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EDITORIAL

Welcome to a bumper edition of the Bulletin – bumper in more ways than one!

In 2018 we will be celebrating an amazing 50 years of woodlice recording. Back in 1968, members of the then British Isopod Study Group, decided that not only would they record the distribution of woodlice but that they would, in addition, endeavour gather ecological data, resulting in a record card where there were "boxes" for habitat information as well. This led, in due course, to the 1970 record card in a design shared, thanks to the involvement of Colin Fairhurst, with those for millipedes and centipedes under the auspices of the British Myriapod Group founded that same year. Hence this Bulletin issue contains an article by Paul Harding who reminisces about those early days and reflects how much has changed (he no longer has to cycle to the jam factory to work for example!). It is truly incredible to think how a simple idea to record where woodlice were found has grown into the complex recording scheme systems that we have today along with the quality of atlases and other publications to disseminate the information. Other isopod articles deal with UV fluorescence in *Pseudolaureola atlantica* and two woodlice new to Britain.

The newly published European atlas of Julid millipedes is a monumental piece of work that has built on those early ideas and has captured data from across Europe. That the UK is so well recorded for Julids, as this atlas shows, is testament to the impact of the initial woodlouse recoding scheme. Today it is possible to take photographs and send them to experts to check identification and to record where and when species were found on personal phones – a level of instant recording that Paul and his colleagues cannot have even dreamt of in 1968.

Looking back at 2017 it was a notable year for congresses, with the 17th International Myriapod Congress in Asia for the first time in Thailand and the 10th International Isopod meeting in Hungary. Hungary is proving a popular place for Myriapod and Isopod meetings, I remember attending a previous Isopod congress there many years ago, also organised by Liz Hornung who tells us here about the 2017 meeting. The next Myriapod Congress will also be in Hungary in 2019, organised by Zoltán Korsós, another good friend to BMIG who hosted our field trip there in 1994. Sadly, the contingent of UK people to both these was much reduced from previous years – here's hoping for a better turn out in 2019!

In this Bulletin, as well as the two new woodlice, we record a staggering four species of millipede new to the UK – truly a bumper crop! No less than three of these millipedes were found in the Welsh Valleys, an area so exciting myriapodologically that we are planning the next field meeting at Easter 2018 to see what else we can find!

We are lucky in the UK to have a long continuity of people associated with biological recording and we need to celebrate their experience and foresight as well as that of the schemes which they set in motion. Somehow we also need to capture their loyalty and perseverance with our particular groups of invertebrates and try to bottle some of that for the next generation. Will we have such fidelity in the future? If not, it is difficult to see how our small group will continue in the long term. For this reason, it is vital for the group to maintain a high profile in both publicising our work and becoming involved in both national and local recording and in schemes such as iSpot and iRecord but also in encouraging others to become interested. Those of us who have been looking at these animals for some years may recall their own "early days" and the ways in which experienced workers such as Gordon Blower and Ted Eason (in the case of myriapods) and Stephen Sutton (woodlice) not only shared their knowledge and experience and supported us in our interest but, so importantly, encouraged us in what we were doing.

"*PER ISOPODA AD ASTRA*" - 50 YEARS OF ISOPOD RECORDING

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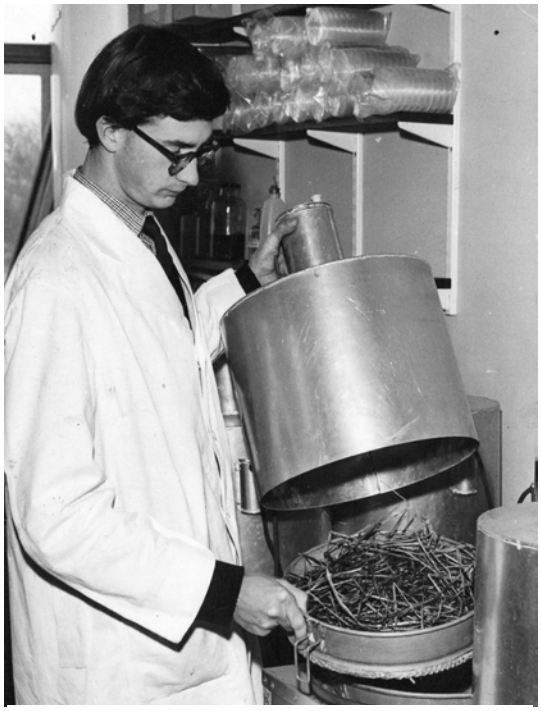
Quite a lot has been written about the origins, history and achievements of the recording scheme covering woodlice and waterlice in Britain and Ireland. Rather than repeat existing information, reference is made to key publications, many of which are available to download or view online. Nevertheless, some stories may be worth repeating or expanding.

TO BEGIN AT THE BEGINNING....JANUARY 1968, A COLD EVENING IN CAMBRIDGE

Following the winter meeting of the British Ecological Society in Cambridge, Stephen Sutton and John Metcalfe were sitting in a pub, developing ideas for what became the Isopod Survey Scheme (ISS). Unknown to them, Paul Harding was cycling out of the city to nearby Histon for another night-shift at the jam factory, having spent the afternoon in a Cambridge library extracting woodlice records from dusty volumes. The three finally met in the following autumn to develop plans towards launching ISS in December 1968; none of them could have imagined that the successor of the scheme would still exist 50 years later.

Sutton and Metcalfe developed a pioneering recording card (for woodlice, waterlice and some, mainly littoral, marine species) which was also aimed at recording broad habitats for the species. The card was intended for recording which species occurred at a single habitat and location on one occasion, rather than summarising records from a large spatial unit such as a 10km square. On the advice of David Burn, a PhD student with Sutton at Leeds, the card was designed for the data to be computerised, and it was printed in the spring of 1968. Harding became involved after the card had been produced, and in 1969, the British Isopoda Study Group (BISG) was launched to host the Isopod Survey Scheme. John Metcalfe[1] soon moved on to build a successful career in psychology, but Sutton and Harding remained actively involved with the scheme. Harding took on the role of scheme organiser for woodlice and waterlice in October 1971 having recently taken up a junior post in the Woodlands Section of the Nature Conservancy at Monks Wood near Huntingdon.



Paul Harding loading a Tullgren funnel at Monks Wood, c. 1965

At that time, very few people in Britain or Ireland had an active interest in woodlice or waterlice, and most had only a few years of practical experience. Woodlice had been quite well studied by some naturalists, up to the 1920s, and by a few individuals into the early 1950s, but most of that cohort of experience had died, moved abroad or gone on to study other taxa. Academic research had been minimal and marine Isopoda were a largely neglected group.

[1] https://thepsychologist.bps.org.uk/volume-28/november-2015/dr-john-alban-metcalfe-1940-2015

THE BIOLOGICAL RECORDS CENTRE, AND WORKING WITH THE BRITISH MYRIAPOD GROUP

During 1969, through the agency of the Biological Records Centre (BRC) at Monks Wood, BISG was brought together with the members of the embryonic British Myriapod Group (BMG), including the prospective scheme organisers Colin Fairhurst (millipedes) and Tony Barber (centipedes). A shared approach to recording the habitats of woodlice/waterlice, centipedes and millipedes was developed and BRC printed new recording cards for BISG and BMG in June 1970, using a more detailed, hierarchical habitat recording format. A separate recording card for marine Isopoda, with an analogous habitat recording system (for mainly littoral habitats), was developed in 1972 by David Holdich and Roger Lincoln as part of the Isopod Survey Scheme. Unfortunately recording marine Isopoda attracted little support from volunteers, despite the publication of a key (Naylor, 1972), so that this part of the ISS was eventually discontinued.

THE EARLY YEARS (1968 TO 1985)

Stephen Sutton and Paul Harding in 2015

Anyone with an obsessive interest in the early years should read the prefatory Introduction to Doogue & Harding (1982), the Recording chapter in Harding & Sutton (1985), the introductory sections of Harding (1990) and the Recording in Britain and Ireland chapter in Gregory (2009) for greater detail.

An important objective at the start was to recruit recorders and help them gain more experience in identification and in field recording. Regular newsletters[2] were produced by BISG and residential field meetings were organised at locations in England, Wales and Ireland every couple of years. A growing band of regional experts, such as Declan Doogue, Glyn and Dawn Collis, Douglas Richardson and Adrian Rundle, also organised local meetings, particularly designed to recruit and help inexperienced recorders. The success of the first combined BISG/BMG field meeting in 1983 at Lancaster resulted in a joint meeting being held in subsequent years.

The publication of Stephen Sutton's *Woodlice* (Sutton, 1972), with its off-printed illustrated key (Sutton, Harding & Burn, 1972), provided an additional impetus to recording, improving on the keys in Edney (1954) and drawing on early results from the ISS. Hilary Burn's colour paintings in the key even made woodlice look attractive!

Discounting any erroneous species that may have been added by W.E. Collinge (see Harding, 1977), only three species of woodlice (all hothouse aliens) had been added to the British list since 1913. In comparison, six species, all apparently native, were added to the British list between 1968 and 1983, including *Metatrichoniscoides celticus* new to science. Although *Eluma caelatum* was new to Britain in 1975, it had been recorded in Ireland since 1908.

Automated data handing in this period was primitive. Even the 1970 recording card was designed around the constraints of an 80-column punched card[3], although that was a considerable advance on the 40-column punched cards used originally at BRC. A *Provisional Atlas* (Harding 1976) was published

[2] http://www.bmig.org.uk/view/resource/bisg-newsletter
[3] https://en.wikipedia.org/wiki/Punched_card

using maps that had been hand-plotted because at that time BRC did not have the resources to process the ISS data. During a family holiday on the Suffolk coast in June 1976, I remember plotting the maps on the dining room table, with half an eye on my younger daughter who was just beginning to crawl.

Four woodlice discovered new to Britain between 1968 and 1985
A) *Metatrichoniscoides celticus*; B) *Miktoniscus patience;* C) *Buddelundiella cataractae;* D) *Stenophiloscia glarearum.* Images from BMIG website www.bmig.org.uk

Beginning in 1975, Declan Doogue had built-up a small team of woodlice recorders in Ireland, with a strong emphasis on developing the enthusiasm and skills of mainly young naturalists. By the end of 1980, all but one of the species that had been known from Ireland at the time of the previous comprehensive review (Pack-Beresford & Foster, 1911) had been rediscovered, and eight species had been added. In 1981 Declan and Paul Harding began work on what would become the *Distribution Atlas of Woodlice in Ireland* (Doogue & Harding, 1982) documenting for the first time information about the habitats of species as well as the distribution of species. In these pre-internet times communication between Declan in Dublin and Paul at Monks Wood was limited to the telephone and post. One frantic weekend together in Dublin helped to finalise the text (and to do a certain amount of essential car maintenance), but it took us longer than planned. Administrative difficulties with the publisher meant that the atlas was not published until early 1983.

By 1982 sufficient data had been collected to plan what would eventually be published as *Woodlice in Britain and Ireland* (Harding & Sutton, 1985). The analysis of the habitat data for this atlas was described by Harding & Sutton. This work was inextricably linked with the analyses being developed by Colin Fairhurst and colleagues at Salford University using analogous data for millipedes and centipedes from the BMG schemes.

The role of organiser of the recording scheme passed from Paul Harding to George Fussey in 1982, soon after Paul was appointed as the Head of BRC. George had recently completed post-graduate research on *Trichoniscus pusillus* with Stephen Sutton at Leeds University and was embarking on a career in teaching, including 30 years at Eton College. The handover was an opportunity for changes to the scheme, with a new recording card that included the additional species. Also the habitat recording element of the card was removed, mainly because it had been considered to make recording too complicated. In 1986, now established in a Lecturer post at Reading University, Steve Hopkin took over as scheme organiser, having completed post-doctoral research on invertebrates and heavy metals pollution at Bristol University (see Hopkin, 1989).

By the early 1980s research on British and Irish woodlice, particularly at Leeds, Bristol and Nottingham, had come to the attention of wider academic circles. The Zoological Society of London invited Stephen Sutton and David Holdich to organise an international symposium on The Biology of Terrestrial Isopoda which was held at London in July 1983 (Sutton & Holdich, 1984). The British contributors presented results from a wide range of recent research to a truly international audience. Unfortunately it was premature to present results from the ISS in 1983, but the 2nd International Symposium, held at Urbino in Italy in 1986, eventually resulted in a paper summarising habitat and biogeographic data drawn from the scheme (Sutton & Harding, 1989). International symposia on terrestrial Isopoda have continued at irregular intervals, but contributions from British workers have declined.

Stephen Sutton had used the motto *per isopoda ad astra* ("through Isopoda to the stars") in his brief report on the 1st International Symposium in ISS Newsletter No 17. From where all this had started in 1968, it was probably a justifiable statement of ambition! Stephen's close involvement with BISG and the scheme continued until the late 1980s, by which time his work on tropical forest ecology and projects such as Operation Drake and Operation Raleigh had increased[4].

A LITTLE BIT ABOUT WATERLICE

Gregory (2009) provides a thorough review of records of the four species of waterlice, but in the early years of BISG, little effort had been put-in to recording them. However, Professor H.P. (Philip) Moon and Professor W.D. (Bill) Williams had been actively working on the two native, mainly surface-dwelling species since the 1950s. By the time the ISS was launched, Williams was working in Australia, but he kindly provided many records from his earlier research. Philip Moon and Paul Harding brought together Moon's own records with those of Williams and scattered other records, in particular of the stygobite *Proasellus cavaticus*, in a preliminary review (Moon & Harding, 1981) published shortly before Moon died. Despite peddling this review to anyone that would take a copy, and the availability of three editions of an illustrated key to species (see Gledhill, Sutcliffe & Williams, 1993) waterlice have remained quite poorly recorded as part of the scheme. Much of the monitoring of aquatic fauna in inland waters fails to differentiate between the two common species of waterlice. Subterranean aquatic fauna remains poorly studied (see Proudlove, *et al.* 2003).

THE MIDDLE YEARS (1986 TO 2000)

Steve Hopkin, who ran the scheme from 1986 to 1991, led several initiatives and developments. He soon established a small research team around him at Reading which helped advance knowledge of several species, including the addition of two cryptic species that previously had been confused with commoner species. Steve published a thoughtful review of the biogeography of species (Hopkin, 1987)

[4] http://stephensutton.info/home/

drawing on data used in the 1985 atlas and subsequent records. He founded, edited and produced the journal *Isopoda* which ran to four issues between 1987 and 1991, publishing several key papers. The publication of his AIDGAP *Key to the Woodlice of Britain and Ireland* (Hopkin, 1991) was a major step in improving the resources for the identification of species. It was notable for the 32 colour photographs, by Steve himself, which illustrate about half the species. The ability to publish colour photographs inexpensively was later developed by Steve and the Field Studies Council to produce a six page folding leaflet *The Woodlouse Name Trail* as a key to common species (Hopkin, 2003).

A more traditional approach to a key to the identification of woodlice was eventually published in 1993 in the *Synopses of the British Fauna* series (Oliver & Meechan, 1993). Although published two years after Hopkin's AIDGAP key, the *Synopses* volume relied on monochrome whole-animal drawings of most species and plenty of detailed taxonomic drawings. The quality of the illustrations was generally excellent, although the absence of colour photographs was noted in some reviews. Graham Oliver had made important contributions to the ISS in the 1980s, notably in publishing descriptions of three species new to Britain and also providing descriptions and illustrations of these and one other species included in Harding & Sutton (1885).

By the time Steve Hopkin handed on the baton of scheme organiser to Dave Bilton in 1991, and although his interest in woodlice continued, Steve had already diversified his work to include millipedes (for example Hopkin & Read, 1992), and Collembola (see Hopkin, 1997). Steve's untimely death in a traffic accident at the age of 50, soon after taking early retirement, was a tragic loss of a uniquely talented and stimulating colleague and delightful friend to many[5].

Steve Hopkin at the Ento'03 conference at Reading University

Dave Bilton bravely took on the role of scheme organiser early in his career – whilst at Oxford and working for his PhD. Dave's nine year period as organiser saw several moves after being awarded his PhD, with research fellowships at Uppsala University, York University, back to Oxford University and finally to Plymouth University in 1996. Dave is now Professor of Aquatic Biology at Plymouth. Steve Hopkin and Dave had planned to update the woodlice distribution maps in a further volume of *Isopoda* but, for various reasons, this never happened. The planned work was probably a victim of their respective developing careers, at a time when work pressure on everyone in academia was increasing rapidly. It was also a time when BRC was unable to provide consistent support to the scheme due to other demands on its limited resources. But, the scheme remained active and BISG Newsletters from the period include accounts of many important finds and of the annual field meetings. Steve Gregory, a protégé of Steve Hopkin from the 1980s, and Jon Daws were remarkably active and successful in producing many new and often surprising records. Jon's knack of finding the unusual and his amusing reports on various recording expeditions, published in the BISG Newsletter in the 1990s, demonstrate the lengths to which dedicated recorders will go in pursuit of their chosen taxa.

Jon Daws (1994) was also the first to produce a local atlas, covering Leicestershire, but Steve Gregory and Paul Richards soon followed up in 1995 with their respective atlases for Oxfordshire and the Sheffield area. These atlases also marked an increasing trend for records to be submitted to local records

[5] http://www.bmig.org.uk/sites/www.bmig.org.uk/files/bulletin/BullBMIG22%20p2-8%20Obituary%20SPHopkin.pdf

centres, sometimes as well as to the ISS. Although national experts such as Steve and Paul also worked in their respective local areas, most counties were less well served with expertise to validate local records. Woodlice have sometimes been perceived as being "an easy group" for novice recorders to learn how to identify invertebrates. With the growth of local records centre throughout the 1990s there have been occasions when locally curated records have had to be queried as part of the scheme. Steve's Oxfordshire Atlas (Gregory & Campbell, 1995) was a product of his activities as an increasing national expert and the work of a well-run local records centre. Paul's pioneering local identification guide and atlas (Richards, 1995) grew out of his work at Sheffield City Museum and his courses on identification and recording for local naturalists.

At the 1999 joint annual field meeting held at Forde Castle in Northumberland, members of BISG and BMG agreed that it might be to the advantage of the two groups to merge as a single 'society', with a constitution and a committee. After all, we had been getting together for field meetings since the 1980s! Several members with an understandable dislike of bureaucracy had resisted the idea of a formal 'society' for several years, but we eventually agreed that it was worth a try!

RECENT YEARS (2000 TO 2017)

The merger of BISG and BMG to form the British Myriapod and Isopod Group (BMIG) was agreed unanimously at the annual joint field meeting held at Saffron Walden, Essex, just after Easter 2000. A committee was elected and roles distributed among the willing or persuadable.

The year 2000 saw other changes for the isopod scheme, the main one being that Steve Gregory took on the role of scheme organiser from Dave Bilton. Isopod recorders also now had the opportunity to publish isopod papers in the renamed *Bulletin of the British Myriapod and Isopod Group*, and there was a new BMIG Newsletter (the last BISG Newsletter having been produced in 1998). Thankfully, our digital dataset was not lost to the Millennium Bug[6] – a predicted IT apocalypse that never really happened.

Steve Gregory's work, initially with Oxfordshire Biological Records Centre and the Northmoor Trust in Oxfordshire, has involved survey and monitoring many taxonomic groups locally and widely elsewhere in Britain. Before he took over as organiser of the isopod scheme, Steve had been recording all the BMIG groups for more than a decade, contributing many unusual records and developing his identification skills. He soon set about revitalising the scheme, publishing new records and challenges to recorders in the BMIG Newsletter. Over the years he has taken on key roles within BMIG including co-editing and doing the layout of the Bulletin. More recently Steve has been the web-master for the BMIG website that was re-designed by and is hosted by BRC. Steve set himself the task of assembling, and making available via the website, the growing resource of bulletins, newsletters and early publications of BMIG and its predecessors. He also led on setting up the BMIG Library and reference collection at the base of the British Entomological and Natural History Society (BENHS) at Dinton Pastures near Reading. BMIG is one of several smaller national societies that are affiliated to BENHS.

An early objective for Steve was to bring together the increasingly scattered datasets for woodlice. By 2001 it was clear that recorders were storing their own data in a variety of digital formats – his note in BMIG Newsletter No 3 identified the problems and his planned approach to collating records. His longer term objective was to work towards a completely new atlas and to this end he used the BMIG Newsletter to publish selected up-dated species maps to encourage us to record.

[6] https://en.wikipedia.org/wiki/Year_2000_problem

Participants at the 2005 BMIG field meeting in Durham
Front row, left to right; Ken Hill, Glyn Collis, Dick Jones, Helen Read, Valerie Standen, Eric Philp & Paul Lee. Middle row; Peter Nicholson, Tony Barber, Paul Harding, Kelly Inward, Shona Turnbull & Richard Price. Back row; Mike Davidson, Desmond Kime, Steve Gregory & Mark Frater.

All three BMIG schemes have continued to work closely with BRC, including for some data processing. Although Paul Harding had retired from BRC in 2003, BMIG's interests were not overlooked in the ever-growing demands of initiatives such as the National Biodiversity Network, and data for woodlice have been used in joint research projects (e.g. Purse, *et al.,* 2012). When BRC staff moved to be based near Wallingford, Oxfordshire in 2008, Steve was well placed to liaise with BRC, initially with regard to his atlas, and subsequently regarding the BMIG website.

Steve worked in his 'spare' time over a couple of years to prepare the text and maps for the new atlas (Gregory, 2009). The comprehensive text and up-to-date maps of this atlas demonstrate the progress that had been achieved in over 20 years since the previous atlas. Steve drew extensively on his own practical knowledge and information resources, such as newsletters and published papers, to provide wide-ranging text. The maps will gradually become out-of-date as a result of more recording, but the text will certainly remain a primary source of information about woodlice for a further 20 years.

INTO A DIGITAL WORLD

Information technology (IT) has been integral to the development of the scheme. The first recording card produced for the scheme by BRC in 1970 was designed for the resultant records to be processed mechanically, using punched cards, and the data analysed electronically. The habitat analyses summarised in Harding and Sutton (1985) would not have been possible without the use of statistical packages on the dataset using computing facilities at Salford University.

Although this is not the place to review advances in IT since 1970, a few important developments regarding the scheme's use of IT should be mentioned. Steve Gregory has observed that, as scheme organiser, email has greatly reduced the turn-around time in giving recorders feedback on their records and identifications.

The website - The original BMIG website was set up by Craig Slawson and further developed by Glyn Collis. Complete re-development was undertaken as part of BRC's support for BMIG, so that http://www.bmig.org.uk/ is now the focus for information (present and past) about BMIG, the recording schemes and the respective taxonomic groups.

Photography - The role of high definition photographs in aiding species identification came to the fore in the 1990s, for example in Hopkin (1991) and Richards (1995). Subsequent developments in digital photography and camera technology have led to further advancements in quality and definition. This is ably demonstrated by the species photographs in Gregory (2009) and those on BMIG website provided by a number of contributors, notably Paul Richards and Keith Lugg.

Richards (2011) - With support from BMIG and a grant through the OPAL project, Paul Richards was able to greatly expand and develop the concept of his Sheffield booklet (Richards, 1995) into a national scale, digital resource for BMIG (Richards, 2011). Drawing on his experience in practical training courses for inexperienced naturalists and his excellent photographs this e-Book is a pioneering approach to teaching about, and how to identify, woodlice, millipedes and centipedes.

Digital publishing - Beginning in 2015, new volumes of the BMIG Bulletin and editions the BMIG Newsletter are published only on-line, as PDFs downloadable free of charge from the BMIG website. Back numbers of all previous BMG Bulletins, Isopoda and all BISG and BMG newsletters are also available.

National Biodiversity Network (NBN) - The woodlouse data set as used in Gregory (2009) is available on-line through the NBN Atlas https://nbnatlas.org/. The main principle of the NBN Atlas is to capture wildlife data once in a standard electronic form, to integrate data from a variety of sources, and to make data freely available. The NBN Atlas enables data to be quickly and easily accessed to provide understanding of the occurrence of particular species in the UK. But users need to be aware of the quality of some datasets that may be available via the NBN Atlas. More recent records of woodlice, verified by the scheme, will be added in due course.

iRecord - This online website was set up by BRC for the submission of biological records of any type, including isopods. Photographs to support the records can be included, which help national experts to verify the records. Once verified, records can then be included into the datasets of national recording schemes (including the BMIG isopod scheme). The main aim of iRecord is to make it easier for wildlife sightings to be collated, checked by experts and made available to support research and decision-making at local and national levels.

Social media - BMIG has embraced some social media as a quick and easy way to post news and other information. It has been used by several people requesting identifications and serves as a place to notify of new species or publications. Principally:

Facebook: https://www.facebook.com/BritishMyriapodandIsopodGroup also
Twitter: @britishmigroup; https://twitter.com/britishmigroup and
Instagram: britishmigroup; https://www.instagram.com/britishmigroup

AND FINALLY

Recording the distribution and ecology of woodlice and waterlice is an esoteric pastime, but includes a willingness to share information among a community of like-minded people. In the course of 50 years more than 1000 individuals, throughout Britain and Ireland, have been motivated to contribute their records, observation and photographs to the recording scheme. Fortunately this behaviour is a well-established tradition in natural history in Britain and Ireland. In those 50 years the scheme has

continued to thrive through a considerable range of changes – long may it continue. So, the last words should probably be with the originator of the scheme, Stephen Sutton, who will celebrate his 80th birthday in 2018 – with a mind to the future "*per isopoda ad astra*".

ACKNOWLEDGEMENTS

Stephen Sutton's original idea for the scheme and John Heath's early support for it at BRC provided a sound basis for the project. Gregory (2009) listed over 350 recorders that had contributed more than 10 records to the isopod scheme, from a list of more than 1000 overall contributors. These people have been the life-blood of the scheme and without them none of this could have happened. Of course, the individual scheme organisers have also been essential to the success of the scheme. I would also like to thank all the members of the BMIG Committee over the last 17 years for their enthusiasm and companionship, in particular Tony Barber, Steve Gregory, Paul Lee and Helen Read. I am especially grateful to Steve Gregory for comments on a draft of this paper and for his help in sourcing the photographs.

This review is a personal account based on my experiences of being involved with the scheme since 1968 (however peripherally). I am certain that other authors, or a consortium of contributors, would have brought different perspectives. It has not been possible to include full reference to the many people that have contributed significantly to the scheme and its continuing success. Sadly, some are now dead, including Colin Fairhurst, Steve Hopkin, John Metcalfe, Philip Moon, Eric Philp, Douglas Richardson and Bill Williams. Others have played a key role at various stages, including Keith Alexander, Roy Anderson, David Bilton, David Bolton, Martin Cawley, Arthur Chater, Glyn & Dawn Collis, Jon Daws, Declan Doogue, John Harper, Peter Harvey, Dick Jones, Paul Lee, Keith Lugg, Ian Morgan, Niall Reardon, Adrian Rundle, David Scott-Langley, Craig Slawson and Mark Telfer.

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A WOODLOUSE NEW TO BRITAIN: *ANCHIPHILOSCIA PILOSA* (BUDDE-LUND, 1913) (ONISCIDEA: PHILOSCIIDAE) IN A HEATED BUTTERFLY HOUSE IN BEDFORDSHIRE

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SUMMARY

The woodlouse *Anchiphiloscia pilosa* (Budde-Lund) is reported new to Britain from a butterfly house in Bedfordshire. A description with illustrations is provided to enable identification. It is a widespread species, known mostly from islands in the Indian and Pacific oceans. Potential confusion with *A. balssi* (Verhoeff), a similar species recorded from European glasshouses, is highlighted. *A. pilosa* is a non-native species in Europe and is very unlikely to be able to survive outdoors in the British climate.

THE DISCOVERY

On 16th January 2017, MGT visited the Butterfly House (TL005176) at Whipsnade Zoo, Bedfordshire (VC 30). This Butterfly House was opened in 2015 and houses an impressive range of spectacular tropical butterflies which fly in a heated, humidified environment, populated with a range of exotic trees and shrubs. From just two or three handfuls of leaf-litter from beneath the shrubs, four adults (two males, two females) and one immature of an unfamiliar, attractively-patterned woodlouse) were collected.

The excitement at finding an unfamiliar woodlouse was tempered with a fear that it could be very difficult to identify. With a three-segmented antennal flagellum, stepped pereion-pleon outline and weakly developed head lobes, this appeared to be a member of the Philosciidae. Four philosciids are known from British heated glasshouses: *"Setaphora" patiencei* (Bagnall) and *Burmoniscus meeusei* (Holthuis) have been known since 1908 and 1947 respectively (Gregory, 2009), and *Chaetophiloscia sicula* Verhoeff and *Pseudotyphloscia alba* (Dollfus) were discovered more recently in the Eden Project, Cornwall (Gregory, 2014). The two Eden Project species were easily ruled out using the descriptions and illustrations in Gregory (2014). *Setaphora patiencei* was ruled out using Bagnall (1908). The Whipsnade species strongly resembled a photograph of *B. meeusei* from Japan in Karasawa & Goto (2014) but it was clear from the illustrations of male 1st and 2nd pleopods, and 1st pereiopod in Holthuis (1947), Taiti & Ferrara (1991) and Karasawa & Goto (2014), that the Whipsnade species was not *B. meeusei*. Having established that the Whipsnade woodlouse was a species new to Britain, MGT emailed some photographs to Stefano Taiti. Exactly 30 minutes later, he replied with a confident identification: *Anchiphiloscia pilosa* (Budde-Lund, 1913).

On a return visit on 7th February 2017 in company with Alan Outen, SJG and Keith Lugg, *A. pilosa* was found to be common in parts of the Butterfly House (Gregory, 2017).

IDENTIFICATION OF *ANCHIPHILOSCIA PILOSA*

Anchiphiloscia pilosa was re-described and illustrated by Ferrara & Taiti (1986) which is the definitive reference for identifying this species.

FIGURES 1-3: Live *Anchiphiloscia pilosa* from Whipsnade

General appearance

The general appearance of *A. pilosa* (Figures 1 - 3) may be sufficient to distinguish it from all other British species except *B. meeusei*. It has a rich, dark-, rather purplish-brown ground colour with strongly contrasting paler marbling. All the pereionites have contrastingly orange-brown hind-corners, with the same colour on the uropods and antennae. The largest Whipsnade specimen (a female) is 6.5 mm long. Relative to the familiar outdoor philosciid *Philoscia muscorum* (Scopoli), this is a smaller, more slender species, with more elongate legs and antennae and an even faster running speed.

The cephalon bears weakly developed median and lateral lobes, typical of the Philosciidae. The eyes are composed of numerous ommatidia. The antennal flagellum is composed of three elongated segments bearing stout setae. The entire upper surface of the body is covered in short, erect setae. The hind-angles of pereionite 1 are obtuse and evenly rounded, becoming increasingly more acute and more distinct towards the last pereionite (Figures 1 - 3). The pleonites are much narrower than the pereionites, with their epimera reduced and appressed, producing a strongly stepped body outline. The pleopod exopodites lack respiratory areas ('pleopodal lungs'). The telson is triangular, with slightly concave margins and with a gently rounded tip. The protopodite of the uropod bears a prominent groove on its outer margin which continues onto the adjacent exopodite (Figure 4). The endopodite and exopodite of the uropod are inserted at the same level.

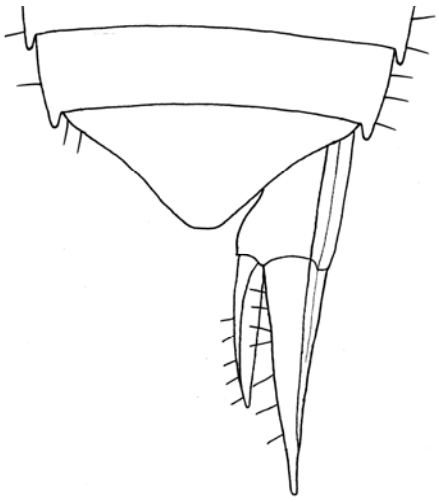

FIGURE 4: Telson and right uropod

Male characters

In males, there are important identification features on the 1st and 2nd pleopods (Figures 5 to 8). The shape of the endopodite of the 1st pleopod is particularly distinctive, tapering rather strongly in the apical quarter before a long, slender, apical part. There are two small, appressed spines near the apex of this endopodite (arrowed in Figure 6) though these are on the dorsal surface and difficult to see in ventral view, depending somewhat on the position of the endopodite in the slide preparation. The exopodite of the 1st pleopod is developed into a posterior lobe, pointing diagonally outwards (Figure 5).

Males possess a flattened and enlarged carpus of the 1st pereiopod (Figure 9) (and, to a lesser extent, the 2nd pereiopod) which is much more strongly modified than the 7th pereiopod (Figure 10).

Females and immatures are best identified by association with adult males.

FIGURE 5: Male 1st pleopods, ventral view

FIGURE 6: Male 1st pleopod endopodite apex, ventral view
Photographed using differential interference contrast (DIC) microscopy (appressed spines arrowed)

FIGURE 7: Male 2nd pleopods (both endopodites, right exopodite only), ventral view
Photographed with transmitted light (above) and dark ground (below)

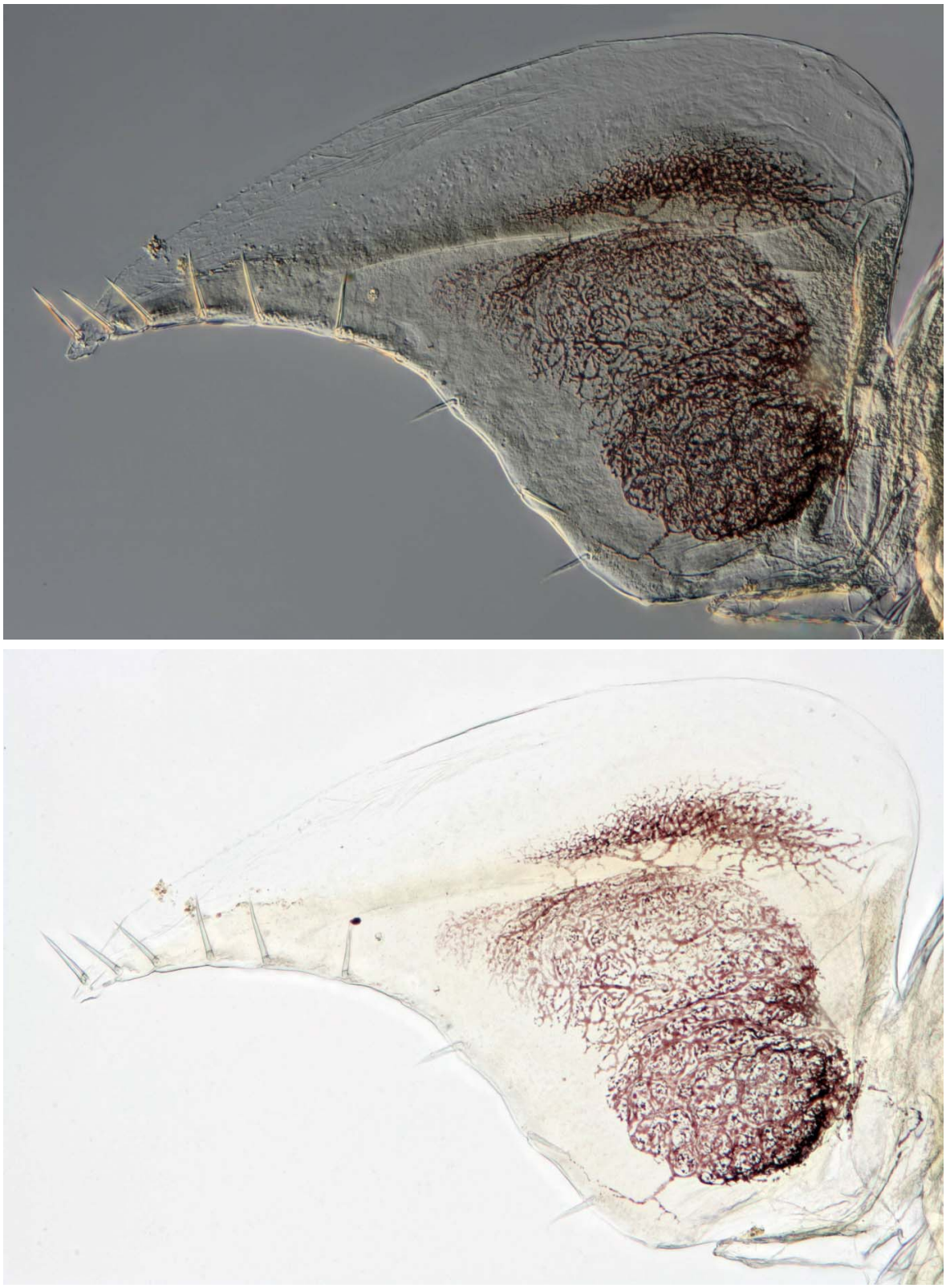

FIGURE 8: Male 2nd pleopods, left exopodite

Photographed with DIC (above) and conventional lighting (below)

FIGURE 9: Male 1st pereiopod

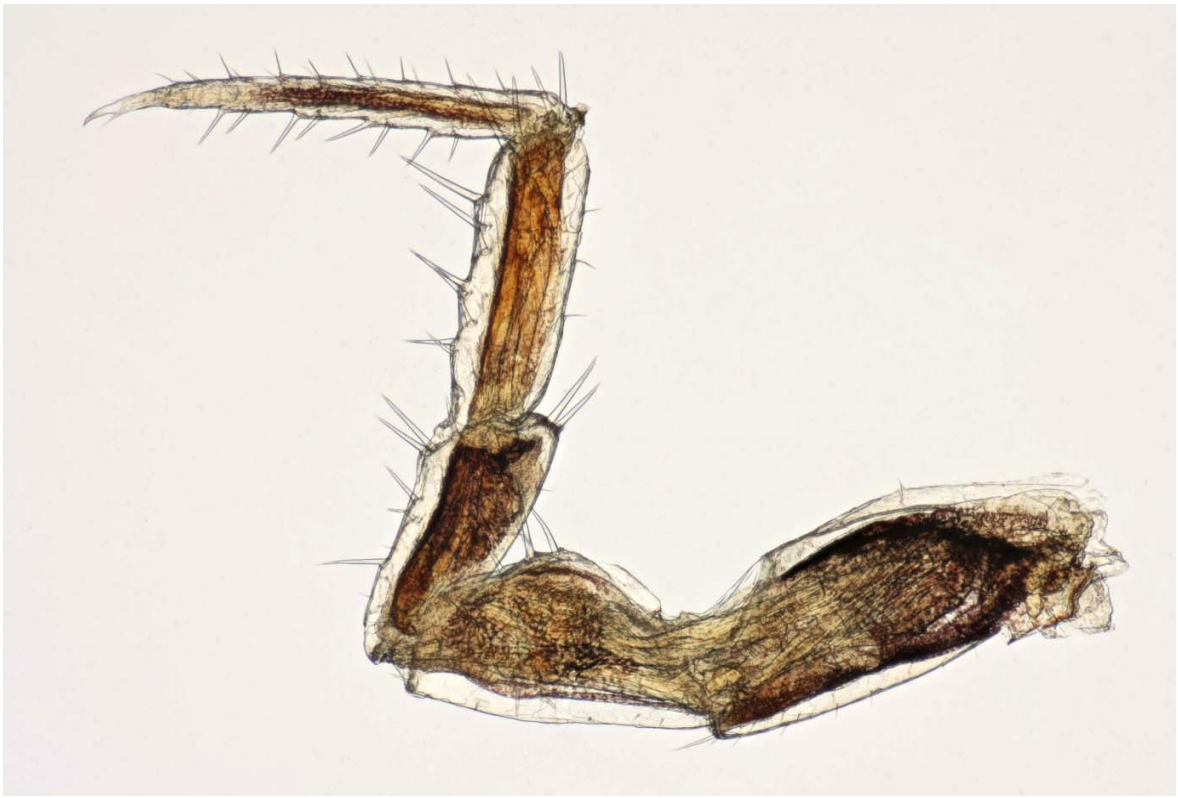

FIGURE 10: Male 7th pereiopod

DISTRIBUTION AND ECOLOGY

Anchiphiloscia pilosa is widely distributed, mostly on islands in the Indian and Pacific oceans. It was described from the Chagos Archipelago (British Indian Ocean Territory) and has since also been recorded from the Maldive Islands, Peninsular Malaysia, Java, Bali, Krakatoa, Christmas Island, and the Hawaiian Islands (Taiti & Ferrara, 1991; S. Taiti, *in litt*., January 2017).

The distribution of *A. pilosa* in European glasshouses is uncertain due to confusion with the similar species *A. balssi* (Verhoeff, 1928). This latter species was described from glasshouses in Munich, Germany, and has subsequently been recorded from glasshouses in The Netherlands (Holthuis, 1945; Berg & Wijnhoven, 1997; Berg, 2015) but remains unknown in the wild. Stefano Taiti has determined specimens from glasshouses in Utrecht and Amsterdam, The Netherlands, as *A. pilosa* (S. Taiti, *in litt*., March 2017) and although the www.pissebeddenproject.nl website (Berg, 2015) still refers to *A. balssi*, it is possible that all Dutch *Anchiphiloscia* records refer to *A. pilosa* (Matty Berg, *in litt.*, April 2017).

Illustrations of the 1st pleopod of *A. balssi* by Verhoeff (1928) and Berg & Wijnhoven (1997) suggest it is probably distinct from *A. pilosa*, though it is possible that an examination of the type material may see *A. balssi* reduced to a junior synonym of *A. pilosa*.

The occurrence of *A. pilosa* at Whipsnade is the first record for Britain.

In the wild, *A. pilosa* is regarded as a species occurring in leaf litter and along lowland streams and has been collected in mango leaf litter, mangrove litter, and by sifting leaf litter and rotting logs (Taiti & Haworth, 1996). The habitat conditions in the Butterfly House at Whipsnade Zoo are probably rather similar to these natural habitats. *A. pilosa* is very unlikely to be able to survive outdoors in the British climate.

ORIGINS OF *ANCHIPHILOSCIA PILOSA*

It is a matter of speculation whether the supplier in The Netherlands imported *A. pilosa* directly from its Indian Ocean and Pacific Ocean range or from another supplier elsewhere, and whether *A. pilosa* is established in their premises or merely passed through. Despite a recent resurgence of interest in the non-native woodlouse fauna of heated glasshouses, this is still an under-recorded environment in which discoveries can be made even from casual sampling.

ACKNOWLEDGEMENTS

We are most grateful to the following: Stefano Taiti for his expert help, without which the identification of *A. pilosa* might have taken much longer; Tyrone Capel at Whipsnade Zoo for hosting our visit on 7th February and Alan Outen and Keith Lugg for their company on that visit; Keith Lugg also for use of his photographs (Figures 1 - 3); Malcolm Storey for creating some extraordinary images (Figures 5 - 10); and Matty Berg for correspondence about *Anchiphiloscia* in The Netherlands.

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PHILOSCIA AFFINIS VERHOEFF, 1908 NEW TO THE UK (ISOPODA: PHILOSCIIDAE)

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ABSTRACT

While revising specimens of *Philoscia muscorum* in the collection of the Royal Belgian Institute of Natural Sciences (RBINS), one male *Philoscia affinis* was found which apparently was collected in the UK in 1985. Since *Philoscia affinis* was not known as a native species for the UK it was uncertain if the specimen was indeed caught in the UK or if the sample was just mislabelled. During a field trip in July 2017 several locations were visited in search of the species. Eventually, *Philoscia affinis* was found in South East England, which confirms its presence in the UK. Further, the identification, habitat preferences and distribution of *Philoscia affinis* in the UK and Europe are discussed in this article.

INTRODUCTION

In September 2014 the Belgian terrestrial isopod group 'Spinicornis' was founded. Shortly afterwards, in December 2014, a new species *Philoscia affinis* Verhoeff, 1908 was recorded for the first time in Belgium (Boeraeve *et al*., in press). The following years it became clear that the species is present across the whole of the country, with the exception of two northern provinces (*ibid*). *Philoscia affinis* closely resembles the omnipresent *Philoscia muscorum* (Scopoli, 1763) and therefore it was concluded that the species must have been overlooked in the previous decades. A revision was carried out for all specimens of *Philoscia muscorum* in the collection of the Royal Belgian Institute of Natural Sciences (RBINS), which included one specimen apparently collected in the UK in 1985. This specimen appeared to be a male *Philoscia affinis*. At first, it was expected to be a mislabelled specimen as it was the only one in an otherwise Belgian collection.

In July 2017 two members of Spinicornis went on a four day field trip to south-east England to verify whether or not *Philoscia affinis* was present. Different parks and ancient forests were visited in Cambridgeshire, Essex, Greater London, Hampshire, West Sussex and Wiltshire (Fig. 1). Review of collected specimens under the microscope revealed one male and several females of *Philoscia affinis*, which confirms the presence of the species in the UK.

IDENTIFICATION

Philoscia affinis belongs to the family Philosciidae, with *Philoscia muscorum* the only other native species in the UK belonging to that family (Gregory, 2009). Both species are medium-sized (up to 11 mm), have a stepped body outline, lack pleopodal lungs and have antennal flagella composed of three segments. Whereas *Philoscia muscorum* (Fig. 2A) has a distinctive black head with a small yellow spot on the rear of the head, the head of *Philoscia affinis* (Fig. 2B) is mottled brown, similar to the rest of the body. *Philoscia affinis* also lacks the white and orange brown stripe on the epimeron, typical for

Philoscia muscorum. It has a clear white dot on every front corner of the segments of the epimeron, which is normally not present in *Philoscia muscorum*. Even though the coloration of the head and body gives a good indication, for sure identification the 7th pereiopod of the male needs to be examined. The species can be conclusively discerned by the small hook at the base of the merus. For *Philoscia affinis* this hook stands up (Fig. 3A) whereas for *Philoscia muscorum* the hook on the merus is bowed down back to the leg (Fig. 3B). One has to be careful though whilst observing this feature since depending on the angle of view it can be deceitful. It is important to look straight at the side of the leg, only then can be distinguished between the hook roughly lying down or standing up.

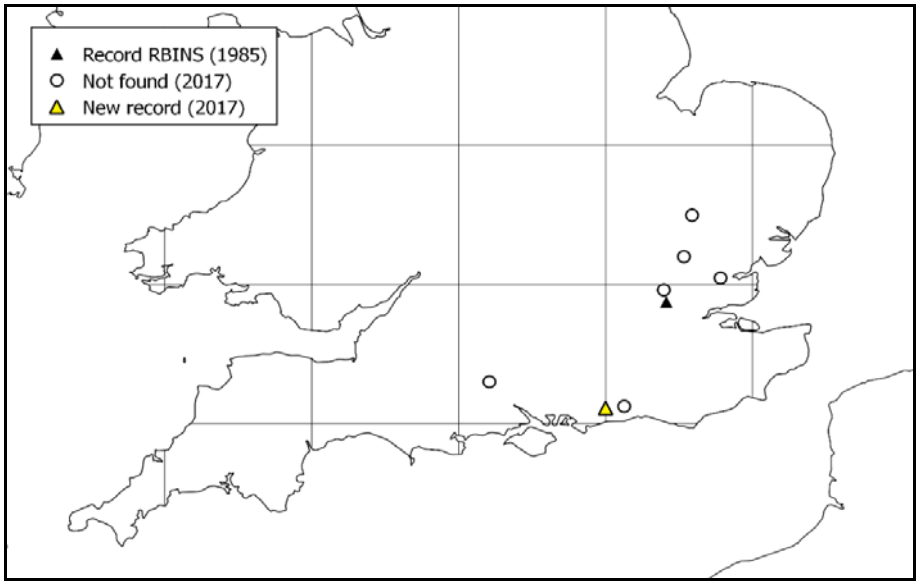

FIGURE 1: Map indicating the locations investigated in search for *Philoscia affinis* in July 2017
Source: Stijn Segers & Pepijn Boeraeve

FIGURE 2: A) *Philoscia muscorum*; B) *Philoscia affinis*. Photographs by Gert Arijs

DISTRIBUTION

Philoscia affinis has a widespread distribution in Europe and Northern Africa, being reported in north-eastern Spain, France, Italy, Germany, Croatia, northern Algeria (Schmalfuss, 2003), Slovenia (Vilisics & Lapanje, 2005), Hungary (Farkas & Vilisics, 2013), Austria (Lefebvre, 2012) and Tunisia (pers. comm. Sonia Hammaied). The species is common to very common in south-western Europe but is only scarcely and locally found in Germany and northern France (Gruner, 1966; Séchet & Noël, 2015). More recently, it has been found on numerous locations in Belgium (Boeraeve *et al*., in press). The species had not been recorded from the UK, despite some occasional searches (pers. comm. Steve J. Gregory). The specimens present in the collection of RBINS from Wanstead, Greater London could therefore be the first record of the species for the UK. In July 2017, the presence of *Philoscia affinis* in the UK could be confirmed by collecting one male specimen in Arundel, West Sussex.

Overview of the records

Greater London: Wanstead, "Bridle Path Allotments", area under horticultural cultivation, TQ423869, 01.x.1985, 1 ♂, 2 ♀, leg. J.M. Tarvernier, det. Pepijn Boeraeve.

West Sussex: Houghton (Arundel), 200m north-west from the Whiteways Lodge Roundabout, TQ001110, 15.vii.2017, 1 ♂, 8 ♀, leg. & det. Pepijn Boeraeve & Stijn Segers. (Fig. 4)

HABITAT

According to Vandel (1962) *Philoscia affinis* can be found in forests, forested river banks and waterlogged wooded terrains. Gruner (1966) mentions that the species can be found in wet, more or less shady, forests.

The currently known locations in Belgium for *Philoscia affinis* show that the species is mainly found in oak forests and in oak-hornbeam/oak-beech forests with average soil humidity (Boeraeve *et al*., in press). For the UK more sightings are necessary to make conclusions about its habitat, since multiple locations that correspond to the foregoing description were visited without success (Gregory 2009).

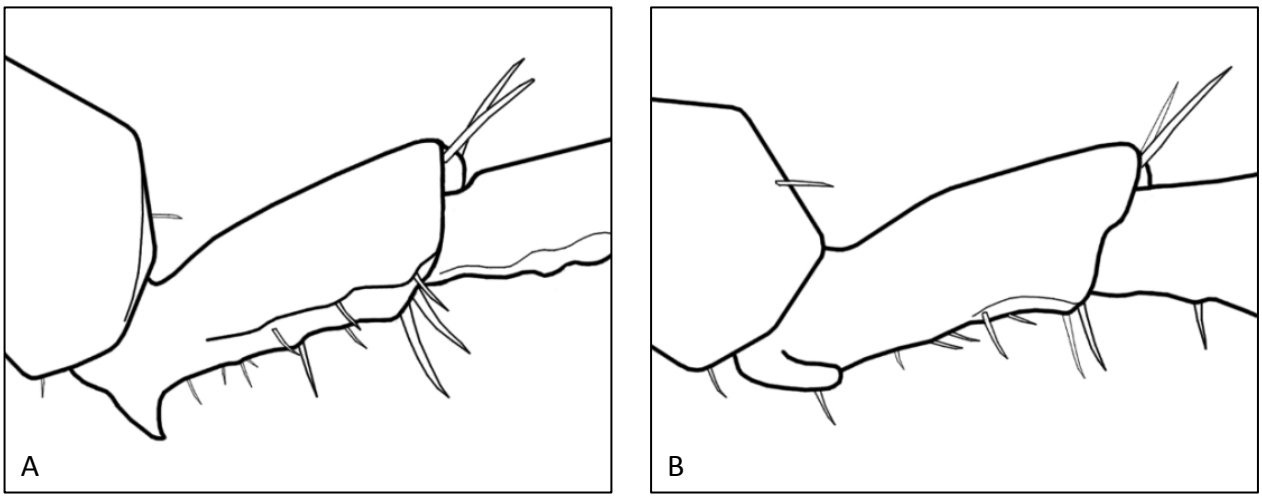

FIGURE 3: A) Upstanding hook on the merus of the 7th leg of a male *Philoscia affinis*; B) Bowed down hook on the merus of the 7th pereiopod of a male *Philoscia muscorum*.
Drawings by Stijn Segers

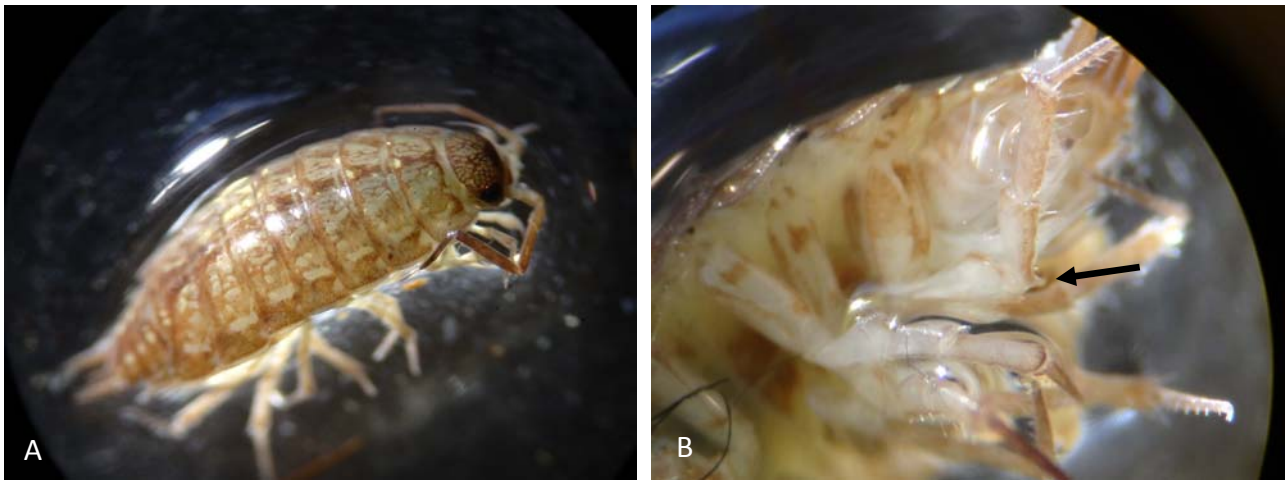

FIGURE 4: *Philoscia affinis*. Specimen found in the UK
A) Body; B) Detail of the 7th leg (hook at base of merus arrowed). Photographs by Pepijn Boeraeve

The specimen present in the collection of RBINS was collected in Wanstead Park (129 ha). The park is located to the east of Leytonstone, south of Epping Forest and northwest of Ilford, in the London borough of Redbridge. It consists of remains of formal gardens, a landscape park and lakes, the form of which dates mainly from the late 17th century to early 19th century, on the site of a 16th century deer park. Developed late 19th century as a public park and early 20th century as a private golf course, with associated sports facilities. The park consists of areas of mature woodland (predominantly oak and sycamore - some of the oaks dating from the 17th century and 18th century - and elm scrub), with large open areas of grassland with scattered trees (Historic England, 2017). The park underwent some changes during the late eighties and early nineties of the 20th century, which means the habitat has been changed and *Philoscia affinis* could not be found after an extensive search.

The specimens collected in Houghton (Arundel) were found in leaf litter in a forest consisting of shallow lime-rich soil over chalk or limestone (Cranfield University, 2017), mainly populated by beech trees (*Fagus sylvatica* L.) with absence of a true shrub and herb layer. The accompanying species were the omnipresent species *Philoscia muscorum* Scopoli, 1763; *Oniscus asellus* Linnaeus, 1758; *Porcellio scaber* Latreille, 1804; *Trichoniscus* sp. Brandt, 1833 and *Armadillidium vulgare* Latreille, 1804.

DISCUSSION

While revising specimens of *Philoscia muscorum* from the collection of the Royal Belgian Institute of Natural Sciences, one male specimen was found which seemed to be a mislabelled *Philoscia affinis*, collected in the UK in 1985. If the specimen was indeed collected in the UK this would be the first record of *Philoscia affinis* in the UK. Numerous forests in the south-east of the UK close to the location of the historic record were visited and eventually *Philoscia affinis* was found in one location in Houghton (Arundel), around 90 km (56 miles) from the location of the specimen in the RBINS collection. With this discovery we can assume *Philoscia affinis* is a native species in the UK and we can validate the specimen from the RBINS collection.

Further research is necessary to fully understand the habitat preferences and distribution of *Philoscia affinis* in the UK. All visited forests were expected to be the right habitat for *Philoscia affinis*, but except for Houghton (Arundel) none could be found. Because of its close resemblance to the very common *Philoscia muscorum* it is possible that the species has been overlooked in the UK, as was the

case in Belgium (Boeraeve *et al*. in press). We therefore recommend re-examining historic collections of *Philoscia muscorum* in the UK.

ACKNOWLEDGEMENTS

We would like to thank Yves Samyn and Wouter Dekoninck for giving access to the RBINS collection.

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STYLONISCUS MAURITIENSIS (BARNARD, 1936) – AN OVERLOOKED WOODLOUSE OF TROPICAL GLASSHOUSES NEW FOR ENGLAND AND WALES (ISOPODA, ONISCIDEA: STYLONISCIDAE)

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ABSTRACT

The tropical woodlouse *Styloniscus mauritiensis*, first recorded in Britain from inside glasshouses at Royal Botanic Garden Edinburgh in 1986, was rediscovered there in 2015. Subsequently, additional sites new for England and Wales have been discovered, suggesting it may have been overlooked in heated glasshouses. Information about microsites inhabited and associated species is provided. A description with illustrations is provided to allow identification.

INTRODUCTION

The styloniscid woodlouse *Styloniscus mauritiensis* (Barnard, 1936) has been recorded 'in the wild' from the tropical islands of Mauritius in the Indian Ocean and from Hawaii in the Pacific (Schmalfuss, 2004). In August 1986 Charles Rawcliffe collected several specimens of *S. mauritiensis* (identified by F. Ferrara) from among peat in plant pots inside a heated 'tropical' glasshouse at Royal Botanic Garden (RBG) Edinburgh (NT2475, VC 83); the only recorded occurrence of this species in Europe (Schmalfuss, 2004). Additional specimens were collected the following November and are held in the collection of the late Steve Hopkin (now in possession of SJG).

Although written up in the British Isopod Study Group Newsletter No. 22 (Rawcliffe, 1987), species confined to heated glasshouses were not included in the standard British identification works; i.e. Hopkin's (1991) AIDGAP Key and Oliver & Meechan's Synopsis (1993). Consequently, this addition to the British fauna was overlooked for twenty years until Rawcliffe's discovery was highlighted by Collis & Harding (2007). There have been no additional UK records for *S. mauritiensis* since Rawcliffe's original discovery in 1986 (Gregory, 2009) and the species has never been described or figured in British literature.

RE-DISCOVERY OF *STYLONISCUS MAURITIENSIS*

During the 2015 annual BMIG spring field meeting based at Linlithgow a visit was organised on 10th April to RBG Edinburgh. The authors took the opportunity to collect from the complex of heated glasshouses, including those closed to the public, and were successful in re-finding *S. mauritiensis*. Two specimens were found inside one of the non-public glasshouses and a thriving population inside the Montane Tropics House (Gregory, 2015; Table 1). These were identified using Taiti & Ferrara (1983), subsequently confirmed by Stefano Taiti (pers. comm.).

Subsequently, in spring 2017 the authors visited a number of heated glasshouses as part of a general survey of the fauna inhabiting such sites (Gregory, 2017). Specimens of *S. mauritiensis* have been identified from three additional locations: the Amazonia House at Living Rainforest, Berkshire; the Tropical Forest House at Birmingham Botanic Gardens and the Tropical House at the National Botanic

Garden of Wales. See Table 1 for details of records. These represent the first records of *S. mauritiensis* in England and Wales.

In light of the discovery of *S. mauritiensis* at several sites in the UK, a description with figures based on British specimens is provided below to allow identification of this species.

TABLE 1: Material examined of *Styloniscus mauritiensis* (Barnard)
CR – Charles Rawcliffe (in collection of late Steve Hopkin); KL – Keith Lugg; SJG – Steve Gregory.

Locality	Glasshouse	Grid Ref	Vice County	Number of specimens	Date of collection	Leg.
RBG Edinburgh	House 20 (tropical)	NT247755	83	1♂, 4♀♀	11.xi.1986	CR
RBG Edinburgh	House 18 (tropical)	NT247755	83	1♂, 1♀	10.iv.2015	KL
RBG Edinburgh	Montane Tropics	NT247755	83	5♂♂, 4♀♀, 8juv	10.iv.2015	SJG, KL
Living Rainforest	Amazonica	SU543761	22	2♂♂, 3♀♀	12.i.2017	SJG
Birmingham BG	Tropical Forest	SP048854	38	1♂, 8♀♀, 3juv	24.i.2017	SJG, KL
NBG Wales	Butterfly House	SN522181	44	3♂♂, 2♀♀	27.ii.2017	KL

HABITAT AND MICROSITES

All specimens of *S. mauritiensis* have been collected from inside artificially heated 'tropical' glasshouses, where the mean monthly temperature does not fall below 18°C. Despite extensive searches, additional specimens have not been found inside adjacent 'subtropical' or 'Mediterranean' glasshouses (where mean temperatures for some months are cooler).

Specimens are typically found, and most numerous, among damp peaty soil or debris. Where surface conditions are drier it becomes much more difficult to locate this species. This is probably also true of other associated oniscids. Details of individual locations are given below.

Royal Botanic Garden Edinburgh

Charles Rawcliffe's original (1986) specimens were found among peat in pots holding cuttings of the Indonesian club-moss *Lycopodium pinifolium* (Collis & Harding, 2007).

In April 2015, two specimens were collected from House 18, which is not open to the public, from among peaty debris between plant pots and capillary matting on glasshouse staging. The millipedes *Oxidus gracilus* (C.L.Koch, 1847), *Poratia digitata* Porat, 1889 and *Choneiulus palmatus* (Němec, 1895) were also collected. In addition, a population was found inside the Montane Tropics House, where specimens were collected from between and within blocks of peat and from among damp peaty debris nearby. The millipedes *Choneiulus palmatus* and *Cylindroiulus salicivorus* Verhoeff, 1908 were also collected.

Living Rainforest, Berkshire

In January 2017, specimens of *S. mauritiensis* were hand sorted from damp peaty debris within a rotting palm stump in the Amazonica House. Here it was associated with the tropical woodlice *Trichorhina tomentosa* (Budde-Lund, 1893) and *Reductoniscus costata* Kesselyak, 1930.

FIGURE 1: ***Styloniscus mauritiensis*** **(Barnard), habitus**
A) Royal Botanic Garden Edinburgh, 10.iv.2015; B) Living Rainforest, Berkshire, 12.i.2017;
C) Birmingham Botanic Garden, 24.i.2017 (images © Keith Lugg).

Birmingham Botanic Garden

In January 2017, several specimens were hand-sorted from upper layers of peaty soil in the Tropical Forest House, which had been kept moist by a dripping pipe. No additional specimens were found nearby where the soil surface was noticeably drier. The woodlouse *Nagurus cristatus* (Dollfus, 1889), a pan-tropical tramp species (Schmalfuss, 2004), was collected nearby.

National Botanic Garden of Wales

In February 2017, specimens of *S. mauritiensis* were found by turning large pieces of dead wood. Individual specimens would emerge from peat filled cracks within the wood and could be collected by pooter as they run across areas of bare wood before disappearing into another crack. Also collected from the same habitat were the millipedes *Poratia digitata* Porat, 1889 and *Cylindroiulus parisiorum* (Brölemann & Verhoeff, 1896).

IDENTIFICATION

A complete re-description of *Styloniscus mauritiensis*, based on specimens collected from Mauritius, is provided by Taiti & Ferrara (1983). The description below is based on live specimens and freshly preserved material preserved in 75% IDA collected in Britain (Table 1) between 2015 and 2017. Some of Charles Rawcliffe's original 1986 material was also examined. Specimens are held in the personal collections of the authors.

Taxonomy

ORDER Isopoda Latreille, 1817
SUBORDER Oniscidea Latreille, 1802
SECTION Synocheta Legrand, 1946
FAMILY Styloniscidae Vandel, 1952
GENUS *Styloniscus* Dana, 1853
***Styloniscus mauritiensis* (Barnard, 1936)**
syn. *Trichoniscus mauritiensis* Barnard, 1936
syn. *Indoniscus mauritiensis* (Barnard, 1936)

Appearance

Male specimens are 2.00-2.5mm in length, while gravid females are 2.75-3.25mm. In life specimens varied from tan-coloured to a reddish-brown (Figs. 1A-C), but typically marbled with indistinct pale patches. Antennae and uropods are unpigmented and in live specimens contrast against the pigmented body. Body pigments gradually fade following preservation in alcohol and specimens collected by Charles Rawcliffe in 1986 (in the personal collection of the late Steve Hopkin, now in possession of SJG) are a uniform off-white colour.

Lateral lobes of cephalon weakly developed, frontal region slightly projecting, with distinct forward projecting tubercles (Fig. 2A). Antennae rather stout, flagellum slender, comprising about four indistinct segments and terminating in a long fine brush. Eye composed of three black ommatidia arranged in a triangle, close-set and fused in adults, but separated in immatures (as in *Trichoniscus pusillus* agg.). The black pigment of the ocelli has faded slightly in preserved specimens collected in 1986, but remains distinct. The cephalon and pereionites are covered with coarse tubercles arranged traversely in rows, each bearing a short spine. The pleon bears a single row of weak tubercles. Apical margin of telson rounded and bearing four short stout spines (Fig. 2B).

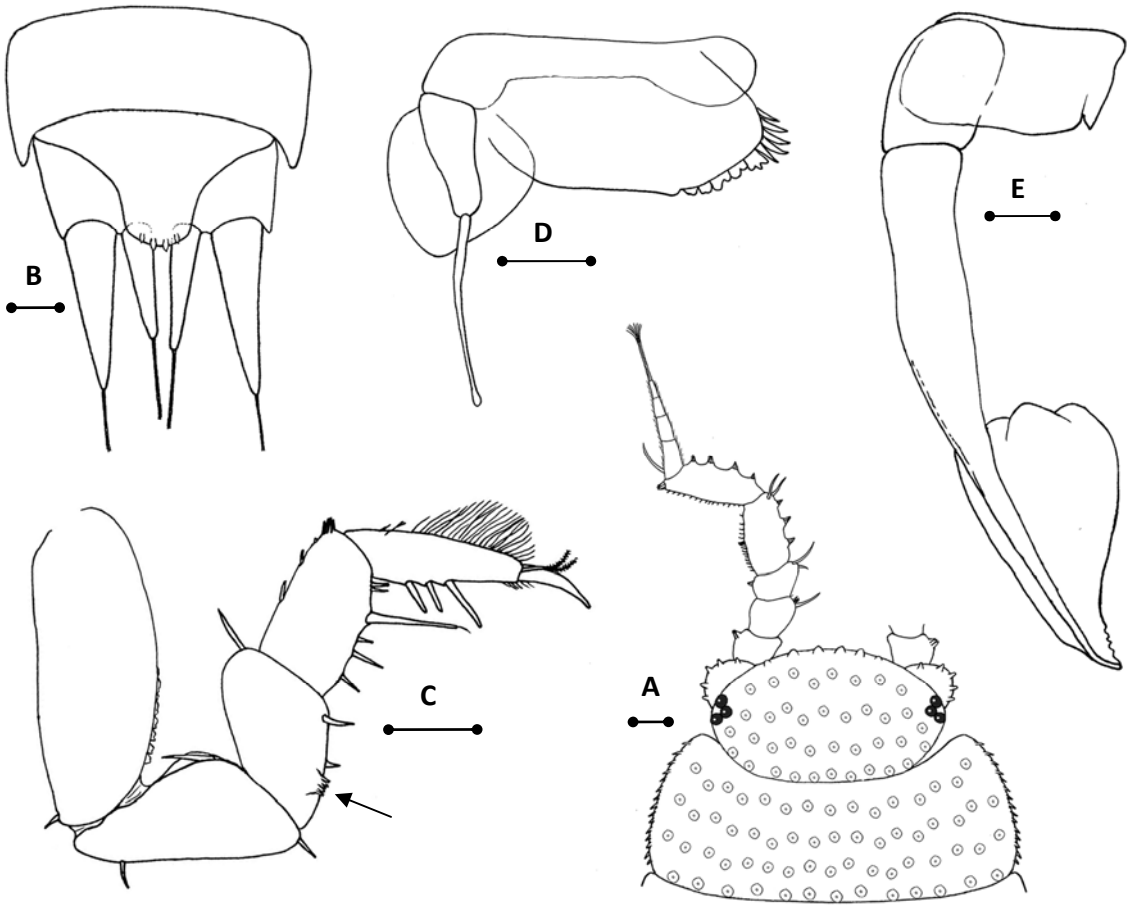

FIGURE 2: *Styloniscus mauritiensis* (Banard) male. RBG Edinburgh, SJG leg., 10.iv.2015.
A) Head, antenna and first pereionite, dorsal view; B) Last pleonite, telson and uropods, dorsal view; C) Pereiopod 7, internal view; D) First pleopod; E) Second pleopod, with fifth exopod attached to tip. Scale bars 0.1 mm

Male sexual characters

First pleopod (Fig. 2D) is considerably wider then long. The outer edge bears a number of rounded tooth-like structures, which abruptly change into tapering elongated structures. Basal section of endopod stout, the second slender and elongated, terminating in a rounded spoon-like tip. The exopod of non-descript rounded triangular shape.

Second pleopod (Fig. 2E) with endopod curved along its entire length and gradually tapered to a fine outwardly curved point. In all male specimens dissected the tip of the endopod 2 is slotted tightly into a groove on the fifth exopod, and difficult to tease apart (as shown in Fig. 2E).

Male 7th pereiopod (Fig. 2C) is distinctive in bearing a small lobe, topped with a group of scales, on the inner face of the merus (arrowed). This scale tipped lobe can be difficult to see until the pereiopod is in the correct orientation.

Similar species

Styloniscus mauritiensis is similar in size and general appearance to the two other Styloniscid species known from heated glasshouses in Britain (Gregory, 2009); C*ordioniscus stebbingi* (Patience, 1907) and

Styloniscus spinosus (Patience, 1907). The authors have yet to encounter (male) specimens of either *C. stebbingi* or *S. spinosus*, but the three species should be readily separable on the basis of male first and second pleopods. However, figures in old texts, such as Edney (1954), can be misleading. Unfortunately, Patience's (1907a) original description and figures of *C. stebbingi* bear more than a passing resemblance to *S. mauritiensis* (as redescribed by Taiti & Ferrara, 1983).

According to Patience's (1907b) original description of *S. spinosus*, the tip of the telson is rounded and bears three small teeth (four in *S. mauritiensis*, Fig. 4B, and in *C. stebbingi* (Patience, 1907a). Also in *S. spinosus,* the antennae, legs and uropods are similarly pigmented to the body. These appendages are poorly pigmented, contrasting against the pigmented body, in *S. mauritiensis* (Figs. 1A-C) and *C. stebbingi* (Patience, 1907a).

It is also likely that additional species of Styloniscid woodlice may occur inside heated glasshouses. Reliable identification can only be based on examination of a male specimen.

AN OVERLOOKED SPECIES?

In addition to RBG Edinburgh, *S. mauritiensis* has now been found at three additional localities with tropical glasshouses (of five surveyed) in spring 2017 (Table 1), including first records for England and Wales. This suggests that previously *S. mauritiensis* may have been overlooked and/or misidentified in Britain. As far as we are aware, this species has not been recorded elsewhere in Europe either (Schmalfuss, 2004).

In the past, C*ordioniscus stebbingi* was the most widely recorded styloniscid in Britain, including several records since 1980 (Gregory, 2009). This includes RBG Edinburgh, where it was not found during our 2015 surveys. During the surveys reported herein, male specimens of *C. stebbingi* have yet to be encountered, although several females of a slightly smaller and more darkly pigmented styloniscid species (relative to typical *S. mauritiensis*) have been collected.

Although in recent decades there has been a resurgence of interest of the woodlouse fauna (Oniscidea) of heated glasshouses, such as those of botanic gardens (e.g. Gregory, 2014), this remains an under-recorded environment and there remains much to discover, even from casual sampling.

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UV FLUORESCENCE IN A CRITICALLY ENDANGERED ISOPOD, *PSEUDOLAUREOLA ATLANTICA* (VANDEL, 1977)

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ABSTRACT

The Critically Endangered Spiky Yellow Woodlouse, *Pseudolaureola atlantica* (Vandel, 1977), has been found to display fluorescence under ultraviolet (UV) light. This has only been documented in one other woodlouse species and provides a unique opportunity to develop a hitherto underutilised and novel survey technique; particularly useful for a rare species in sensitive habitat.

INTRODUCTION

Fluorescence has been noted in a number of invertebrate taxa; scorpions are the most readily recognised group to exhibit fluorescence under ultraviolet (UV) light (e.g. Gaffin *et al.,* 2012). There has been an increase in studies of fluorescence in terrestrial invertebrates, including spiders (Andrews *et al*., 2007), and a number of insects, and many invertebrate groups exhibit some fluorescence (Welch *et al.,* 2012). While many papers look at interactions between fluorescing individuals (Zimmer *et al*., 2002, Guillermo-Ferreira *et al*., 2013), the utility of fluorescence in aiding species detection during surveys has not yet been sufficiently documented.

The Critically Endangered Spiky Yellow Woodlouse, *Pseudolaureola atlantica* (Vandel, 1977) (Isopoda: Armadillidae), is endemic to St Helena, a UK Overseas Territory in the South Atlantic Ocean (Fig. 1). It is one of four species in the genus; the others occur in Madagascar, New Caledonia and South West Australia (Schmalfuss, 2004). *P. atlantica* is restricted to cloud forest habitat on the upper parts of the High Central Ridge, commonly known as the 'Peaks'. It is usually found on vegetation above ground; originally thought to occur on the fern understorey of Black Cabbage Tree (*Melanodendron integrifolium*) woodland, specifically Black Scale Fern (*Diplazium filamentosum*) (Havery *et al*., 2016), but now confirmed to be present on other fern and tree species. In 2015 it was thought that the *P. atlantica* population had become restricted to a single location, approximately the size of a tennis court, but subsequent surveys across the Peaks have revealed a number of new locations.

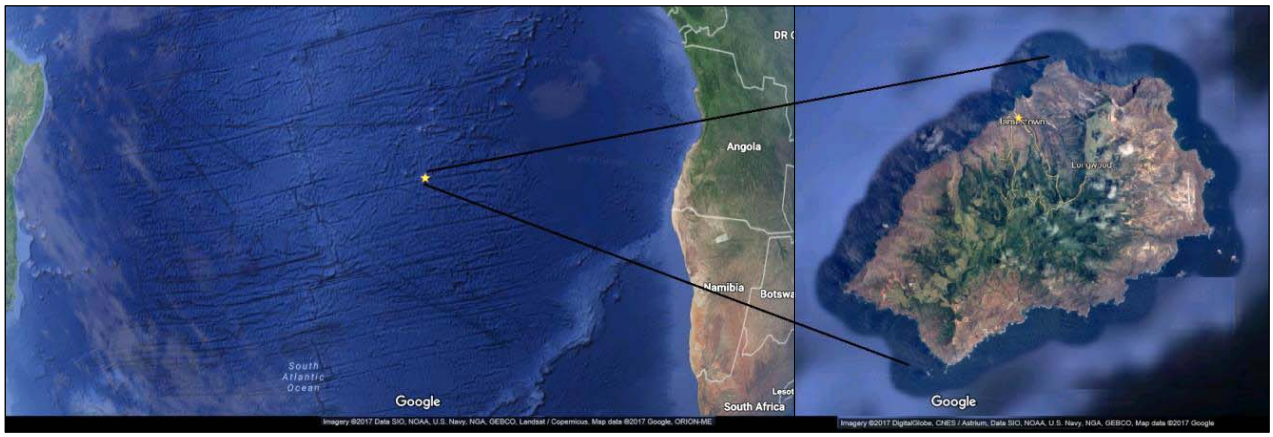

FIGURE 1: Geographic location of St Helena Island, a UK Overseas Territory in the South Atlantic
S.A.O Imagery ©2017 Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Landsat/Copernicus, Map data ©2017 Google, ORION-ME
Island Imagery ©2017 DigitalGlobe, CNES/Astrium, Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Map data ©2017 Google

St Helena's cloud forest vegetation is highly sensitive, vulnerable to erosion and invasive species, and the terrain and access is difficult, making standard survey techniques difficult to apply. Also, despite their vivid yellow colouration, *P. atlantica* is cryptic against the fern fronds that it is regularly found on, with its spiky outline helping to camouflage it and reduce its detection (Figs. 2A & 2B).

The fluorescence of *P. atlantica* under UV had been previously reported (P. Lambdon, pers. comm.) and was initially investigated by the author to confirm this account. To date, there is only one known study on fluorescence in a woodlouse species; *Mesoniscus graniger* (Frivaldsky, 1863), a cave dwelling species found in Central and Eastern Europe (Giurginca *et al*., 2015).

FIGURE 2: *Pseudolaureola atlantica* A) Two *P. atlantica* on St Helena Tree Fern *Dicksonia arborescens*; B) Close up of an individual Spiky Yellow Woodlouse

FIGURE 3: General habitat photographs
A) Black Cabbage Tree; B) St Helena Tree Fern; C) St Helena Dogwood

SEARCH METHODS

Across the Peaks accessibility varies and care is required to move around away from established paths. This makes it difficult to establish standard search methodologies. There is little deadwood to search and pitfall traps are also inappropriate for this apparently arboreal and rare species.

Daylight searches for this species primarily involve point counts along set routes utilised as transects through the vegetation (Fig. 3). The use of these transects restricts the extent of survey but also prevents excessive habitat disturbance. Single searches at other locations have been undertaken to investigate the extent of *P. atlantica* presence, but repeated visits to numerous locations have been avoided.

Ten minute searches using binoculars are employed for counts in trees, and five minute point searches for areas which can be physically investigated, following methods used in initial searches by fieldworkers for Darwin Initiative Project DPLUS029 'Conserving cloud forest species and their associated invertebrates'. These were found to usually reveal the presence of *P. atlantica* with little difference in numbers between 5 and 10 minute manual searches.

ULTRAVIOLET (UV) TORCH USE

An initial test on identified *P. atlantica* individuals with a small UV torch showed that they did display fluorescence and that this could be used to establish an effective search technique, but that a stronger torch was required. Once procured, an OxyLED 51 LED torch was used for general searches for *P. atlantica* and to conduct five minute UV searches, undertaken in line with the daytime point count technique. A daytime survey was conducted then replicated at night to compare the detection of individuals by eye against fluorescing individuals under the UV torch.

A general walk with the UV torch was undertaken on 1.3 km of public paths on the Peaks where the species could potentially occur. This gave the opportunity to search large amounts of apparently suitable vegetation either side of the path, where the terrain is relatively easy. *P. atlantica* had not been recorded in vegetation adjacent to paths prior to this survey.

Access during the hours of dark are restricted to clear and well-known locations only. The fluorescence of other invertebrate species was also assessed as and when they were found.

RESULTS

Pseudolaureola atlantica displays strong fluorescence (Fig. 4) under UV light (wavelength 395 nm). The use of the UV torch substantially increased the number of individuals located compared to daylight searches. In an initial observation survey, 33 individuals were located in a single five minute point count, where it was originally suspected there may be up to a dozen individuals. It is believed that the UV torch picks up all individuals within 2 metres provided that the vegetation is thoroughly searched. *P. atlantica* appear to exist in discrete 'pockets' within the habitat, and there still seems to be large areas of potential habitat devoid of *P. atlantica*, although access issues makes this difficult to conclusively prove.

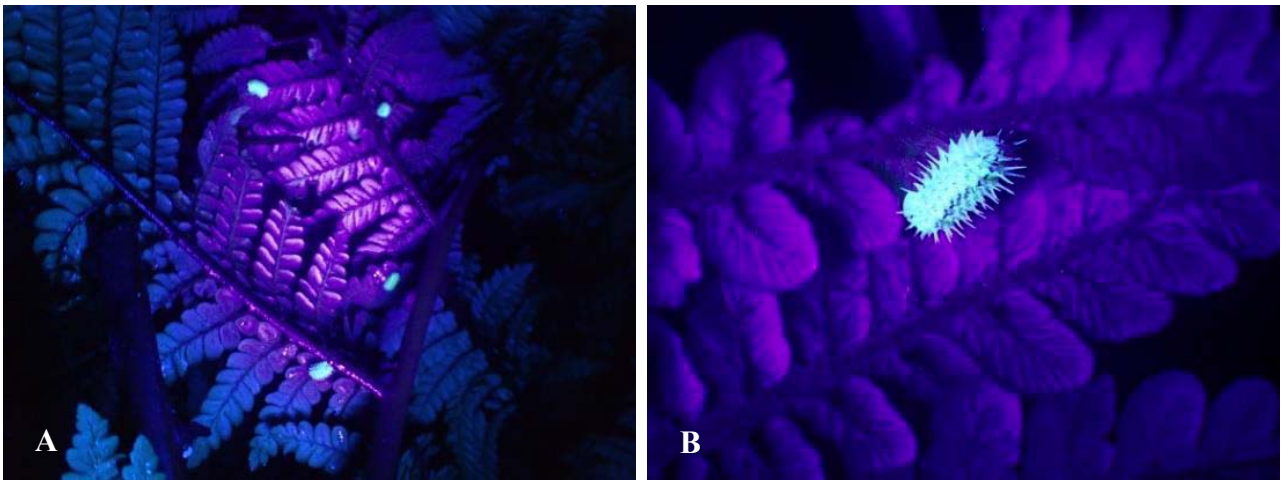

FIGURE 4: The fluorescence of *Pseudolaureola atlantica*
A) *P. atlantica* detected on St Helena Tree Fern under UV light; B) Individual *P. atlantica* fluorescence.

It was found that a second apparently undescribed woodlouse species also fluoresces; this displayed a striped pattern distinct from that of the *P. atlantica*. Other species found during the survey, including isopods and the iconic endemic Golden Sail Spider *Argyrodes mellissi* did not exhibit fluorescence. Searches with the UV light located individuals 2 metres away, and juveniles were also easily seen.

The replication of survey techniques in day and at night has provided a useful indication of the accuracy of the daytime searches (see Fig. 5); generally more individuals were detected with UV light than during daytime searches in two identified *P. atlantica* locations.

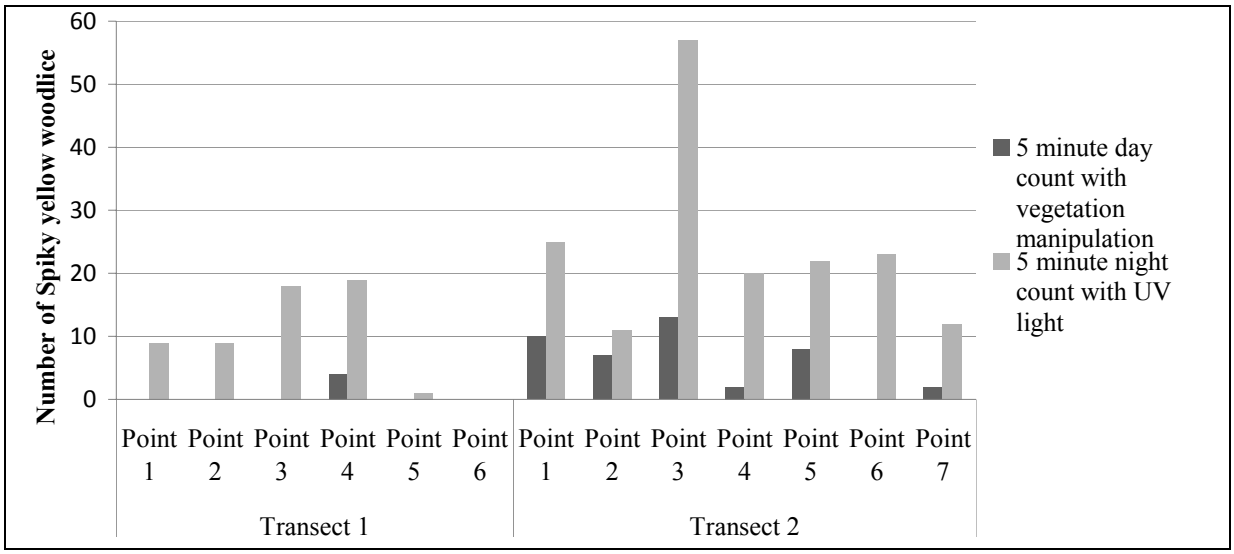

FIGURE 5: Comparison of day and night (UV) surveys for *Pseudolaureola atlantica*

Prior to UV searches no *P. atlantica* had been observed in vegetation along public paths on the Peaks. Walking steadily using the UV torch *P. atlantica* were found on 20 m of path, approximately 50 metres from the closest known location at that time. A five minute timed count was undertaken and 22 individuals were located. This species is under protection from the St Helena Environmental Protection Ordinance (2016) and while knowledge of their locations will help to inform management actions, disturbance of this Critically Endangered species is actively discouraged.

DISCUSSION

The fluorescence of *P. atlantica* under UV has resulted in detection being far easier at night than during the day, where despite its bright yellow appearance it blends into the vegetation. Individuals can be confidently detected at a greater distance at night, even including small juveniles. This method also helped remove observer bias stemming from targeted searching of areas considered to be most suitable habitat as the UV light can be rapidly shone over all vegetation in an area, although the structure of low vegetation still limits visibility in some areas.

Interestingly, several individuals were identified on non-native plant species, something not found previously. While numbers are generally low (up to three individuals), they have been found on Whiteweed (*Austroeupatorium inulifolium*), Bilberry Tree (*Solanum mauritianum*), Bramble (*Rubus pinnatus*), Spoor (*Pittosporum* sp.) and even New Zealand Flax (*Phormium tenax*). This suggests that there is less specificity to its preferences and requirements than originally suspected.

During first few uses of the UV torch, additional locations for the species were found. This makes it an

essential tool for investigating its distribution. While the technique helps to increase the knowledge about population numbers and distribution – with minimal disturbance – its use is limited to areas which can be accessed safely at night, therefore must still be used in conjunction with daytime surveys.

As well as providing a better estimate of presence of *P. atlantica* in some locations, using UV lights also gives more confidence in confirming its absence. Another night walk was undertaken in an area that appeared suitable for the species but where individuals had not yet been found; over 150 metres of potential *P. atlantica* habitat was surveyed but no individuals were found. The specific needs of this species are still not fully understood, and the identification of areas where it is definitely absent, as well as present, is a useful step towards identifying these requirements.

The fluorescence of other species was tested as they were found. None have yet been found to exhibit the strong fluorescence of *P. atlantica*, except for a small apparently undescribed woodlouse species, which was found to have fluorescent stripes. Interestingly, parts of St Helena Tree Fern (*Dicksonia arborescens*), specifically dead or dying fronds, were also found to also display fluorescence, but no direct link can yet be made between this and the fluorescence of *P. atlantica*.

If further rare or cryptic isopods, or other invertebrates, are found to display strong fluorescence then there would be great potential in employing this simple survey technique. UV light has been used to assess coral recruitment (Piniak *et al*., 2005) but has so far been under-utilised as a search technique in research. Investigation into which species are fluorescent is a primary requirement, but the use of a UV torch would be a quick and cheap screening tool to identify potential candidates. It must also be stated that sites, as well as species, should be evaluated on an individual basis for the suitability and applicability of night working.

This paper highlights both an unusual trait found for a woodlouse, but also the potential benefits of novel survey techniques. This may have wide ranging implications for survey work on other fluorescent invertebrates, particularly for iconic species, in those locations where minimal physical disturbance is desirable, or where collection of specimens is inappropriate due to their rarity.

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CRANOGONA DALENSI MAURIÈS, 1965 NEW FOR THE UK FROM SOUTH WALES (DIPLOPODA; CHORDEUMATIDA: ANTHOGONIDAE)

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ABSTRACT

The millipede *Cranogona dalensi* Mauriès is reported new for the UK from a colliery spoil heap in south Wales. A description with figures is provided to enable identification. Information about micro-sites inhabited and associated species is given. It is considered inconclusive as to whether *C. dalensi* is an over-looked British native or an accidental introduction.

INTRODUCTION

The millipede family Anthogonidae was established by Ribaut in 1913 and today includes seven genera within two geographically separated groups; subfamilies Acherosomatinae and Macrochaetosomatinae occur across the Balkan Peninsula, while subfamily Anthogoninae occurs in Western Europe (mainly Pyrenean) (Antić*, et al.*, 2015). Previously, the sole representative of this family in Britain was *Anthogona britannica* Gregory, Jones & Mauriès, 1994, described from south-west England. Ten species of *Cranogona* are listed by Fauna Europaea (https://fauna-eu.org/: accessed 25th June 2017); eight from France and two from Spain. Brolemann (1935) describes the then known French species as having Pyrenean distributions and inhabiting both subterranean and epigeal habitats.

During a recent collecting trip by CO to a colliery spoil heap in the Rhondda Valleys (south Wales) specimens of *Cranogona dalensi* Mauriès, 1965 were collected. Details of its discovery and a description based on material collected from south Wales is provided below.

DISCOVERY

On 22nd December 2016 CO (in the company of Liam Olds and Chris Lawrence) undertook a survey of invertebrates occurring at Cwm Coal Tips, north-east of Beddau in the Rhondda Valleys (ST069861, VC 41, Glamorganshire; 3.3445°W 51.5661°N, WGS84). A number of small white millipedes were collected from beneath stones. In the field these were superficially similar in appearance to *Brachychaeteuma melanops* Brade-Birks & Brade-Birks, 1918 in terms of size, lack of pigmentation and reduced number of well pigmented ocelli. However, the specimens differed in having eyes comprising 7-8 ocelli (instead of 6) and the body bearing long stout curved macrochaetae. Microscopic examination of the gonopods suggested this was indeed a species new for the UK.

Two males and four female specimens were sent to JS for genetic bar-coding. These were subsequently identified by JS, on the basis of male morphology, as *Cranogona dalensi* Mauriès, 1965. An informal account of the discovery is given by Olds (2017). This is the first recorded occurrence of this species in the UK.

FIGURE 1: *Cranogona dalensi*, specimens from Cwm Coal Tips

A) Male, live specimen (image © Keith Lugg). B-E) Female: B) Anterior body rings, lateral view; C) Head showing typical arrangement of ocelli; D) Anterior body rings showing paratergal keels and macrochaetae, dorsal view; E) Female, mid-body rings showing paratergal keels, lateral view.

IDENTIFICATION

Taxonomy

ORDER Chordeumatida Pocock, 1894
SUBORDER Craspedosomatidea Cook, 1895
FAMILY Anthogonidae Ribaut, 1913
SUBFAMILY Anthogoninae Ribaut, 1913
GENUS *Cranogona* Ribaut, 1913
***Cranogona dalensi* Mauriès, 1965**

Diagnosis

Cranogona dalensi is a small off-white millipede (< 6mm in length), with body bearing long stout curved macrochaetae and eye comprising 7-8 ocelli arranged in an acute triangle. Mature male specimens may be readily identified by the distinctive shape of the coxae and trochanters of the seventh pair of legs and the male gonopods, especially in anterior view. Using Blower (1985), *C. dalensi* will key to *Brachychaeteuma melanops* Brade-Birks & Brade-Birks, 1918 due to its very small size, absence of pigmentation and well pigmented ocelli. However, it differs in the arrangement of the ocelli and length of the body. It is more similar in appearance to an un-described *Typhlopsychrosoma* sp. found by CO in south Wales (see Gregory, 2016), but at 10 mm this is a noticeably larger millipede.

Description

This description is based on one male and one female collected by CO from Cwm Coal Tips on 22nd December 2016 and preserved in 96% ethanol, examined by JS, and a second male and female collected by SJG on 25th February 2017, preserved in 70% IDA.

Adults with 30 body rings (pleurotergites). Body lacking pigment, appearing yellowish white in life (Fig. 1A). Male 5 mm in length, body height 0.5 mm (15th body ring); female 5.5 mm in length, body height 0.55 mm. Eye (Figs. 1B-C) comprises 7-8 well pigmented ocelli arranged in an acute triangle typically arranged in vertical rows of 2(3);2;2(1);1;(1). Antenna (Fig. 2E) about 1 mm long with pronounced apical club 3 times longer than wide.

Lateral paratergal keels (paranota) (Figs. 1D-E) prominent in dorsal view, situated low on the sides of the body, about two thirds down from the dorsal surface. Tergites each with three pairs of macrochaetae mounted on low bumps; each macrochaeta (Fig. 1D) elongated and gently curved to a fine point. The length of the longest exceeds the length of the associated metazonite. The external and median macrochaetae sit laterally on the paranotal keel. The internal macrochaeta sits dorsally above the main bulge of the paranota. Angle formed by bases of the three macrochaetae about 90-100° (15th body ring). Distance between bases of external and median macrochaetae about the same as the distance between bases of median and internal macrochaetae. The distance between medial suture and base of internal macrochaeta more than double the distance between bases of median and internal macrochaetae.

Male: sexual characters

Leg pair 7 (Figs. 2A & 4A) with coxae bearing an inward facing basal projection comprising two lobes, the innermost bearing a stout hyaline ‘horn’ towards its tip. Trochanter with prominent curved medially directed projection that tapers to a rounded tip. Leg pairs 10 and 11 (Figs. 2B-C; 4B) with medially directed coxal gland on their internal face. Leg pair 11 also bears a cone-shaped ‘horn’ on the coxa, towards the apex of the internal face.

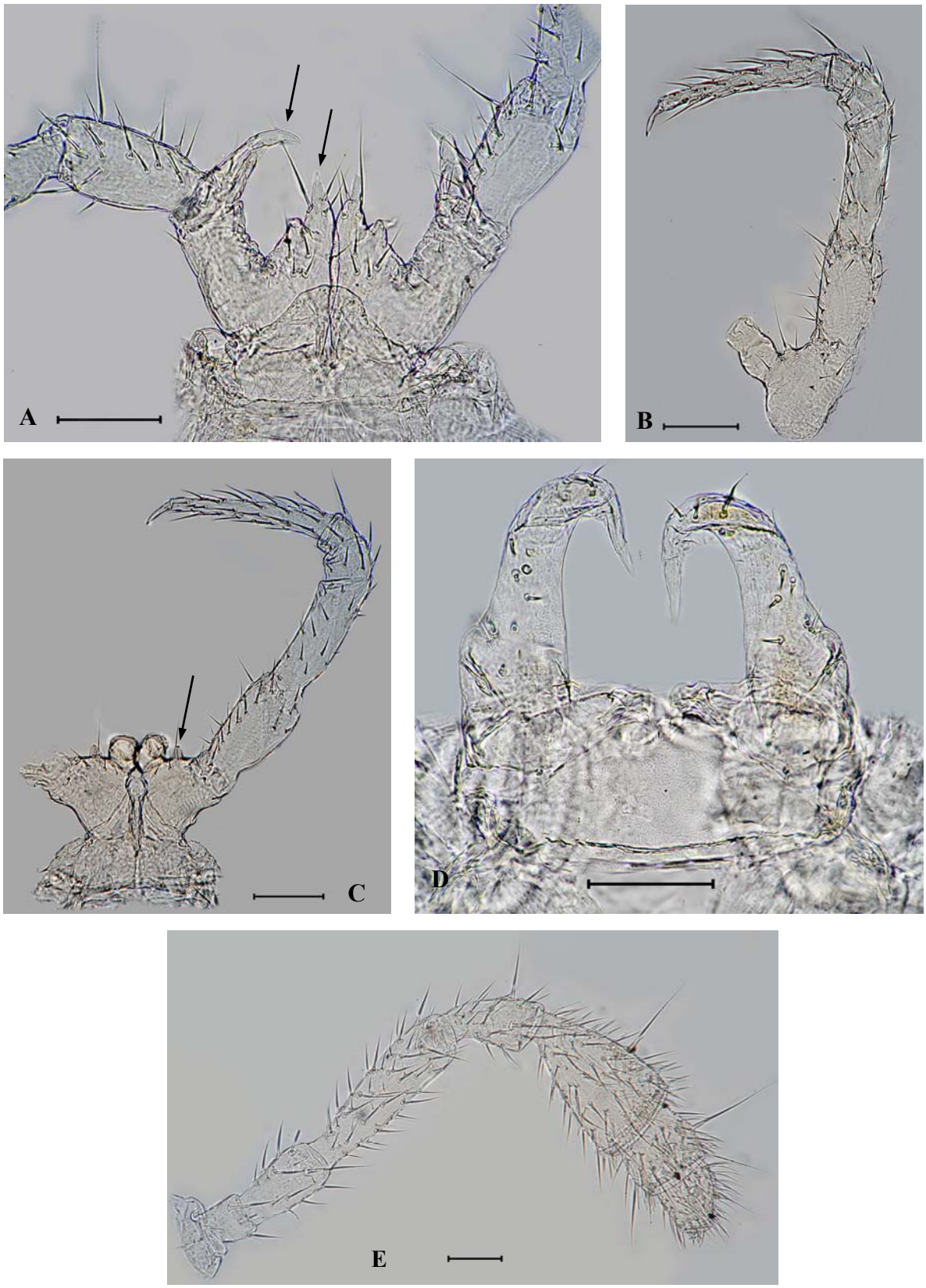

FIGURE 2: *Cranogona dalensi* male, specimen from Cwm Coal Tips, December 2016
A) Basal articles of 7th leg pair (coxal and trochantal projections arrowed); B) 10th leg; C) 11th leg (coxal horn arrowed); D) Posterior gonopods, anterior view; E) Antenna. Scale bars 100 μm

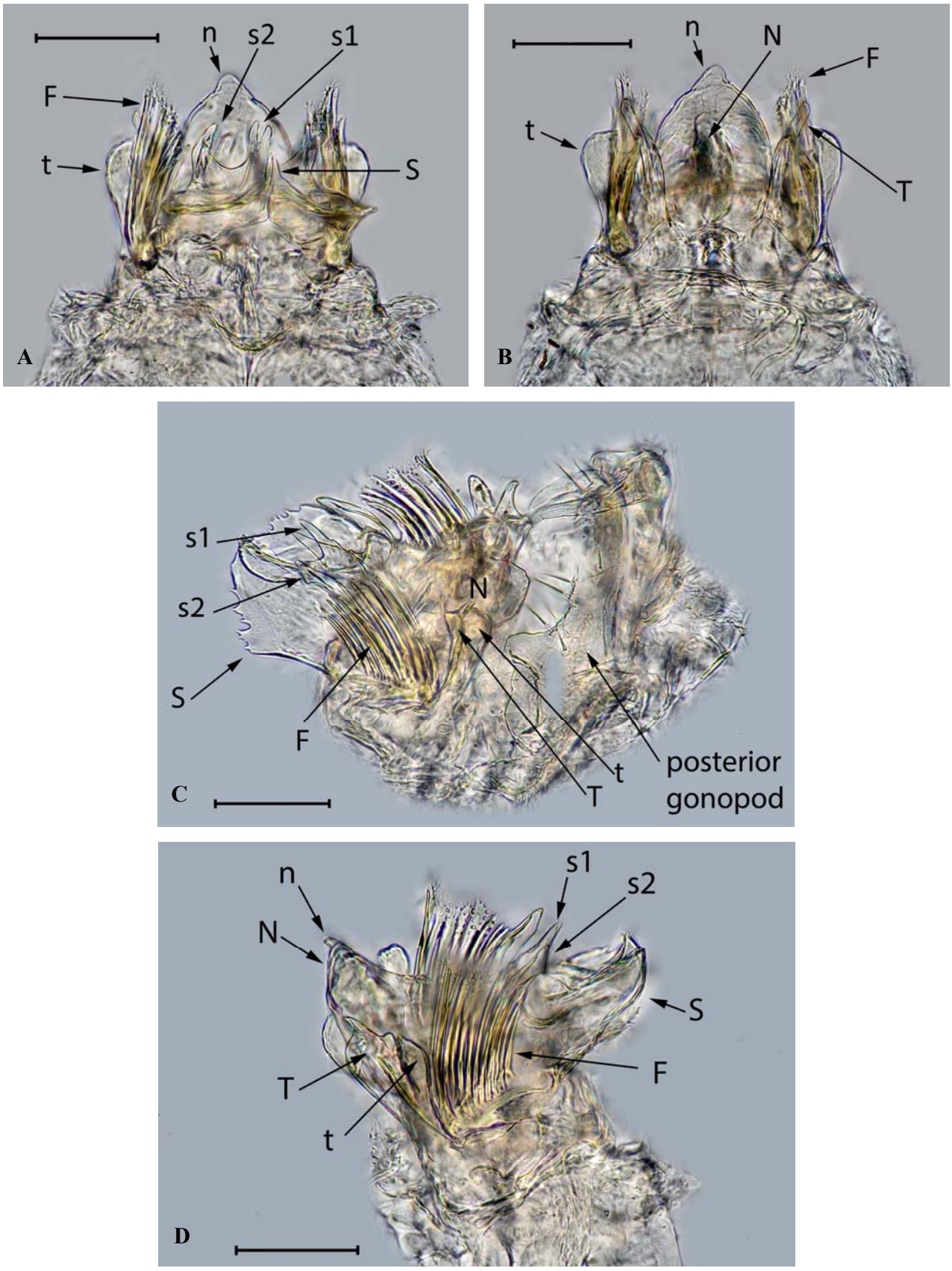

FIGURE 3: *Cranogona dalensi* male, specimen from Cwm Coal Tips, December 2016

A) Gonopods, anterior view (here 'S' appears to be deflected anteriorly to reveal structures behind; cf Fig. 4C); B) Gonopods, posterior view; C) Gonopods, ventral lateral view; D) Gonopods, lateral view. Scale bars 100μm.

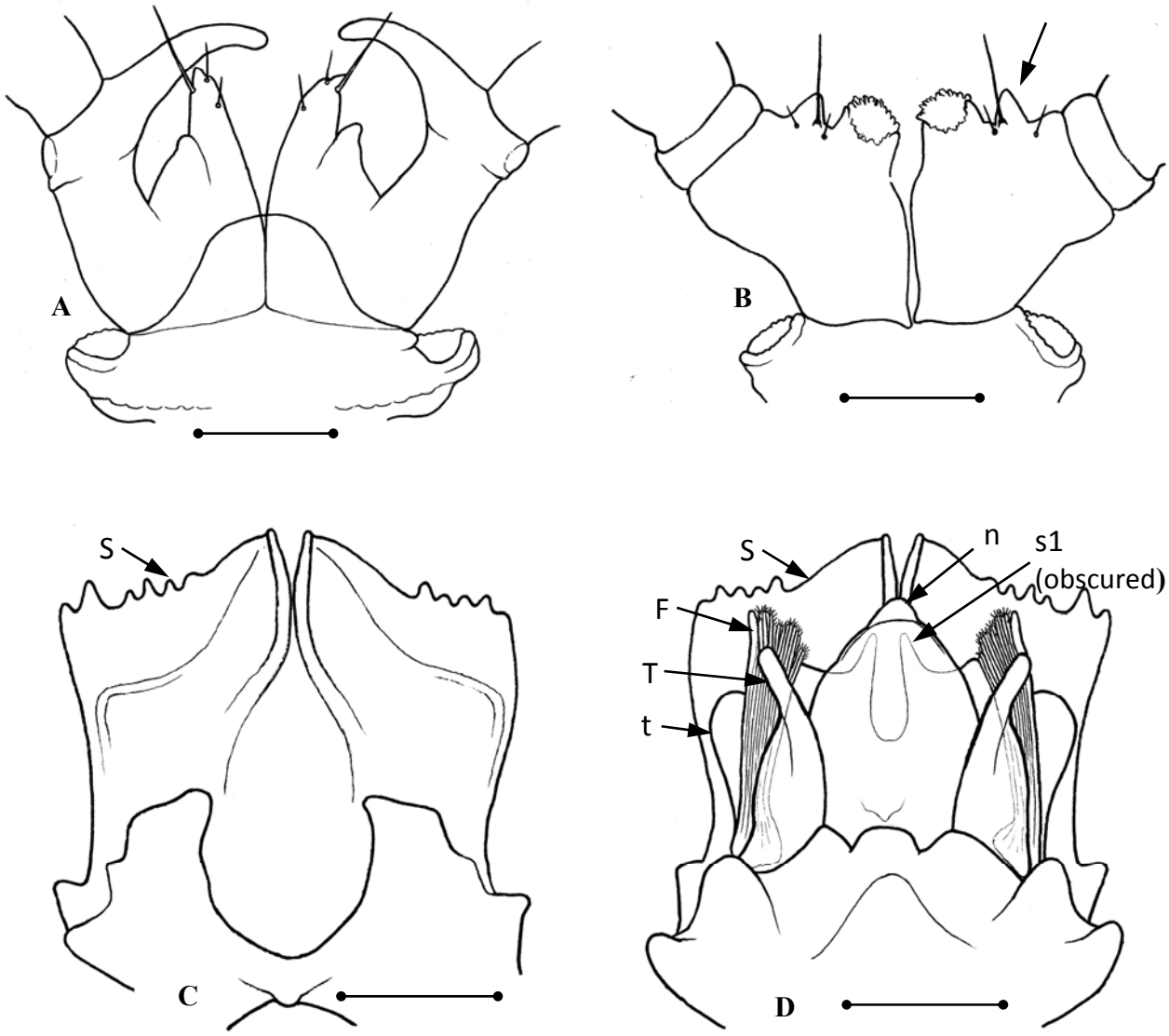

FIGURE 4: *Cranogona dalensi* male, specimen from Cwm Coal Tips, February 2017
A) 7th leg pair, coxae and trochanter, posterior view; B) 11th leg pair, coxae and trochanter, posterior view (coxal horn arrowed); C) Gonopods, anterior view (in this view 'S' obscures the gonopods structures that lay behind; cf Fig. 3A); D) Gonopods, posterior view. Scale bars 100 μm.

Male: anterior gonopods

In anterior view the gonopods are dominated by the syncolpocoxite (S) which comprises a pair of sub-rectangular colpocoxites that entirely obscures the other gonopodal structures that lie posteriorly (Fig. 4C). The colpocoxites are fused towards their bases and each bears a small number of irregular teeth along their distal margin. Mauriès (1965) comments that this is quite unlike the equivalent structures seen in other species of *Cranogona* and is the only character figured in Demange (1981; fig. 113). However, the syncolpocoxite (S) is not obvious in Fig. 3A since it appears to be deflected anteriorly, revealing the gonopods structures that lie behind. The syncolpocoxite (S) can be clearly seen in Fig. 3C.

In posterior view (Figs. 3B & 4D) the telopodites (T) taper gently from their broad bases and then narrow abruptly in their apical third to become parallel sided and gently curving outwards. From the telopodite arises a hyaline structure (t) about ¾ of its height. Between the telopodites lies the medial

dome (N). A broad bristle apparatus (F), which comprises a row of many long bristles, lies on the coxites between the telopodite (T+t) and the medial dome (N+n). Each bristle bears many fine denticles along its anterior margin. The bristle apparatus is developed to a greater or lesser extent in other species of *Cranogona* and *Anthogona* (Antić, *et al*., 2015).

In lateral view (Fig. 3D) the gonopods form a shallow 'V' shape; the syncolpocoxite (S) to the anterior and the medial dome (N+n) to the posterior. Between lies the bristle apparatus (F). The two projections (s1 and s2) that arise from the posterior face of each colpocoxite are most easily seen in lateral view.

Male: posterior gonopods

The posterior gonopods (Fig. 2D) lack segmentation, comprising a pair of well-developed curved blade-like coxal extensions that taper towards their apex before terminating in an anteriorly curved hook. Lacking a medial sternal process.

Female characters

Female vulvae were not examined. These are figured by Mauriès (1965; figs. 11-12).

Genetic analysis

Genetic analysis of one male and one female has been undertaken by sequencing the classical barcode fragment, the mitochondrial cytochrome c oxidase subunit I (COI), following the methodology described by Spelda *et al*. (2011). Barcodes of full length (658 base-pairs) were obtained in both specimens. The sequences generated can be accessed in the Barcode of Life Data System (BOLD; Ratnasingham & Hebert 2007, http://www.boldsystem.org) via DOI dx.doi.org/10.5883/DS-CRANDALE, under the BOLD Process IDs GOMYR262-17 (female, Genbank: MG699451) and GOMYR274-17 (male, Genbank: MG699450). Both sequences differ only in a single base and have been assigned to the BIN "BOLD:ADF7910". This will enable future comparison with continental populations, once fresh material becomes available.

DISTRIBUTION AND HABITATS

Occurrence in South Wales

To date, *Cranogona dalensi* has only been recorded from the Cwm Coal Tips, north-east of Beddau, in the Rhondda Valleys. This colliery spoil-heap, associated with the former Cwm colliery and coking works, has been left to naturally re-vegetate following closure of the colliery in 1986 and the coke works in 2002. Covering an area of c. 8ha, the site now supports an interesting mix of habitats including bare ground, flower-rich grassland, scrub, secondary woodland, calcareous flushes, a lake and secondary wetland (Olds, 2017).

The first specimens of *C. dalensi* were collected from under stones, but subsequently it was found to be widespread and rather abundant under rocks and deadwood across the entire Cwm Coal Tips site. As a rule, the species was collected from areas devoid of vegetation, such as wheel ruts on tracks, where few other species were observed.

Due to this unusual habitat few associated species were recorded. In one area the trichoniscid woodlouse *Haplophthalmus mengii* Zaddach was present and elsewhere the millipede *Ceratosphys amoena* form *confusa* Ribaut was found; another millipede recently discovered in south Wales (Telfer, *et al*., 2015).

Foreign distribution and habitats

Cranogona dalensi was originally described by Mauriès (1965) from the commune of Aïnharp in the Pyrénées-Atlantiques, where specimens were collected from beneath stones partially embedded in soil on a north facing non-wooded slope. Here it was associated with the trichoniscid woodlouse *Metatrichoniscoides fouresi* Vandel, 1950.

Golovatch and Kime (2009) consider *C. dalensi* to be a species restricted to topsoil and possibly also to mesovoid shallow substratum (MSS). Certainly, heaps of compacted colliery spoil as found at Cwm Coal Tips, could be described as an example of MSS. This species may benefit from specific microclimatic conditions associated with MSS, such as the absence of light and amelioration of temperature and humidity extremes.

Native or Introduced?

Cranogona dalensi was originally described from the western Pyrenees and it is therefore possible that it is an over-looked native species with an Atlantic distribution. Certainly, other species originally described from the Pyrenees (e.g. *Anthogona variegata*), have proved to be more widespread in north-western France (Gregory, *et al*. 1994), if not Britain. However, on current evidence *C. dalensi* would appear to be restricted to a single synanthropic site, suggesting an introduction beyond its natural range, probably in recent years. Additional field-work in south Wales and south-west England could help clarify the situation.

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OMMATOIULUS MORELETI (LUCAS) AND *CYLINDROIULUS PYRENAICUS* (BRÖLEMANN) NEW TO THE UK (DIPLOPODA, JULIDA: JULIDAE) AND A NEW HOST FOR *RICKIA LABOULBENIOIDES* (LABOULBENIALES)

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ABSTRACT

The schizophylline millipede *Ommatoiulus moreleti* (Lucas) and the cylindroiuline millipede *Cylindroiulus pyrenaicus* (Brölemann) (Julida: Julidae) are recorded new for the UK from a site near Bridgend, Glamorganshire, in April 2017. An unidentified millipede first collected in April 2004 from Kenfig Burrows, Glamorganshire, is also confirmed as being *C. pyrenaicus*. Both species are described and illustrated, enabling identification. *C. pyrenaicus* is reported as a new host for the Laboulbeniales fungus *Rickia laboulbenioides*. Summary information is provided on habitat preferences of both species in South Wales and on their foreign distribution and habitats. It is considered likely that both species have been unintentionally introduced into the UK as a consequence of industrial activity in the Valleys of south Wales.

INTRODUCTION

The genera *Ommatoiulus* Latzel, 1884 and *Cylindroiulus* Verhoeff, 1894 (Julida: Julidae) both display high species diversity (Kime & Enghoff, 2017). Of the 47 described species of *Ommatoiulus* the majority are found in North Africa and the Iberian Peninsula (*ibid*). Currently, just one species, *Ommatoiulus sabulosus* (Linnaeus, 1758), is known from Britain and Ireland, a species that occurs widely across northern Europe (Kime, 1999) and in Britain reaches the northern Scottish coastline (Lee, 2006). The genus *Cylindroiulus* occurs widely across Europe and with over 100 described species is one of the largest genera the family Julidae (Kime & Enghoff, 2017). Nine species are recorded from Britain and Ireland by Lee (2006) with the introduced *C. apenninorum* recently added to the British list by Barber & Read (2016).

This paper reports the discovery of two millipedes new for the UK, *Ommatoiulus moreleti* (Lucas, 1860) and *Cylindroiulus pyrenaicus* (Brölemann, 1897), both found during a series of collecting trips by EW and CO to Craig yr Aber, Glamorganshire.

OMMATOIULUS MORELETI (LUCAS, 1860)

Discovery

During a fungal foray on 13th April 2017 by EW to Craig yr Aber, near Bridgend, Glamorganshire (SS855850, VC 41) a number of large, but unfamiliar, millipedes were encountered. Body colour varied from grey to almost black, with contrasting pink legs and antennae (Figs. 1A-C). The darkest individual, a female some 40mm in length, was collected and examined by CO who provisionally identified it as a species of *Ommatoiulus*, but distinct from our native *O. sabulosus* (Linné). CO returned to the site on 17th April and collected a male, two females and two immatures. The male

specimen was sent to SJG who identified it as *Ommatoiulus moreleti* (Lucas, 1860) using Akkari & Enghoff (2017) (identification confirmed by Henrik Enghoff).

This is the first recorded occurrence of this species in the UK.

Taxonomy

ORDER Julida Brandt, 1833
FAMILY Julidae Leach, 1814
TRIBE Schizophyllini Verhoeff, 1909
GENUS *Ommatoiulus* Latzel, 1884
***Ommatoiulus moreleti* (Lucas, 1860)**
syn. *Julus moreleti* Lucas, 1860

Ommatoiulus moreleti exhibits considerable variation of the male gonopods and has been the source of much taxonomic confusion. A full list of synonyms is given in Akkari & Enghoff (2012; 2017).

Diagnosis

Ommatoiulus moreleti is a distinctive robust millipede, typically darkly pigmented with contrasting pinkish legs and antennae (Figs. 1A-B). Mature male specimens may be readily identified from the distinctive profile of the gonopods in posterior view (Figs. 2C-D).

Using Blower (1985), it will key to *Ommatoiulus sabulosus* (Linné) due to the upturned telson and presence of fine traverse chasings on the prozonites on larger specimens (Figs. 2A-B). However, the relatively long telson could result in confusion with the tribe Julini, but these have a straight or down-turned telson and prominent fringing setae on the metazonites (glabrous in *Ommatoiulus*).

Description

This description is based on a single recently collected male specimen preserved in 70% isopropyl alcohol, with additional notes provided by field observations.

Size

The male examined is 35 mm in length by 3.0 mm in diameter (measured dorsa-ventrally). Females observed by EW and CO are slightly larger, up to 40 mm in length. This is significantly larger than *O. sabulosus*, where males reach 23 x 1.8 mm, females 33 x 2.8 mm (Blower, 1985).

Colour

Body colour is highly characteristic. Larger juveniles and adults (Figs. 1A-B) vary in colour from uniform grey with pinkish legs and antennae, through increasing darker shades to almost uniform black with contrasting burgundy legs and antennae. Immature specimens (Fig. 1C) are pale grey, often with a pair of indistinct dorsal stripes, but these are much less pronounced that seen in *O. sabulosus*.

Body rings

The male examined comprised 47 body rings (including collum and telson). Prozonites (Fig. 2B) bear irregular fine striations in addition to the usual distinct longitudinal striae of the metazonites, with the ozopores lying posterior to the suture. Metazonites are glabrous, lacking fringing setae. Telson (Fig. 2A) is produced into a long caudal projection (somewhat longer than seen in *O. sabulosus*), curving upwards towards its tip, which bears a distinct tuft of setae. All these characters are similar to those seen in *O. sabulosus* (Blower, 1985).

FIGURE 1: *Ommatoiulus moreleti* (Lucas) from Craig yr Aber

A) Mature specimen as found on underside of Beech log (the two small specimens are *Cylindroiulus pyrenaicus*); B) Defensively coiled specimens; C) Immature specimen. (images © Christian Owen)

FIGURE 2: *Ommatiulus moreleti* male, from at Craig yr Aber

A) Telson); B) Mid body rings; C-D) Gonopods, posterior view; E) Promerites; F) Mesomerite; G) Solenomerite; H) Paracoxite, all posterior view (E-H cleared in clove oil). Scale bars 0.2 mm

Male: gonopods (leg pairs 8 and 9)

The gonopods are almost entirely retracted into the body. In posterior view (Figs. 2C-D) the gonopods are of highly characteristic shape. The paracoxite (px; Figs. 2C-D & 2H) is antler-shaped, bearing three tapered processes. Behind the paracoxite (i.e. anteriorly), the mesomerite (ms), which is as long as the promerite (p), and the shorter solenomerite (s) both curve outwards. The anterior promerites (p, Fig. 2E) are more or less parallel-sided. The mesomerites and solenomerites (Figs. 2F-G), when dissected out, are also of characteristic shape.

Male: secondary sexual characters

In keeping with other species of the genus (Akkari & Enghoff, 2017), males have the mandibular stipes vertically expanded into rounded lobes; leg-pair 1 considerably reduced in size and modified into a pair of hooks; and postfemoral and tibial pads are present on the subsequent leg-pairs.

Female characters

Female vulvae were not examined.

Occurrence in South Wales

Location

Despite being a large and conspicuous species, this millipede has only been recorded from a discrete area (c. 400m by 250m) of the southern part of the Craig yr Aber woodland. Searches beyond this area have not found additional specimens.

Habitat

The first specimens, collected in spring, were found beneath rotten logs and among leaf-litter in a narrow strip of Beech *Fagus sylvatica* woodland (some 50m wide) within a larger conifer/mixed woodland matrix (Fig. 3). Here the ground flora is dominated by Bluebells *Hyacinthoides non-scripta*. Subsequent surveys found this species throughout adjacent conifer blocks among *Polytrichum* sp. mosses and within rotten logs. Specimens were also observed climbing the sun-lit side of Beech trunks and collected from within rot-holes and from low branches of Beech, Holly *Ilex aquifolium*, and other woody species. This wide vertical range is similar to that seen in the other British schizophylline millipedes, *O. sabulosus* and *Tachypodoiulus niger* (Leach). In November the species proved elusive, but could found in small numbers sheltering beneath, and within, pieces of dead wood.

Associated species

The most abundant millipede present is *Cylindroiulus pyrenaicus* (Brölemann) (the discovery of which is detailed below). *Hylebainosoma nontronensis* Mauriès & Kime, *Ceratosphys amoena confusa* (both recent additions to the UK fauna – Telfer. *et al*., 2015) and an unidentified chordeumatidan were also collected. The remaining millipede fauna was unremarkable; *Polydesmus angustus* Latzel, *Cylindroiulus punctatus* (Leach), *Proteroiulus fuscus* (Am Stein) and a single *T. niger*.

Of the associated centipedes, *Lithobius pilicornis* Newport and *L. piceus* L. Koch were the most frequently encountered species. These two species have very restricted distributions in Britain and have only recently have been discovered in South Wales (Barber, 2009). The widespread woodland species, *Lithobius variegatus* Leach and *Strigamia crassipes* (C.L. Koch) were also present.

Foreign distribution and habitats

O. moreleti is native to continental Portugal and southern Spain where its distribution is related to the availability of deep litter, often provided by Pine *Pinus* and Oak *Quercus* trees, but also by dense shrubs and heath and undisturbed grassland (Bailey & de Mendonça, 1990). However, *O. moreleti* has been spread through commerce and has been introduced to the Macaronesian Islands, Bermuda, South Africa and south-eastern Australia (Akkari & Enghoff, 2012; 2017). In South Africa it is recorded from various natural habitats and synanthropic sites, such as gardens. In south-eastern Australia, where it is known as "Portuguese millipede", it has become a pest of fruit and vegetables (*ibid*).

FIGURE 3: Beech *Fagus sylvatica* dominated woodland strip where both *O. moreleti* and *C. pyrenaicus* occurred in good numbers.

CYLINDROIULUS PYRENAICUS (BRÖLEMANN, 1897)

Discovery

On 19th April 2004 GJ collected a small well pigmented millipede, bearing both a projecting telson and projecting ventral scale, from the banks of the River Kenfig at Kenfig Burrows, Glamorganshire (SS792833, VC 41). Subsequently, GJ collected two additional specimens from a domestic garden at North Cornelly close to the River Kenfig (SS813819, VC 41) just a few kilometres upstream (Table 1). These specimens were forwarded to Paul Lee (organiser of the BMIG Millipede Recording Scheme), but unfortunately were immature and could not be allocated to species (although referable to a species of *Cylindroiulus/Allajulus* that was unknown in Britain (Paul Lee, pers. comm. to GJ). This discovery appears to have slipped from the collective consciousness of many myriapodologists in the UK until Barber & Read (2016) reported the discovery of *Cylindroiulus apenninorum* in southern England and raised the possibility that these Welsh specimens could be referable to the same species.

On 17th April 2017 while searching for male specimens of the then unidentified *Ommatoiulus moreleti* at Craig yr Aber CO also collected two specimens of a much smaller millipede (Fig.1A) which had a very obvious projecting telson and ventral scale. Unfortunately, these were immature, but additional specimens collected by CO on 1st May 2017 included two males and a number of females. One male was sent to SJG who provisionally identified it as *Cylindroiulus pyrenaicus* (Brölemann, 1897). The second male, bearing a Laboulbeniales fungus, was sent Henrik Enghoff (University of Copenhagen) who confirmed the millipede's determination.

Subsequently, five specimens collected by GJ on 19.iv.2007 from the banks of the river Kenfig at Kenfig Burrows were examined by SJG. The presence of a male confirmed that these too were *C. pyrenaicus*. Thus, after more than a decade, the puzzle of the 'two-tailed' millipede from south Wales finally had been solved.

These are the first British and Irish occurrences of *C. pyrenaicus*, and are listed in Table 1.

Taxonomy

ORDER Julida Brandt, 1833
FAMILY Julidae Leach, 1814
TRIBE Cylindroiulini Verhoeff, 1930
GENUS *Cylindroiulus* Verhoeff, 1894
***Cylindroiulus pyrenaicus* (Brölemann, 1897)**
syn. *Iulus pyrenaicus* Brölemann, 1897

Diagnosis

Cylindroiulus pyrenaicus is a relatively short and stout, well pigmented, millipede that lacks body setae. It is distinctive in bearing both a projecting telson and ventral scale. In Britain and Ireland, this combination of characters is otherwise only seen in *C. apenninorum* and *Enataiulus armatus*. The former is much larger, reaching 30mm or more in length (Barber & Read, 2016) and the latter has conspicuous fringing setae on the metazonites (Blower, 1985), which are glabrous in *Cylindroiulus* sp. (Table 2). Male gonopods are characteristic in lateral or mesal view (Figs. 4D-E).

Description

Size

Body is relatively short and stout. The two males examined are 12 mm and 13 mm in length by 1.0 mm in diameter. Females examined were between 15-18 mm in length by 1.3-1.5 mm in diameter.

Colour

Fresh specimens (Fig. 4A) are brown mottled with white; the pattern giving the impression of being darker dorsally and paler laterally. The head is mostly pale with a dark brown band between the eyes. The collum and anal rings also pale, the latter (Fig. 4B) contrasting with the darkened pre-anal ring. Legs are noticeably paler than the body. Specimens collected in 2007 had faded noticeably after a decade in alcohol, becoming a more uniform pale brown.

Body rings

Both males were stadia VII, with 7 rows of ocelli arranged in a rounded triangle, and with 41 body rings (including collum and telson). The four females examined in detail were also stadia VII with 40 or 41 body rings. All with three apodous posterior body rings.

Metazonites with distinct longitudinal striae. In common with other *Cylindroiulus* species, frontal setae on head and fringing setae on metazonites are absent and the ozopores lie on the suture between prozonites and metazonites. Anal valves with three pairs of setae (as seen in *C. britannicus* (Verhoeff) and *C. latestriatus* (Curtis)). Telson (Fig. 4B) is produced into a stout caudal projection that is slightly down-turned towards the tip and ventral scale also projecting, relatively stout, and about half length of telson. Both the tip of the telson and the ventral scale bear a pair of setae (though broken off in some specimens). In Britain and Ireland, this combination of projecting telson and anal scale is otherwise only seen in *C. apenninorum* and *E. armatus*. The key differences between these species are listed in Table 2.

Male: gonopods (leg pairs 8 and 9)

Male gonopods are of characteristic shape (Figs. 4D-E). Promerite and mesomerite of similar length, together forming a rather short and squat structure. Opisthomerite with prominent triangular coxal process and with brachite evenly rounded like the tip of a thumb. Flagellum well developed.

TABLE 1: The first British records of *Cylindroiulus pyrenaicus* in chronological order

GHJ – Greg Jones; SCW – Simon Warming ham; CO – Christian Owen

* Material examined for this paper; # still present on site in 2017

Locality	Grid Ref	VC	Number of specimens	Date of collection	Collector
River Kenfig, Kenfig Burrows	SS792833	41	1	19.iv.2004	GHJ
Heol Maendy, North Cornelly	SS813819	41	1	2.v.2004	GHJ
Heol Maendy, North Cornelly	SS813819	41	1	29.iv.2006 #	GHJ
River Kenfig, Kenfig Burrows	SS794831	41	*1♂ 3♀♀ 1juv	19.iv.2007 #	GHJ, SCW
Craig yr Aber, nr Bridgend	SS855851	41	*2 juvs	14.iv.2017	CO
Craig yr Aber, nr Bridgend	SS856849	41	*2♂♂ 10♀♀	01.v.2017	CO

TABLE 2: Comparison of some characteristics of *Cylindroiulus pyrenaicus* (*from Brölemann, 1897) with *C. apenninorum* (from Barber & Read, 2016) and *Enantiulus armatus* (from Blower, 1985)

Character	*C. pyrenaicus*	*C. apenninorum*	*E. armatus*
Maximum size	18 (*20) mm x 1.5 mm	33 mm x 3 mm	15.1 mm x 1.05 mm
Colour	Medium to dark brown	Typically medium to dark brown	Light amber to olive green
Body rings	40 – 41 (*41)	45 – 53	Up to 51
Setae on body rings	Absent	Absent	Present
Male first legs	Comma shaped, Fig. 4C	Comma shaped	More angular and "elbow" shaped
Current known occurrence in Britain	South Wales	Isle of Wight & Plymouth, Devon	South Devon & Cornwall

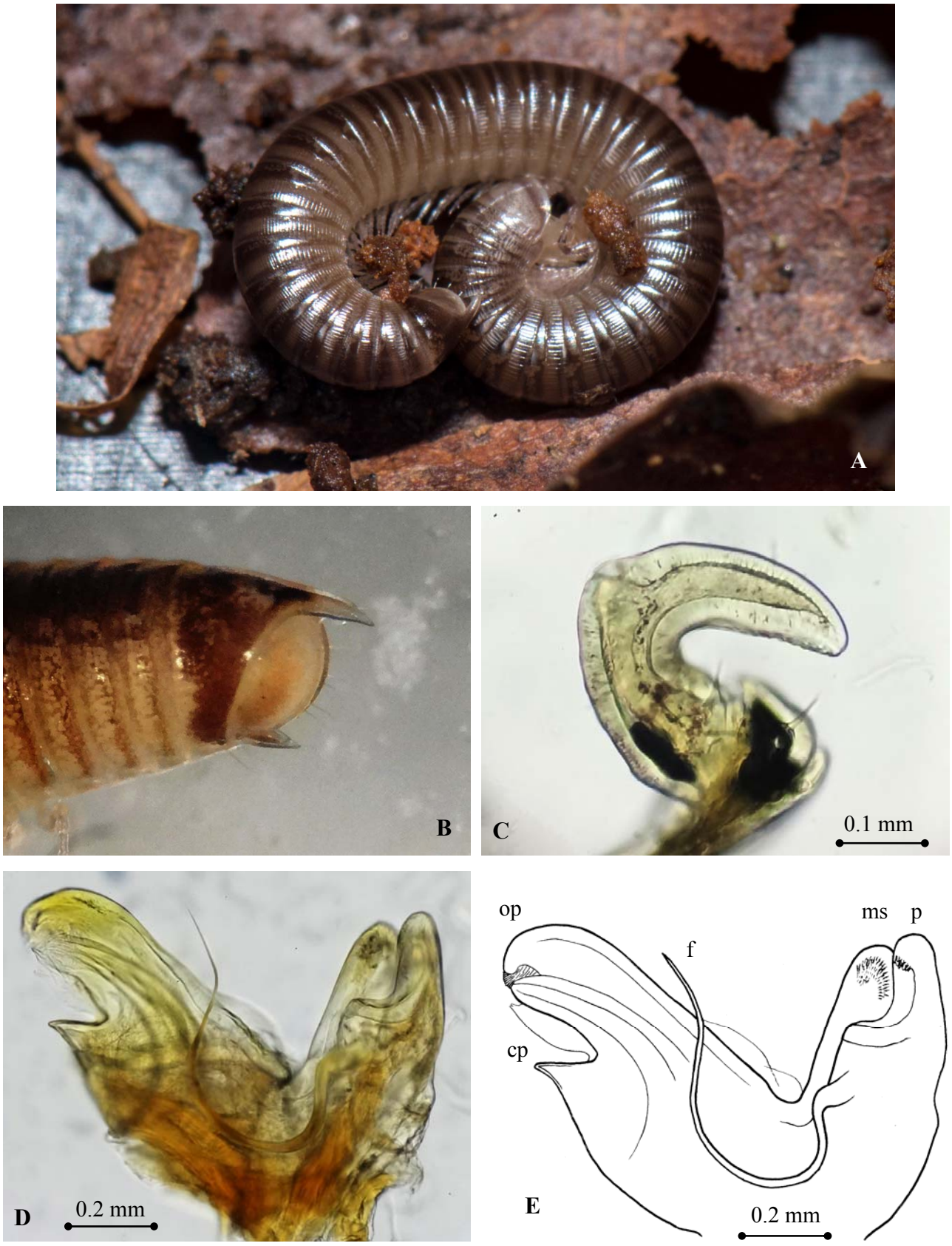

FIGURE 4: *Cylindroiulus pyrenaicus* from at Craig yr Aber

A) Female, habitus (image © Keith Lugg); B) Male posterior body rings showing apododous segments, projecting telson and projecting ventral scale; C) Male first pair of legs; D) Male gonopods (cleared in euparal), mesal view; E) Male gonopods, mesal view (op – opisthomerite; cp - coxal projection; f – flagellum; ms - mesomerite; p – promerite)

Male: secondary sexual characters

In keeping with other species of the genus the stipites of mature males are expanded and leg-pair 1 considerably reduced in size and modified into a pair of hooks (Fig. 4C).

Female characters

Female vulvae were not examined.

Occurrence in South Wales

Location

Current observations suggest that *C. pyrenaicus* is confined to the lower catchment of river Kenfig (which is about 18km in total length). Kenfig Burrows lies close to where the River Kenfig meets the sea (The Bristol Channel). The North Cornelly garden is situated about two kilometres upstream of this, while Craig yr Aber is another 5km further upstream beside the Nant Craigyraber, a tributary of the River Kenfig. There is also a report (John Harper, pers. comm. to GJ) of a similar 'two-tailed' millipede at Cefn Cribwr, south of Craig yr Aber, which also drains into the Kenfig catchment. Considering that the observations of this species have been made on a number of occasions, between 2004 and 2017, and at several locations (Table 1) then it appears that *C. pyrenaicus* is well established in this area of south Wales.

Habitat

The first specimens of *C. pyrenaicus*, collected in 2004 (Table 1), were from the bank of the River Kenfig under bark of rotten logs that had been washed downstream by winter floodwater. The species was still present in 2017, with many specimens (male and female) seen within a rotten log in the same general area as the original 2004 and 2007 records. A few other specimens were found under a small piece of plastic and a house brick near the entrance to an abandoned building. The specimens from North Cornelly have been collected from beneath flower pots on a patio in a domestic garden on several occasions between 2004 and 2017, suggesting that it is able to survive in synanthropic habitats. Specimens of *C. pyrenaicus* at Craig yr Aber were found in the same general area (but slightly more widespread) in which *O. moreleti* was found. In the Beech woodland strip (Fig. 3) it was the most frequently encountered millipede, found in large numbers in rotten wood and among Beech leaf litter. It was less numerous in the surrounding conifer plantation but still present in rotten logs and among moss throughout the site.

Associated species

At Craig yr Aber *C. pyrenaicus* was associated with the same species of millipede and centipede reported for *O. moreleti* (above). In the North Cornelly garden the myriapods recorded included *Cylindroiulus britannicus* (Verhoeff), *C. punctatus* (Leach), *Leptoiulus belgicus* (Latzel) (which has a predominantly south-western distribution in Britain (Lee, 2006)) and *Lithobius melanops* Newport. Few millipedes were seen at the River Kenfig site, but those noted were *Polydesmus angustus* Latzel, *C. britannicus* and *Ommatoiulus sabulosus* (Linné).

Foreign distribution and habitats

Cylindroiulus pyrenaicus is known from the French and Spanish sides of the Pyrenees and the Montagne Noire (south-west Massif Central) in southern France (Kime & Enghoff, 2017). It favours Beech *Fagus* forest, but also has been recorded from mixed deciduous woodland and conifers, including Pine *Pinus* plantation. Typically it is found among deep litter and moss or under bark and within dead wood (*ibid*).

These habitats and associated microsites are in keeping with observations of this species in South Wales.

Very recently *C. pyrenaicus* has been reported from several sites within three departments in north-west France (Unpublished data; A. Racine and F. Nöel; J-J. Geoffroy, pers. comm.), which raises the possibility of a disjunct distribution for this species in France, where it was previously thought to be endemic to the Pyrenees (Kime & Enghoff, 2017).

A NEW HOST FOR *RICKIA LABOULBENIOIDES* (LABOULBENIALES)

One male and at least three females of *Cylindroiulus pyrenaicus* collected by CO from Craig yr Aber on 1st May 2017 were found to be infected with a Laboulbeniales fungus, which was confined to the anterior legs close to the head. This was identified by Henrik Enghoff as *Rickia laboulbenioides* De Kesel *et al*, 2013. This is the second British record for this fungus and a new host millipede species. Previously, the only confirmed British record of *R. laboulbenioides* is from Berkshire, England, found on *C. punctatus* (reported in Santamaria *et al*, 2016). However, Irwin (1989) reports the occurrence of unidentified Laboulbeniales on specimens of *C. britannicus* (Verhoeff) collected by the Welsh Peatland Invertebrate Survey.

Of the four genera of Laboulbeniales known to occur on millipedes, *Rickia* Cavera, with 161 described species, is the largest and parasitizes a wide variety of hosts in addition to Diplopoda (Santamaria, Enghoff & Reboleira, 2016). *Rickia laboulbenioides* was described relatively recently from infected *Cylindroiulus latestriatus* (Curtis) collected in The Netherlands and Belgium (De Kesel *et al*. 2013). Subsequently, it was found in the Iberian Peninsular, Denmark and Italy parasitizing *Cylindroiulus latestriatus* (Curtis), *C. punctatus* (Leach), *C. perforatus* (Verhoeff) and *C. dahli* Demange.

It is probably overlooked in Britain and could prove to be more widespread in both distribution and the range of host species it parasitizes. Ten species of *Cylindroiulus* have been previously recorded in Britain and Ireland (Lee, 2006; Barber & Read, 2016).

NATIVES OR INTRODUCED?

Recent fieldwork has indicated that the Valleys of south Wales support a number of unexpected species. Recent work on Molluscs has revealed several species new to Britain; the slugs *Arion cf. iratii* Garrido, Castillejo & Iglesias, *Arion cf. fagophilus* (de Winter), Ghost Slug *Selenochlamys ysbryda* Rowson & Symondson and semi-slug *Daudebardia rufa* (Draparnaud) (Rowson & Symondson, 2008; Rowson *et al*., 2014; 2016). Among myriapods, the centipedes *Lithobius tricuspis* Meinert and *Lithobius piceus* L.Koch and the millipede *Propolydesmus testaceus* (C.L. Koch) otherwise have disjunct distributions elsewhere in the UK (Barber, 2009; Lee, 2006). Recently, the millipedes *Ceratosphys amoena confusa* Ribaut, 1920 and *Hylebainosoma nontronensis* Mauriès & Kime, 1999 were discovered new to Britain (Telfer, *et al*, 2015). Subsequently, three additional chordeumatidan millipedes, *Typhlopsychrosoma* Mauriès, 1982 sp., *Turdulisoma* Mauriès, 1964 sp. and *Cranogona dalensi* Mauriès, 1965, have been discovered in the same region of south Wales (unpublished data: see www.bmig.org.uk/checklist/millipede-checklist). Some, such as the Ghost Slug *S. ysbryda* of Crimean origin, are considered introduced to Britain, but in the case of other species which are native to western Europe it is less easy to be sure.

Following the discovery of coal in the previous century, much of South Wales had become highly industrialised by the 19th century. Railways, ports, ironworks and other industry were constructed in many areas. The major port towns of Port Talbot and Bridgend lie a few miles west and east, respectively, of the Kenfig/Craig yr Aber area and an extensive open cast coal, partially restored,

lies just south of Craig yr Aber. Port Talbot Steelworks, founded as late as 1902, imported 300,000 tons of iron ore per annum by 1930, and rising to 3,000,000 tons per annum by 1960 (https://en.wikipedia.org/). Thus, there are plausible pathways for introductions from other countries into South Wales.

Given that *O. moreleti* has been introduced far from its original Iberian range into several other parts of the world, e.g. becoming a pest in Australia (Akkari & Enghoff, 2012; 2017), it seems highly probable that it has been introduced into South Wales. In the case of *C. pyrenaicus* the situation is less clear. However, given that its current known distribution is centred on the Pyrenees and in light of the importation of iron ore from the Basque Country (western Pyrenees) into South Wales (Telfer, *at al*, 2015), then it seems plausible that *C. pyrenaicus* could also have been introduced.

It is considered that on balance the evidence favours that both *O. moreleti* and *C. pyrenaicus* have been introduced to Britain, beyond their natural range, probably in recent decades, and have become established in a small area of south Wales. It will be interesting to see if either is recorded further afield.

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We thank Henrik Enghoff, to whom we are very grateful, for providing relevant literature that enabled the identification of *O. moreleti,* for confirming the identification of *C. pyrenaicus* and for undertaking the identification of its associated *Rikia* fungus.

Franck Nöel and Jean-Jacques Geoffroy kindly alerted us to the recent discovery of *C. pyrenaicus* in north-west France.

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A MILLIPEDE NEW TO THE UK: *OPHYIULUS GERMANICUS* (VERHOEFF, 1896) (DIPLOPODA, JULIDA: JULIDAE) FROM OXFORD

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ABSTRACT

The millipede *Ophyiulus germanicus* Verhoeff is reported new for the UK from a site in Oxford city. A description with illustrations is provided, and comparison made with the common *O. pilosus* (Newport), to enable identification. Information about microsites inhabited and associated species is given. It is considered that *O. germanicus,* a millipede native to the Italian mainland, is an accidental introduction into the UK.

INTRODUCTION

The millipede genus *Ophyiulus* Berlese 1884 (Julida: Julidae) comprises 26 known species (Kime & Enghoff, 2017) with the centre of diversity occurring on the Italian peninsula, where 16 species, many endemic, are listed. Until now, just a single species, *Ophyiulus pilosus* (Newport, 1842), was known from the UK (Lee, 2006). Although ubiquitous in Britain (*ibid*), *O. pilosus* is thought to be an ancient introduction from its northern Italian stronghold and is scarce in much of neighbouring continental Europe, including France (Kime, 1999).

During a collecting trip to Trap Grounds, Oxford City (SP502081, VC 23) on 5th November 2015 the author collected a male and female specimen of what were thought in the field to be anomalous *Tachypodoiulus niger* (Leach). While viewing the specimens with a binocular microscope it was apparent that the traverse striae on the prozonites characteristic of *T. niger* (Blower, 1985, Fig.42A) were absent. In addition, the first pair of legs in the male were modified into elongated sickle-shaped structures, as seen in *Ophyiulus pilosus*. However, the specimens were much larger than expected for *O. pilosus* (as given in Blower, 1985) and lacked the characteristic deep metazonite sculpture. The specimens were sent to Henrik Enghoff who identified them as *Ophyiulus germanicus* (Verhoeff, 1896). Additional material, comprising two males and four females, was collected by Keith Lugg and the author on 27th April 2016. These are the first recorded occurrences of this species in the UK.

IDENTIFICATION

Specimens collected from Trap Grounds are described below, highlighting the key features that differentiate *O. germanicus* from the common *O. pilosus* (which was also recorded from Trap Grounds). Specimens of *O. germanicus* are deposited in the author's and BMIG's collections.

Taxonomy

ORDER Julida Brandt, 1833
FAMILY Julidae Leach, 1814
TRIBE Julini Lohmander, 1936
GENUS *Ophyiulus* Berlese, 1884
***Ophyiulus germanicus* (Verhoeff, 1896)**
syn. *Julus germanicus* Verhoeff, 1896
syn. *Ophyiulus strandi* Attems, 1927

Diagnosis

Ophyiulus germanicus is very similar to *O. pilosus* in general appearance (Fig. 1), but differs primarily its larger size and shallower metazonite striae. Males can be distinguished by the shape of the first legs, the structure of the coxae of the second legs and by the shape of the velum on the opisthomerite of the gonopods. These features are listed in Table 1 and considered in more detail below.

FIGURE 1: *Ophyiulus germanicus* (Verhoeff)
Habitus, live male from Trap Grounds, Oxford. Image © Keith Lugg

TABLE 1: Comparison of some characters of *Ophyiulus germanicus and O. pilosus.*

Character	*Ophyiulus germanicus* from Oxford city	*Ophyiulus pilosus* (*after Blower, 1985)
Male: length & diameter	21.0 x 1.4 and 23.0 x 1.6 mm	13.8-19.4 (21.0) x 1.03-1.14 mm*
Female: length & diameter	23.0-32.0 x 1.7-2.2 mm (4 specimens)	19.6-29.3 (30.0) x 1.50-2.17 mm*
Metazonite striae	Shallow 'scratches' (Fig. 1C)	Deeply fluted like 'Doric pillar'*
Male: distal article of first leg pair	Anterior margin with distinct bulge with 3+ long stout spines (Fig. 3C)	Anterior margin gently curved, with one long stout spine (Fig. 3F)
Male: coxae of second leg pair	Prominent finger-like processes on distal inner corner (Fig. 3D 'p')	Any process on distal inner corner considerably reduced (Fig. 3G 'p')
Male gonopods: velum of opisthomerite	Velum triangular, pointed, with 4-6 teeth on anterior margin (Figs. 3A-B)	Velum parallel sided with rounded tip bearing blunt tubercles (Fig. 3E)

FIGURE 2: *Ophyiulus germanicus* (Verhoeff) from Trap Grounds, Oxford.

A) Anterior body rings (swollen gnathochilarial stipes and sickle-shaped first leg pair arrowed) Image © Keith Lugg; B) Posterior body rings and telson; C) Central body rings showing metazonite striae; D) Size comparison of *O. germanicus* (top) and *O. pilosus* (bottom). E) Male, gonopod, mesal view; F) and G) Female, vulva, posterior and lateral view (E-G cleared in euparal).

Description

This description is based on three males and five females collected from Trap Grounds.

Colour

The first specimens collected were grey/brown in colour (Gregory, 2016), but subsequent specimens were more heavily pigmented, being a dark brown-black, with pale brown legs (Figs. 1, 2A-D). The prozonites are lightened ventro-laterally due to the absence of dermal pigment over the muscle attachments and therefore very similar in appearance to *O. pilosus*.

Size

The two males measured were 21 and 23 mm in length by 1.4 and 1.6 mm in diameter, respectively. The five females ranged between 23-32 mm by 1.6-2.2 mm in diameter. Thus, for a given stadium this species is noticeably larger than *O. pilosus* (as given in Blower, 1985) (Fig. 2D).

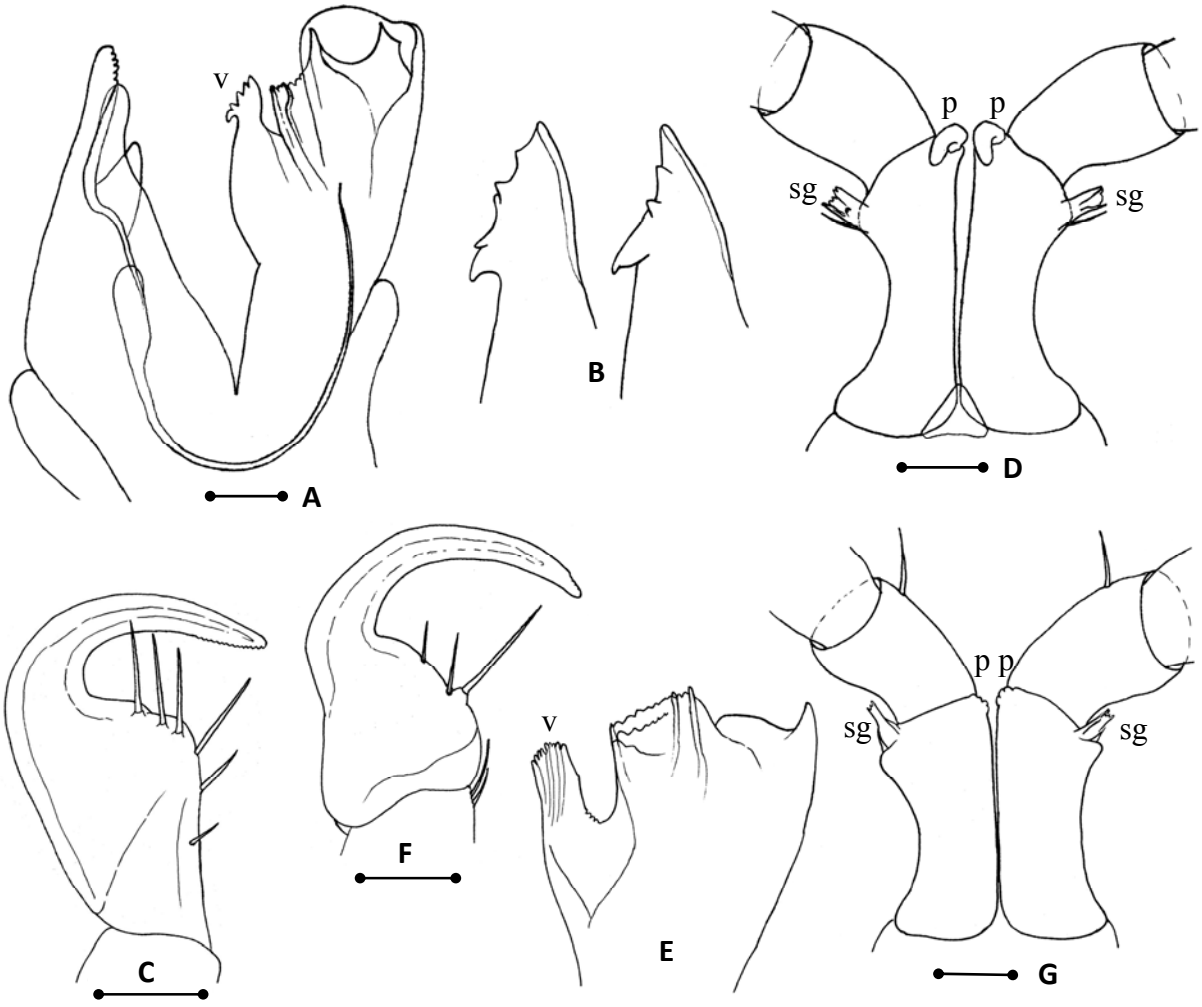

FIGURE 3: A-D) *Ophyiulus germanicus* (Verhoeff), male, Trap Grounds, Oxford.
A) gonopod, mesal view (v = velum); B) velum, two examples; C) distal article of first leg, lateral view; D) coxae of second leg, anterior view.
E-G) *Ophyiulus pilosus* (Newport), male, Trap Grounds, Oxford.
E) opisthomerite of gonopod, mesal view (v = velum); F) distal article of first leg, lateral view; G) coxae of second leg. All scale bars 0.1 mm.

Body rings

Metazonites bear shallow longitudinal striae (Fig. 2C), which is quite different from the deep fluting "like a Doric pillar" (Blower, 1985) seen in *O. pilosus.* Metazonites are fringed along their posterior edge with distinct setae. These are typically only about half the length of the metazonites, but becoming distinctly longer towards the anterior and posterior of the animal (Fig. 2A). Overall the setae are shorter and less conspicuous, than seen in *O. pilosus*, where they typically exceed the full width of the metazonites (Blower, 1985).

Telson (Fig. 2B) is produced into a long pointed caudal projection, ending in a straight hyaline tip. This is essentially identical to that seen in *O. pilosus*.

As in other members of the genus, including *O. pilosus*, the distal part of the gnathochilarial stipes is conspicuously swollen in the male (Fig. 2A).

Male: first leg pair

Males bear elongated sickle-shaped first legs (Figs. 2A, 3C) that are characteristic of many species in this genus. In lateral view, the anterior margin has a prominent bulge which bears a row of at least three elongated stout spines and a few smaller ones. In *O. pilosus* (Fig. 3F) the anterior edge lacks this bulge, and bears just one elongated stout spine (and a few smaller ones).

Male: second leg pair

The distal inner corner of the coxae of the second pair of legs is extended into a small triangular projection which bears a fleshy finger-like curved process that projects anteriorly (Fig. 3D 'p'). The outer edge of the coxae bear prominent secretory glands located on a bulge (Fig. 3D 'sg'). *O. pilosus* bears similar secretory glands on the outer edge of the coxae (Fig. 3G 'sg'), but the triangular projection on the distal inner corner is absent and the finger-like process is more or less absent (Fig. 3G 'p').

Male: gonopods (leg pairs 8 & 9)

The gonopods of *O. germanicus* (Figs. 2E & 3A) are very similar in general appearance to those of *O. pilosus* (Fig. 3E). The diagnostic character is the shape of the velum on the anterior margin of the opisthomerite. In *O. germanicus* (Fig. 3B), the velum is triangular with a pointed tip and bears a number of stout teeth along the anterior edge (between four and six in the three specimens examined). Some of these teeth may be directed laterally and therefore not immediately obvious in lateral view. In contrast, the velum in *O. pilosus* (Fig. 3E) is more or less parallel sided with a rounded apex bearing blunt tubercles.

Female: vulvae

The female vulvae are very similar to those of *O. pilosus* (as figured in Blower, 1985, Fig. 54C-E), but differ subtly in shape. In posterior view the apical margin is less deeply incised (Fig. 2F) and in lateral view is slightly more swollen posteriorly (Fig. 2G) relative to *O. pilosus*. However, these differences are possibly not sufficient to enable reliable species determination.

OCCURRENCE AT TRAP GROUNDS

Location

Trap Grounds is a designated Local Wildlife Site is one of the last remaining un-built spaces along the Oxford Canal between the city centre and the northern suburbs. It lies on the flood plain of the river Thames at about 55m asl. Although only six acres (2.4 ha) in size, it supports a rich mosaic of habitats,

including reed bed, grassland and mature secondary deciduous woodland (Jackson-Houlston, 2009). The site was formerly much larger in size but modern housing has encroached on three sides. The site continues to support a diverse invertebrate fauna including Nationally Scarce species such as the spider *Theridiosoma gemmosum* and the bee *Hylaeus signatus* (Gregory, 2013). Until the 1990s Trap Grounds was used as an unofficial rubbish tip and consequently the invertebrate fauna (and flora) shows a strong synanthropic element, including the second British record for the introduced millipede *Anamastigona pulchella* (Gregory *et al*, 2015), and now *O. germanicus*.

Habitat and associated species

Despite searches across the entire site, all specimens of *O. germanicus* collected so far (data presented herein and M.G. Telfer pers. comm.) have been collected from a discrete area of secondary woodland known as Sparrowhawk Wood. This is mainly composed of Sycamore, *Acer pseudoplatanus,* and Hawthorn, *Crataegus monogyna,* that has developed over made up ground strewn with rubble and other debris. This is in keeping with the typical woodland habitat favoured by this species (see heading *Occurrence elsewhere in Europe* below).

At Trap Grounds specimens of *O. germanicus* were found associated with the Chordeumatidans *Anamastigona pulchellum* (Sivestri) and *Brachychaeteuma melanops* Brade-Birks & Brade-Birks; the Julids *Brachyiulus pusillus* (Leach)*, Cylindroiulus britannicus* (Verhoeff)*, Cylindroiulus punctatus* (Leach), *Tachypodoiulus niger* (Leach) and *Ophyiulus pilosus* (Newport); and the Polydesmid *Polydesmus coriaceus* Porat.

Ophyiulus germanicus has been collected from the Trap Grounds on 5th November, 18th April (M.G. Telfer, pers. comm.) and 27th April. The German observation (Decker & Hannig, 2011) was made on 23rd September. This may be a species that is mature all year, or possibly mature only during the winter months.

OCCURRENCE ELSEWHERE IN EUROPE

Ophyiulus germanicus was described from northern Italy (South Tyrol) and its distribution is centred of the Apennine Mountains of Italy (Foddai, *et al*, 1995), where it is mainly associated with deciduous woodland, including Sweet Chestnut *Castanea,* Oak *Quercus,* Hornbeam *Carpinus,* Ash *Fraxinus* and Hazel *Corylus* (Kime & Enghoff, 2107). Despite its name, this species has only very recently been recorded from Germany (in 2006), where it is considered to be introduced (Decker & Hannig, 2011; Reip *et al*, 2016). It has also been collected from Mt Turbon, Huesca, in Spain at an altitude of 1400-1600m (Kime & Enghoff, 2107). The Italian and Spanish records are from mountainous regions, which contrasts strongly with the Trap Grounds which lies on the lowland floodplain of the River Thames at about 55m asl.

CONCLUSION

Ophyiulus germanicus appears to be established in a fairly discrete area of Trap Grounds (Sparrowhawk Wood). Given the suburban location and its historical use of as an unofficial rubbish tip then it is most likely that this species has been unintentionally introduced to this site. Woodland seems to be a key feature in its occurrence, and it may be found at other similar sites within Oxford city or elsewhere in the UK. However, fifteen tubes of voucher specimens of *Ophyiulus pilosus* that are held in the author's personal collection, all collected from the county of Oxfordshire (VC 23 & 22 in part), have been examined and all have proved to have been correctly determined as *O. pilosus*.

ACKNOWLEDGEMENTS

My thanks go to Henrik Enghoff for identification of the original specimens and subsequent advice; Desmond Kime for additional information; and to Hans Reip for providing relevant literature. Keith Lugg allowed me to examine his specimens collected in April 2016 and gave permission to use his images of the live animal in this paper.

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CYLINDROIULUS APENNINORUM (BRÖLEMANN, 1897) (DIPLOPODA: JULIDAE) FOUND IN IRELAND

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DISCOVERY

While looking at the fauna of a Parks Dept. tip at Sir Thomas and Lady Dixon Park on the outskirts of Belfast (Irish Grid J30386742) on 1 November 2016, I came across several examples of an unfamiliar julid. I contacted Tony Barber with a rough description and discovered that a similar julid had been found on the Isle of Wight and near Plymouth (Barber & Read, 2016). Tony subsequently informed me that the specific characters used to determine the British examples could be applied to at least two species in Europe. However, the most likely determination of my specimens was as *Cylindroiulus apenninorum* (Brölemann), a species native to Italy.

TAXONOMY

An obvious characteristic of *Cylindroiulus apenninorum* is its possession of projecting scales on both the dorsal and ventral surfaces of the telson. This character is also found in *Enantiulus armatus* (Ribaut) but *Cylindroiulus apenninorum* is larger and darker and lacks setae on the rings. Setation on the rings is obvious in *E. armatus* (Barber & Read, 2016). There is a third European species with a projecting scale on the ventral side of the telson, *Allajulis dicentrus* (Latzel) from Austria (Barber & Read, 2016). And Demange (1981) lists a fourth, *Julus spinosus* (Ribaut) from the valley of the Garonne in the French Pyrenees. In addition, there is *Cylindroiulus pyrenaicus* (Brölemann) now recorded from Wales (Gregory *et al*., 2018, this edition). But the dorsal anal scale is large and slightly hooked in that species which does not accord with the modest dorsal and ventral scales in the Belfast specimens.

However, reading Barber & Read's (2016) description of *C. apenninorum*, one or two points of difference stood out. The largest specimen found at Belfast in 2016 measured only 18 mm. These specimens were also quite pale varying from pale buff to pale cinnamon brown, with only the telson a darker brown in one or two specimens. There was also the problem that adult males could not be found.

Several visits were paid to the Dixon Park site in 2017 with 4-5 specimens of the target species collected in soil under leaf litter on each occasion. The number soon began to accumulate but, remarkably, only female (or immature) specimens continued to be seen. Not until 2 November 2017 were male specimens finally recovered. Two were found with a single large, dark female measuring 26 mm in length. A male was dissected and the gonopods compared with illustrations of the various species listed above. The best match was, as expected, with *C. apenninorum*. However, Brölemann's drawing of the gonopods (in Barber & Read, 2016; Fig. 2 here) corresponds only roughly with the gonopod profile of the Belfast material. An edited photomicrograph of the left gonopods of an Irish specimen, in mesial profile is shown here (Fig. 1).

In particular the opisthomerite appears narrow and hooked with only translucent (thin) tissues connecting the apex to the rest of the organ (Fig. 1). This appears at odds with the solid oval outline in Brölemann's drawing (Fig. 2).

The difference is likely to be a result of viewing by transmitted light in the present instance compared to viewing by incident light. The two figures, in scale and outline, otherwise correspond well and confirm the identify of the Belfast *Cylindroiulus* as *apenninorum*.

The issue of size and colouration and the apparent absence of males can also be accommodated easily. All specimens collected before November 2017 appear to have been immature. But why were no mature animals found before this date? Possibly the colony was only becoming established during this period, when the (more mature) founder colonists were few and therefore easily overlooked.

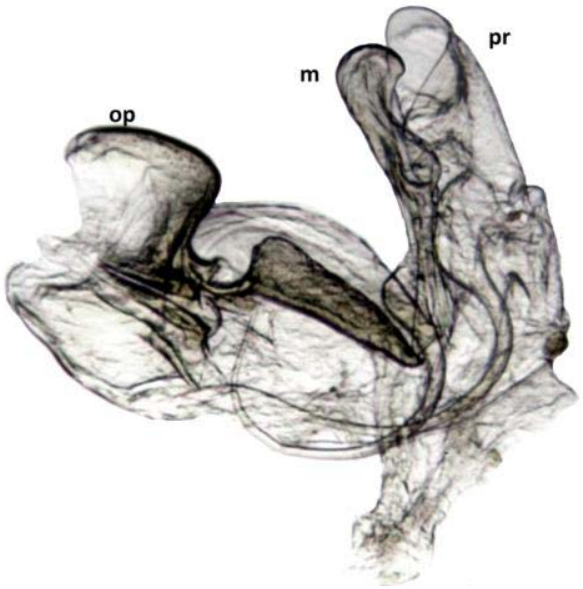

FIGURE 1: Left gonopods of *Cylindroiulus apenninorum*, from Belfast
(digested in 10% KOH, cleared in euparal), external mesial view (head end to left).
Key: op - opisthomerite; m - mesomerite; pr – Promerite

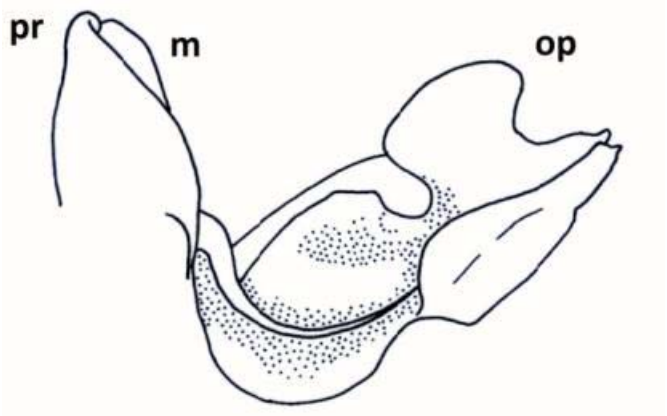

FIGURE 2: Right gonopods of *Cylindroiulus apenninorum* internal view (head end to right)
after Brölemann (1897)

THE HABITAT AND ASSOCIATED INVERTEBRATES

The area around the Parks Dept. tip is on the flood plain of the River Lagan. Soils are Lagan Valley Clay, formed during the immediate Postglacial within a glacial lake, and despite their name, quite sandy, well-drained. Composted and uncomposted wood, plant and soil material is steadily pushed down on to the flood plain from the tip to where *C. apenninorum* was found. Most specimens were found under large stones or wood but also in soil under leaf litter of sycamore and lime. A good range

of mainly disturbed ground species were recorded in this habitat:

Arcitalitrus dorrieni (Hunt) (Amphipoda); *Anamastigona pulchella* (Silvestri)*; Choneiulus palmatus* (Němec)*, Chordeuma proximum* Ribaut*; Cylindroiulus britannicus* (Verhoeff)*; Cylindroiulus punctatus* (Leach)*; Glomeris marginata* (Villers)*; Leptoiulus belgicus* (Latzel)*; Ommatoiulus sabulosus* (L.)*; Ophyiulus pilosus* (Newport)*; Polydesmus asthenestatus* Pocock*; Tachypodoiulus niger* (Leach). Among the Isopoda *Porcellionides pruinosus* (Brandt) was common and this is one of the very few Irish sites at which it has recently been recorded. Also found were *Haplothalmus mengii* (Zaddach) and *H. danicus* Budde-Lund.

SUMMARY

Despite repeated collections for this study, the colony at Dixon Park appears resilient and the same sort of numbers/density have been observed in all seasons. However, no specimens have so far been found more than 4-5 m from the tip edge. The species is therefore not expanding into neighbouring woodland or riverine marsh. Some continued reliance on the warmth and shelter provided by the tip is suggested.

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NEW RECORDS OF *HENIA (CHAETECHELYNE) DUBOSCQUI* (VERHOEFF, 1943) AND OF OTHER CENTIPEDES FROM CORSICA (CHILOPODA) TOGETHER WITH SOME NOTES ON THE FRENCH SPECIES OF *HENIA*

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ABSTRACT

Examination of centipedes collected in Corsica allowed us to identify a female and a male of *Henia (Chaetechelyne) duboscqui* (Verhoeff, 1943) from two new localities of this island (Vizzavona, Haute-Corse department; Bocognano, Corse-du-Sud department). Following its original description this endemic species had not been found subsequently up until now. Its main determining characters are detailed and are illustrated by magnified pictures and its validity is confirmed. The other French species of the genus *Henia* C. L. Koch, 1847 are briefly described and *H. (Pseudochaetechelyne) brevis* (Silvestri, 1896) is added from the Ardèche department, in Berrias-et-Casteljau. Other new data on centipedes of Corsica are included as well as the finding of the endemic *Lithobius (Lithobius) raffaldii* Iorio, 2009 in two new caves in Sorio and in Lano (Haute-Corse).

KEYWORDS: Lithobiomorpha, Scolopendromorpha, Geophilomorpha, France, Corsica, distribution, morphology.

RÉSUMÉ

Un examen de chilopodes récoltés en Corse nous a permis d'identifier *Henia (Chaetechelyne) duboscqui* (Verhoeff, 1943) dans deux nouvelles stations sur l'île (Vizzavona, Haute-Corse; Bocognano, Corse-du-Sud). Jusqu'à ce jour, cette espèce endémique n'avait jamais été retrouvée depuis sa description originale. Ses principaux caractères déterminants sont détaillés et illustrés, et sa validité est confirmée. Les autres espèces françaises du genre *Henia* C. L. Koch, 1847 sont brièvement présentées. *H. (Pseudochaetechelyne) brevis* (Silvestri, 1896) est citée pour la première fois en Ardèche, à Berrias-et-Casteljau. Plusieurs autres données nouvelles sur les chilopodes de Corse sont incluses, comme la trouvaille de l'endémique *Lithobius (Lithobius) raffaldii* Iorio, 2009 dans deux grottes situées à Sorio et à Lano (Haute-Corse).

INTRODUCTION

Henia (Chaetechelyne) duboscqui (Verhoeff, 1943) (Geophilomorpha, Dignathodontidae) is a poorly known species endemic to Corsica, not seen since the original description of Verhoeff (1943) based on one adult male only. In the nineteen-eighties Minelli (1982) had doubts about its distinction from *H. (C.) vesuviana* (Newport, 1845) and *H. (C.) duboscqui* has been considered as a possible junior synonym of the same subsequently (Geoffroy & Iorio, 2009; Vadell & Pons 2009; Zapparoli & Iorio, 2012). However Bonato & Minelli (2014) have provisionally maintained it as a valid species because of its lower number of leg-bearing segments, even if it needed further comparison with *H. (C.) montana* (Meinert, 1870). We have adopted Bonato & Minelli's position and also recognized *H. (C.) duboscqui* as valid in our catalogue of French centipedes (Iorio, 2014). The genus *Henia* C. L. Koch, 1847 (*sensu lato*) thus include five species in France (Iorio, 2014): *H. (C.) duboscqui*, *H. (C.) montana*, *H. (C.)*

vesuviana, *H. (Meinertia) bicarinata* (Meinert, 1870) and *H. (Pseudochaetechelyne) brevis* (Silvestri, 1896).

During recent years several entomologist colleagues, including the second author, have collected centipedes in Corsica for the first author. Amongst these the latter has identified both a female and a male of *H. (C.) duboscqui*. We give here details on this discovery as well as a brief account of French species of the genus *Henia* C. L. Koch, 1847. We also include other new data on Corsican centipedes after Zapparoli & Iorio (2012) and Iorio (2014).

MATERIAL AND METHODS

Our personal collection of *Henia* specimens as well as other Chilopoda is preserved in 70% ethanol in our office in the city of Rougé (Loire-Atlantique department, France). In other materials from Corsica, we have reviewed some of our numerous *H. (C.) vesuviana* specimens and taken into account our recent identifications of *H. (M.) bicarinata* and *H. (P.) brevis* in Southern France (data on the second unpublished until now). We have also carefully reviewed the literature, particularly that which describes species of the subgenus *Chaetechelyne* Meinert, 1870 (Meinert, 1870; Latzel, 1880; Verhoeff, 1928, 1943; Attems, 1929, 1947; Brolemann, 1930; Eason, 1964; Minelli, 1982; Koren, 1986; Spelda, 1999; Barber, 2009; Iorio & Labroche, 2015), with a special attention to *H. (C.) montana*.

Other new centipedes identified from Corsica are included in a separate section and are also preserved in 70% ethanol in our collection as above. In further material examined and held by the first author, the second author has also identified some specimens from Corsica and kept them at his house.

All the magnified pictures have been taken with a digital camera on a trinocular lens (7x to 50x) and stacking of several photographs with the « Combine ZP » software.

Abbreviations used: LBS = leg-bearing segment(s); ind. = individual(s).

RESULTS

Henia (Chaetechelyne) duboscqui

The examined specimens of *H. (C.) duboscqui*, a female and a male, respectively come from: Vizzavona (municipality of Vivario, Haute-Corse department in Corsica) at an altitude of 1100 m in the forest of Vizzavona; under mossy stones in a beech forest with some pines, 16.X.2015, leg. C. Quindroit, det. E. Iorio; Bocognano (Corse-du-Sud department), Monte Renoso, beech forest at 1200 m, 17.XI.1967, leg. P. Beron, det. E. Iorio. These are only the second and third locations where the species has been found; the first (type locality) being San Petrone, a mountain in the territory of the city of Nocario (Haute-Corse department) (= "S. Pedrone" after Verhoeff, 1943).

We summarise below the main distinguishing features of our female and male of *H. (C.) duboscqui* mainly in comparison with *H. (C.) montana*:

The colour of the body of the female *H. (C.) duboscqui* is mainly pale yellowish, with some darker zones but these darker areas do not create stripes as in *H. (C.) vesuviana*. The male is pale yellowish without darker zones (but it has been in 70° ethanol for 50 years). The body-length of the female reaches 26 mm without the antennae and legs and it has 53 LBS; the male reach 19,3 mm and has 51 LBS. It is notable that *H. (C.) montana* is quoted as having 55 to 59 LBS in males and 57 to 61 LBS in females by Meinert (1870) and Latzel (1880) and 55 to 61 LBS by Verhoeff (1928) under the name *Chaetechelyne vesuviana pharyngealis* Verhoeff, 1928, a junior synonym of *H. (C.) montana* according to Bonato & Minelli (2014). If we look at Verhoeff's (1943) account, *C. vesuviana pharyngealis* has 55

to 65 LBS, possibly because Verhoeff had examined new individuals and better knew the precise variability. Thus it seems reasonable to assume that *H. (C.) montana* could have 55 to 65 LBS. *H. (C.) duboscqui* is far from well known for this characteristic but in a case with less than 55 LBS, it could perhaps be of use.

The pore-area of the sternite of the first LBS of *H. (C.) duboscqui* is well rounded as described by Verhoeff (1943) (Fig. 1). Beginning with the second LBS, the pore-area of the sternite is longitudinally oval. Its length increases a little in the following several sternites to reach approximately twice its width at maximum (or even 2.25 times on some rare sternites as on the 15th of the female) (Fig. 2). With the exception of the first sternite, including those of the posterior half of the trunk, the pore-areas are always oval. Even the penultimate LBS has an oval pore-area on its sternite (the length of the pore-area reaching approximately 1.75 times its width). Thus the pore-areas of the sternites of the trunk are different from those in *H. (C.) montana*: in this latter, these pore-areas are also oval on the sternites of the anterior part of the trunk, but have a square shape with rounded angles on the sternites of the posterior half (Latzel, 1880; Attems, 1929; Verhoeff, 1943). According to Verhoeff (1928), the oval shape of the pore-areas of *H. (C.) montana* (= *C. vesuviana pharyngealis*) can end after the sternite of the 10th LBS; after this the pore-areas are round.

The last LBS has the usual small cavity containing several pores on each coxa (these pores being more or less hidden without manipulation), a typical characteristic of *Henia*. In addition *H. (C.) duboscqui* has one isolated posterior pore as described by Verhoeff (1943). This pore is large and easy to see with a magnification of 50 times or even less (Fig. 5). *H. (C.) montana* does not have this isolated pore according to Attems (1929) and Verhoeff (1943). As quoted by Verhoeff (1943), *H. (C.) duboscqui* has a pair of anal pores, but these pores are small and difficult to see even with a 100 times magnification (we have seen this feature with difficulty; it is better with a 400 times magnification).

The last pair of legs are thickened in the female *H. (C.) duboscqui* (Fig. 5), a useful criterion in addition to those already described: the last pair of legs of the female of *H. (C.) montana* being thin according to Latzel (1880). Apical claws of last legs are present but are very reduced, almost insignificant and only visible with a high magnification (at least 100 times). The male has the same features, but the last legs are a little thicker than in the female.

THE OTHER SPECIES OF *HENIA* (*SENSU LATO*) EXISTING IN FRANCE

Our recent examination of centipedes from various French localities gives some interesting recent data on this genus which updates our catalogue of French centipedes (Iorio, 2014). We include below a brief account.

Henia (Chaetechelyne) montana

Amongst French species, *H. (C.) montana* is the only one which has not been found for a long time and which involves one record formally recognized as valid by Iorio (2014): the quotation of two specimens in La Salle (Hautes-Alpes department) by Geoffroy (1981). Its main identifying characteristics are detailed above. A record by Léger & Duboscq (1903) from Vizzavona in Corsica is considered as doubtful by Iorio (2014). It seems possible that the "*H. (C.) montana*" of Léger & Duboscq corresponds in fact to *H. (C.) duboscqui*, not described in 1903; and our finding of *H. (C.) duboscqui* in Vizzavona adds credibility to this hypothesis.

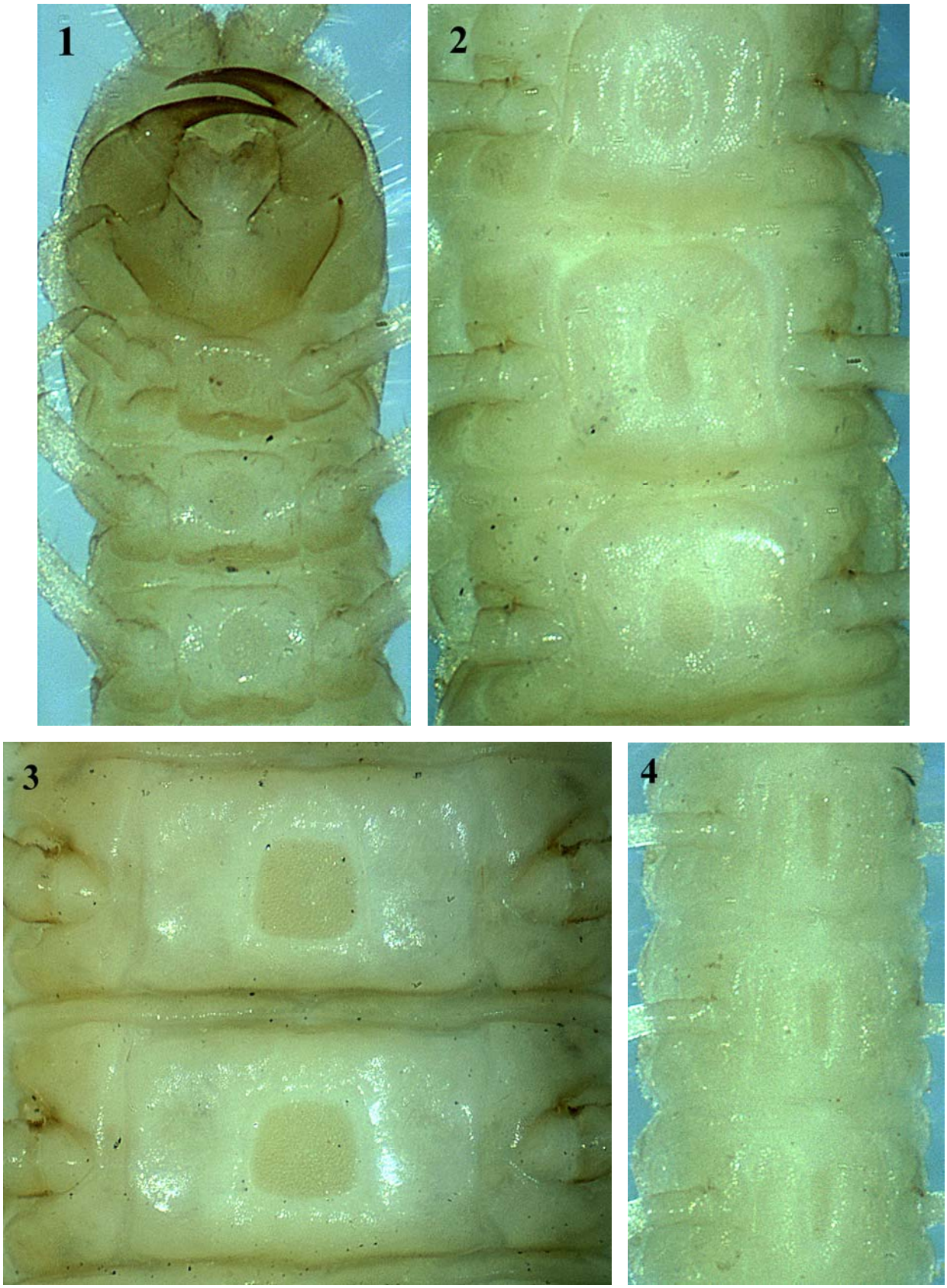


FIGURE 1: Ventral view of the head, forcipules and sternites of the three first LBS of *Henia duboscqui*. **FIGURE 2** : Sternites of the 14th to 16th LBS of *H. duboscqui*. **FIGURE 3**: Sternites of the 14th and 15th LBS of *H. vesuviana*. **FIGURE 4**: Sternites of the 11th to 14th LBS of *H. brevis*. Pictures by E. Iorio of a *H. duboscqui* from Vizzavona (Haute-Corse department), of a *H. vesuviana* from île d'Hoedic (Morbihan department) and of a *H. brevis* from Païolive (Ardèche department) (France).

Henia (Chaetechelyne) vesuviana

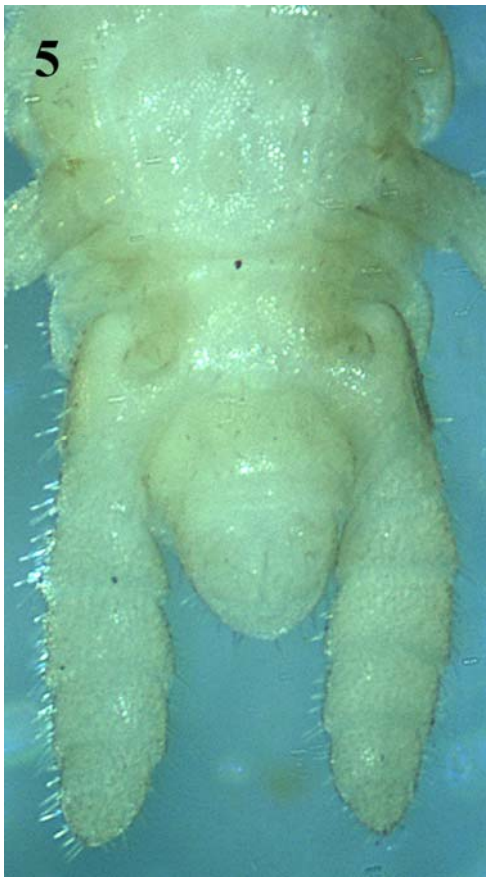
In United Kingdom, this species is restricted to the southern half of England and to the eastern coast of Ireland (Barber, pers. comm.), but it is well known and by far the most common and widely distributed of the genus in France (Iorio, 2014; Iorio (coord.), 2017). This is also the case in Corsica where Iorio (2014) synthesizes several historic and recent sets of data, and where we have again identified several specimens from Lavezzi (Corse-du-Sud), Ile Piana (island), 4.XI.2014, leg. P. Ponel, det. E. Iorio: 2 ♂; Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 2 ♂, 2 ♀; Morosaglia (Haute-Corse), Monte San Petrone, forest of San Pietro d'Accia, elevation 1085 m, beech forest with stony soil and dense leaf litter, IX.2015, N42°25'12.7", E9°19'21.6", leg. C. Courtial, det. E. Iorio: 1 ♀; Partinello (Corse-du-Sud), X.2015, leg./det. C. Quindroit: 2 ind. Its morphology and identification are well detailed in recent monographs (Barber, 2009; Iorio & Labroche, 2015). With regards to *H. (C.) duboscqui*, *H. (C.) montana* and *H. (P.) brevis*, the most easily observable characters are the number of LBS (63 to 79) and the appearance of the pore-areas on the sternites of the trunk: these have an approximately square shape, as long as wide or even very slightly wider than long (Fig. 3). The angles can be more or less rounded. Also see Iorio & Labroche (2015: p. 73).

Henia (Meinertia) bicarinata

Until very recently, there was very little recent data on this taxon in France; in the synthesis of Iorio (2014), only data from Corsica is recent; this coming from Zapparoli & Iorio (2012) based on a specimen found during 1997 in Serriera (Corse-du-Sud department). There is also another reference to *H. (M.) bicarinata,* left out of our French catalogue, from Mauriès & Duy-Jacquemin (2001) who discovered one specimen in Porquerolles island (Var department) during 1994. However, Iorio & Noël (2017) have identified several individuals of *H. (M.) bicarinata* on the seashore of the Port-Cros National Park (Var department) and also from Sainte-Marguerite island (Alpes-Maritimes department) during autumn 2015. This species is considered as halophilic but not strictly halobiontic (Iorio, 2014; Iorio & Noël, 2017) since whilst frequently living on seashores it is also observed far from this littoral habitat. With its last pair of legs with 5 articles (not counting coxae) instead of 6 and the particular shape of its pore-areas, this species is easy to recognize compared with other French species of *Henia*. With the exception of *H. (C.) vesuviana*, it also has more legs than the other taxa: 67 to 85 LBS after Brolemann (1930).

Henia (Pseudochaetechelyne) brevis

It is less the case in United Kingdom where this species is known from fairly numerous synanthropic sites of southern England and Ireland (Barber, pers. comm.), but in France, it seems to be very rare. It was only known in three French departments according to Iorio (2014): Corse-du-Sud and Haute-Corse from which there is recent data and Alpes-Maritimes. From a further location, we identified a year ago a male of *H. (P.) brevis* collected by H.-P. Aberlenc and from the Païolive forest, Montchamp in Berrias-et-Casteljau (Ardèche department) in Southern France. This has 53 LBS and the very typical pore-areas of this taxon (Fig. 4): these latter are oblong, very elongated longitudinally, more than three times longer than wide (up to approximately four times longer than wide in our specimen). The shape of these pore-areas make this species very distinctive compared with other French *Henia* species. On the subject of the number of legs, Verhoeff (1898), Attems (1929, 1947) and Brolemann (1930) respectively quoted 45 to 47 LBS for this taxon under the name of *Chaetechelyne montana oblongocribellata* Verhoeff, 1898, a junior synonym of *H. (P.) brevis* (Iorio, 2014). Verhoeff (1943) had quoted 43 to 47 LBS.



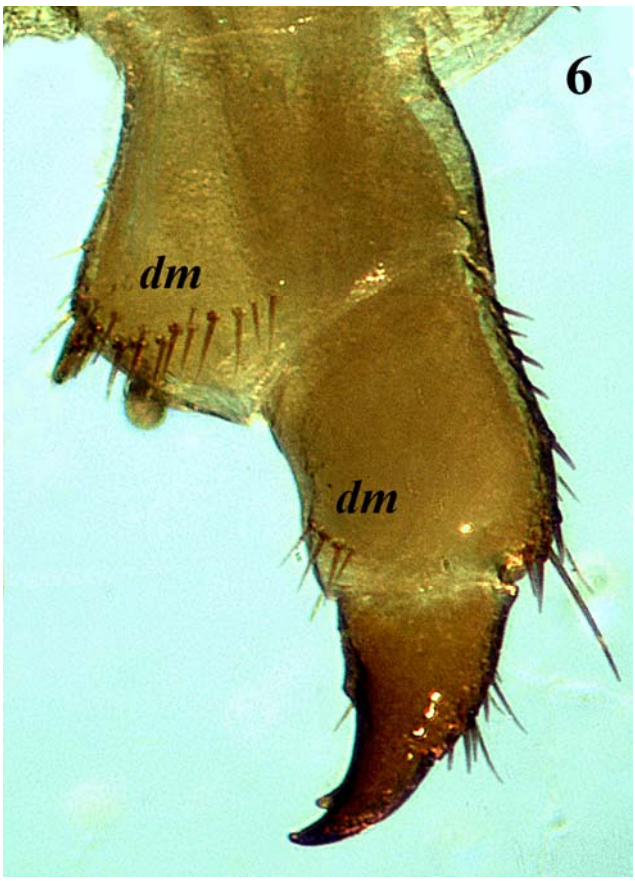


FIGURE 5: Last LBS and legs of *Henia duboscqui*, ventral view. **FIGURE 6**: Right female gonopod of *Lithobius raffaldii*, dorsal view; *dm* = dorsomedial setae. **FIGURE 7**: Head and forcipules of *L. raffaldii*, ventral view. Pictures by E. Iorio of a *H. duboscqui* from Vizzavona and of two *L. raffaldii* from Sorio.

In UK, Eason (1964) quoted 55 LBS for the male and Barber (2009) 53 to 57 without sex distinction. In Germany, Spelda (1999) records 45 LBS for males and 47 to 49 females for its specimens. In Sardinia, Zapparoli (2009) observed 49 to 59 LBS (the maximum in a female; he, however, says that "specimens with 55-59 leg pairs are tentatively assigned to this species"). From France, Zapparoli & Iorio (2012) found two males of 15 and 18 mm each with 51 LBS in Corsica. Minelli (1982) has had doubts about the UK specimens in relation to the previous known numbers of LBS in Italy and France (43 to 47), but with regards to the various specimens discovered in Western Europe including these countries, it seems very possible that the true amplitude of variation of the number of LBS is fairly wide and of 43 to 59 LBS for *H. (P.) brevis*; possibly we cannot exclude a "species-group" under this name. Barber (2009) said that, based on a personal communication from Koen Lock, Belgian specimens quoted by Lock (2009) under "*Henia montana*" are similar to the British ones in the aspect of having more legs than the "old" variability of 43-47, but are similar in other respects to Verhoeff's "*oblongocribellata*". Thus the description of Lock (2009) very probably refers to *H. (P.) brevis*, but unfortunately, he gave few details about his observations.

NEW CORSICAN DATA ON OTHER CENTIPEDES

Scutigeromorpha
Scutigeridae

Scutigera coleoptrata (Linnaeus, 1758): Cap Corse (Haute-Corse), Grotte des Archéologues (cave), 21.X.2015, leg. J. Raffaldi, det. E. Iorio: 1 ind.

Lithobiomorpha
Lithobiidae

Eupolybothrus nudicornis (Gervais, 1837): Zonza (Corse-du-Sud), vallée du Cavio, 22.V.2008, leg. S. Danflous, det. E. Iorio: 1 ♂, 1 ♀.

Lithobius (Lithobius) aidonensis Verhoeff, 1943: Lano (Haute-Corse), grotte de Cherpinède (cave), 2015, leg. J. Raffaldi, det. E. Iorio: 2 ♀ (of which 1 immature). Pietracorbara (Haute-Corse), sieving in faults, VII.2017, leg. J. Raffaldi, det. E. Iorio: 1 subadult ♀.

Comments: all these specimens fit well with the morphological details given by Iorio (2010). A large female has no dorsal spines on prefemora of the 1st to 6th pair of legs, but DmP spine begin on 7th femorae in this female. The other specimens have no dorsal spines on prefemora until the 9th legpair (included). With the other determining characters of this species, its plectrotaxy is still a useful criterion, even with the rare beginning of DmP on 7th legpair instead of 9th (Iorio, 2010).

Lithobius (Lithobius) blanchardi Léger & Duboscq, 1903: Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 3 ♀.

Lithobius (Lithobius) castaneus Newport, 1844: Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 1 ♀. Morosaglia (Haute-Corse), Monte San Petrone, forest of San Pietro d'Accia, elevation 1085 m, beech forest with stony soil and dense leaf litter, IX.2015, N42°25'12.7", E9°19'21.6", leg. C. Courtial, det. E. Iorio: 2 ♀. Vivario (Haute-Corse), Vizzavona, elevation 1100 m, forest of Vizzavona, 16.X.2015, leg./det. C. Quindroit: 5 ind. Lano (Haute-Corse), grotte de Cherpinède (cave), 2015, leg. J. Raffaldi, det. E. Iorio: 1 ♂. Baragogna (Haute-Corse, Morsiglia municipality), chestnut forest, trap, 2016-2017, leg. J. Raffaldi, det. E. Iorio: 3 ♂, 3 ♀.

Lithobius (Lithobius) lapidicola Meinert, 1872: Corte (Haute-Corse), Lac de Nino, elevation 1753 m, mountainous scrubland with *Genista salzmannii* and grass near the lake, IX.2015, N42°15'23.1", E8°56'15.3", leg. C. Courtial, det. E. Iorio: 1 ♀. Morosaglia (Haute-Corse), Monte San Petrone, forest of San Pietro d'Accia, elevation 1085 m, beech forest with stony soil and dense leaf litter, IX.2015, N42°25'12.7", E9°19'21.6", leg. C. Courtial, det. E. Iorio: 1 ♂, 3 ♀.

Lithobius (Lithobius) nodulipes Latzel, 1880: Baragogna (Haute-Corse, Morsiglia municipality), chestnut forest, trap, 2016-2017, leg. J. Raffaldi, det. E. Iorio: 1 ♀.

Comments: this is the fourth Corsican locality where this rare species is found. The found female is badly preserved (many legs lacking; watered down coloration because of the trap) but is tentatively assigned to this species, because the tergal criteria fit well with those described in Iorio (2010) and the 2 + 2 teeth on the forcipular coxosternite are in the same level and well spaced one from each other, with a moderately deep median notch (Fig. 10). These particularities are underlined by several authors (Matic, 1966; Koren, 1992; Iorio, 2010). Remember that the poorly known Corsican *L. (L.) brandensis* Verhoeff, 1943 has perhaps a close link with *L. (L.) nodulipes* (Zapparoli & Iorio, 2012; Iorio, 2014).

Lithobius (Lithobius) pilicornis Newport, 1844: Zonza (Corse-du-Sud), vallée du Cavio, 22.V.2008, leg. S. Danflous, det. E. Iorio: 2 ♀.

Lithobius (Lithobius) raffaldii Iorio, 2009: Lano (Haute-Corse), grotte de Cherpinède (cave), 2013, leg. J. Raffaldi, det. E. Iorio: 1 immature ♀. *Idem*, 2015: 1 subadult ♀. Sorio (Haute-Corse), Grotte de Gudrone (cave), 2013, leg. J. Raffaldi, det. E. Iorio: 2 ♂ (of which 1 immature), 2 ♀ (of which one immature).

Comments: these are the third and fourth caves in which this Corsican cavernicolous endemic has been found. Lano is located near an already known cave site, but the cave of Gudrone is located between the two other known locations (Iorio, 2014). The adult specimens of Sorio fully agree with the known morphology of this species (Iorio, 2009, 2010) and also give some further data: the body-length of the biggest, a male, reaches 34 mm and the length of its 15th legs reach 22.1 mm, hence still approximately two thirds of body-length. The 15th tibia and tarsus 1 each reach 5.6 and 6 mm respectively. The female is 24 mm but its 15th legs are lacking. Both adults have 7 + 7 and 7 + 6 forcipular teeth respectively (previously known numbers: 5 + 6, 6 + 5, 6 + 6) and, as previously described, (Iorio, 2010), elongated forcipules (Fig. 7). The interesting character of the tergite projections of *L. (L.) raffaldii* are also well developed here: as well as those of the 9th, 11th and 13th tergites, clear acute projections on 7th tergite are seen in all specimens including immatures (Fig. 9). Two specimens even have very small projections on the 6th tergite. Spine VpF occurs on the 15th legs of the male and confirms that the ventral plectrotaxy of 15th legs is: --, m, amp, am(p), am- (Iorio, 2010). The male has the distinctive cover of very numerous short setae on the sternites and coxae of four last LBS (Fig. 8). The female gonopods have here 13-14 dorsomedial setae on the 1st articles and 3 dorsomedial ones on the 2nd. This complements the known variation of the dorsomedial setae of Iorio (2010): 13 to 19 dorsomedial setae on the 1st article and 3 or 4 dorsomedial setae on the 2nd (Fig. 6).

Amongst the Lithobiomorpha, there is also a mysterious but unfortunately badly preserved specimen without the 15th leg-pair of *Eupolybothrus* Verhoeff, 1907 collected from Cap Corse (Haute-Corse), Grotte des Archéologues (cave), 21.X.2015, leg. J. Raffaldi. It has 68 articles on each antenna and 8 + 8 forcipular teeth, 15 ocelli, a small Tömösvary's organ, triangular projections on 6th, 7th, 9th, 11th and 13th tergites and a VaC spine on 15th legs.

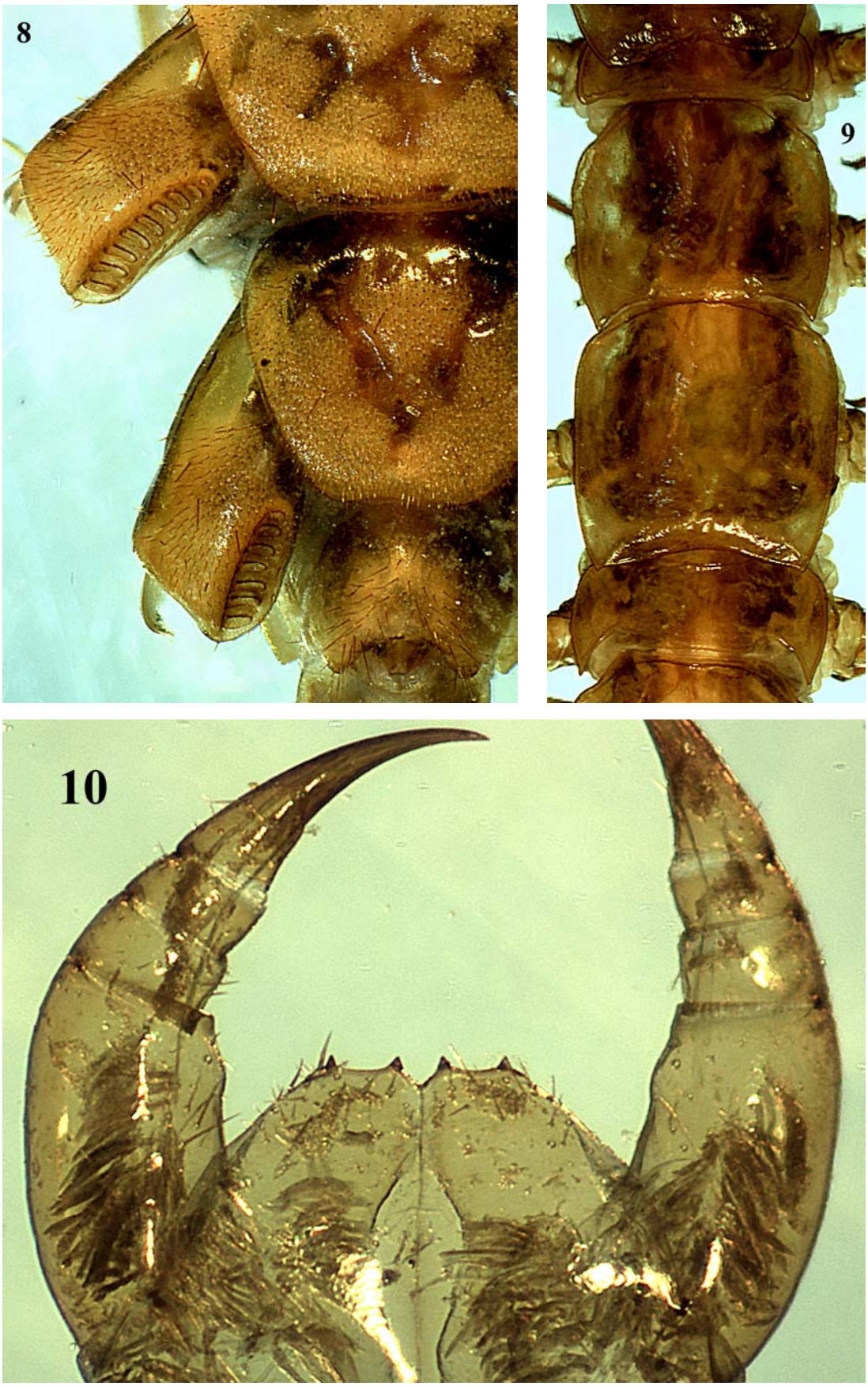


FIGURE 8: Partial ventral view of two last LBS and of genital segment of a male *L. raffaldii*. **FIGURE 9**: Tergites from 6th to 9th LBS of *L. raffaldii*. **FIGURE 10**: Forcipules of *L. nodulipes*, ventral view. Pictures taken by E. Iorio of a *L. raffaldii* from Sorio and of *L. nodulipes* from Baragogna.

Scolopendromorpha

Cryptopidae

Cryptops hortensis (Donovan, 1810): Morosaglia (Haute-Corse), Monte San Petrone, forest of San Pietro d'Accia, elevation 1085 m, beech forest with stony soil and dense leaf litter, IX.2015, N42°25'12.7", E9°19'21.6", leg. C. Courtial, det. E. Iorio: 2 ind.

Cryptops trisulcatus Brölemann, 1902: Zonza (Corse-du-Sud), vallée du Cavio, 22.V.2008, leg. S. Danflous, det. E. Iorio: 1 ind. Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 1 ind. Partinello (Corse-du-Sud), X.2015, leg./det. C. Quindroit: 1 ind.

Scolopendridae

Scolopendra oraniensis Lucas, 1846: Zonza (Corse-du-Sud), vallée du Cavio, 22.V.2008, leg. S. Danflous, det. E. Iorio: 1 ind. Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 2 ind. Lavezzi (Corse-du-Sud), Ile de Cavallo (island), 6.XI.2014, leg. P. Ponel, det. E. Iorio: 1 ex. Partinello (Corse-du-Sud), X.2015, leg./det. C. Quindroit: 1 ind.

Geophilomorpha

Himantariidae

Stigmatogaster gracilis (Meinert, 1870): Moltifao (Haute-Corse), elevation 258 m, grazed and disturbed scrubland, IX.2015, N42°28'49.4", E9°9'2.2", leg. C. Courtial, det. E. Iorio: 1 ♀. Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 2 ♂. Ocana (Corse-du-Sud), 13.XI.1967, leg. P. Beron, det. E. Iorio: 2 ♂.

Schendylidae

Schendyla vizzavonae Léger & Duboscq, 1903: Morosaglia (Haute-Corse), Monte San Petrone, forest of San Pietro d'Accia, elevation 1085 m, beech forest with stony soil and dense leaf litter, IX.2015, N42°25'12.7", E9°19'21.6", leg. C. Courtial, det. E. Iorio: 1 ♂, 1 ♀. Pie d'Orezza (Haute-Corse), beech forest, minimum elevation 800 m, leg. J. Raffaldi, det. E. Iorio: 1 ♂, 3 ♀. Vivario (Haute-Corse), Vizzavona, elevation 1100 m, 17.XI.1967, leg. P. Beron, det. E. Iorio: 1 ♀. Bastelica (Corse-du-Sud), Monte Renoso, oak forest, elevation 1200 m, 14.XI.1967, leg. P. Beron, det. E. Iorio: 1 ♂. Vivario (Haute-Corse), Vizzavona, elevation 1100 m, forest of Vizzavona, 16.X.2015, leg./det. C. Quindroit: 10 ind.

Geophilidae

Geophilus carpophagus Leach, 1815: Ghisoni (Haute-Corse), Col de Sorba, elevation 1311 m, forest of *Pinus nigra corsicana*, with rocks, stones and a dense cover of pine litter, IX.2015, N42°8'40.3", E9°11'27.0", leg. C. Courtial, det. E. Iorio: 1 ♀ with 59 LBS.

Pachymerium ferrugineum (C. L. Koch, 1835): Lavezzi (Corse-du-Sud), Ile Piana (island), 4.XI.2014, leg. P. Ponel, det. E. Iorio: 1 ♀. Lavezzi (Corse-du-Sud), Ile de Cavallo (island), 6.XI.2014, leg. P. Ponel, det. E. Iorio: 1 ♀.

Stenotaenia linearis (C. L. Koch, 1835): Nonza (Haute-Corse), 26.XI.1967, leg. P. Beron, det. E. Iorio:

1 ♀. Palasca (Haute-Corse), Plage d'Ostriconi (beach), 26.XI.1967, leg. P. Beron, det. E. Iorio: 1 ♂, 1 ♀.

Comments: male has 63 LBS, both females have 65 LBS.

SHORT DISCUSSION AND CONCLUSION

It was very interesting to find *Henia (Chaetechelyne) duboscqui* in two new places in Corsica. Firstly, this species had never been seen again since Verhoeff's original description and the adult female was unknown until now. Despite the validity provisionally admitted by Bonato & Minelli (2014), these authors also written that "its possible identity with *H. montana* remains to be evaluated". The characters described above show clearly that *H. (C.) duboscqui* is a different species from *H. (C.) montana*: as underlined by Verhoeff (1943), the pore-areas of the sternites of the trunk (particularly of the posterior half), the presence or absence of the isolated pore on last coxae as well as the presence or absence of anal pores are good distinguishing criteria between the two taxa. Also, in other characters, the degree of swelling of the female last legs seems to be a good character as well: thick in *H. (C.) duboscqui* female, thinner in *H. (C.) montana* female. The number of LBS is possibly different at least for the extreme amplitudes but it needs examination of many individuals to determine this with certainty.

Secondly, *H. (C.) duboscqui*, is endemic to Corsica in France and possibly only present in mountainous sectors of this island because the three known locations are from more than 1000 m in altitude (1100 and 1200 m in our case, 1600 m in Verhoeff's): hence this species seems to only exist in a very reduced area. These elements suggest high conservation importance for *H. (C.) duboscqui*.

In addition, the troglobitic *Lithobius (Lithobius) raffaldii*, found in two new caves, has already been considered as "sensitive species" by Iorio (2014) and the new discoveries refine its distribution, which is still limited to the Northern third of Corsica. One of these new caves is the "grotte de Cherpinède", in which the most localized endemic of Corsica occurs: *L. (L.) cherpinedensis* Iorio, 2010. Thus this cave is of great interest for its centipedes.

It would be interesting to find more specimens of *H. (C.) duboscqui* in other Corsican locations as well as to continue research on centipedes in this island with the aim of better determining the distribution of the different species, their ecological requirements and in the case of *H. (C.) duboscqui*, to improve our knowledge as to the number of LBS. We also cannot exclude the possibility that new taxa for science could be discovered in the future, particularly in caves. The finding of the rare *H. (P.) brevis* in Ardèche department must also encourage us to look for it elsewhere in continental France.

ACKNOWLEDGEMENTS

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REPORT ON THE BMIG FIELD MEETING AT HALTWHISTLE 2014

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INTRODUCTION

The 2014 BMIG field weekend, held from 24th to 27th April, was based at Saughy Rigg, half a mile north of Hadrian's Wall, near Haltwhistle in Northumberland but very close to the border with Cumbria to the west and Scotland to the north. The main aim of the meeting was to record in central areas of northern England (VC 66, 67 and 70) where few records existed previously but many attendees were drawn also to sites on the east coast of England (VC 66) and to the Scottish coast on the Solway Firth (VC 73). All these vice counties had been visited by BMG/BISG or BMIG in the previous twenty years but large parts of them remained under-recorded.

The annual joint field meeting of BMG and BISG in 1995 was held at Rowrah Hall near Whitehaven (VC 70). Gregory (1995) reports 24 millipede species found during the weekend including *Choneiulus palmatus* new to VC 70. A list of the centipede appears not to have been published. Bilton (1995) reports 14 woodlouse species including *Eluma caelata* found at Maryport, its most northerly global location, and *Armadillidium pictum* in the Borrowdale oakwoods. Most of the sites visited were in the western part of the county.

In 1997 BMG and BISG met at the Lochinvar Hotel, St Johns Town of Dalry (VC 73). Lee (1999) lists 17 millipedes including *Boreoiulus tenuis, Choneiulus palmatus, Macrosternodesmus palicola*, *Melogona scutellaris* and *Thalassisobates littoralis* all recorded new to VC 73. No list of centipedes was produced from the meeting. Gregory (1997) lists 11 woodlice reporting 'no spectacular finds' but comments that the coastal sites were the most interesting.

The penultimate annual meeting of BMG and BISG was held at Ford Castle, Northumberland (VC68) in 1999. Most of the sites visited during the weekend were further north in VC 68 and 81. Barber (2001) reports just four species of centipede from a single site in VC 67 while Lee (2006) gives no millipede records from VC 67. It seems that no list of woodlice was produced from the meeting.

BMIG was based at Collingwood College in Durham for the annual meeting in 2005. Lee (2006) reports 30 millipedes collected including *Geoglomeris subterranea* and *Poratia digitata* new to VC 66. Barber (2006) lists 14 species of centipede recorded and Standen & Gregory (2006) list 12 species of woodlouse.

There is a wealth of earlier published work on the centipedes and millipedes of Durham and Northumberland beginning with the work of Bagnall in the first half of the twentieth century (1912a, 1912b, 1913, 1918, 1922). Barber (1981, 1984) gives details of his own records from VC 66 and 67 made in 1976 and 1981. He also includes some unpublished records from Ted Eason, Des Kime and P.S. Davies. Jackson (1982) reported on centipedes, millipedes and woodlice from pitfall trap material collected by David Sheppard in Castle Eden Dene. He refers to his own records from VC 66 as well as

some records made by Val Standen. In comparison there is little published data on the woodlice of Durham and Northumberland or the centipedes, millipedes and woodlice of Cumbria or Dumfries and Galloway.

As a result of the combined efforts of the individuals and groups outlined above, prior to the BMIG meeting in 2014, the number of millipede species recorded from Durham (VC 66), South Northumberland (VC 67), Cumberland (VC 70) and Kirkcudbrightshire (VC 73) stood at 30, 26, 28 and 23 respectively (Table 1). For centipedes, ignoring the old and doubtful *Lithobius piceus brittannicus* and *Lithobius tenebrosus* and the hothouse *Dicellophilus carniolensis* but including the old records by Bagnall of *Strigamia crassipes*, *Strigamia acuminata* and *Stenotaenia linearis*, the numbers of species for the same vice-counties were 18, 17, 20 and 16 (data from Biological Records Centre, etc.). For woodlice, the numbers of species for the same vice-counties were 16, 6, 10 and 12, respectively (of a total of 17 species), including records for *Armadillidium album* (VC 70), *Armadillidium pulchellum* (VCs 66 & 73), *Trichoniscoides albidus* (VC 66) and *Trichoniscoides saeroeensis* (VC73).

TABLE 1: Summary of number of species of centipede, millipede and woodlice recorded prior to 2014 from VCs 66, 67, 70 & 73

	VC 66	**VC 67**	**VC 70**	**VC 73**
Centipedes	18	17	20	16
Millipedes	30	26	28	23
Woodlice	16	6	10	12

METHODS AND SITES

The meeting was less targeted than some of these in more recent years. No effort was made to undertake a systematic survey during the weekend. The approach adopted was more like the 'square bashing' of earlier years with members free to spend however long they liked wherever they chose to record. This resulted in almost fifty sites being visited, the majority in South Northumberland (VC 67) but a few were in Cumberland (VC 70) and single visits were made to the Southwick Coast in Kirkcudbrightshire (VC 73) and to Tow Law in Durham (VC 66). A specific visit to the Hunstanworth area was made by one group to, again, unsuccessfully, attempt to throw any further light on the enigmatic *Lithobius piceus britannicus* of R.S. Bagnall (1913).

A summary of the sites is shown in Table 2. Where recorders had reported records from what were considered sub-sites of a larger site, usually within a single monad (1x1km square) of the OS national grid, only the main site is listed for clarity.

Further details of the species records for each site are summarised in Tables 3-5.

CENTIPEDES

Out of a total number of 23 species of centipede previously recorded for the four vice-counties altogether, only 15 were collected during the meeting, a number that compares with the 13 collected by ADB in two summer visits to Durham, Northumberland and the Scottish Borders in 1976 and 1978 (Barber, 1981) and the 12 found during a fortnight's work based at Wooler in 1981 (Barber, 1984).

TABLE 2: List of sites visited. Recorders: ADB - Tony Barber; DS - Duncan Sivell; HJR - Helen Read; JPR - Paul Richards; KL - Keith Lugg; KC - Kevin Clements; MR - Mark Robinson; PL - Paul Lee; SJG - Steve Gregory; WA - Wallace Arthur.

Site code	Site name	Grid reference	VC	Date	Recorders
1	Southwick Coast	NX9155	73	26/04/2014	WA, SJG, DS
2	Southwick Coast	NX9156	73	26/04/2014	KL
3	Wreay Woods	NY4449	70	25/04/2014	SJG, KL, DS
4	Bewcastle, Townfoot	NY5578	70	27/04/2014	KC
5	Bewcastle	NY5675	70	27/04/2014	KC
6	Williamstone River Shingle SSSI	NY6851	67	25/04/2014	KC
7	Williamstone River Shingle SSSI	NY6852	67	25/04/2014	KC
8	Waterhead Plantation, Kingwater	NY6369	70	27/04/2014	KC
9	Robin's Rigg, Kingwater	NY6570	70	27/04/2014	KC
10	Spadeadam Forest, Kingwater	NY6671	70	27/04/2014	KC
11	Catches Rigg, Kingwater	NY6873	70	27/04/2014	KC
12	Kielder Water	NY6785	67	26/04/2014	JPR
13	Kielder Water	NY6490	67	26/04/2014	JPR
14	Haltwhistle	NY7166	67	25/04/2014	DS
15	Saughy Rigg	NY7368	67	24/04/2014	ADB, KL
16	Saughy Rigg	NY7468	67	24/04/2014	JPR
17	Steel Rigg	NY7567	67	26/04/2014	ADB, MR
18	Barcombe Grove	NY7765	67	25/04/2014	PL, HJR
19	Beltingham River Gravels SSSI	NY7864	67	25/04/2014	KC
20	East Crindledykes Quarry	NY7867	67	25/04/2014	PL, HJR
21	Allen Banks & Briarwood Banks	NY7962	67	25/04/2014	KC, DS
22	Scotchcoultard	NY7270	67	26/04/2014	PL, HJR
23	Outer Butt Hill	NY7575	67	26/04/2014	KC
24	Stonehaugh picnic site	NY7876	67	26/04/2014	KC
25	Falstone cemetery	NY7286	67	26/04/2014	JPR
26	Near church, Greystead	NY7685	67	26/04/2014	JPR
27	River North Tyne, Greystead	NY7786	67	26/04/2014	JPR
28	Pundershaw, Border Country Ride	NY7981	67	26/04/2014	KC
29	Allendale Town	NY8355	67	26/04/2014	ADB, MR
30	Allendale, Huntrods	NY8452	67	26/04/2014	ADB
31	Tony's Patch	NY8265	67	26/04/2014	ADB, PL, HJR, MR
32	Langley Wood	NY8361	67	26/04/2014	ADB, MR
33	Haydon Bridge	NY8464	67	26/04/2014	ADB
34	Whinny Hill, layby on B6319	NY8968	67	26/04/2014	KC
35	Houxty Burn valley	NY8279	67	26/04/2014	KC
36	Simonburn, layby on B6320	NY8873	67	26/04/2014	KC
37	Pundershaw, Border Country Ride	NY8080/ NY8180	67	26/04/2014	KC
38	Belingham churchyard	NY8383	67	26/04/2014	JPR
39	Hunstanworth Common	NY9447	67	26/04/2014	ADB
40	Hunstanworth churchyard	NY9449	67	26/04/2014	ADB, MR
41	Juliet's Wood	NY9758	67	26/04/2014	KC
42	Tow Law	NZ1336	66	24/04/2014	JPR
43	Priestclose Wood	NZ1062	67	25/04/2014	SJG, KL, JPR
44	Cresswell	NZ2893	67	25/04/2014	MR
45	Swallow Pond LNR	NZ3069	67	25/04/2014	ADB, MR
46	Cresswell Quarry	NZ3092	67	25/04/2014	MR
47	Seaton Delaval Hall	NZ3276	67	25/04/2014	ADB, SJG, KL, JPR, MR
48	Seaton Sluice	NZ3376/7	67	25/04/2014	SJG, KL, JPR

Similarly limited numbers of species, although not necessarily the same ones, have been found during BMG/BISG & BMIG field meetings. 11 species were reported from the 1999 meeting and 4 from the 2005 meeting (Barber, 2006). Of the 15 species reported in the present paper, all are here recorded from the vice county of South Northumberland (VC 67), 4 each from Cumberland (VC 70) and Kirkcudbrightshire (VC 73) and two from Co. Durham (VC 66). This is undoubtedly a reflection of the relatively limited centipede fauna of rural areas of northern England and southern Scotland compared with southern Britain. The highest number of species for any one location (9) was recorded from Site 47, Seaton Delaval Hall.

Certain species which have been recorded before in the general area include the parthenogenetic *Lithobius macilentus* whose occurrence is distinctly patchy and was found during the 2005 meeting, *Strigamia crassipes* and *S. acuminata* both recorded by Bagnall (1913), *Stenotaenia linearis* recorded from Hexham and Ryhope Dene by Bagnall (1935) and *Geophilus electricus* which E.H. Eason found in Peebles. Also Bagnall's *Dicellophilus carniolensis* (a mecistocephalid from a hothouse in Newcastle) and his *Lithobius tenebrosus* and *Lithobius piceus britannicus*, neither of which have been subsequently found in the area and whose status is unclear. It is almost certain that all earlier records of *Geophilus carpophagus* from rural inland sites are likely to refer to *Geophilus easoni* as recorded here.

Haplophilus subterraneus (4 records) is almost always synanthropic in northern Britain as is *Cryptops hortensis* (1 record). *Geophilus easoni* (3 records) is often characteristic of upland areas including moorland and woodland, *G. alpinus* (11 records) is a typical northern species although not restricted to there, *G. flavus* (10 records) and *Schendyla nemorensis* (2 records) are both widespread as is *Geophilus truncorum* (14 records) which is often found in moorland as well as sub-cortically and in litter in woodlands (14 records). *Lithobius forficatus* (15 records) is a large and commonly found species in many habitats whilst *L. crassipes* (8 records) is the common smaller lithobiid of the area. *L. borealis* (1 record) on the other hand, of comparable size to *L. crassipes*, seems to be commoner in western Britain. Both *L. melanops* (6 records) and *L. microps* (4 records) are often associated with human influenced and disturbed sites in the area. *L. calcaratus* (2 records) is usually associated with drier sites and can be a typical member of the fauna of moorland areas. *L. variegatus* (14 records) is restricted in its occurrence in eastern Britain including the present study area; its sometimes unpredictable occurrence is commented on by Barber (1981, 1984) and it was not recorded at all during the 1999 BMG/BISG meeting (Barber, 2001). *Strigamia maritima,* found at Cresswell Quarry is a common marine littoral species found around most of Britain and Ireland.

MILLIPEDES

During the 2014 meeting only a single site in Durham (VC 66) was visited. Collecting there produced just four common species none of which were new to the vice-county fauna. The large number of sites visited in South Northumberland (VC 67) was reflected by the fact of the 31species recorded over the weekend, 29 were recorded from at least one site in VC 67.

Furthermore, seven of these species, *Allajulus nitidus*, *Brachychaeteuma bagnalli*, *Chordeuma proximum*, *Cylindroiulus caeruleocinctus*, *Cylindroiulus truncorum, Cylindroiulus vulnerarius* and *Polydesmus coriaceus*, appear to be additions to the vice-county fauna. Two species, *Allajulus nitidus* and *Craspedosoma rawlinsii*, were added to the fauna of Cumberland (VC 70) and *Melogona gallica* was collected for the first time from Kirkcudbrightshire (VC 73).

TABLE 3: Summary of species of centipede recorded during the BMIG meeting in Northumberland.

Location:	**1**	**2**	**3**	**4**	**6**	**7**	**11**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**25**	**26**	**27**
Haplophilus subterraneus																				
Strigamia maritima																				
Schendyla nemorensis																	X			
Geophilus easoni								X	X							X				
Geophilus flavus										X		X		X				X		
Geophilus alpinus	X		X		X	X									X			X		
Geophilus truncorum	X	X					X			X		X	X		X				X	X
Cryptops hortensis																				
Lithobius borealis															X					
Lithobius calcaratus					X														X	
Lithobius crassipes				X	X										X					X
Lithobius forficatus	X		X		X			X				X	X	X						X
Lithobius melanops	X										X			X						
Lithobius microps															X					
Lithobius variegatus				X			X	X							X	X	X			
Location (cont.):	**28**	**29**	**30**	**31**	**32**	**33**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**45**	**46**	**47**	**48**	
Haplophilus subterraneus						X									X	X		X		
Strigamia maritima																	X			
Schendyla nemorensis															X			X		
Geophilus easoni																				
Geophilus flavus			X							X		X			X			X	X	
Geophilus alpinus		X											X		X	X		X		
Geophilus truncorum	X												X		X	X		X		
Cryptops hortensis																		X		
Lithobius borealis																				
Lithobius calcaratus																				
Lithobius crassipes					X		X				X		X							
Lithobius forficatus		X			X					X	X			X		X		X		
Lithobius melanops									X						X			X		
Lithobius microps				X										X				X		
Lithobius variegatus	X	X		X	X			X			X		X		X					

TABLE 4: Summary of species of millipede recorded during the BMIG meeting in Northumberland.

Location:	1	2	3	4	5	6	7	8	11	12	13	14	15	16	17	18	19	20	21	22	23
Glomeris marginata	X		X								X	X				X	X		X		
Brachychaeteuma bagnalli																					
Craspedosoma rawlinsii			X																		
Nanogona polydesmoides							X														
Chordeuma proximum																					
Melogona gallica/voigtii	X																				
Melogona scutellaris																X					
Brachydesmus superus	X	X	X										X	X		X		X	X		
Polydesmus angustus	X					X					X	X				X		X			X
Polydesmus coriaceus											X										
Polydesmus denticulatus																					
Macrosternodesmus palicola																X					
Ophiodesmus albonanus																					
?Choneiulus palmatus																					
Proteroiulus fuscus	X		X	X											X	X			X	X	
Blaniulus guttulatus																					
Archiboreoiulus pallidus												X				X					
Boreoiulus tenuis			X													X					
Nemasoma varicorne																					
Julus scandinavius			X			X													X		
Ophyiulus pilosus	X	X	X													X			X	X	
Allajulus nitidus			X																		
Cylindroiulus britannicus	X	X	X													X					
Cylindroiulus caeruleocinctus																					
Cylindroiulus latestriatus	X	X																			
Cylindroiulus punctatus	X		X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X
Cylindroiulus truncorum																					
Cylindroiulus vulnerarius																					
Brachyiulus pusillus	X																				
Ommatoiulus sabulosus	X		X																X		
Tachypodoiulus niger	X		X	X		X			X		X	X	X	X	X	X	X	X	X	X	X

TABLE 4: Continued

Location (cont.):	24	25	26	27	28	29	31	32	34	35	36	37	38	40	41	42	43	44	45	47	48
Glomeris marginata		X					X	X									X				
Brachychaeteuma bagnalli																				X	
Craspedosoma rawlinsii																					
Nanogona polydesmoides							X													X	
Chordeuma proximum		X																			
Melogona gallica/voigtii																					
Melogona scutellaris							X						X				X				
Brachydesmus superus	X	X	X	X		X			X				X			X	X	X		X	
Polydesmus angustus		X		X		X	X						X			X	X			X	
Polydesmus coriaceus																					
Polydesmus denticulatus							X														
Macrosternodesmus palicola																	X			X	
Ophiodesmus albonanus																				X	
?Choneiulus palmatus													X								
Proteroiulus fuscus		X			X	X	X	X			X				X		X			X	
Blaniulus guttulatus						X											X		X	X	
Archiboreoiulus pallidus													X				X				
Boreoiulus tenuis		X															X				
Nemasoma varicorne							X													X	
Julus scandinavius				X			X										X			X	
Ophyiulus pilosus		X	X					X					X			X	X				
Allajulus nitidus				X									X								
Cylindroiulus britannicus													X				X		X	X	
Cylindroiulus caeruleocinctus																				X	
Cylindroiulus latestriatus																		X			
Cylindroiulus punctatus	X	X		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	
Cylindroiulus truncorum																				X	
Cylindroiulus vulnerarius																				X	
Brachyiulus pusillus																	X			X	
Ommatoiulus sabulosus																					
Tachypodoiulus niger	X	X	X		X	X	X		X	X	X	X	X	X	X		X	X		X	X

TABLE 5: Summary of species of woodlouse recorded during the BMIG meeting in Northumberland.

Location:	1	2	3	4	5	7	9	10	11	13	14	15	16	18	19	20	21	22	23
Ligia oceanica																			
Androniscus dentiger																			
Haplophthalmus danicus																			
Haplophthalmus mengii																			
Trichoniscoides saeroeensis		X																	
Trichoniscus pusillus	X	X	X			X		X	X		X	X		X	X	X	X	X	X
Trichoniscus pygmaeus																X			
Philoscia muscorum	X		X							X	X					X			
Oniscus asellus	X	X	X	X		X	X			X	X	X	X	X	X	X	X		
Porcellio scaber	X	X	X	X	X	X	X			X	X			X	X	X	X		
Porcellio spinicornis			X							X		X							
Porcellionides pruinosus																			
Armadillidium vulgare																			
Location (cont.):	**24**	**25**	**26**	**27**	**28**	**29**	**31**	**34**	**35**	**36**	**37**	**38**	**41**	**42**	**43**	**46**	**47**	**48**	
Ligia oceanica																		X	
Androniscus dentiger						X						X					X		
Haplophthalmus danicus															X		X		
Haplophthalmus mengii												X			X				
T. saeroeensis																			
Trichoniscus pusillus	X	X	X	X	X		X	X		X	X	X	X	X	X		X	X	
Trichoniscus pygmaeus												X			X		X		
Philoscia muscorum	X	X	X	X			X					X	X	X	X	X	X	X	
Oniscus asellus	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	
Porcellio scaber				X			X	X	X	X	X		X	X	X	X	X	X	
Porcellio spinicornis												X							
Porcellionides pruinosus																	X		
Armadillidium vulgare													X			X	X	X	

During earlier BMG visits *Allajulus nitidus* had been collected in Durham (VC 66) and North Northumberland (VC 68) (Lee, 2006). Also, it had been reported from Mid-west Yorkshire (VC 64) and southern Scotland. With the species known to occur both north and south of the vice-counties visited in 2014 it was not surprising that Paul Richards added it to the fauna of South Northumberland from two sites in two different hectads and Duncan Sivell collected the first record for Cumberland (VC 70) from Wreay Woods. Wreay Woods also produced the second addition to the VC 70 fauna, *Craspedosoma rawlinsii* (Fig. 1).

FIGURE 1: *Craspedosoma rawlinsii,* a millipede new to the fauna of Cumberland (VC 70)

Although *Brachychaeteuma bagnalli* was described as new to science from a male specimen collected by Bagnall at Gibside in 1911 (Verhoeff, 1911) and later found at several more sites in Durham (Bagnall, 1919; Lee, 2006), the first hint that it occurred in Northumberland was an unidentified female *Brachychaeteuma* collected in Wooler during the BMG meeting in 1999 (Lee, 2006). The presence of the animal in South Northumberland (VC 67) was confirmed through the collection by Paul Richards of a male specimen from the gardens of Seaton Delaval Hall. These gardens proved to have the most species diverse millipede fauna of any visited during the weekend (Priestclose Wood was a close second) and three other species typically associated with synanthropic sites, *Cylindroiulus caeruleocinctus*, *Cylindroiulus truncorum* and *Cylindroiulus vulnerarius*, were added to the VC 67 fauna from here. The latter two have not been recorded from Durham or North Northumberland but *Cylindroiulus caeruleocinctus* is known from both adjacent vice counties.

The remaining two additions are at first sight the most surprising but both records reflect changes in distribution of the two species that seem to be ongoing. Lee (2006) commented on an apparent northward expansion in range of *Polydesmus coriaceus* following its discovery at five separate sites in Durham during the 2005 BMIG meeting. The discovery of the millipede at a site near Kielder Water, not far from the Scottish border, adds further weight to the idea of a range expansion. The *Chordeuma proximum* collected by Paul Richards from Falstone Cemetery appears to be even further outside of its known south western distribution but unpublished records from Suffolk and, especially, North-east Yorkshire (Tony Wardhaugh, pers. comm.) show a different situation. The species shows a classic Atlantic distribution in Europe (Kime, 2001) but clearly it should be looked for more widely in Britain.

WOODLICE

Out of a total number of 18 species of woodlouse previously recorded for the four vice-counties (VCs 66, 67, 70 & 73) combined, 13 were recorded during the 2014 field meeting. Only a single site in Durham (VC 66) was visited, yielding just three common species of woodlouse. More effort was put into recording VC 67, which was relatively under-recorded (Table 1). This was rewarded with 12

species of woodlouse (of the weekend's total of 13), including *Ligia oceanica* on the coast. *Porcellionides pruinosus* (Fig. 2). The latter, recorded by Steve Gregory and Keith Lugg at Seaton Delaval Hall, appears to be a new vice-county record (VC 67) (Gregory, 2009). An excursion by Keith Lugg to the Kirkcudbrightshire coast (VC 73) turned up *Trichoniscoides saeroeensis*, where this species is well known.

Woodlice were recorded from a total of 37 sites. Unsurprisingly, three species were widely recorded; *Oniscus asellus* (30 sites) *Trichoniscus pusillus* (29 sites) and *Porcellio scaber* (25 sites). The relative scarcity of *Philoscia muscorum* (17 sites) and *Armadillidium vulgare* (4 sites) reflects the northern location, where both these species become less common and increasing coastal in their respective distributions.

FIGURE 2: *Porcellionides pruinosus,* a woodlouse new to South Northumberland (VC 67).

ACKNOWLEDGEMENTS

Thanks to Wallace Arthur, Tony Barber, Kevin and Nathan Clements, Steve Gregory, Paul Lee, Keith Lugg, Helen Read, Paul Richards, Mark Robinson and Duncan Sivell for submitting their records.

Imogen Wilde gave invaluable assistance in arranging access to Wildlife Trust Reserves and National Trust sites. Steph Ames at Biological Records Centre helpfully provided us with vice-county lists for centipedes for the four vice-counties.

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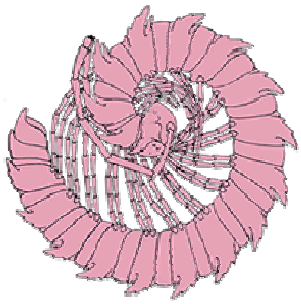

17TH INTERNATIONAL CONGRESS OF MYRIAPODOLOGY

23-26 July 2017, Krabi, Thailand

Conference logo – the Thai shocking pink dragon millipede

Having been a regular attender at International Congresses for several years but missing the last two in Australia and the Czech Republic, it was very interesting to see what has changed in that time.

The Congress location was Krabi in southern Thailand at the Maritime Park and Spa (17km from the sea and without a spa – but nonetheless a lovely location!). It was obviously very used to housing conferences and had a small conference centre in a separate building to the hotel proper. The grounds of the hotel were beautiful with pools containing lotus flowers and views of the nearby karst landscape as well as a nice pool to cool off in after sessions – something I made use of along with many other delegates.

There was a good turn out with delegates from a wide range of countries attending, from Australia to South Africa and Finland to Vietnam. The scientific sessions covered three days (instead of the previous four), which did make for some long sessions. Our Thai hosts were delightful and equally impressive was the number of people working on myriapods now in Thailand, most as a result of the encouragement by Somsak Panha. Key note speakers were Henrik Enghoff giving what was effectively an update on 'Anamorphosis International' (Enghoff *et al.* 1993), Sergei Golovatch about Himalayan Millipedes and Greg Edgecombe on recent developments in centipedes.

Interestingly taxonomic presentations were by far in the majority, with genetic techniques being used to complement conventional morphology. Examples included Ruttapon Srisonchai studying the Thai dragon millipedes and Paul Marek's group in the USA on Xestodesmids where colour patterns are helping to distinguishing between species of this group of polydesmids (not something we are able to use much in the UK). We also learnt that the percentage genetic difference, usually a guideline for distinguishing species, seems not to be so useful for centipedes where a massive 15% is not uncommon.

Another noticeable improvement has been the technology available to study both whole animals and parts of them. Micro CT scans of myriapods in Burmese amber enabled Thomas Wesener and his student Leif Moritz to study, for example, gonopods within the body of an animal embedded in Burmese amber as well as gain amazing pictures of the habitus.

This modern technology has enabled good quality scans of slides and photographs of specimens to be used instead of sending out type specimens on loan and risking them being damaged or lost. Peter Decker spoke about the Virtual Microscope Slide Collection.

The Onychophora, traditionally included within the congresses were rather poorly represented with just two papers but we were treated to an insight into Chinese Pauropods by Changyuan Qian, good to know there is still someone in the world attempting to study these difficult creatures!

Notable was the very low number of ecological studies, Karel Tajovský presented an update on his long running study of the millipedes along an altitudinal gradient in the West Tatra Mountains. Pitfall

trapping has been carried out in these study sites intermittently since 1992 which is no mean feat as I can testify having run traps for a similar length of time, but mine don't involve long walks up mountains to service them! Millipedes and impacts relating to climate change were examined by Ivan Tuf who compared the impact of a rise in temperature on two species of millipede and Bruce Snyder studying the impact of increased nitrogen on millipede biomass and survival.

There were however two lovely studies involving very careful observation in contrast to the special equipment required for many of the studies: *Bachycybe lecontii*, a Platydesmid (now referred to as feather millipedes) was observed in some detail by Victoria Wong who established that the first stadium has five pairs of legs a departure from the norm in millipedes. Irina Semenyuk reported on her work looking at niche separation of millipedes in the Vietnam jungle with distinct wet and dry seasons, there was clearly massive amounts of data (and hours of watching) behind the summary that she presented.

We were treated to several short videos of centipede behaviour by Matthes Kenning & Andy Sombke as part of their paper about centipedes 'sensing from both ends' including some amazing footage of *Theatops* using its hind legs to carry freshly caught prey. This genus is dear to the hearts of some BMIG members who had the fortune to find several specimens of this spectacular creature in Galicia on a field trip in 2004. We also heard *Alipes grandis* stridulate by rubbing its hind legs together and learnt that *Scutigera* has the same number of tarsomeres as antenomeres (500).

Another noticeable change from before, to me, was the International flavour of the research groups. There are still some clear groups within countries, like the Paul Marek group in Virginia, USA working on millipede systematics and ecology and Carsten Muller's group in Germany working on centipede physiology which obviously derive great benefits from being close research groups. However, there were also people like Nesrine Akkari, Greg Edgecombe, Henrik Enghoff and Sergei Golovatch working across country borders to carry out their own research and encourage and support new young researchers. This was perhaps particularly marked in the case of Thailand with concerted input over the last few years which have really born fruit in the surge of work. Former students are now spreading out and starting their own research groups, helping to spread the word. Although the UK featured in this international co-operation through Greg Edgecombe and Gonzalo Giribet it was sad to note that there is a distinctly impoverished number of people attending the congress from our country in comparison to previous years where we have frequently been the envy of other countries in the number of active workers – this makes me wonder where our next generation of ecologists and field biologists might come from.

One particularly nice inclusion (for me) was a paper on the conservation of myriapods in Brazil. Conservation does not generally get much prominence at the Congresses although there was a notable exception in the work presented by Michelle Hamer about millipedes in South Africa in 2002. Manoela Karam-Gemael from Brazil evaluated the Red Data Book status of myriapods in different habitat types across the county with a view to highlighting the importance to policy makers.

Polyxenids, often largely forgotten as a myriapod group, was represented by two studies from the Pacific Islands and Australia (Megan Short and Cuong Huynh). It is always interesting to hear more about the diversity of this group which is represented in the UK by just one species.

Closer to home, Jacques Geoffroy presented an update on the distributions of myriapods in France. There now seem to be a considerable number of amateurs in France working in a very similar way to BMIG and contributing lots of distribution data, especially for Brittany, and working towards a distribution atlas at department level. As a consequence of this increase effort *Polydesmus aesthenestatus*, originally from Corsica and with one record in the Maritime Alps has been found very

commonly in Brittany (and now in Ireland) and *Cylindroiulus pyrenaicus* has been found to have a disjunct distribution in the Pyrenees and Brittany (and the UK). Dragan Antic discussed the taxonomy and distribution of the millipede family Anthroleucosomatidae which he described as the 'waste basket' for Chordeumatids and which includes *Anamastigona pulchella*, recently found in the UK (Gregory et al. 2015).

Collecting techniques were discussed in relation to field work in the USA and the enthusiastic Jackson Means demonstrated his millipede rake. This simple gadget is helpful for turning over fallen logs and works well for colourful species like Xestodesmids living in areas with lots of poison ivy.

The traditional excursion on the middle day of the congress was on day three and saw a 3-way split with a few people able to go millipede hunting while the rest could choose between two different boat trips to admire the islands of limestone karst made famous by films such as 'the Beach' and the James Bond films. My tour was able to snorkel over a coral reef and explore an amazing lagoon in the middle of one of the islands before having a very rough journey back - memorable but not perhaps as relaxing as it had sounded on paper!

The final afternoon included the formal CIM General Assembly where the next Congress was confirmed as Budapest in 2019. The Proceedings of the Thai Congress will be published in Zookeys hopefully in February 2018. Many congratulations to the Thai organisers, a great team of friendly people who were amazingly enthusiastic about our favourite groups of animals!

Various millipedes had been found in the hotel grounds but I was particularly thrilled to find some (tiny) Platydesmids in the forest around a temple I visited near to the congress venue after the meeting (tipped off by Henrik Enghoff) and even more so when, after climbing the 1267 steps up to a temple on the top of one of the karst rocks I sat down to rest and a dragon millipede walked across the marble floor in front of me! He was a very fine dark brown/black with orange spines, a fitting end to a congress with a shocking pink dragon millipede as the logo!

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Helen Read

The real thing !

Conference photo ~ 17th International Congress of Myriapodology

THE 10TH INTERNATIONAL SYMPOSIUM ON TERRESTRIAL ISOPOD BIOLOGY (10TH ISTIB)

The 10th ISTIB was held at Budapest, Hungary this year. The meeting was hosted by the University of Veterinary Medicine (UVM) and by the Hungarian Natural History Museum. The main organisation activity was undertaken by the Hungarian Biological Society.
http://bio.univet.hu/istib2017/main.html

The first symposia in the series was held in London, UK, in 1983, which was followed by eight others: Urbino, Italy (1986); Poitiers, France (1990); Haifa, Israel (1997); Iraklion, Greece (2001); Aveiro, Portugal (2004); Tunis, Tunisia (2007); Bled, Slovenia (2011) and Poitiers, France (2014).

The opening plenary lecture in Budapest was given by Heikki **Setälä** (Department of Environmental Sciences, University of Helsinki, Lahti, Finland) with the title '*Soil fauna and ecosystem services – what's the connection*?'

Diverse topics were offered on the latest findings on woodlice organized into seven sessions: *1. Taxonomy – Systematics – Phylogeny; 2. Biodiversity – Faunistics – Distribution; 3. Ecology – Behavior; 4. Ecotoxicology; 5. Agrobiology; 6. Morphology; 7. Physiology and isopod-microbial interaction*. Each session started with an invited talk.

Helmut **Schmalfuss** (Stuttgart, Germany): *Woodlice, sowbugs, slaters and pillbugs – a historical survey of who did what to explore the biology of terrestrial isopods*

Spyros **Sfenthourakis** (University of Cyprus, Dept. of Biological Sciences Nicosia, Cyprus): *Oniscidea as Model Organisms in Ecological Biogeography*

Matty **Berg**, Ooms A, Dias ATC (Vrije University, Amsterdam, The Netherlands): *The Reaction of Communities and Ecosystems to Extreme Climate Events: a Trait Approach*

Katalin **Szlavecz**, Vilisics F, Hornung E (JHU, Baltimore, US): *Isopods in Urban Environments – an Overview*

Sándor **Farkas** (Kaposvár University, Hungary): *Possible ecosystem services of terrestrial Isopods*

Jasna **Štrus**, Vittori M, Tusek Znidaric M, Znidarsic N (Ljubljana, Slovenia): *Architecture of Exoskeleton in Troglobitic and Epigean Woodlice*

Andreas **Ziegler**, Hild S, Fabritius H-O, Griesshaber E (Ulm, Germany): *Biomineralisation in Terrestrial Isopods: Epithelial Calcium Transport and the Relation between Structure, Composition and Function of Mineral Composites*

The meeting was attended by 76 registered participants from 21 countries.

Similar to the last two ISTIB meetings, conference participants have the opportunity to publish their results in a special issue of ZooKeys (Pensoft Publishers; https://zookeys.pensoft.net/).

After the Symposium there was a short course organized by Stefano Taiti (who was assisted by H. Schmalfuss, G. Montesanto and I. Soares Campos-Filho) on the taxonomy and systematics of terrestrial isopods aimed at graduate and postgraduate students and young researchers.

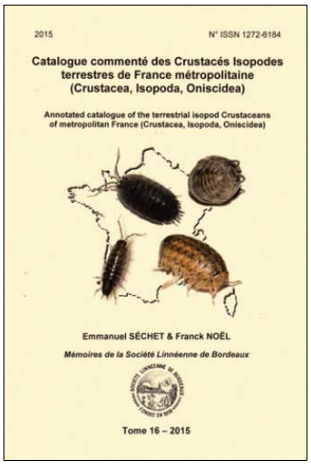
Erzsébet Hornung

Conference photo ~ 10th ISTIB

BOOK REVIEWS

CATALOGUE COMMENTÉ DES CRUSTACES ISOPODES TERRESTRES DE FRANCE MÉTROPOLITAINE (CRUSTACEA, ISOPODA, ONISCIDEA)

[ANNOTATED CATALOGUE OF THE TERRESTRIAL ISOPOD CRUSTACEANS OF METROPOLITAN FRANCE (CRUSTACEA, ISOPODA, ONISCIDEA)]



By Emmanuel Séchet & Franck Noël; 2015

Mémoirs de la Société Linnéenne de Bordeaux, Tome 16 – 2015.

ISSN 1272 6184

In French with abstract in English. A4, soft cover, 156 pages, 30 colour photographs of species.

This is a taxonomic catalogue of the woodlice of mainland France, its coastal islands and Corsica, covering 218 species plus 81 subspecies. The woodlice fauna of France is more than four times greater than that of Britain and Ireland (even including our 'alien' species), but some 45% of the French species are regarded as being endemic.

The volume is essentially a review and does not provide keys or other guides to identification. Sources for identification are included by reference to the bibliography, such as Vandel's two *Faune de France* volumes published in the 1960s, and other original descriptions and revisions. Although Vandel's *Faune de France* could be regarded as the starting point for their catalogue, the bibliography is impressive – over 300 titles (of which 10% of titles are by Vandel). For a selection of species, mainly French endemics, the location of type material is also listed, including many museum collections outside France.

The volume updates nomenclature to specific and sub-specific levels with an excellent index including synonyms. Subspecies are covered (under the nominate species) in as much detail as some species, under a range of headings. The levels of detail regarding each taxon are pragmatically variable. For common species usually no more than:

Biblio: reference to the relevant pages of Vandel's *Faune de France*, or other identification sources,

Aire: world distribution,

Distr: summary of distribution in France (with source references),

Ecol: biotopes with which the taxon is normally associated,

Comm: comments which may include additional sources of identification.

Recognised synonymies are listed with references and for species for which there have been perceived difficulties with identity and nomenclature, the authors' up-to-date interpretation is given with relevant references.

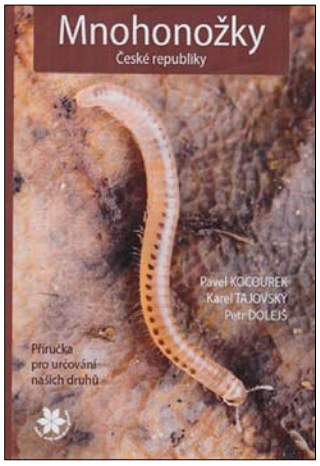
Work by Dalens and his collaborators, mainly in southern France, and in Corsica by Taiti & Ferrara, has brought forward new species and subspecies in several genera to which the authors have added their own revisions, including new combinations. For example, the catalogue includes 25 species of *Oritoniscus*, with some Vandel species now reduced to subspecies and several species brought forward

by Dalens, Legrand and Taiti and Ferrara since Vandel. The individual accounts for such species and subspecies demonstrates the value of the flexible approach to what information is likely to be useful in such a catalogue.

For anyone interested in woodlice in France, this catalogue is essential. It brings together much existing but widely dispersed information as a coherent and readily understood summary. Most of the titles cited in the bibliography were published in journals or series that will be accessible only through specialist libraries. For example, anyone wishing to check-out the authors' 2007 paper on the woodlice of North-West France would need to search out the serial *Invertébrés Armoricains*. This catalogue has much to recommend it and a copy has been purchased by BMIG and added to our section of the British Entomological and Natural History Society's library at Dinton Pastures.

Paul T Harding

MNOHONOŽKY ČESKÉ REPUBLIKY (MILLIPEDES OF THE CZECH REPUBLIC)



By Pavel Kocourek, Karel Tajovský and Petr Dolejs; 2017

ISBN: 978 80 87964 09 5

Available from http://csopvlasim.cz/eshop/

293 CZK (11 Euros)

This paperback, in full colour, is in Czech with an abstract in English. Despite the language this book is likely to be of interest to those in the UK working on millipedes because of the plentiful illustrations, colour plates and accessible layout.

The first section, consisting of introduction, morphology, ecology, methods of study and fossil groups is perhaps the least useful for an English readership but the taxonomic list is interesting because it includes many British species, but also many more as well. The key to species is potentially useful in separating pairs of similar species using diagrams and there is a useful table, including illustrations, showing features of the different orders.

The main bulk of the book consists of a double page spread for each species, including a photograph (some live, others preserved specimens), an illustration of the whole animal (sometimes both male and female), an illustration of the gonopods or other key feature to help determine the species such as telson shape, illustrations of variation in colour pattern (as appropriate), a distribution map covering the Czech Republic, a list of synonyms and some explanatory text. One interesting feature is the inclusion of status, thus highlighting species that are of conservation concern.

The species accounts are interspersed with various additional illustrations such as SEM photographs and pictures of habitats. At the end there are sections on bioindicators, further reading and an index and glossary.

The book is of use to British workers as it covers quite a few British species and could be useful for additional species that may turn up in the future. One minor criticism is that some of the plates are a bit vivid in colour but it is nice to see attractive depictions of our species which are normally portrayed as dull and boring! The guide is very comprehensive in including illustrations of gonopods etc. It is

interesting to see the conservation status of species in the Czech Republic such as *Tachypodoiulus niger* as near threatened and *Melagona gallica* as critical putting in context the British fauna. It is also interesting to note how many more Chordeumatid species there are in the Czech Republic than the UK. It is a nice touch to include photographs of typical habitats which could be useful, for example the gardens of a rather grand looking stately home for *Cylindroiulus caeruleocinctus*! The book includes species only found in the Czech Republic in glasshouses.

This guide provides useful information on pairs of similar species for which we have one in the UK but should be vigilant in case of other similar species turning up. It is also interesting to note the consequences of a more continental climate than the UK, and some differences in the fauna, for example the presence of five species of *Glomeris*, but not *marginata*, and two species of *Trachysphaera*, but not *lobata*.

The book is a handy size and being soft backed keeps the price low. There was a similar sized book (Lang 1954), in black and white, published over 60 years ago now and to which I have referred frequently over the years so it is lovely to have a modern version.

In summary, an attractive book that is well worth buying as a British worker, giving an insight into both the species found in Czech Republic and the work that is being carried out there as well as being of help for those of us working on these animals in the UK. The authors are to be congratulated on an attractive book that will hopefully stimulate additional people to take an interest.

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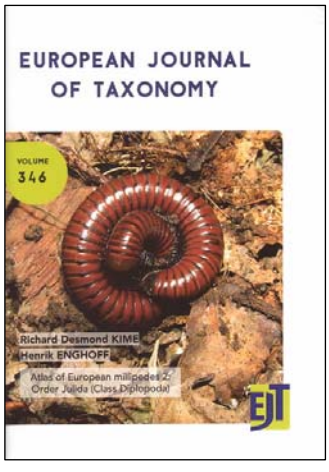
Helen Read

ATLAS OF EUROPEAN MILLIPEDES 2: ORDER JULIDA (CLASS DIPLOPODA)



By Richard Desmond Kime and Henrik Enghoff.

European Journal of Taxonomy. Volume 346: 299pp.

I was delighted to receive a copy of the long awaited second volume in the atlas of European millipedes. This herculean project has been spear headed by Desmond Kime and Henrik Enghoff with the first volume on various orders including the Polydesmida published in 2011 by Pensoft. Only a limited number of printed copies of the second volume have been printed but it is available for free download from http://www.europeanjournaloftaxonomy.eu/index.php/ejt/article/view/471.

The volume starts with a short introduction to millipedes and millipede recording and some information to help with the interpretation of the maps and the rest of the atlas and then gives a complete species list. Each species is then considered separately with a list of synonyms and the distribution given by country, with some regions within countries mentioned if appropriate. There are then sections on habitat and 'remarks' which vary in length and detail according to what is known about the individual species. There then follows an extensive reference list and then the last third of the volume consists of the maps with species

mapped at the 50km square definition. The maps vary in size and geographical extent depending on the distribution of the species that they represent. For some closely related species, like those found on the Canary Islands or Madeira, one map may be used to show the extent of several species. A map is provided showing all the 50km square from which provided records and there are some interesting 'white' spaces – a fair bit of the Iberian peninsula but also a few squares in France and a small number in Italy, all of which may be worth a look if people are on holiday in these regions – plus large expanses of northern Scandinavia which might be rather less productive…! The maps extend eastwards into European Russia although the 'dots' thin out considerably.

It is fascinating looking through at some of the British species to see their full European extent. I also had fun looking up some species we have found on BMIG field trips abroad, for example to Galicia and Hungary. To pick a few at random, *Cylindroiulus britannicus* shows a wide European range with scattered localities from the Canary Islands right through to Russia, but the UK really does appear a stronghold. Several British species show strong coverage in the UK relative to other places in Europe – but of course the recording in the UK is probably more extensive than most other European countries so how much this reflects recording effort is difficult to say. *Ommatoiulus sabulosus* has a distribution that is pretty widespread but does not appear to extend south of the Pyrenees, watch out for *Ommatoiulus rutilans* however, a very similar although more restricted distribution to *O. sabulosus* but not yet in the UK. *Ophyiulus pilosus* is also quite interesting, it is widespread in the UK but the only French records appear to be a few on the north coast and the bulk of the range is further east, in Germany, northern Italy, Denmark and Austria. The cut-off date for inclusion of records was the end of 2014 so some recent finds from the UK have not made it into the volume but it is interesting to see their previous known ranges mapped. *Cylindroiulus pyrenaicus* very much restricted to the Pyrenees, *C. apenninorum*, confined to Italy and a couple of outliers in the Netherlands and Belgium, *Ommatoiulus moreleti* on some Atlantic Islands and the Iberian peninsula.

I have a few minor quibbles. First the blue colour used for the dots on the maps is sometimes quite difficult to see, so that if a species has been found from a single 50km square it can be difficult to locate this on the map, especially if this is on a small island or a bit of coast, which can lead to playing 'hunt the dot'. Secondly, species that have the same distribution and are thus illustrated on the same map are listed in the 'correct' place alphabetically in the map section with a cross reference to the page with the written information on but not the page where the 'communal' distribution map is located.

These do not however detract from what is a remarkable piece of work which will be incredibly useful for anyone interested in European Julids. In the light of the numbers of new species turning up in the UK in recent years the information presented here may well become more relevant in the future. The authors are to be congratulated on their hard work and also for securing publication in a format where it is available to all – something much appreciated by those that are in effect amateurs. It is thoroughly recommended to British workers.

Volume 3 will cover the large order Chordeumatida but I believe it is not especially close to being completed.

Helen Read

Bulletin of the British Myriapod & Isopod Group: Volume 30 (2018)

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Cover photograph: *Philoscia affinis* male; a woodlouse new to Britain (image © Keith Lugg)
Cover illustration: Male gonopods of *Ommatoiulus moreleti*, a millipede new to Britain

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