

WILLIAM PENGELLY CAVE STUDIES TRUST



Newsletter

Number 139
March 2024

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Issue 139
March 2024

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All articles, notes, comments, reviews and news items are welcome and should be sent to the Newsletter Editor. Authors are responsible for the contents of their articles which do not necessarily reflect the policies of the William Pengelly Cave Studies Trust.

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<https://pengellytrust.org/> where
copies can be downloaded

Front cover: Entering Reeds Cave for the bat count; photograph by David Millin.
Back cover: captioned separately and are from the John Hooper slide collection

From the editor

It's still early in 2024 but we have just lost two great friends of the Pengelly Trust, both of whom were part of the very early development of the Centre. Patrick Boylan was our President for 15 years and David St Pierre linked us to the world of caving. Both contributed time and effort and, at a personal level, were good friends to many of us. There's not a lot of pleasure to be had in writing obituaries except that we were glad to have known them and are pleased to honour their memory.

John Wilmut

Patrick Boylan 1939-2024

Over its 60 years the Pengelly Trust has been very fortunate to have had three most distinguished Presidents: George Black, Harry Pearman and Patrick Boylan all diligently provided valuable support, excellent advice and good leadership. So it is with great sadness and regret that we record the death of Professor Patrick Boylan in February this year. Until his declining health and mobility problems made travel impossible, Patrick devoted a great deal of time to the Trust, continuing this by phone and email until the onset of dementia limited even that.



Patrick was born in Hull and went to school and university there, graduating in Geography and Geology and subsequently completing a PGCE. After three years of teaching he joined the staff at Hull Museum and Art Gallery, moving to become

director of the Royal Albert Museum in Exeter in 1968. He had already developed an interest in the work of William Buckland and Kirkdale Cave in Yorkshire and had written about Buckland's life and work for *Studies in Speleology*¹, so it was natural that he should now come into contact with the development of the William Pengelly Centre and he and his young family became regular visitors, participating in the development of the site as a study centre.

1 Dean William Buckland, 1784-1856 (1967) *Studies in Speleology*, 1.5, 237-253

Patrick made a considerable impact at Exeter, reorganising exhibits and persuading the City Council to set up its own archaeology unit, leading to a remarkably long history of archaeological excavation in the city.

From Exeter Patrick moved in 1972 to Leicester where he stayed for 18 years as Director of the Arts, Museums and Records Service. It was during this period that he completed his PhD and began to develop a national and international involvement in the fields of environmental protection, museum policy and studies and in the history of geology, whilst bringing together the museums, heritage properties and record offices of Leicester City, Leicestershire and Rutland into a single integrated service. Later, he took responsibility for the County's involvement with the arts, including theatre and music.



Patrick Boylan and Doug Bridger in Kirkdale Cave in 1967

In 1990 Patrick moved to City University, London as Professor of Heritage Policy and Management, eventually retiring back to Leicester. It was in 2009 that he took over the chairmanship of this Trust's Council and was subsequently appointed as Trust President. By that time he was a Consultant to UNESCO, the EU, the World Heritage Committee, the Council of Europe, the World Bank and many national governments. He had a leading role in developing and implementing the 1999 Second Protocol to the 1954 Hague Convention on the Protection of Cultural Property in the Event of Armed Conflict. He was centenary President of The Museums Association, Vice-President of the International Council of Museums and had been President of the Yorkshire Geological Society as well as President with this Trust. He wrote very widely with over 200 publications across many disciplines and was always willing to write for us.² Above all, Patrick's commitment and humour were of immense value to the Trust and he will be sorely missed.

John Wilmut and Alan Finch

2 The 1858 discovery and excavation of the Brixham Bone Cave, Devon (2008) *Studies in Speleology* **16** 3-15
200th Anniversary of the discovery and first publication of the Kirkdale Cave fossil hyaena den near Kirby Moorside, North Yorkshire (2022) *WPCST Newsletter*. **135**. 8-14



David St Pierre 1938-2024

It was with great sadness that we have learned of the death from Parkinson's disease of David St Pierre.

David and his wife Shirley, who had married in 1965, were two of the many people recruited by Antony Sutcliffe in the mid-1960s in support of the establishment of the Pengelly Centre. At that time they were members of SWETCCC (the South West Essex

Technical College Caving Club) but in the early 1960s had developed an interest in the caves of Norway about which they wrote extensively over many years; Shirley contributed a thorough review of cave studies in Norway to *Studies in Speleology* in 1967 and it was at this time that she and David started a Norwegian Cave Index and Bibliography which, by 2013, had described over 2500 caves with a total of over 3000 references.

It was a shock when Shirley died in 1987. By that time she and David had visited and written about caves in Puerto Rica and about Grotte Casteret in the Pyrenees and were firmly established as leading members of the cave studies community. There is now a long list of publications about caves and caving bearing the St Pierre name.

David later moved to Yorkshire, living near Ingleton and caving regularly in the Dales whilst maintaining a close interest and involvement in the exploration of the caves of Norway where, in 2017, a trip through the Ville Hesten cave in Beiarn was filmed and dedicated to David. It can be viewed on <https://www.youtube.com/watch?v=LUNRHlt3z3k>

David was also a long-serving member of the Cave Rescue Organisation and a few years ago reconnected with Pengelly, collaborating with Geoff Newton over reviews of *Norsk Grottblatt*, the journal of Norwegian caving. I was very pleased to have these and, in our email exchanges he spoke of his wider caving interests and the difficulties of coping with his illness, and it was clear that he would never willingly surrender his lifelong interest in caves and caving.

John Wilmut

The Annual Meeting, 1st June 2024



The Annual Meeting of the Trust will be held at 2 pm on 1 June 2024 at the Centre.

This an open meeting to which all those interested in the work of the Trust and at the Centre are invited. Under the provisions of the CIO constitution the meeting will include a report on the Trust activities in the previous year and a financial report but not officer or trustees elections or motions upon which votes can be taken. But it will provide an opportunity for visitors to ask questions or comment on the work of the Trust.

The Centre will be open from 11 am and guides will be on hand to take anyone who is interested into the museum, quarry and cave, and to answer questions.

Standing order and direct debit changes

For many years now most of you will have paid your subscription to the Trust by standing order or direct debit to our account with Barclays Bank. For a number of reasons the Trust, at a recent Trustees meeting, decided to close this account. You will therefore need to close your standing order or direct debit to the William Pengelly Cave Studies Trust at Barclays using sort code 20-68-10 and account 50962805.



**DIRECT
Debit**

Barclays Bank. For a number of reasons the Trust, at a recent Trustees meeting, decided to close this account. You will therefore need to close your standing order or direct debit to the William Pengelly Cave Studies Trust at Barclays using sort code 20-68-10 and account 50962805.



**Standing
Order**

To continue supporting the Trust you can set up a standing order or direct debit to the William Pengelly Cave Studies Trust for £15 each year and payable annually on 2nd January to Lloyds Bank, sort code 30-98-69 and account 01063037. Many thanks for your continued support.

David Jean

Cave Studies Centre developments

Centre charges

Due to significant increases in energy and insurance costs the Trust has, with regret, raised its charges for groups using the Centre. Residents will now pay £14 per person per night with a minimum group size of 12 people. Friends (members) will pay half that amount. People wanting to book the Centre for day rather than residential use will be charged £100 for the day. These charges came into effect on 1st January this year.



Educational visits that include the quarry and Joint Mitnor Cave are now £8 for an adult and £4 for a child of school age. Younger children are free of charge. These charges will apply to the summer guided walks (see page 8) but may be adjusted for group visits where a different programme is followed.

Prospective residential visitors and day groups can discuss their requirements with David Jean while prospective educational visitors should speak to Sheila Phillips (contact details for both inside the back cover)

Reeds Cave

Richard Vooght, who manages access to Reeds Cave, says that, after Easter, he will be looking for some volunteers to help with re-taping Reeds Cave and installing a stopper for the door. If you can help please contact Richard (see inside back cover).

Buildings

The buildings have recently been heavily used by residential groups but are generally in a good and clean condition. Arrangements are being made for deep cleaning before the summer walks programme. The heating system works well but the woodchip feed into the boiler has given trouble with chips getting damp and stuck in the hopper where it is extremely difficult to get access to free them. The hopper is to be raised onto a new base which will improve the access and a new switching system installed so that heating can be started and stopped remotely, thus saving fuel. There may be an experiment with running the heating continuously at a low level, thus improving conditions in the library and museum.

Museum

Sheila Phillips is developing a new display that will identify and acknowledge recent work done at the Centre by various volunteer groups. John Wilmut is replacing a display of John Hooper's bat photographs that were damaged by damp coming through part of one wall in the museum.

Car Park

There's been some pretty awful weather this winter and the footpath that starts above the Centre and then passes through our car park has been deeply gouged by water. This has brought a huge amount of mud into the car park, parts of which have been very difficult to use. Some mud has also over-topped the cill protecting the courtyard so that the drains there have become clogged. Installing new footpath drainage will be very costly and may not solve the problem so, not for the first time, the next working party will need to clear mud from the car park - not an inspiring task.

Caves and Quarry

Members of the Council have agreed to allocate a substantial sum of money to, in the first instance,

- replace the steps down into the quarry from the car park; the existing wooden steps (old railways sleepers) have rotted and become dangerous;
- replace the wooden platform in front of Reeds Cave with a deep limestone infill;
- do repairs to the platform in front of Rift Cave, with a view to replacing this in due course.

A meeting with Devon Wildlife Trust is imminent and it is hoped that this work can be done jointly with their volunteers. There is also a need to replace the wooden fence in front of Joint Mitnor Cave.

Lighting in the entrance and inside Joint Mitnor needs attention and the steps down into the lower passage will be replaced.

We need volunteers!

We need help in all of these areas:

- To clear a maintenance backlog at the Centre
- With publicity and marketing publications
- With guiding at the day walks in August
- In organising events outside the Centre

If you can help please get in touch - details inside the back cover

Website improvements

As we reported in the last issue, the website is being improved. It is a principal means by which potential Centre users and others access information about Trust events and availability, and it needs to better meet this range of demands.

A draft site was prepared by John Wilmut during the autumn and reviewed by the Council in December. Some extensions and improvements are now being implemented by Keith Coventry and we hope that the new site will be up and running (though perhaps not entirely complete) in time to advertise the 2024 visiting season.

We will then monitor the use of the site and review it again later in 2024. Certain facilities, such as an online shop for Trust publications and a searchable library catalogue are expected to follow as soon as possible.

Two more Buckfastleigh Christmas Fairs



In December 2022 the Trust participated in the Buckfastleigh Christmas Street Fair and we were glad to go back for a repeat performance a couple of weeks before last Christmas. Once again we were in a prime central position, thanks to John Brodribb.

In addition we had a stall at Buckfastleigh Town Hall in November where the local WI also had a Fair and we were lucky to again be

in a prominent position. At both Fairs we met a lot of local people who told us that they had no idea that the Centre is part of the town, despite the fact that we've been at the site for over 60 years! These fairs are one of the ways in which we can make ourselves known in the community and build more local support, and we were pleased to recruit one new guide for the summer walks, sell some publications and speak to people who will, we hope, come to the Centre to see for themselves.



Photos of the 2023 stalls by John Brodribb

Visiting the Centre in 2024

Summer guided walks programme

Following the heavily booked programme of guided day and bat walks last summer an extended programme has been arranged for 2024. Day walks will be limited to 30 and bat walks to 20 people.

Day walks will be at 11 am and 2 pm on each Wednesday and Thursday in August; this programme is unchanged from 2023.

Bat walks in August will this year be on

Thursdays 1st, 8th and 15th at 8 pm

Wednesday 21st and Thursday 22nd, at 7-30 pm

Wednesday 28th and Thursday 29th at 7 pm.

Advance booking will be available on Eventbrite from about 1st May; pre-booking is optional for day walks but required for bat walks. Numbers are limited and most visitors do book in advance; it is possible to turn up and pay on the door for a day walk but priority will be given to those who have pre-booked.

To pre-book for the walks either go to the Trust website on <https://pengellytrust.org/> (where you will find a link to Eventbrite) or go directly to the Eventbrite site at <https://www.eventbrite.com>

Individual and group visits

Sheila Phillips manages individual and group visits to the Centre. Those requesting these are very varied and she arranges programmes to suit their needs or specialisms. Many group visits have a programme that is similar to the public guided walks programme but others use the Centre facilities but do not go into the quarry and bone cave.

Following a full programme of group visits in 2023 some more are already booked in for the summer of this year. They include one extended family group with professional interests in the geology, bats and general environmental issues and a local school group and a couple of home educator groups with interests in present-day and Ipswichian ecology. These groups will use the museum facilities and will visit Joint Mitnor Cave.

There is scope for more visits like this. If you want to discuss a visit please contact Sheila (details inside the back cover).

By the way, we have two gardens

We reported on the revival of the Eemian garden in Newsletter 135 (March 2022). But there is also a small area at the other end of the buildings that was, for a long time, the site of the toilet hut and then served as an occasional camping ground and barbecue site. Then Charlie Bird was bringing groups from the Prince's Trust to stay at the Centre and turned part of this area into a garden. It had a large bug (insect) hotel and meadow plants. Sheila Phillips updates:



“... the original project was Charlie's, in collaboration with Prince's Trust [and] I remember working alongside them. When Charlie had to finish due to ill-health and [with] the demise of the Plymouth Prince's Trust, the garden was neglected and became overgrown.

In 2023 a Community Matters Fund - Community Green Spaces Fund was launched by National Grid. This seemed too good an opportunity to miss, a grant application was made and approved for 'The regeneration of a wildlife area to include an interactive nature trail with rubbing plaques depicting wildlife species past and present'.



Under the guidance of a local horticulturalist, recommended by the [Buckfastleigh] Town Council, and a volunteer team of Military Veterans the regeneration is taking place. Local residents are involved in seed propagation and plant donations with the Woodland Trust donating saplings.

Schools and

youth organisations are booking to use this facility as a supplement to the normal Centre visit.”

Photographs show the bug hotel, a delivery of tree saplings donated by Woodland Trust and a volunteer putting together the final design for an information leaflet.



2024 bat count at the Centre

On Saturday 20th January David Wills, Richard Vooght and David Millin conducted the annual bat count in the caves at the Pengelly Centre. The results were excellent and the table below, kindly provided by David Wills, shows the numbers of horseshoe bats in each of the caves.

Cave	Number of Greater Horseshoe bats	Number of Lesser Horseshoe bats
Spiders	2	8
Joint Mitnor	1	8
Disappointment	7	3
Rift	5	-
Reeds	56	14
Partition	-	5



Bat numbers vary considerably from year to year. Below are the numbers of Greater Horseshoe bats in Reeds Cave in several recent years.

Year	Number of Greater Horseshoe bats
2008	3
2015	84
2016	2
2017	61
2018	36
2019	119
2022	4
2024	56



Photographs by David Millin:
Top, Richard Vooght and David Wills at Joint Mitnor Cave; Below, bats in Reeds Cave

And David and Richard report that it's also good at Chudleigh with over 170 Greater Horseshoe bats, 5 Lesser Horsehoes and a single Natterers bat in three caves at that site.

Pat Morris, John Hooper and bats

In October last year Alan Finch had an email from a former member Pat Morris, offering the Trust a small collection of material related to John and Win Hooper's work on bats in Devon and elsewhere. Included in the gift were well over 100 35 mm slides and a DVD with another 50 or so images scanned from slides in Pat's own collection. It's a rich resource and, after it's been catalogued and the slides digitised, the collection will be placed in the Trust's library.

First, we'd like to thank to Pat Morris for this collection of material which will join with other notes and photographs left to the Trust when John Hooper died in 2005. The collection includes a copy of a paper describing John Hooper's work*, much of which was done in and near Higher Kiln Quarry, though long before the Centre was created.

John Hooper

John was an industrial chemist working for BP who took up caving in the late 1930s and was a founder member of the Devon Speleological Society. He wrote extensively about caves and caving and then, from the mid-

1940s onwards, wrote about his and wife Win's work on bats.

At that time very little was known about bats and John and Win pioneered their study with an extensive programme of bat ringing. It was they who first identified something of the life cycle of horseshoe bats in particular, found how far away from winter roosts they travelled in the summer (over 60 km in a few cases) and how long they lived (20 or more years). They kept very extensive records (now lodged with the Linnean Society) and these remain valuable data sources, available for modern re-analysis.

John and Win almost completely stopped bat ringing in the 1960s - populations were

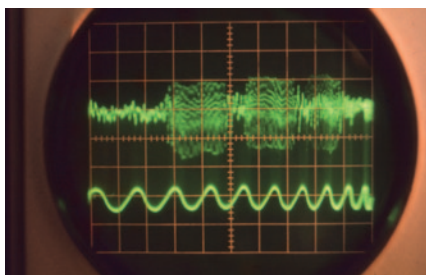


John Hooper with his bat detection equipment

* Pat Morris & Derek Yalden (2010), John Hooper - pioneer British batman. *The Linnean* Vol 26(2), 13-22



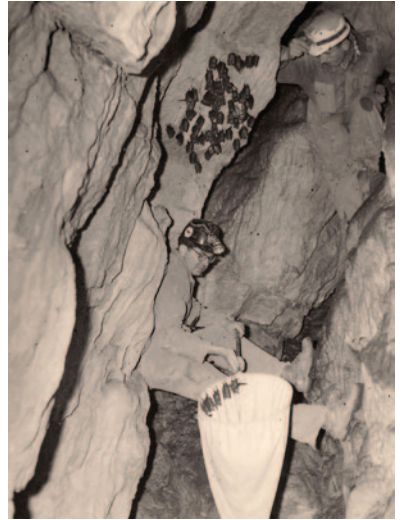
in sharp decline, some bat rings were found to be causing injury, and they were concerned about the disturbance caused by their work. They turned their research into bat detection using the primitive and very bulky equipment that had recently been developed. By the time that happened they were working with a widening group of naturalists, scientists and volunteers and John was backing up the research with increasingly sophisticated bat photography. He was the first to succeed in capturing clear pictures of bats in flight whilst continuing to keep extensive records from bat counts at a wide range of sites across Britain.



John and Win lived on the outskirts of London and the bat research expanded to include local sites which John would visit on his bicycle, carrying his bat detection equipment. From the mass of data from these forays and from his work in caves and mines across southern England, he and Win were able to demonstrate that different species used ultrasonic sounds of

different frequencies and with different patterning.

They continued to publish widely and worked with the BBC to present what they had found to a wider audience. Their published material was not only targeted on readers from the scientific world - much was aimed at cavers



and the general public. And their wide circle of volunteer helpers (many of whom were also involved in the Pengelly Trust) laid the basis for today's interest in and concern for bats. All of them were, indeed, pioneers in their field.

Photographs from the collection are by John Hooper or Pat Morris or by an unknown photographer. Clockwise from bottom left: a bat sound displayed on John's oscilloscope; the best bat detector then available; John cycling out from home in search of bats; bats in Rockhouse Quarry Cave in 1977; bats in Bakers Pit; Wilfred Joint and another recording bats, possibly in Rift Cave; John's equipment to detect and photograph bats in flight; baby bats in Rockhouse Barn in 1967. See also photographs on the back cover. The Centre museum has a display of some of John Hooper's bat photographs.

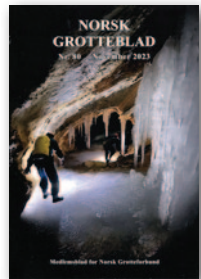
New library acquisitions

The Pengelly Trust library is located at the Centre in Higher Kiln Quarry and receives a regular supply of publications from across Britain and overseas. Librarian Richard Vooght has been involved in a long and demanding re-cataloguing of the collections and we published a first part of this catalogue in Newsletter 136 (September 2022); further parts will soon be available with the possibility that a searchable online catalogue will follow.

In the meantime here are some recent acquisitions.

Norsk Grotteblad 80, November 2023

A large part of this issue is devoted to the contribution that Gunner Horn, Norway's first and most prominent professional speleologist, made to the development of cave studies there and across Scandinavia. There is a brief English abstract and the article is well illustrated with examples of Horn's work. There is also a celebration of the events at a summer gathering of speleologists and a discussion of how an experienced caver overcame his claustrophobia. The abstracts in English are most welcome.



Die Höhle 74, April 2023

This is a substantial (160 page) journal of speleology in Austria. There are articles on glacier caves, areas of the country where no caves have been documented, studies of cave sediments and drainage, a report on bones of cave bear found in Lower Austria, a number of descriptions of specific caves, some spectacular cave photographs and a tribute to the late Herbert Franke who made a staggering contribution to European speleology over a long lifetime.



Subterranea 64, December 2023

This is the magazine of Subterranea Britannica which is committed to the exploration and description of a huge range of underground sites of all types. There's not a lot in this issue about natural caves but quite a bit about mines, canal and railway tunnels, underground bunkers and the like.

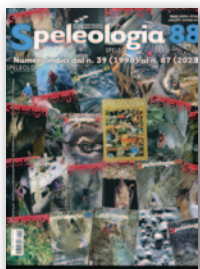


Stalactite Nos 2.2020, 2.2021, 1.2022, 2.2022 and 1.2023



This Swiss journal, published in French and German, has a wide range of articles on speleology in Switzerland and its bordering countries, with the occasional article describing caves in Scotland, Mexico, Antigua and elsewhere. It is substantial and well produced and, though there are no abstracts in English, most of us can probably get the gist by switching between its two languages.

Speleologica 88 December 2023



This issue comes in at 200 pages, indexing material published in Speleologica from 1998-2023 together with a summary of other publications from Italy. All is in Italian with the exception of a short final article in English, describing the history of speleological bulletins in Italy and listing those currently in publication. The main index is in 3 sections: chronological, by author and by topic. It's the sort of material that surely lends itself to a searchable online database!

Grottan, 4 issues from 2023



This is the Swedish speleological journal with a wide range of articles in Swedish, many of which are accompanied by a summary in English. It is a well-produced magazine that reports local caving activity as well as visits to Spain, Norway and Ireland together with reviews of publications from elsewhere (including this newsletter).

Chelsea Spelæological Society Newsletter Vols 65.7-9 and 65.10-12



CSS members made a major input to the early development of the Pengelly Centre and these two Newsletters record the wide range of activities and interests of club members, now based in South Wales rather than in London. There's a lot of stuff about caving activities in local caves such as Agen Allwed, Eglwys Faen and Daren Cilau, some reports of mine trips in other parts of Wales and into England for more caving, with an excursion to Thailand (some stunning pictures) thrown in.

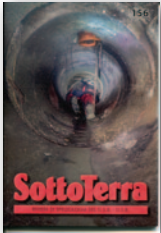
continued ➤

UBSS Proceedings 29.2 for 2023



The long-established University of Bristol Speleological Society has an enviable record of exploration of and research into caves, with a special interest in the caves of Ireland. Of particular interest in this issue is a paper by Andrew Chamberlain and Graham Mullan on the further interpretation and radiocarbon dating of human remains removed from Stoke Lane Slocker around 1950. Another paper in the same issue uses the same methods on bone fragments from King Arthur's Cave in the Wye Valley. There are also notes on caves in County Clare and SW Ireland and on the karst area north of Bristol. An interesting and useful issue.

SottoTerra 156



Entirely in Italian, it is hard to describe this very classy-looking journal covering caves and other underground sites in Campagna. Plans of some of the caves are provided and they seem small and extremely tight, though one article does include information about a bone deposit. You'll need to brush up your Italian!

New woolly rhinoceros genome



The woolly rhinoceros is an iconic species of the Eurasian Pleistocene megafauna, which was abundant in Eurasia in the Pleistocene until its demise some 10,000 years ago. Despite the early recovery of several specimens from well-known European archaeological sites, no genomes of European populations were so far available, with all available genomic data originating from Siberian populations. Using coprolites of cave hyenas recovered from two caves in Germany researchers isolated and enriched predator and prey DNA to assemble the first European woolly rhinoceros and cave hyena mitochondrial genomes. It seems that these genomes of European woolly rhinoceros are genetically distinct from the Siberian woolly rhinoceros, suggesting a split of the populations perhaps coinciding with the earliest fossil records of woolly rhinoceros in Europe.

A summary taken from <https://royalsocietypublishing.org/doi/10.1098/rsbl.2023.0343>

Cave spider research at the Pengelly Centre

During November 2023 Emily Brannigan carried out a study of cave spiders in caves at and near the Centre at Buckfastleigh. On behalf of the Trust Richard Vooght assisted with this work and the article which follows is Emily's description of the study.

Despite their large size and abundance, *Meta menardi* - or the European cave spider - is a species rarely seen by people across the UK. The caving community, however, is an exception, and I am sure many people reading this article have had the pleasure (or displeasure) of crawling along a cave entrance and spotting one of these large brown spiders suspended from their unusual orb webs. Seemingly even more recognisable from my conversations with cavers are these spiders' egg sacs which dangle like white baubles from the cave ceiling.

Most people exploring the caves probably skirt past these creatures as quickly as possible, either desperate to get away from them, or just eager to get to the labyrinth that lies beyond the entrance zone; yet, for two weeks in November, I sought out *M. menardi* in caves in and around Buckfastleigh as part of my Master's research at the University of Oxford.

After hearing about the William Pengelly Cave Studies Trust and their promotion of cave research, I quickly organised a visit to the Centre during the first week of November - which was so successful I visited a second time three weeks later. Before I talk a bit more about what I got up to, I want to highlight the generous support of Richard Vooght from the Pengelly Trust, as well as cave biologist Lee Knight (who I was put in contact with via the Devon Speleological Society), and thank them for assisting with my research, introducing me to useful cave sites, and for being on call whilst I was out collecting data alone. Additionally, during both of my visits to Pengelly, Richard spent many hours inside the caves helping to film my behavioural experiments (more on this below) - even giving up his day off work to assist in the tricky



Fig. 1: An adult female with her egg sac.

entrance to Afton Red Rift. The William Pengelly Cave Studies Trust is a fantastic resource for cave researchers, and I am very grateful to have benefitted from the passion and generosity of its volunteers.

Now, a bit more about what I am doing: I'm Emily, and I am currently studying for my Master's in Biology at the University of Oxford, and my research project is looking at how species might adapt to living in subterranean environments through altering their behaviour, rather than the much more commonly studied morphological adaptations (stereotypically resulting in pale, blind animals with elongated limbs). People all-too-often dismiss caves as barren, but in actuality, the simplified community of species interacting with each other, more stable environmental variables, and a predictable gradient of selection pressures as you get deeper into the cave actually creates an ideal 'natural laboratory' for biological research. My study species, *M. menardi*, has been identified in recent years as a potential candidate for a creature that displays behavioural adaptation to cave-life without any clear evidence of morphological change. Specifically, the 'orb webs' built by *M. menardi* differ when compared to the characteristic structure of orb webs built by other spiders within the same family group, Tetragnathidae: if we compare a spider web to the wheel of a bicycle, most orb weaving spiders will enclose the web's radii (which we can visualise as the spokes of the wheel) inside a frame (the rim/tyre of the wheel) and then anchor the frame to the substrate using multiple threads made of strong silk. In contrast, *M. menardi* almost entirely excludes this outer frame (the rim/tyre) and instead anchors the radial threads (the spokes) directly to the walls of the cave. This is the most striking and unusual difference in the webs of *M. menardi*, but it is not the only one - they also seem to invest less in constructing the sticky spiral of thread which has evolved to capture flying insects colliding with the orb web. Indeed, diet studies actually show that *M. menardi* consumes a large percentage of non-flying prey, a highly unusual trait for an orb weaving spider. The unique environmental conditions of caves - such as reduced wind and spatial limitation - have also been considered and found to be insufficient to explain the unique web structure of *M. menardi*.

The current narrative in the academic literature suggests that *M. menardi* has developed a novel prey capture behaviour in order to feed on a wider range of prey, likely as a result of the nutrient limitation characteristic

of the cave environment. The data I have been collecting in numerous cave sites around England, including the two weeks spent in and around the Pengelly Centre, will help me investigate if and how the foraging behaviour of *M. menardi* varies as you go deeper into the cave, where we assume the pressures of the cave environment - such as nutrient availability and the likelihood of predators - will gradually and predictably change. I'm using two main methods to do this.

Web-building spiders are great subjects for behavioural studies and especially those occurring in caves, because web construction (an 'extended phenotype') is a physical and, importantly, measurable record of the spiders' behaviour. This allows you to quantify behaviour indirectly, without having to spend long hours underground just waiting for a behaviour to occur. Therefore, my first method involves taking many measurements of *M. menardi* web structure at varying distances into the caves, as well as recording environmental variables (temperature, humidity, wind, light) and size data for the spider itself (usually 'herself', as large males rarely build webs, instead spending their adulthood on the hunt for a girlfriend). The method of measuring spider size looks a bit strange, and I have included a photo of a resident of 'Spider's Hole' to show how this is done; I use a home-made spi-pot to trap the spider between a layer of foam and clingfilm, where it is gently held in place so I can record the length of its body before releasing it unharmed.

For my second set of methods, I am conducting behavioural experiments where I actively stimulate the radial threads (the 'spokes') of webs using tuning forks of different vibrational frequencies and record how the spider responds; spider webs are designed to transmit vibrations from the source to the centre of the web, where the waiting spider sits and interprets this vibrational information as a potential meal or a potential threat. Spiders can also 'tune' their webs to transmit certain vibrational frequencies better than others in order to filter for only useful information, such as the vibration caused by a preferred food source.



Fig. 2: A large female resident of Spider's Hole, photographed before release.

Therefore, these experiments allow me to investigate whether the type and speed of a spider's reaction to different vibrational cues changes with increased distance into the cave, as the type and availability of prey changes. For example, if a spider closer to the cave mouth is more likely to encounter small flying prey (e.g. gnats) that stray in from outside, we might expect this individual to be more 'tuned' to the high-frequency vibrational cues that are characteristic of this prey type and thus attack the tuning fork quicker than a spider deeper in the cave.



Fig. 3: A still from one of the behavioural recordings, showing a female oriented and about to run towards the vibrating tuning fork.



Fig. 4: A large female raising her legs up towards the vibrating tuning fork during an attack response.

Nature, however, is rarely this clean-cut, and many hours were spent in very cold, very wet conditions refining these techniques (thank you again to Richard for your incredible patience, especially during the stormy week we had at the start of November!). These long hours have resulted in plenty of excellent footage where spiders display a range of attack and escape behaviours in response to the different stimuli used, which I will spend the next few months analysing. I have included stills (Figures 3 and 4) from two

separate videos taken by Richard and I during my trip; in both you can see a female spider showing slightly different attack behaviours towards the 128 Hz tuning fork (the stick attached to the end of the fork is necessary



Fig. 5 (left): During a stormy week in November, a plastic bag was used as a DIY method of keeping my camera dry whilst conducting the behavioural experiments in a very wet Pridhamsleigh cavern entrance.)

Fig. 6 (above): Richard helping me record the behavioural experiments in Spiders Hole. We are using red light as this wavelength is not visible to the spiders, who otherwise might be disturbed by white light.

to increase the precision of where I contact the web and reduce the chance of web damage). During my work this year, I have learnt that it is difficult to confidently mimic the vibrational cues caused by the non-aerial prey which *M. menardi* is somehow capturing. To further investigate this, I have plans in early 2024 to conduct experiments using live prey with the goal of recording an actual prey capture event; this should shed some light on if and how the unusual web modifications in this species are used to capture prey crawling along the cave walls.

I will keep the William Pengelly Cave Studies Trust up to date with my findings over the next few months as I get ready to submit my Master's thesis in May. Thank you again to everyone at the Pengelly Centre, and to anyone who has enjoyed reading this, for your support and interest in my work!

Trust publications

Publications of the Trust may be obtained either from **Alan Finch** at **'Zennor', Throwleigh Road, South Zeal, Okehampton, Devon EX20 2QA**. Telephone **01837 840259** or by ordering online at <https://pengellytrust.org/> or from the Centre bookstall.

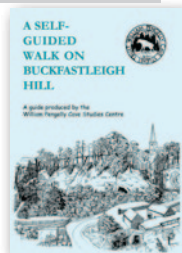
Here is a list of the books, booklets and leaflets available. Prices include postage and packing.

A Self-Guided Walk on Buckfastleigh Hill

John Wilmut, David Jean and Sheila Phillips (2004)

This is one of two guides for use at the Centre. Over 14 pages it describes a self-guided route that starts at the Centre and introduces the walker to the principal features, structure and geology of the hill and its caves. It is well illustrated, has a map and is a valuable summary of the more detailed information in other Trust publications and in the Centre museum.

£2-50

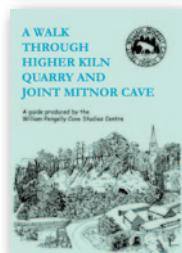


A Walk through Higher Kiln Quarry and Joint Mitnor Cave

John Wilmut, David Jean and Sheila Phillips (2004)

This is the second of two guides for use at the Centre. Over 12 pages it provides a summary of the principal features that visitors see in the guided walk through the quarry, in Joint Mitnor Cave (the bone cave) and in the Centre museum. It forms a companion guide to the self-guided walk, limekilns and geological garden publications.

£2-50

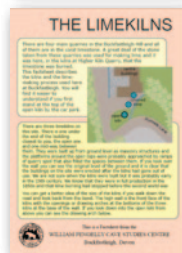


The Limekilns

Wilfred Joint and John Wilmut (2005)

This is a 4-page supplement to the information boards at the Centre. There are four main quarries in Buckfastleigh Hill and all are in the coral limestone. Much of the stone taken from these quarries was burned for making lime in the kilns at Higher Kiln Quarry. This factsheet describes the kilns and the traditional lime-making process that was used at Buckfastleigh.

£0-50



The Geological Garden

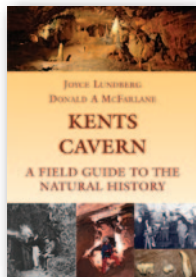
Bob Symes, Sheila Phillips and John Wilmut (2007)

This is another supplementary 4-page leaflet. In the courtyard of the Centre there is a group of rocks from the local area, set out as a geological garden. They give some idea of the range of rocks that visitors see on and close to Dartmoor. The leaflet gives detailed information about the rocks and where they came from.

£0-50



Articles from back numbers of **STUDIES IN SPELEOLOGY** or from this **NEWSLETTER** are available. Please contact the librarian to enquire about copies.

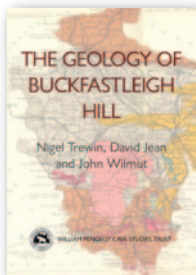


Kents Cavern: A Field Guide to the Natural History

Joyce Lundberg and Donald A McFarlane (2008)

Over more than 150 years researchers at Kents Cavern have discovered a sequence of deposits that cover a half-million year history, making this cave one of the most important cave sites in the world. Here the authors show how the cave first formed and developed and they describe the excavations by William Pengelly. The Guide then takes the visitor on a tour of the show cave. At each stop the authors describe the evidence on which our understanding of its development is built.

£4-50

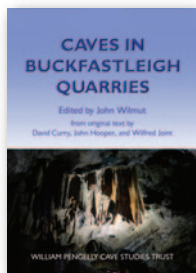


The Geology of Buckfastleigh Hill

Nigel Trewin, David Jean and John Wilmut (2007)

The origins of Buckfastleigh Hill go back 350 million years and its story embraces tropical seas, volcanoes, coral reefs and the building of a massive mountain chain. Caves in the hill's limestone provide evidence of ice age erosion and of warm periods when lion, elephant, hippopotamus and other animals roamed the Dart valley. This illustrated booklet provides a detailed description of the geological history of the hill.

£3-50

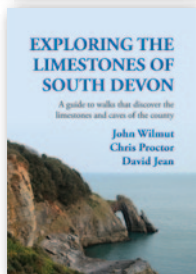


Caves in Buckfastleigh Quarries

Edited by John Wilmut (2012)

This booklet has been produced by the Trust as an updated and extended replacement for two of its earlier publications. It includes descriptions of the history, geology and exploration of the caves that will be of interest to anyone who has visited the area and particularly for those who have seen some of the caves at the Centre.

£5-50



Exploring the Limestones of South Devon

John Wilmut, Chris Proctor and David Jean (2014)

Created when Britain lay south of the equator, Devon's limestones are as exciting and interesting as any rocks in Britain, as are the caves which have been formed by the action of water over thousands of years. Research in the last two centuries has yielded much information about our past climates and about the people, animals and plants that once inhabited this area. The walks are described in great detail and the book can be used to combine the walks in ways to suit the walker.

£7-00

The William Pengelly Cave Studies Trust and Centre:



The William Pengelly Cave Studies Trust is a charity, originating in 1962, when Higher Kiln Quarry at Buckfastleigh became the site of a cave studies centre. The quarry contains several caves including Joint Mitnor Cave where there are the remains of animals dating from the warm period between the last two ice ages. The organisation is named after William Pengelly, a local man who, in the mid-19th century, excavated local cave sites including Brixham Cave and Kents Cavern at Torquay.

He was responsible for establishing excavation methods and records that became a model for all modern archaeology.

Joint Mitnor Cave was first entered just before WW2 when bones were found and identified as the fossil remains of animals that had once been present in this location. The cave was excavated in the 1940s and 50s but a large part of the deposit was left in place and this can be viewed by visitors. The picture shows a tooth from a juvenile straight tusked elephant and bones from bison and red deer. Other species include hippopotamus, lion, hyena, wolf, and bear.



Other caves at the Cave Studies Centre are closed to visitors either because of their fragility or because they are used by hibernating bats.

There are other local caves that are used for recreational purposes.

What we do

Research

The Trust supports a range of research in areas such as cave water percolation, cave location techniques, palaeontology and bat studies.

Education

The Trust provides information about cave studies through visits, lecture programmes, publications and displays in the Centre museum.

Conservation

The management of the quarry and caves is consistent with good conservation practice.

what we do and how you can visit us

Group visits

We welcome visits from student groups, children and special interest organisations. These can be at any time of year although visits to the caves are not possible from mid-autumn until mid-spring. Your visit can be tailored to your specific needs. To arrange, please contact **Sheila Phillips** on **01752 775195** or email **danehurst@tiscali.co.uk**

Specialist visits

These are visits from those individuals expressing interest in the Trust's work. Please contact **Sheila Phillips**, details above.

By joining public day walks

Held during August, widely advertised and lasting for a couple of hours including a cave visit; see page 8 for dates and book via our website <https://pengellytrust.org>

By joining a bat walk

Held on August evenings, these are an opportunity to see bats and hear the ways in which they use echolocation to navigate and catch insects. Book on <https://pengellytrust.org> - see page 8 for dates.

Residential visits

We can accommodate just over 20 people. These visits are especially suitable for groups interested in environmental activities. Book or enquire on <https://pengellytrust.org> or to **David Jean** on **01752 700259**

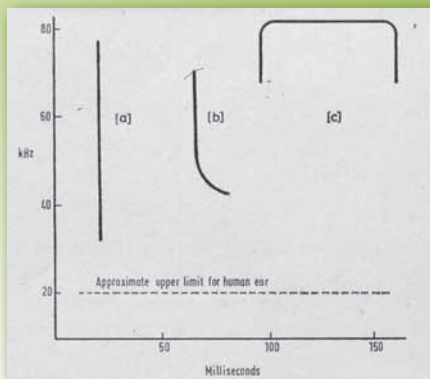
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Council Members	Charles Bird, John Brodribb, Ben Hall	



John and Win Hooper's pioneering bat studies (see pages 11-13 inside).

Above: Win Hooper with bat detector at a tip in Saxmundham in 1964;
 Right: bat detecting in a Buckfastleigh house;
 Top Right: weighing bats;
 Far right: Reeds Cave in the 1960s.



Two of John Hooper's slides. Left: types of bat sound pulse;
 Right: comparing pulses from pipistrelle (right) and noctule (left) bats.

