod and Isopod Group, Volume 23 (2008)

DISTRIBUTION AND ECOLOGY OF TWO ENIGMATIC SPECIES, *TRICHONISCOIDES SARSI* PATIENCE, 1908 AND *T. HELVETICUS* (CARL, 1908) (CRUSTACEA, ISOPODA) IN THE NETHERLANDS

Matty P. Berg.

The species distribution map (figure 1, page 3) was drawn in greyscale and did not reproduce clearly. For clarity it is redrawn here in black and white.

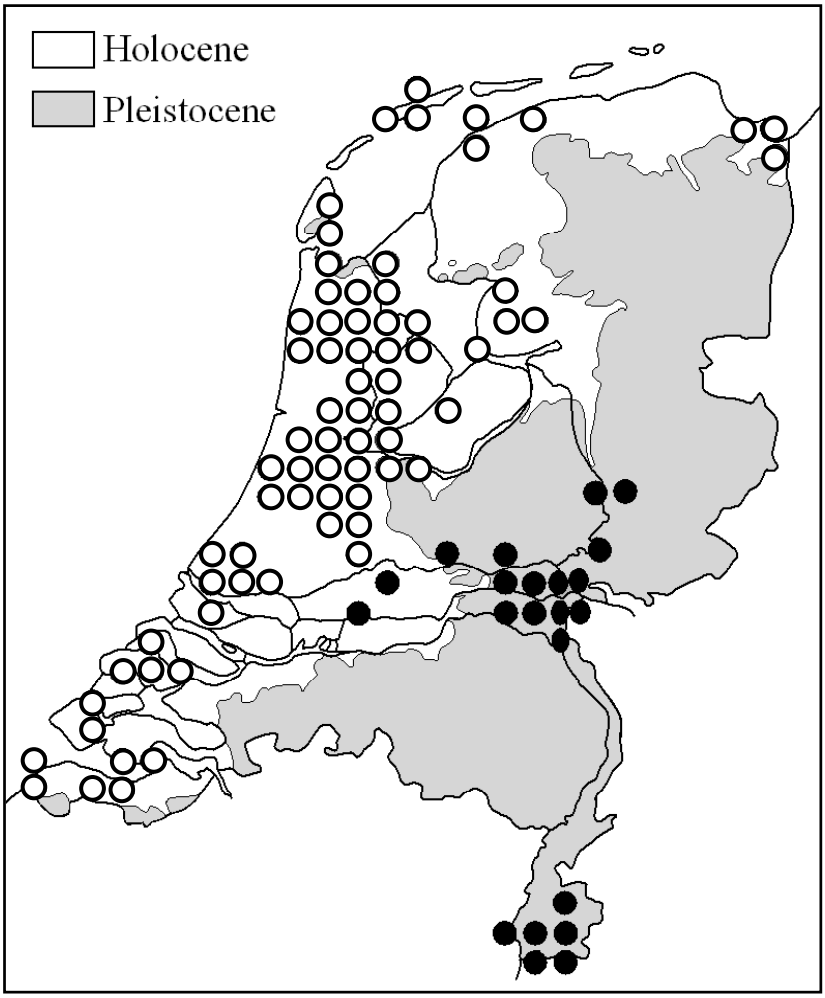


FIGURE 1: Distribution of *Trichoniscoides sarsi* (white dots) and *T. helveticus* (black dots) in the Netherlands (grid cells are 10x10 km).

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Cover photograph: *Armadillidium pictum* © Paul Richards
Cover illustration: *Geophilus carpophagus* sensu stricto © Tony Barber/Steve Gregory

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