# SWCC CODC

75th Anniversary Publication

Volume I

South Wales Caving Club | Clwb Ogofeydd Deheudir Cymru
75th Anniversary Publication
Volume 1

# Contents

# *Editorial*

## Andrea, Beth & Tim Lewingdon

Well, what a year it's been. The COVID-19 pandemic has impacted on virtually every household, not only in the UK, but the whole world. Terms such as 'lockdown' and 'social distancing' are now in everyday use and when people hear the word Zoom, they think first of video meetings, rather than the power of a camera lens. The South Wales Caving Club HQ in Penwyllt is still not fully open after many months of closure, and many Club members have not been able to go underground for over a year. Within this context, though, there has still been much positivity in the Club. Chloe (Francis) must be applauded for keeping us all in regular, social, 'Zoom' contact, with many members supporting these sessions via games, photos, and tales of exploration from healthier times. The HQ has been kept safe and secure by local members, and all the other essential activities that keep the Club alive have been sustained during this challenging time by the Committee and many others.

So, that brings us to where we are today and the SWCC 75th Anniversary Publication. When the Chairman at the time, Paul Meredith, approached us in January 2020 to ask if we would be prepared to be the Publication's editors, our lack of experience in this activity meant we had no idea what we were taking on but thought it would be fun and interesting. It has, of course, been both of these things, as well as engaging and educational. I ought to add, though, that it has also been a monumental undertaking that we have been living and breathing for well over a year, alongside our talented authors and amazing Publication team.

From the beginning, we had a vision for this Publication, as something that would look and feel very different from the (excellent) Newsletter; something that would try to capture the emotional experience of being a member of SWCC alongside the more traditionally styled technical articles. We hope this has come through in the passion and personal experiences shared here. We have worked hard with our authors to ensure we have preserved 'their voice', a consequence of which is a more eclectic style, reflecting the essence of the Club's members.

So, what did we set out to achieve? The following describes the original vision for the Publication, a vision that we have worked hard throughout to realise:

- To create a 'really good read' through personal stories and experiences.
- To provide authoritative articles that educate and enhance understanding.
- To provide something for everyone, including families, new members, and old members alike.
- To acknowledge the era we now live in, today's opportunities and enabling technologies.
- To acknowledge today as a key point in time for the Club through a retrospective look at the 75-year journey that has led to where we are now – the people, the exploration, the adventures, the advances.
- To open up opportunities and possibilities for the future – the continuation of the Club's journey.

We have structured the Publication around seven Themes, arranged over three volumes:

**Volume 1**

Volume 1 opens up with **Life at the HQ**, a collection of heartfelt poems, stories and photos from a wide range of members, tales of growing up in the Club, and experiences of events through the years, with the 'power' of the Soup Dragons playing a key role.

The Theme finishes on a more serious note, describing the very important role that the HQ has played in the coordination of cave rescue over the years. Thanks go to Lel Davies for collating the articles for this Theme; she managed to gather a staggering 23 contributions. Lel's powers of persuasion are second to none!

The next Theme in this volume is **Local Caving**. We have been incredibly lucky in being able to document several firsts for SWCC in what has become known as the Club's Golden Era, beginning in the 60s, but also continuing into the following decades. This Publication has presented a unique opportunity to draw these together into one place through the relating of personal experiences mapped against new discoveries. The Theme continues with a light-hearted description of the Club's evening caving 'gang' and then finally, a short but poignant tribute to one of the Club's Gower explorers, from the 1960s, who tragically died very young, still at the height of his caving career. We would like to thank Paul Tarrant for coordinating and editing this theme and recreating the Club's journey around local exploration and discovery.

The final Theme in Volume 1 is **Technology**. The last 75 years has presented us with massive changes and technological advances. It has been a great opportunity to look back over the last century and capture personal moments in using new technology for the first time to record, map and visualise our underground world and surface topography. Thanks go to Graham Christian for coordinating and editing this Theme and gathering an impressive range of articles. It makes me wonder whether the Club should develop a museum of old kit as members were quickly able to gather from their 'attic' in order to take photos of their 'old kit stores'.

**Volume 2**

Volume 2 is dedicated to the Club's primary reason for being. Entitled **Digs, Digging and Diggers**, it includes exactly what is stated 'on the tin'. Diggers have been central to the Club for 75 years and their personal stories and achievements are recognised and celebrated here. Broadly based on hydrological catchment areas, Bob Hall and Tony Baker have engaged with the Club's digging community to provide a definitive and impressively comprehensive description, warts and all, of the SWCC area digs, past and present and looking forward to the future possibilities. The diggers' stories are engaging, amusing and to be honest, really scary at times. These diggers are tough types, and it is they who have opened the way for the rest of us to enjoy the underground passages we know so well. This Volume will certainly make every reader want to get digging, to be sure! Thanks to Bob and Tony for successfully pulling together this epic Theme, which I know has involved an incredible amount of effort and resilience, and to all their contributors who have been quoted extensively throughout.

**Volume 3**

Volume 3 kicks off with **Foreign Caving.** Over the last few decades, the Club has enjoyed caving in the Gouffre Berger and other systems in Europe, referred to colloquially as the 'Gary trips' and included here, followed by an article on 'Gary's other trips' in Cantabria. The Theme then moves onto a more diverse set of personal stories and adventures from around the world.

We then progress to the first complete coverage of the SWCC **Unexpeditions**, an idea inspired by Dominic Hyland, with a young family at the time, looking for milder caving (and other) adventures suitable for families and others looking primarily for a holiday, with a bit of caving thrown in for good measure. These 'holidays' have been highly successful, engaging the whole Club, and have seen some unanticipated adventure along the way. Thanks go to Denise Knibbs for bringing together and editing an enjoyable collection of short stories and photographs.

Our final Theme in the Volume and, indeed, this Publication, is **Cave Diving**. Its position in the Publication is by no means reflective of its significance. Cave divers have always been an impressive breed and here we have personal stories of journeys into the world of diving, accompanied by some truly awesome photography. Thank you to George Linnane for bringing this theme together late in the day – and you're right, this Publication would not have been complete without it, and is much richer for its inclusion.

So, there you have it. We are certain you will find this Publication a captivating read (although perhaps not all at once!) and will be equally engaged by the stunning photography. This has been an amazingly rewarding journey of discovery. Many of the authors are almost mythical creatures of the Club's history, and to get the chance to talk through their contributions and help shape them into their current form in this Publication has been a privilege and truly enlightening.

Compiling the 75th Anniversary Publication has been a true team effort and we would like to thank the whole Publication team for their time, energy and dedication. In addition to the Theme coordinators identified above, we would like to say a massive thank you to Ariana Preston for bringing her incredible artistic flair and expertise to the design of the Publication, to Elaine Hall for her excellent proof-reading skills and Gary Vaughan for managing the distribution of the Publication.

Finally, we must thank all the authors who have taken the time to provide contributions to this hugely significant 75th Publication. Without you, we would have no publication…

## Publication Editors


Beth Lewingdon


Tim Lewingdon


Andrea Lewingdon

## Publication Team


Bob Hall


Tony Baker


Ariana Preston


Graham Christian


Lel Davies


Paul Tarrant


George Linnane


Denise Knibbs


Gary Vaughan


Elaine Hall

*Please note:*

*We have done our best to implement consistent styling, grammar and spelling throughout the Publication. We are not professional editors, so we apologise for any errors or inaccuracies, particularly in the Welsh place names which seem to be spelt in many different ways! We have used the Cambrian Cave Registry (CCR) for definitive spellings.*

*Authors, where we have needed to make adjustments to your text for reasons of consistency, we have made every effort to minimise changes and to avoid tinkering with your stories and your style.*

*Identifying the source of photographs and images is not always an easy task. For guidance, the authors have been responsible for sourcing images for their articles. If you wish to use or share these images, we ask that you request permission from the photographer, where identified, and in all other cases, the authors.*

*The opinions represented here are those of the authors alone and may not represent either the views of the editors nor the policies of the SWCC.*

# *A Note from the SWCC President and Chairman*

The passion for caves and caving of our members shines out from these pages. Achievements, projects, exploration, trips and most importantly aspirations are threaded through our 75-year history and what is written here would undoubtedly resonate with the original group of cavers who founded the Club at Easter 1946.

Caving has always brought challenges and we know that our members relish a challenge. In the early days even getting to the Club took a great deal of determination: petrol was still rationed, personal transport slow and unreliable, and time for hobbies precious. Today we face different challenges brought on by disease, government restrictions and other changes in society.

Founded in a very different era, just after WWII, SWCC has grown steadily to be one of the biggest UK caving clubs with a geographically dispersed membership, including a number of members based overseas. Our activities are not limited to the UK and members regularly take the opportunity to cave across the world. We value the chance this brings to share ideas and information.

Putting together this celebration and record of our achievements and activities has taken a very great deal of time and effort by the editorial team and those who have written articles. Our grateful thanks to all of them.

Above all else, it is our hope that the contents will inspire others in the future just as today we have been inspired by the vision and can-do attitude of those members from earlier times. If they could read this publication, we are sure they would be proud, as are we, of the Club we have today.

*Fred Levett*
*President*

*Paul Meredith*
*Chairman (2018-2021)*

*Gary Vaughan*
*Chairman (2021-)*

# Life at the HQ

## *Introduction by Lel Davies*

Powell Street and its surrounding landscape has been the heart and lifeblood of SWCC since 1959. To all members the Club HQ is primarily a centre for sport and exploration. For some, it is also their second home and a refuge from the usual stresses of life. For many members, a big part of HQ life is about partying and socialising and there are many a tale that can be told. We should be proud of these tales, be they enlightening, amusing or downright embarrassing!

The Theme tries to capture the essence of life in the Club through imagery, poems, and stories. We have collected photos from members that are personally significant to them. Members have also kindly provided their stories, several of which relate to their growing up in the Club's rich social environment. We will also read about important elements of Club life such as evenings in the long common room and the sterling contributions of the many different wonderful Soup Dragons across the years!

So, sit back and enjoy going down memory lane if you have been members long enough and if you are relatively new to the Club it is an insight of the many antics that have happened over the years!

Finally, we can't leave this Theme without talking about the important role the Club has in cave rescue. Jules provides us with the origins and activities of the Club as part of the South and Mid Wales Cave Rescue Team, British Cave Rescue Council and affiliation to Mountain Rescue England & Wales.

We hope you enjoy it...



◀ *The SWCC HQ landscape (©Tim Lewingdon)*

Penwyllt - Fifty years of change and continuity (©Andy Freem)

These images were taken from the same position as each other, next to Party Quarry, the first in the early 1970s and the second close to 50 years later.

The years have taken a dramatic toll on many aspects the landscape. A hill has disappeared, a new view of mountains beyond revealed.  Neighbouring houses and occupants are gone. The old access track replaced.

The industrial noises of quarrying and railway have become just part of history. The older photo was taken on a Tuesday – blasting day – always worth a grandstand view to see what might be uncovered in the new rock face. It was a time when the whole HQ needed re-pointing, hence the scaffolding. Areas were allocated to each member to complete (initials were marked on the walls to emphasise the communal responsibility).

Trees, being planted by Bill Little, possibly to mask the effects of the wind and quarrying, have in the recent image, enveloped Powell Street softening and masking high moorland vistas.

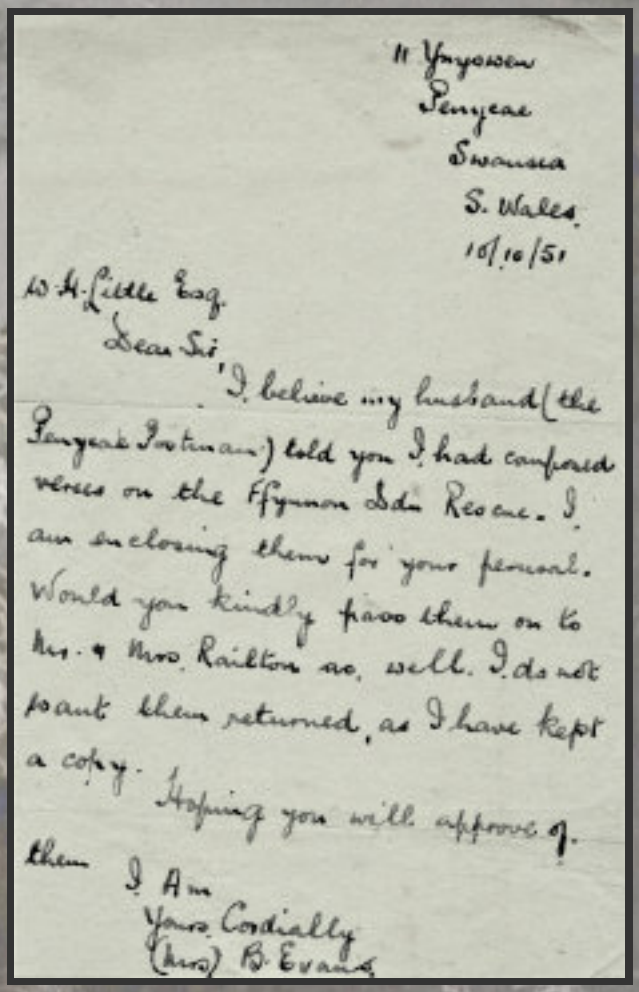
What has not fundamentally changed is 1-10 Powell Street. Along with ever-present grazing livestock, it is a main feature of human continuity.

## The SWCC HQ Landscape

*View from HQ towards Fan Hir (©Tim Lewingdon)*

# *The Epic Rescue at "Ffynnon Ddu"*

## August 27th 1951



11 Ynysowen
Penycae
Swansea
S. Wales.
16/10/51

W. H. Little Esq.

Dear Sir,

I believe my husband (the Penyrae Postman) told you I had composed verses on the Ffynnon Ddu Rescue. I am enclosing them for your perusal. Would you kindly pass them on to Mrs. & Mrs. Railton as well. I do not want them returned, as I have kept a copy.

Hoping you will approve of them

I Am
Yours Cordially
(Mrs) B. Evans

**Twas, August 1951**
**On the five and twentieth day**
**The morn was dank no sign of sun**
**Not even a promising ray.**

**The ground was sodden with the damp.**
**To saturation point**
**No one went out without a "gamp"**
**The clime seemed out of joint.**

**Stout heart's had driven out of "Brum"**
**Down into rugged Wales.**
**For exploration they had come**
**O'er hills and countless dales.**

**They "dug" at the Ancient Briton**
**In upper Swansea Vale**
**And of caves of Ancient Britons**
**The two know many a tale.**

**On Saturday morn they set out**
**In "togs" they loved so well**
**They reached the cave, 'twas, without doubt -**
**The Cave of the Black Well.**

**The entrance is on Ongur Farm**
**Below the Penwyllt Road**
**And into it, without alarm**
**Both cavers firmly strode.**

**Engrossed were they on danger's brink**
**In caverns vast of rock**
**Ne'er once did those two stout hearts think**
**That "swells" their path would block.**

**But when return they sought to make**
**Alas! And yet alack!**
**Dark "booming" floods had formed a lake**
**which blocked the pathway back.**

**Railton and Little both were trapped**
**In Ogof Ffynnon Ddu**
**In awe both men gazed there enrapt**
**Upon that inland sea.**

**Outside a lonely woman thought**
**'twas time for their return**
**And with her anxious fears she fought**
**Hope and despair, in turn.**

**To Mrs. Railton rest came not**
**She worked in fev' rish haste**
**to get brave rescuers on the spot.**
**She had no time to waste.**

**From every walk of life, they came**
**To dam the mountain stream**
**They laboured hard the floods to tame**
**an eager, glorious team.**

**Far up above Penwyllt they toiled**
**to save two lives at stake.**
**But rains & darkness had them foiled**
**they wished the dawn would break.**

**Then in the daylight, men at speed**
**Out to the mountains filed**
**and with great effort did succeed**
**to stem the flows so wild.**

**Down at the Black Well entrance**
**News came at last indeed**
**That rescuers could now advance**
**For the waters did recede.**

**Boldly some fifty men went in**
**To seek the imprisoned two**
**Miners and teacher, postman, scout**
**a detective sergeant too.**

**Twas 6 o'clock and rain returned**
**But just for one brief spell.**
**Pray, God, the rescue team interned**
**Would shout a grand "All's well."**

**Round about 8 o'clock came thrills**
**a message lond & clear**
**"Both cavers safe and sound from ills"**
**The watchers raised a cheer.**

**Soon afterwards they all emerged**
**Railton a wife embrace**
**Then Little came, the crowd converged**
**To gaze upon his face.**

**Twas, well on 60 hours now**
**Since daylight they had seen**
**And every person there would vow**
**That brave men they had been.**

**The divers too, had done grand work**
**Worthy of every praise**
**And other cavers did not lurk**
**Their friends they helped to raise.**

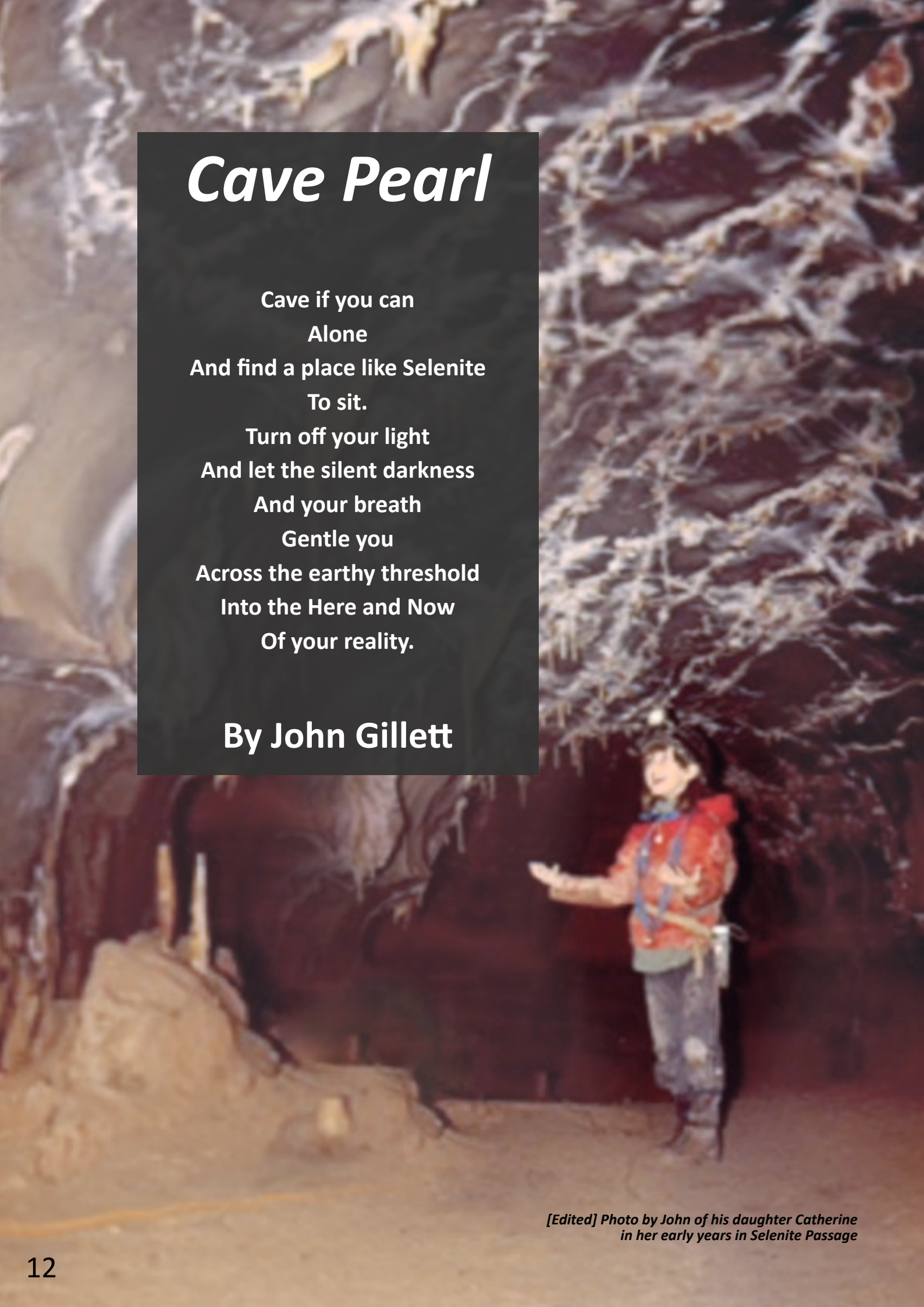
**From horrors down below they're free**
**from ugly death, they're saved**
**But they'll remember Ffynnon Ddu**
**And the treachery while they caved.**

*Note: The 'Bill Little Rescue' is documented in full in: C.I. Railton & W.H. Little (1996) 'Experiences in Ogof Ffynnon Ddu, August 25th-27th 1951', SWCC Newsletter 118, pp.24-28.*

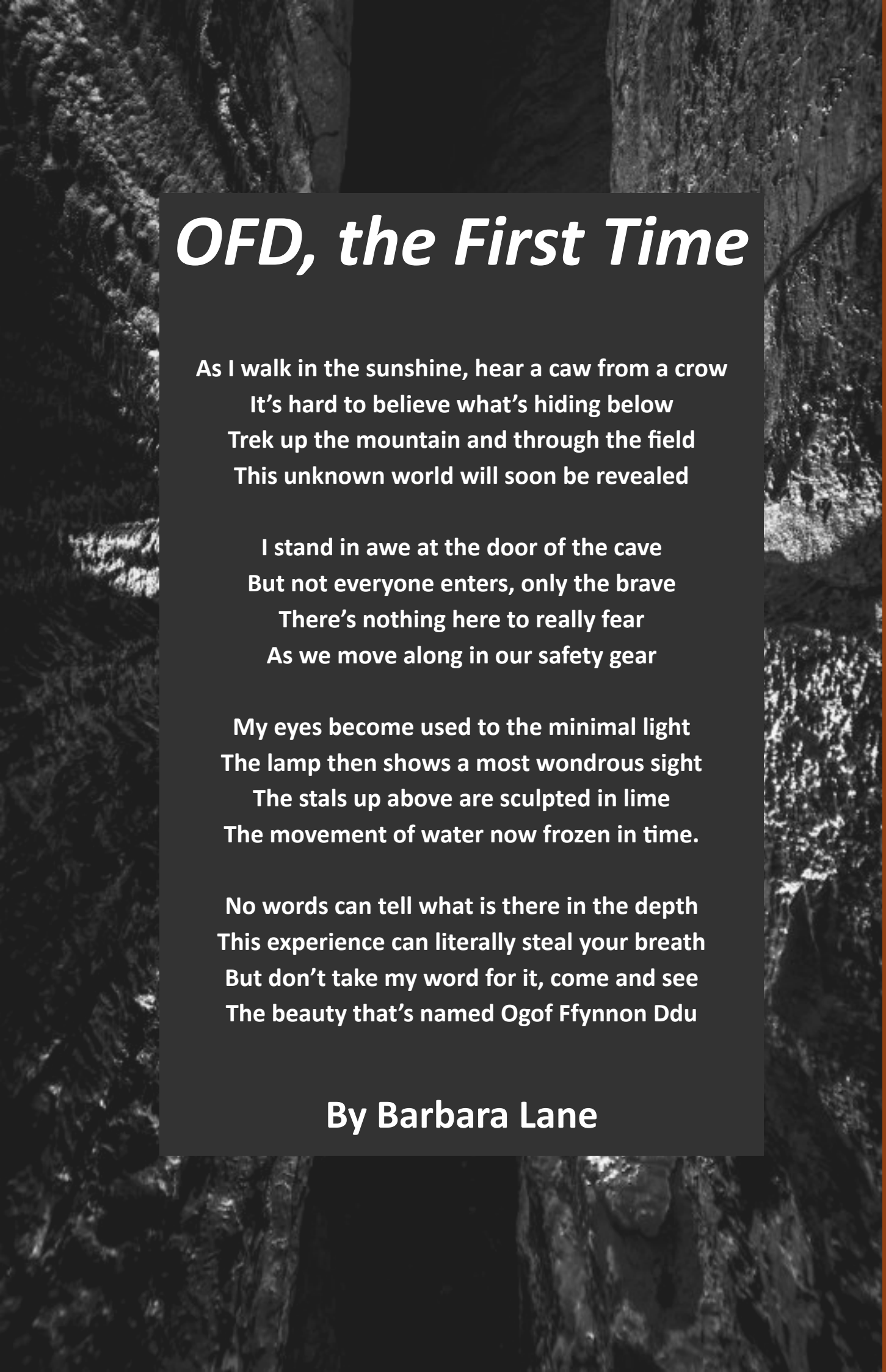
# *Cave Pearl*

**Cave if you can**
**Alone**
**And find a place like Selenite**
**To sit.**
**Turn off your light**
**And let the silent darkness**
**And your breath**
**Gentle you**
**Across the earthy threshold**
**Into the Here and Now**
**Of your reality.**

## By John Gillett



*[Edited] Photo by John of his daughter Catherine in her early years in Selenite Passage*



# *OFD, the First Time*

**As I walk in the sunshine, hear a caw from a crow**
**It's hard to believe what's hiding below**
**Trek up the mountain and through the field**
**This unknown world will soon be revealed**

**I stand in awe at the door of the cave**
**But not everyone enters, only the brave**
**There's nothing here to really fear**
**As we move along in our safety gear**

**My eyes become used to the minimal light**
**The lamp then shows a most wondrous sight**
**The stals up above are sculpted in lime**
**The movement of water now frozen in time.**

**No words can tell what is there in the depth**
**This experience can literally steal your breath**
**But don't take my word for it, come and see**
**The beauty that's named Ogof Ffynnon Ddu**

**By Barbara Lane**

# *Tales from the Long Common Room*

## Anonymous

**The Purloined Cider**

There was once a young lad who was known as Dai, usually with a politically incorrect adjective attached, for he was somewhat naive and not always co-ordinated in all matters.

Now Dai drank cider, though not usually to excess, and was in the habit of taking his flagon into the Common Room for the evening. Repairing upstairs for the usual reason, he returned but on this occasion his relief was short lived, for his bottle of cider was nowhere to be seen.

"*Where*," he cried, "*is my cider? What have you done with it?*"

"*We have put it under the President's bed*," they said.

Now in those days the President slept (with his milk bottle) under the stairs in the front of No 10, for there was then no Library. This had been his habit since time immemorial, and no other would use that bed, for several reasons.

"*But the President has retired and is asleep,*" said Dai. "*I cannot wake him up*." For, in truth, like many another, he was in awe and somewhat nervous of the President.

"*No,*" they said. "*You cannot. What you must do is to open the door very quietly, sneak in, and get your bottle back without waking him*."

"*But be very careful,*" they said, "*not to wake him. For he was in Malaya, you know, and he always sleeps with a knife under his pillow. And were he to wake with a start, who knows what might happen?*"

So, Dai opened the door, very quietly, and went silently into the room, while they waited, tittering amongst themselves. And shortly there was a bellow from the President and a scream from Dai, and Dai burst out of the room and disappeared into the night.

And the President came out of the room in all his glory and said "*Who was that? I was lying there, unable to sleep for the noise that you lot were making, when the door opened, and somebody started to crawl across the floor. And I could hear you all giggling, but it was dark, and I could not see who it was. So, I waited until they got close to me, and then they started to reach under my bed, and I yelled GOTCHA in their ear*."

Dai did return to the Common Room that evening, sheepishly. But the bottle of cider, or its contents at least, had long since disappeared.




*Anon*


PENWYLLT FINE ALES
presents
THE
RUINED STRUMPET
I just found a new OFD extension...
Shouldn't you be caving?

*Anon*

**What Goes Up…**

In days gone by, there was even more interest within the Club in matters involving pyrotechnics, deflagrations and faster forms of combustion than there is now. Much thought was given by various members to means of more effectively removing obstinate rocks and enlarging impassibly tight rifts, both in the interests of cave discovery and because it was deeply satisfying. Nothing much has changed there.

Prior to the advent of battery drills, enlarging rifts was particularly difficult and slow work. What was needed was a means of drilling shot holes but doing this by hand was nigh-on impossible in most situations. Mechanical alternatives required either air hose or cable to be laid to the site of interest and were therefore limited to near-surface locations, although valiant (but largely unsuccessful) attempts were made to use diving cylinders to power small pneumatic drills and breakers.

One member more imaginative than others, and with a keen interest in matters military, hit upon the idea of using shaped charges to drill holes in limestone. A copper cone of substantial gauge was fabricated, with the charge placed around and above it. At the risk of undue technicality, this resulted in a focused jet of molten copper being driven against the rock with extremely high force. The results were impressive and holes of up to approximately 25cm depth could be 'drilled' in this way. Not only that, but as noted above it was a great deal more fun than manual alternatives.

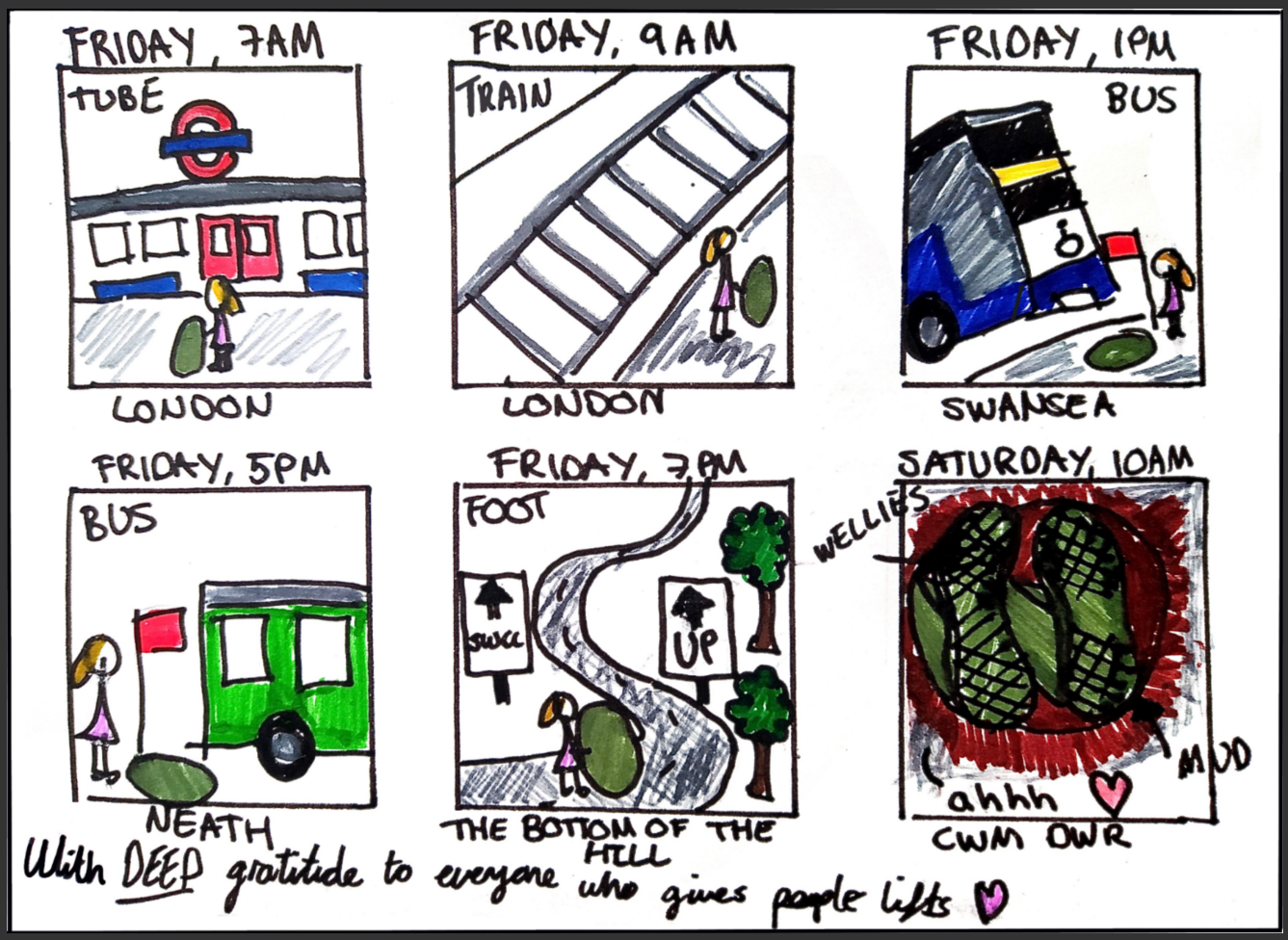
The only problem was that the copper cones required quite a large charge to be used, had to be made quite carefully and were very definitely single use only. Our hero thought laterally and came up with the idea of using a large nut to replace the cone. He arrived at the HQ one weekend with a nut that would not have been out of place on a steam locomotive – fully 75mm across and 30mm thick. In keeping with the finest traditions of the Club, it must have been at least a 1" Whitworth thread.

On the Saturday afternoon, a group of like-minded people duly went across to the Brickworks quarry, which was the traditional site for such experimentation. The nut was placed on a suitable flat rock surface and a substantial charge was placed in a cone above it. The party retired to a notionally safe distance, the charge was fired, and everyone eagerly rushed back to inspect the result, which was a reasonably impressive hole into which a further charge could certainly have been packed.

At that point, a strange noise was heard, which began as a distant whine but rapidly developed into a loud whistle. In their excitement, the fate of the nut itself had been overlooked. Miraculously, it had survived the ground zero event and had been propelled into the air, if not exactly to the stratosphere, then certainly very high indeed. Realisation was belated, with no time to react – not that any form of cowering or shielding of the head would have been of much use anyway. There was a dull thump nearby and then a relieved silence, with all having survived unscathed.

The nut proved surprisingly difficult to locate, because it had buried itself at least 150mm into hard ground. It wasn't even bent.

*(© Tim Lewingdon)*




*Anon*

**The Grease Monkey**

And it came to pass that, on a crowded Bank Holiday weekend, the grease trap before the septic tank did block and there was an unpleasant effluvium in the camping area.

And the assembled multitude was sore afraid, for it knew what came next, which was that the grease trap needed to be bailed and dug out. And so, the more experienced of those present began to back carefully away, with tales of hard caving trips upon which they had promised to lead others.

But there was among them one who was braver, or mayhap foolhardier, and he said, "*I will empty it*."

And they said, "*Can it be that you are going to dig it out by yourself?*" And he said "*Nay, I am going to pump it out. Bring to me the old petrol-driven manhole pump which has been under the bench in the workshop these many years past*."

And so, they brought him the pump and he fettled it and checked that it started and ran, and it seemed good. And they brought him also a collection of suction hoses and delivery pipes, and all seemed well.

And they urged him to start, yet he demurred and said, "*it is needful that I first change*." For, while he may have been foolhardy, he was no fool. And so, he took off his outer clothes and arrayed himself in furry suit, oversuit, wellingtons, veterinary examination gloves and his beloved South Crofty helmet with the very wide brim.

And then he was ready.

But the pump, though it ran, did not deliver the effluent. And there was one among the crowd who said, "*it is needful that it is first primed*." And verily that was so.

And the only means of priming was to unscrew the blanking plug from the pump chamber and to pour water into the pump. Yet when he did this, the water ran out from the pump down the suction hose, for there was no non-return valve.

So, he said "*I will start the pump, and pour in water and refit the plug quickly when it catches*." He smiled as he said this, for what could possibly go wrong?

And the pump caught, and effluent fountained out and he essayed to refit the plug, but to no avail. And he cried "*I have cross-threaded it*."

And he was covered from head to foot, and yet he laughed.

For the others had drawn closer despite themselves, for they were the clockwork caving club and wished to witness this engineering miracle, and they too reaped the benefit. And he was the only one not wearing good clothes.

# An Interview with SWCC President, Fred Levett

## Interviewer – Lel Davies

During the summer of 2020, our 'correspondent' caught up with Fred Levett, our current President, and asked him about his role in the life of the Club.

***You have been President twice. When were you President and how long for each time?***

I was first elected President in 2009 taking over from the late Peter Harvey. I had been a Vice President since I completed my second term as Chairman in 1996. I served for three years before stepping down and being elected one of the Vice Presidents again. In 2019 I was elected for my second term.

***What was your first reaction each time to being told that you had officially been voted in as President? Did it feel any different the second time round?***

To understand why it meant so much to me I'll just remind you of the process for being elected President. At least six weeks before an AGM six full members must nominate you, and at the AGM 66% of those voting must vote for you. It's pretty daunting to face the judgement of the membership, repeated each year, knowing such a high proportion need to vote for you. Also, knowing that our members will not be shy if they don't want you. I have a lot of respect for our members, many of whom I know well. It's a lot like an extension of my family. My reaction first time was on of pure pride to be representing an organisation I care a lot about. I said at the AGM, that as far as I was concerned, this was a bigger honour than anything the Queen might bestow, and I meant it! Second time round I was much more nervous. It was a much larger AGM and it occurred to me that the sea of faces in front of me were cavers from every interest group; expedition cavers, explorers, diggers, cave divers and cave rescuers, many of whom were pre-eminent in their field, and I now had a track record

to be judged against! I've done a fair bit of speaking in public over the years, yet addressing the AGM was difficult. Why? Because of the emotional attachment to the Club, the members and caving.

***What has been the most significant event that have occurred during your Presidencies? Tell me about it and what your role was during this event?***

In 2011 we purchased a small amount of land in which was the entrance to Ogof Ffynnon Ddu. This step cemented our relationship with the Cave

discovered by Peter Harvey and others in 1946. It changed our ability to access and manage the cave and our relationship with Natural Resources Wales, the landowner of Top Entrance. I was part of the negotiating team with our Chairman Tony Baker and trustee, Clark Friend. I worked with our solicitor to bring the purchase to a successful conclusion.

I will always remember meeting my good friend John Lister in a car park in Brecon to get the final signature of our four trustees on the transfer deed. He was sitting on top of his Land Rover so I could find him. He signed the deed on the boot lid of my Triumph Stag.

***What, in your experience, is great about being the Club President?***

There is no 'job description' or brief for the role, I can get involved in anything I want to and have a say. I also get to meet a lot of members and visitors, often ones that are important to the Club's external relationships. I see the membership as an extended family, and it is great fun. Also, over the years I have seen members join as students, get jobs, find a partner, perhaps have children, who in turn become members. I have always felt privileged to be able to pursue my passion for caves and caving in the UK and abroad. I like to encourage others to develop their particular interest in the underground world.

***What are the challenges of being the Club President?***

Whilst I'm called on to speak at celebrations and other events, which is really enjoyable, I sometimes speak at funerals for Club members. Most often, I have known the member and family for years and it is very emotional. Older members (of which we have many) may in their later years not come so often. They still expect me to remember, quite reasonably, their name. There have been some tricky moments! Also, I cannot be seen to side with any particular group; I have an obligation to represent the whole membership.

***Can you tell me why it is important for the Club to have a President?***

I was asked this question just before lockdown in the LCR. Why with 'no job to do' do we bother to elect one? I think it important to have a representative, not involved in the day to day running and politics who can speak for the Club and membership collectively; someone who can, when needed, paint the bigger picture and who can bring a sense of continuity. Perhaps the commentator was giving me a hint I needed to sharpen up my act! I am very conscious that I am one of a select band who, since 1946, have been the figurehead: North, Glennie, Harvey, and Rowland. It feels quite a responsibility.

***Lastly, what has been your favourite moment as President and why?***

They say it is the small things you remember most sharply in life. In a pub in Corris, North Wales during a Club mines trip, a younger man came up to me.

"*Do you know Gary Jones?*" he said. This is a question I have been asked in some unlikely places in the UK and Europe over the years, Gary having travelled extensively and always quick to engage with the local cavers.

"*I do,*" I said.

"*Are you Fred Levett?*" he said.

He asked after my son, Duncan, and it transpired he was a friend of Gary's son, Rowan and used to come up to the Club as a boy. It had plainly made a big impression on him. He took me into the other bar to meet his wife and family like an old friend and introduced me as Fred, President of the South Wales Caving Club.

# *Some thoughts from an ex-Chairman*

## Pete Hobson

It was strange coming to a new club 23 years ago. Is it normal for someone with over 30 years of caving experience to be the new unknown kid in the Club? In many ways, although I had come from the largest and oldest club in NZ, visiting Powell Street for the first time was a bit overpowering. There were so many more new people than you'd ever meet at a Kiwi caving event, and all with very different life experiences from mine; it was a complete culture shock. However, I was made welcome. The first people I remember welcoming me were Heather and Marg, who made me feel at home, and having recently been bereaved, I almost felt as if I had been adopted by two new mums.

The caving was also different. Most of what I did in NZ was exploratory. Even now, if I was in NZ, I could drive into the hills, 30 mins from the fourth largest city, and walk into undiscovered caves. I know of entrances that have never been entered. Contrast this to Wales, where to find anything new, requires years of digging, or climbing; I felt a bit out of place. Also, at that time, I was suffering from caving burnout and had consciously made the decision that I needed to stop caving for a few years. It didn't help that the caves here all seemed very cold, small and squalid. I also missed my carbide.

However, some people just need to go caving and soon Lisa and others were dragging me underground. My first trip in OFD was a trip to Northern Lights with one of the grumpiest old men in the Club. A result of that trip was his portrait, a copy of which hangs in or near the Small Common Room. I suppose, because of my age, and because I was introduced to the Club by Lisa Williams, I soon started caving with the likes of Ali Garmin and Jules Carter et.al. and this got me involved in the Rifleman's dig trips, but more importantly got me involved in rescue.

Lisa didn't need to encourage me to get involved with the Rescue Executive and the Club Committee. I had been President/Chairman of the Hamilton Tomo Group (HTG) for four years prior to moving to Wales, as well as Secretary for a year and Newsletter Editor. Having grown up with parents running the NZ Speleological Society, it was just natural to get involved. It was a bit of a shock when I ended up Chairman of the Club. I hope I did an acceptable job of it.

Working Week is also an activity I've always enjoyed. The first couple I attended were much more relaxed than they seem now. Although there were plenty of jobs to do, there was always time to get some caving in. This seemed to change the year we ripped out the chimney in the boiler room. That was one full-on week, in which Tom Moore and I shuttered and pinned the wall by pouring in tons of Galpinite. I wonder if anyone will ever notice things like the Kirby Mug I set into the wall or a year or two earlier, the faces I moulded when pointing the Fornacatorium; and "*no Clark, it wasn't me that cut the slab in the fireplace!*" However, the thing I really enjoy, even when the midges are biting and the incessant rain, is the company: Working Weeks are like unexpeditions; you all have to work together, the food is fabulous, and the beer flows well into the night.

Cliques: there are many. Do I fit in to one; I don't think so. I like hanging out in the library with the 'library crowd'. You can get some peace and quiet there when the Long Common Room (LCR) is overwhelming, and it's always warm, but I'm not of the Library Clique. You'll find me behind the bar, on a comfy chair, in Ye Olde Ruined Strumpet; again peace and quiet or at least, slightly less manic. I'll be found in the LCR avoiding the carnage of Married, peace and quiet again. Wandering around OFD on my own, listening to opera or Gregorian chants

through my ear buds whilst taking photos: Peace and glorious quiet! Quite frankly, I'd rather negotiate an underwater squeeze in zero viz than be 'shoe-horned' into the LCR. From this you might think that I hate company. No, I thrive on it, especially the company of the sort of people who become cavers; it's just a shame not being able to hear what you're saying and it's the struggle to do so that I always find overwhelming.

So, in my humble opinion, the Club is most inclusive and at its best when the sun is shining, the midges have gone hunting elsewhere, and the picnic tables are loaded with cakes, biscuits and pots of tea. Everyone is talking about caving and caving kit or similar, e.g., when various groups meet at pinch points in a cave, with people squeezing past one another, and while waiting, talking meaningless rubbish over a Mars-bar-session and snapping photos. When you're talking about caving, you can, if just briefly, forget about all the other rubbish in this world.

*Around the fire circa 2015. (© Pete Hobson)*

# *Hiraeth*

## Caitrín Pursell

Twenty-five years ago, at the age of ten, I was asked to write a short article that would feature alongside Caitlin Bones' (née Day) recollections of her childhood in, on, around and under, Number five Powell Street in the late seventies and early eighties. My article started with, "*Most of our days are spent nicking stuff for Kelty*" (Peat). I am happy to report that to the best of my knowledge, this early criminal intent remained limited to the workshop, main kitchen and, on one memorable occasion, Ye Olde Ruined Strumpet, and none of us have continued in our life of crime. Although, Angharad Lister probably still owes money on someone else's bar tab.

My recollections now, of a childhood of the nineties in, on, around and under Number five Powell Street are probably at best hazy, and at worst, the entirely fanciful creations of a child… so, I beg the forgiveness of my fellow inhabitants of married for anything of the following that does not quite seem how you remember…

*A drawing by Jenny Peat of the back room of Married Quarters 1986. Thanks to Kelty Peat for sharing.*

There's a saying about parenting that "*it takes a village to raise a child.*" Nowhere, could this be more evident than on Powell Street. Fathers and mothers would take it in turns to be in charge of the children while their partner spent a day on their own interests; this sacrifice for the community never more evident than in the fact that every year one family would mind us while all the other adults went to the Ceilidh. Being on top of a mountain with fifteen semi-feral children has a distinctly Lord of the Flies edge to it! In number five, family ties blurred; "*Lel...*" "*No Nick, I'm your mum!*" Every adult was aunt or uncle, and we absolutely knew which adult would console us, which adult would cajole us, and which adult would threaten to eat us. Ahem, Bob Hall... There was no doubt that whichever adult was nearest, would reprimand us if needed, so, for the most part, we avoided adults. Considering that all of the parents seemed to have a hands-on attitude to parenting, whichever child or children were closest, it seems very odd to remember that somehow, despite lots of adults around, Laura (Buckberry) managed to get left at SWCC once when her parents departed for home in their separate cars.

*Various children sleeping like sardines upstairs in Married Quarters, May 1997. Photo provided by Margaret Richardson*

On busy weekends, we would be 'packed in' like sardines, sleeping four across the bunks. Over time, most of our parents gave up trying to separate us into families to sleep, gave over the back room to children, and quite sensibly, shut the door on us. Lel Davies lasted longer than most; some say that it was because she loved children. Others know it's because she was our confidante and so knew best that we were not to be trusted. We could be fiercely protective of each other as children (especially when milk went missing and nobody would own up*) but we could also be foul to each other. I'm still not sure that Bethan Moore can visit the beach without feeling queasy after eating sand cakes aged three, because Adrian Davies said they were delicious. The busy weekends of fancy dress parties, fireworks, New Year's Eve and the Ceilidh punctuate the memories of our childhoods.

The overriding factor in all that we did to pass our time on Powell Street was the weather. In winter, there would be sledging on trays and hitting every rock on the way down, igloo building and skating on ponds that we absolutely knew we were not supposed to be on.

*From L-R: Angharad Lister, Hannah Lister, Robert Richardson, Thomas Moore, Megan Moore, Bethan Moore and Caitrín Richardson atop a gate New Year 1994. Photo provided by Margaret Richardson*

*Chloe Foster dressed for caving success. Photo provided by Annie Amatt*

*It was Kelty. It was ALWAYS Kelty. Apparently, there was not enough lumpy Angel Delight in the world to sustain him.

For the rest of the year, in all but the wettest and windiest of weather, we would only appear back at the cottage for food or because we had hurt ourselves. Normally the former; if we had hurt ourselves, it was probably our fault anyway, and it was easier not to explain how it happened. Besides, sympathy could be short. We always 'should have known better'. After a misadventure in a tree, Robert Richardson had a brick dropped on his head. Allan Richardson, who was digging, enquired after the brick, but not before his son was already en-route to Morriston in the back of Elizabeth Jay's car. That's not to say that our parents weren't caring. Tess Lister was frequently pressed into nursing action! On one memorable occasion, Bethan Moore appeared in the kitchen absolutely covered in blood. Bethan was screaming, so all the adults set to stem the flow. Unfortunately, despite their best efforts they couldn't find the wound. Hannah Lister helped by nearly fainting, at which point, a small puncture wound was discovered behind Hannah's ear which had been pumping across Bethan as they shared a swing seat. Not always were we the cause of actual or near mishap. Ian Alderman broke a number of pairs of glasses by bodily throwing us in the bin in jest, and someone nearly drowned Kelty several times over by using the same technique to dump him headfirst in the kitchen sink having caught him pilfering. Once, John Lister, having come across the boys, who were just on the cusp of acceptable axe-use age, having a go at chopping wood, decided that there was no time like the present for some lessons. With hindsight, he should probably have waited for daylight, and been a little more sober.

When the weather really was too wet to spend time outside, we would turn the 'upstairs back room' of Married into an inside den. As long as we weren't causing too much chaos, or noise, our parents didn't seem to mind. Two things did not go down well though; jumping off the top bunk as part of a homemade obstacle course and the game of 'worm' which involved holding onto an open sleeping bag hanging over the top bunk while someone else jumped in. We broke through a lot of sleeping bags! The constant dare was who would be brave enough to slip through one fire escape into the ladies' bedroom before nipping back through the small emergency door into the honeymoon suite. Hell had no fury like a soup dragon. We were in both terror and awe of their enormous pans and ladles; the thought of running into one of them during this excursion was normally enough to put us off. The 'downstairs back room' of number five was reserved for adults, eating and the smallest of children. We remember fondly, the chalkboard, the puppet in the corner and the sticky table with church chairs. In fact, I can still smell wet socks, old sofas and four different dinners when I think about it.

In fine weather, or what passes for fine weather in Penwyllt, our time around Powell Street as children resembled another childhood book, Stig Of the Dump. If it wasn't nailed down, we took it. Everything has a use. Hammers and old saucepans were particularly prized. Sam Moore was the long suffering 'gatherer up-er' of our pilfered loot. "*I'm off to collect the crockery,*" was a familiar Sunday afternoon utterance of his. We had a series of Dens scattered around the surrounding countryside – Tree Den, Ditch Den, Cliff Den, Quarry Den, Brick Den... These locations were top secret, so, naturally, everyone knew where we were. Some were more sensible than others (Nettle Den was a short lived and ill-advised location), but they all shared a few things in common; firstly, they were often ingenious in their construction (an early den had a working sink) and that they were a huge health and safety trap.

*Keyhole cave from the top Bryn Goodhead, Rhys Goodhead, Hannah Lister, Adrian Davies, Thomas Moore, Nicholas Davies, Huw Goodhead, Angharad Lister, c.1995. Photo provided by Sue Goodhead*

A hole den dug into the cliffs above the Cwm Dwr managed to get so deep that our parents could no longer ignore its existence, and, for safety's sake, Kelty, Bryn and Rhys (Goodhead) were made to fill it in. Tree Den had a complex pulley and counterweight system which negated the need to climb up and down. This system was removed by persons unknown shortly after the brick to the head incident. Brick Den was regularly inspected by our

parents who had imposed strict height limits (nine bricks with no roof, seven with) which we ignored. They also didn't like it when we lit fires inside. Rules had to be made about where fires could be lit. Thankfully, our early starts on the day after the fireworks party meant that we could still rekindle the bonfire with discarded firework sticks without the interference of adults. Brick Den was a distinct step up from our previous efforts. It often had carpet (wet), seating (wet) and lighting (stolen). In contrast, Ditch Den was exposed to the elements and flooded constantly as a result of the road run-off. It was also frequently cleared of our 'treasure'. To this day, we talk about being told to remove one den as "*it was an eyesore,*" which considering photos of the Club at the time, demonstrating discarded washing machines, the old bin store and piles of broken machinery this seemed a bit rich! The removal was justified by invoking something to do with local wildlife and irate farmers. Speaking of irate farmers, it's a good job that none realised that we were quite so into building sheep traps. Especially since the one time it worked; we had no idea how to get the sheep out and devoted several hours to the conundrum. I am glad to report that we did make up for this youthfully innocent incident of animal cruelty by rescuing lambs from wire fences, ditches and cliff ledges regularly.

*Nicholas Davies, Megan Moore and Phayme Peat in Brick Den, c.2000. Photo provided by Bob Peat*

On what felt like rare occasions we were treated to a trip out; swimming (although I now realise this was just a reliable means of getting us all washed), to the wildlife park, Dan-yr-Ogof or Craig Y Nos Country Park. A couple of times we went to the pantomime in Cardiff or Swansea en-masse. No idea what sort of children's home the locals thought that our motley crew had been released from as we piled out of the boots of cars.

As we grew, we became a little more helpful, only a little mind; I'm sure many a member has cursed the vivid colours Hannah Lister, Chloe Foster and I always chose to paint walls. I am very certain that fewer hammers disappeared too. We have fond memories of working weeks; an army of child sized painter and decorators, although the most talked about recollection of working week, is the time that we were allowed to help smash out the old kitchen in number five with a sledgehammer. Graham Christian must have been very fed up with our constant badgering for rides on the dumper truck and eventually stated that if I could start it, I could drive it. I am not sure if he regretted this, following the one near miss where it very nearly rolled down a steep bank, and had to be towed off safely with his Land Rover. Megan Moore and I both agree that enough time has passed now to admit that she, (aged ten), was in fact driving and not me (aged sixteen), which considering it was fully loaded with gravel and children, doesn't sound much better!

Of course, over time, many of us drifted away from SWCC, as we discovered our own interests. By late teens very few of us were keeping up the caving that had brought our families to Penwyllt originally. But, on busy weekends, there was always a friend around, and we would fall back into the easy familiarity of our childhood like no time had passed. It's a rare month even now that I don't talk to someone that featured in my childhood at number five. I would like to thank Chloe, Laura, Ruth, Nicholas, Bryn, Rhys, Angharad, Hannah, Meghan, Thomas, Phaymie and Kelty for their contributions to this article, and their enduring friendship.

Hiraeth indeed.

*1991 in micro-fashion. Adrian Davies and Kelty Peat, before Kelty's "I only wear black" phase. Photo provided by Lel Davies*

# *Life Growing Up at SWCC*

## Emily Mabbett

My childhood was far from average, and SWCC was one of the big reasons why. My first experience of the Club was at merely a few weeks old, and quite frankly I don't remember a single part of it, from then until now I've never gone more than a few months without a trip to the Hut, and I hope this never changes. I suppose I can sum up my childhood experience at SWCC in 3 main points; For one, I have a ridiculously good immune system after being subject to the 'odours' of the caving world from a very young age. Secondly, and single handed, I managed to push multiple teachers close to calling child services with my "*what I did on the weekend*" reports retelling my experiences. Finally, my life was, and is, a non-stop adventure in the outdoors with my caving club family.

*(©Jules Carter)*

*(©Jules Carter)*

I think that's one of the best ways to describe SWCC, a family, yes, we are VERY dysfunctional, and quite frankly there is an extremely unhealthy amount of Facebook arguments, but at the end of the day there's always someone willing to have you on their trip, lend you some milk for your tea and generally have your back. From a very young age my parents liked to dump me on unsuspecting members whilst they went on a trip, or just got drunk. I can happily report that I've never been kidnapped, and I was only slightly scared by Paul Meredith's storytelling. It took me many years to learn that I couldn't run up and annoy any odd-looking old men, and that this was only acceptable when up the Club.

Now, obviously I wasn't the only annoying small thing who ran around the Club making a lot of

noise. To everyone's delight, there were a whole group of us, who still to this day run around making too much noise. As the kids of the Club, we've always resembled that of a sibling group. We fight constantly, share one bedroom, and know exactly how to annoy each other. But we also have a constant laugh and have squeezed as many of us as possible onto one bunk, so we could stay up late whispering; we always have a blast with each other.

*(©Jules Carter)*

As younger kids we would stay awake well past our bedtimes and continue to make way too much noise, even after our parents had been in multiple times to shut us up. We were also 'masters' at pretending to be asleep when they checked up on us… We spent much of our time terrorising the local wildlife, from collecting tadpoles in the rainbow pond, to collecting snails, and once even trying to save a dying rabbit... Spoiler alert, we didn't succeed, but there is now a lovely grave next to the workshop. In between caving, eating and whatever else we would do during the day, we would often play a game, namely hide and seek. This was probably when we would cause the most trouble, with boys hiding in ladies' quarters, small children finding places to hide in parts of the Club where they weren't allowed. But the biggest crime of all was climbing on top of the workshop roof, something we would be shouted at for constantly; but it was the risk of the game that made it all the more fun, so obviously we just made more of a nuisance of ourselves.

*(©Emily Mabbett)*

Along with constant activity and adventure our lives at the Club also involved rainy days where we simply made a blanket fort and watched movies all day or made cookies and drew. These were some of the best days; the moments at the weekend where we could relax and be away from the world of internet and technology, something that is becoming more and more rare. As we've got older the adventures have never stopped. They just become bigger as we've grown, now we have learnt how to hide things that we shouldn't be doing, such as sliding down the married stairs on mattresses, and taking on bigger adventures both in and out of the cave. Abseiling on a lifeline in a quarry has become lead climbing; little kiddy trips in OFD have

*(©Jules Carter)*

*(©Pete Hobson)*

become through trips, and our sleepovers in makeshift tents have become full-on camp-outs in a cave.

What growing up at SWCC gives you is not only an ability to take on huge challenges at a young age but it also provides the best people to take on these challenges with. Not many kids our age understand what we do, or even why we do it, but we have each other to be scared with, to laugh with, and to plan our next adventures with… and of course, to make mischief with as well.

*(©Jules Carter)*

Something that's always astounded me about SWCC is how certain things never change. Yes, the colour of the walls change, the showers become less communal, and the old people seem to multiply over night, but certain aspects have been the same for my entire life. The parties and celebrations are always the same and consist of far too many drunk and half-naked men. The Hog roast almost always ends with someone running around with a pig's head on a stick, and despite the fact that the younger generation are now all teenagers, we still decide to roll coins along the floor at the Ceilidh to entertain ourselves. It's these traditions that make life at the Club so unique, and as older traditions die, we simply come up with new ones. As I've gone into the university caving world, I have come to realise that this isn't something that is unique to the SWCC but more to the caving world in general. Caving games and songs are… well, special to say the least, but they are more alive than ever at student caving events, and apparently people getting naked is just a general caver trait. So, whilst we could undoubtedly be registered as a legal cult, growing up at SWCC has allowed me to grow up in this extremely unique world that I wouldn't change for anything… well, I'd change a few things - for instance, can the tall old men who bolt caves please take note that small 5ft women also like to rig and you are making it extremely hard for them!

One of my favourite times of the year at SWCC is Working Week, and no, it's not only because we get to ride in the dumper truck, but despite being also covered in paint constantly, Working Week has

*(©Jules Carter)*

always been a time where we get to spend lots of time together and generally have a good time.

From putting our handprints on the walls in Married Quarters, to arguing over who gets to ring the bell for cake. Working Week lets us forget about our school lives for a week and just live in the moment. With late nights and early mornings, it usually tires us out, but I'd have it no other way, with the weekends before and after often being filled with caving activities. It's one of the highlights of my year. Working Week wasn't the only event of the year where we would all be up the Club together. Bonfire night is also one of my favourites. I have many memories of sitting in an upstairs window and watching from there because of the noise, playing with sparklers in the rain, and of course, setting off 'out of date' flares. But it doesn't have to be a big weekend. Many of my memories of the Club come from normal caving weekends, from swimming in multiple rivers across the Beacons, including the Club's water supply, to setting up the fake cave at Craig y Nos. Each weekend I've spent there, I've made a multitude of memories, and never once have I come away from a weekend without a scratch or a bruise, and that's just how I like it.

In summary, growing up at SWCC has given me an incredible number of experiences and allowed me to experience things many kids never get to. The friends and family I have because of SWCC are second to none and I wouldn't have wanted to be brought up any other way. The sense of adventure brought into my life because of the caving world is

*(©Jules Carter)*

something that is going to stick with me for many years to come, and whilst I may have encountered one too many creepy old guys during my childhood, I've also encountered many incredible people who helped raised me. Married Quarters is like my second home and the Club my second family, so whilst being brought up at SWCC is certainly not normal, it's all I've ever known, and it hasn't killed me yet. So, as I grow up and lose my right to be first in line for food, I will never lose the memories and adventures SWCC has given me.


*(©Meghan Hallihan)*

**SWCC with kids in the 20-tens**

**Jenny Burrows**

Even when I first visited SWCC as a young and carefree student I noticed how many families were about, quite unlike any of the Mendip or Yorkshire clubs I had previously visited. I met people my age who had grown up there, with three generations of some families visiting together.

When after some time I had twins, it was time to move into Married Quarters! I think it is this area that makes it possible for the kids and the oldies to get along fine without cramping each other's style too much. The cynical folk could see it as a place to save the adults from having kids around, but I don't know of any other caving club that has any provision for families who don't want their kids to sleep in a room full of (other) snoring, beer-addled cavers. The main disadvantage from our point of view is that the stone walls are too thick for baby monitors to work from upstairs married to the Long Common Room!

So, what do the kids think of SWCC? First, I asked Rachel, aka Gary Jones' daughter, for her thoughts. As a 'grown up' now bringing her own kids to SWCC, she was a frequent visitor from birth. Camping under the stars in the party quarry and playing in the tree house were highlights of childhood that came to mind.

I asked the current generation i.e., Thomas and Matthew. Their main loves are the treehouse (sadly in need of major repair!), making dens, mining for gold, collecting caterpillars, and the whirly chair someone dumped in married. They really like the cosy feel of married and the fire in the Long Common Room and exploring. Overall, they get a lot more freedom at the Club, as there is a lot of room to roam and explore while the adults can sit outside and still make out a vague outline of where they might be! Although I get the impression that previous generations had even more freedom, times are changing, and this still offers more roaming than they can do at home.

But what about the caving? Well of course, today's kids still do that, though often because they know there will be a Mars bar break at the bottom. Rachel remembers being sent down 'mousehole' passages by her dad which were small enough that only she could explore them. I'm not so confident of my knowledge of the cave to do that, though we do have a few spots to explore. Sadly, I think some children then feel caving is not so exciting because mum and dad do it, but some of them do become keen and return to the Club as grown-ups. But even if we are not exploiting the kids as a source of new members, at least our existing members are still able to sample the delights of the Club with kids in tow!

*2nd and 3rd generation cavers (©Jenny Burrows, 2017)*

*October fire at the Club. Photo sourced from the Jones family album*

*Sleeping in the party quarry. Photo sourced from the Jones family album (1980s)*

**SWCC as a child in the 80's and 90's**

**Rachel Stewart**

I remember endless days at the Club as a child. A sense of independence unlike anywhere else. I enjoyed days when my brother and I, together with other children, took packed lunches and headed off into the hills behind the Club for the day. The freedom was abundant. Passing of time was different at the Club, mealtimes forgotten, as was washing and changes of clothes. Dirt, cuts, scrapes, ripped clothes were all part of the day!

I recall endless interesting things taking place in and around the Club. Cars being fixed, dumper truck rides, water fights with hoses to wash down caving gear. There was never a dull moment.

Of course, there's the treehouse, a fond place for many. I know the shape of the branches, the knots in the tree, the foot holds - still now, 30 years on. With key events etched in my mind like Nicky, Fred Levett's daughter, falling out from a high branch!

Of course, there was the caving! I had a sense in school, that nobody believed me, when I would talk about ladder pitches, the streamway, Pluto's bath, a family favourite for a comedy 'dunk' on the way out.

As a child, I remember the delight of being able to fit into passages my dad could not. I recall my dad encouraging me, "*go have a look in there, tell me what you see!*" My brother and I had our own name for some passages, as we wandered with mud smeared Indian war paint style around Top Entrance. We had our own names for various Club members too, based on particular events or characteristics - 'snoring man, teddy bear rescue man, fix it man', and all are still members!

Then there was the cleaning. My grandma lived in Neath. A wonderful lady, always well presented, looking her best, she was also very house proud. We often would meet on visits to the Club. She never came up to the Club. She'd been once "*that was enough.*" My mum would scrub us clean, detangle my hair for hours, advise me not to say too much about our weekend underground. We had a complete change of clothes. I also remember grandma offering me money, to pursue low risk more 'lady like' activities, sewing and painting. The knowledge that we were doing something different with our weekends as children, something adventurous and dangerous, motivated me further.


*Outside the HQ, 2006: (top row) Beth Lewingdon, Josh Vaughan, Alex Meredith, James Meredith, (bottom row) Jayelee Thomas, Emily Mabbett, Rhys Lewingdon, Ben Vaughan (© Andrea Lewingdon)*

*Jules Carter and Ali Garman running kids' abseiling with Thomas Garman (left) and Rhys Garman (right) (© Tim Lewingdon)*

*Caitrín and Adrian helping build a bonfire*

*Working week child labour: Adrian*

*Halloween 2003, left to right: (top row) Phaymie Pete, Angharad Lister, Laura Buckberry, Bridget Hall, Bethan Moore, (bottom row) Megan Moore, Beth Lewingdon (©Graham Christian)*

*Kids in the treehouse (© Jenny Burrows)*

*Ogof Fest 2011, Kids' Auction (source unknown)*

**SWCC and me**

**By Megan Moore**

I am a child of South Wales Caving Club. I have been going to SWCC throughout my 28 years, very regularly as a child and much less regularly now, but it will always be part of me. Here are some of my memories at Penwyllt.

Working weeks… Where else would a child be set loose with paint, (always Magnolia - Inner Mongolia or Outer Mongolia), or have the excitement of painting Ladies stairs purple, given saucers to smash into a skip, and allowed to drive a dumper truck as long as we had the muscle to start it?

I remember my joy when Caitrín (Pursell, née Richardson) let me steer the dumper truck long before I could even reach the pedals, and then the subsequent subterfuge, when I accidentally led us into a ditch. Of course, we pretended that I hadn't been involved and John Lister towed us out with his Land Rover.

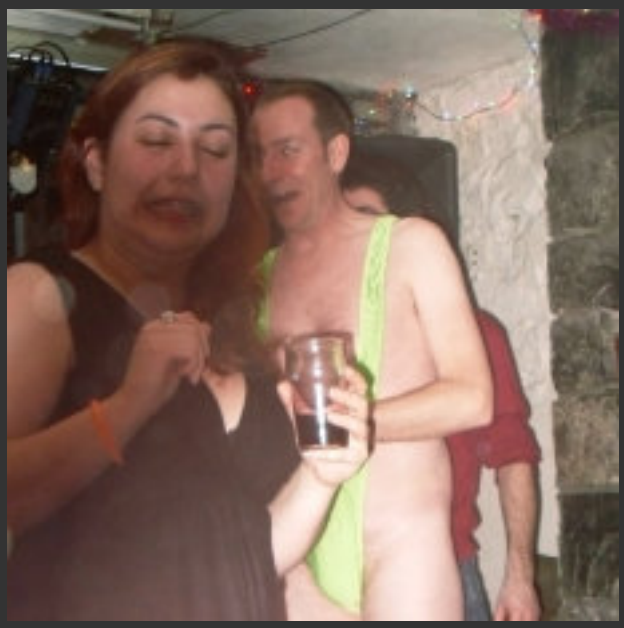
I remember lazing around the back bedroom in the top of Married with all the other kids until 10:15 and then magically getting up and dressed in time for the gong, announcing tea and biscuits for all the hard workers!

I have enjoyed countless SWCC parties, which have given me a particular fondness for The Monkees and the unforgettable experience of seeing Ian Alderman wearing only a neon green mankini (and Converse, of course). For the record, Ian agreed for the photos to be included but I am to blame for the trauma they may cause. On another occasion, I recall Ian sporting a small girls' denim jacket and trying to sell it to us children for what seemed like an extortionate sum of money. The whiteboard outside the Small Common Room always seemed to have a silhouette of Ian's nose drawn somewhere on it.

The annual Ceilidhean were another highlight. We Moores were not allowed to go until we were 10, but when I was only 9 there was no-one to babysit me and so I got to go a year early, and I absolutely loved it. I still love Ceilidhean.

Looking back, there were plenty of things that I did not understand as a child. I have since appreciated the comedy value of the life-size inflatable lady doll that was around for a time, as well as innocently telling my teachers that I slept in the 'fornicatorium' at the weekend, along with the other kids. It was only years later that I realised what that meant…

For me, and all the kids in my sort of age group, SWCC was a place to run free, explore, make dens and mischief. We were lucky to get free reign of such beautiful wilderness and to have all the SWCC adults looking out for us and keeping us in our place – especially Peter Harvey, who did NOT like children!



*Photos provided by Megan Moore*

**How to become a Soup Dragon**

**By Marijke Teeuvissen**

My career as a 'Soup Dragon' began in the late 1980s. My first encounter with the SWCC was after a meeting in the Tafarn-y-Garreg with Dave Edwards, Ian Todd and Julia Hunt. It was they who invited us to come and dry our clothes (and the rest of our camping equipment) at the Club after they found out that we were the poor Dutch people on bicycles who were the only ones who camped on a half-flooded campsite.

So, my first contact was made with the SWCC and a few years later I came for the first time on my own, at the invitation of Dave and Heather, who also gave me a lift from London, to assist the Club during a Working Week. An experience never to be forgotten.

In recent years, it has been well organised and above all, well-equipped. In the 1980s, it was a pleasant chaos and we mainly improvised!

But where shall we start with the job of Soup Dragon? The gas burners (connected to a gas pipe on the wall) had to be put on the work surface, so there was hardly any space left for your other things; burners that you could hardly control so that they either went too high or too low, so food burnt or undercooked; the pots and pans (often too small), we got from everywhere and nowhere and then had to clean them after they had been used by others for a year (just like the kitchen, by the way, where you sometimes had to scrape the grease off the tiles to get them clean); blunt knives (if there were knives at all); too few plates so that we first had to wash all plates to be able to serve the dessert; a kitchen that was really full of food boxes from all present; hardly any cold storage, so we had to run errands every day to keep everything fresh. The list goes on…

Shopping in particular was quite an undertaking, with often four or five in the car (Heather, Lesley, Judy, Marge and I), having to drive all the way to Swansea to the nearest supermarket. We would often be without a shopping list; it was known approximately what we would eat that day, but what you needed for that… that was thought up on the spot! In short, we spent hours in the supermarket (including our tea break of course) and then drove all the way back with a packed car, to find out that a few new workers had arrived who also wanted to eat with us! So, we improvised some more to feed even more mouths. All afternoon, we would be busy peeling potatoes, cleaning vegetables, making desserts (there were no ready-made desserts at that time), peeling even more, cleaning and then getting everything cooked in the pans. And of course, as it was around five o'clock, it became wine o'clock, so it all took a little longer to get everything ready, haha!

In addition to being a grocery girl, I was also allowed to do the dishes, which was not always pleasant with my height of 175cm and a very low sink, but I survived that too. In no time at all, I had made a career. I was promoted to Rice Dragon, meaning I was allowed to cook the rice for the whole orphanage (picture the scene from 'Oliver'!) and I kept it warm in my sleeping bag. That meant there was at least more space in the kitchen to cook the curry and we had no lumps of rice, but tasty dry rice - a trick, by the way, that I learned from my mother. So, after a hard day's work (without time for lunch I might add), dinner was usually ready around 8pm. Everyone could cram themselves into the dining room (how many people fit in there if you push through?) and attack. Sometimes, people took refuge outside or to the Long Common Room because it became too stuffy in the dining room.

But I still didn't have the title 'Soup Dragon'. This was reserved for the four wonderful women who took the initiative at the beginning. Only when they retired, were we allowed to take over the name and I am proud to bear that title.

And although, today, the cooking progresses more smoothly and is faster (the kitchen has been modernised, we have good cooking equipment and are equipped with all modern conveniences such as stoves, fridges, freezer, etc., etc.), I still sometimes miss the cheerful chaos of the early years of my career as a Soup Dragon. Only those sky-high piles of dishes… no, I definitely don't miss them!

*Source unknown*

*Millennium party: Lel Davies, Heather Eteen, Marj Jopling, Les Cardy, Judy Day, Provided by Lel Davies*

**Second Generation Dragons**

**By Lel Davies**

After the original dragons hung up their aprons, we continued the task with Judy who was happy to continue for another few years.

***Working Week***

Over the years we have catered for many events. Our main one is doing the catering for Working Week, usually the last week in May which includes the bank holiday. People make their own breakfast and for the rest of the day we cater for them.

In the morning we provide teas, coffees and biscuits. Lunch is a choice of sandwiches which are made up in the morning with crisps and fruit. In afternoon break, we have homemade cakes, lemon drizzle cake made by Annie H, a firm favourite. In the evening we do a meal for everyone.

To keep the Dragons going, we have a Happy Hour each day where we all drink a variety of gins with tonic, ice and lemon. But we found that an hour wasn't long enough, so we had to make it two hours instead! We really have had some fun times over the years with everyone getting on really well (well mostly). We all go home feeling absolutely shattered, but we obviously forget about that before the next year comes around and we do it all over again!

***Ceilidh***

The annual Ceilidh is always held on the evening of the AGM. This used to be really well attended, often with over 100 people! Catering for this event has in the past meant preparing the food and then transporting it to the venue. This is a really fun event and enjoyed by everyone. It is also a chance for the children to come along and join in the fun. For some reason, they seem to pick up the dance moves a lot quicker than some of the adults do! I can't think why!! Also, the Ceilidh is a place that newer members can meet up with other members. Watching people get the moves wrong is pretty entertaining. I must admit I am usually one of them, but we just laugh it off and carry on! When we did cater every year, it was again very tiring but very enjoyable and it was lovely seeing everyone let their hair down and mess up the dances! A great night is always had by all. We also order a coach to get people to the venue and back again for a small fee. So well worth coming along to the next one we hold!

***Diamond Jubilee Celebrations***

The 4th June 2012 marked the Queen's Diamond Jubilee and some of us were at Working Week so couldn't attend various celebrations around the country. We decided instead to hold our own Penwyllt street party. Some of the men put the marquee up in the car park and we, the 'Dragons', set to work, preparing the buffet and decorating the marquee. I decided that I would make some stuffed eggs and then very carefully, totally forgot that I had left them in the fridge!! They never made it to the table! Oops! As it was a street party, we also invited the locals. They were very pleased to be invited, and armed with many cans of beer, they came along and joined in. We also had a lovely celebratory cake which was kindly made by Anne A.

Everyone seemed to have a good time and it was fun to organize too!

Some other events that we do the catering for have been fire work nights, parties including Ogof Fest, Quarry parties, Pig Roasts and New Year's Eve.

(©Graham Christian)

(© Tim Lewingdon)


(© Tim Lewingdon)

(©Tony Baker)

**Southern CHECC at SWCC**

**By Simon Goddard**

For those you who do not know what CHECC is or what CHECC at SWCC means, then lucky you! No, honestly, it means 'a great weekend.'

So, a bit of background information for you. The Council for Higher Education Caving Clubs (CHECC) was created in 2002 after the first university caving club forum, by Chris Jewell and Joel Corrigan and has become a well-established organisation helping to protect student caving throughout the United Kingdom. Over the years it has built up a body of experienced student and ex-student cavers as well as links to established caving clubs, the BCA and other organisations. CHECC has also earned the support from the wider caving community as well as support from suppliers which is invaluable to student caving. CHECC is now supported by over 12 suppliers, over 13 caving clubs as well as the BCA, BCRA and UKcaving.com.

Many universities are squeezing outdoor sports within their establishments to their limits, making caving whilst at university harder and harder to do. One of CHECC's aims is to try to assist struggling university caving clubs, by helping with training and communication between the BCA and universities. CHECC is now made up of over 25 university clubs from the United Kingdom, including four clubs from Ireland. There are three main events organised by CHECC each year. Main CHECC in November, and Southern and Northern CHECCs in March.

Southern CHECC has been held at SWCC many times and it is a great weekend. Though I am starting to feel a bit old compared to the young students! I have been helping with CHECC for many years now and feel very welcome as a link between CHECC and some of the main caving clubs. I always try to volunteer as duty officer when CHECC is at SWCC. Though I do have one rule, I will NOT do the cooking!

CHECC knows that there is a friendly person on site who is willing to let the party happen but also knows that there is an SWCC member there to keep things under control. And of course, Tony Seddon is usually about as back-up and another first aider (who is usually required…).

Things have, of course, occasionally got out of control! Yes, ambulances have been called, cave rescues have happened, and a lot of alcohol consumed. But it's not just a big party. A huge amount of organisation has happened beforehand. And a lot of people have given up their time to pass their knowledge and expertise onto the younger generation of cavers.

There are multiple training sessions and talks running throughout the weekend. These include leadership training, wilderness first aid training, SRT sessions, cave photography, survey training, and cave rescue training run by the South and Mid Wales Rescue Team. Last year, the rescue team also ran a communications session using the radios, which was very interesting.

*(©Jeff Wade)*

*Photo sourced from the CHECC member archives*

*Photo sourced from the CHECC member archives*

The weekend also encourages inter-club caving trips, and one time in 2019, every cave key was out on Saturday and Sunday with over 70 student cavers in OFD on Saturday. As with any busy weekend at a caving hut, the social side is very important and extremely fun, with lots of caving games, competitions and a lot of drinking. Well, they are students! But as the Duty Officer, I tried to stay sober in the evenings. Which meant I could drink during the day instead (lol).

It is also quite amusing as the food for the weekend arrives on Friday night via an online order, with a chain of students unloading items from the van straight to the kitchen. Cooking for 100 plus people is hard work and a team effort. SWCC is a great venue for CHECC as it can accommodate a lot of people. More than you would actually expect. It turns out that you can actually sleep three people to a single bed and at least five to a double bed.

CHECC at SWCC is a great weekend for university clubs as well as for SWCC members. And I would encourage members to come along and participate. Maybe you can't face staying the night. If this is the case, come for the day. You will be surprised at how much fun you can have. Student caving sometimes gets some bad press but the only way they can learn, and become better cavers, is with the continuing help of the caving world and clubs such as SWCC.

*(©Jeff Wade)*

*Anticipation builds in a crowded Long Common Room. (©Claire Vivian)*

**2016 November Provisional Weekend**

**By Alan Walsh**

**"OFD1 Trip with Sam Moore and Chris Grimmett"**

I arrived at the Club a bit tentatively as I don't like crowds or meeting new people. The Club was very busy that morning but felt surprisingly welcoming for a place where I didn't know anyone. There were a lot more provisional members trying out caving than I had expected, but I still managed to find a spare bunk so that I could sleep in the warm after the trip. The kitchen was heaving with people, but mugs of tea and biscuits were forthcoming. Slowly, everyone gathered in the ever more crowded Long Common Room for Claire to allocate everyone onto trips.

Claire made everyone feel welcome, working with incredible efficiency to get everyone sorted out with kit - a long queue of people in borrowed oversuits and wellies, all needing helmets, lights and belts! Despite being disorganised, I was relieved to find myself in the company of many a fellow faffer. Cavers slowly drifted together into groups, with various folk forgetting things and disappearing to collect them. Finally, each team member managed to be in the approximate vicinity of the others for long enough to be caught on camera.

Our friendly group of five consisted of Sam, Chris, two agreeable provisional chaps and me. We set off enthusiastically, even if the wellies didn't seem like the most suitable footwear on the walk down the hill towards the OFD1 entrance. Climbing over the chain and down the ladder was a different start to the one I was expecting. Once the door was unlocked and we descended the ladder, I was grateful that we had a short time to acclimatise to both the darkness and the function of the headlamp settings. The start of the cave felt quite spacious with a level floor, but I was soon to find out that there was water about.

We climbed up the ladder and then over the beautiful flowstone of the Toast Rack, which seemed unnervingly slippery under my wellies. The most challenging part of the trip was the Bolt Traverse, with an unnerving step of faith to get started, even if it was onto a ledge that sloped away from the rock face and into the darkness! Carefully

*Mission-ready for muddying that spotless caving oversuit! (©Claire Vivian)*

clipping and unclipping as we passed each section, my cautious progress under Sam's patient guidance, contrasted with Chris's incredible confidence moving along the ledge. It was then a slippery climb up into the impressive Pi Chamber, using a rope for guidance and support. This huge chamber was very impressive, and the space was to be enjoyed, because after some clambering and sliding down, we had to traverse a very shallow passage under a bedding plane, which made it necessary to lay down and roll along roly-poly style through the passage.

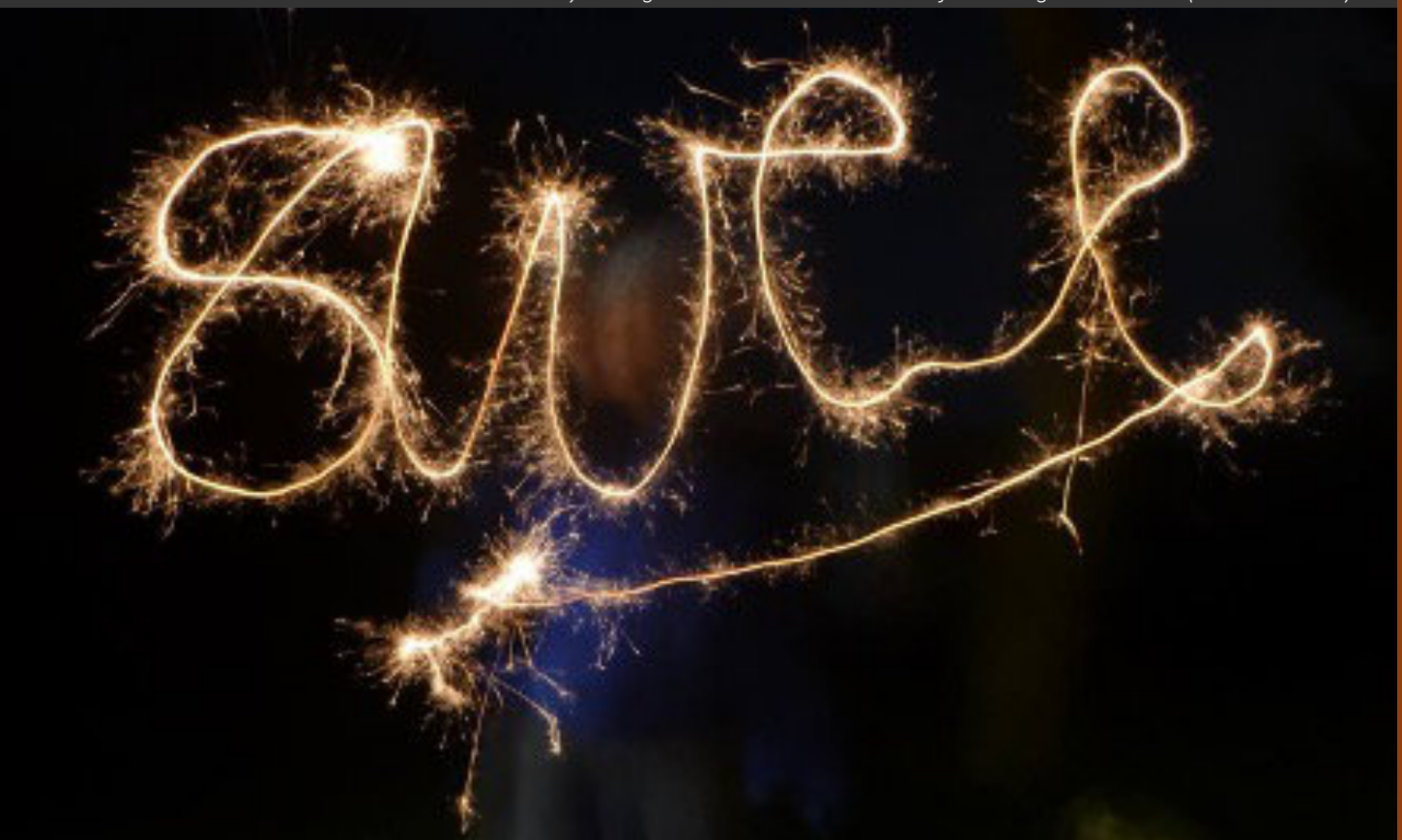
Following a rope assisted climb we finally found ourselves back in the streamway, where things were very wet. Pluto's bath was a surprise, best experienced on the way out – we all had a good soaking in the cold, deep water! At least it was a chance to cool off before taking a short detour to skeleton chamber. We all took turns to peer into the chamber, but being soggy and tired, none of us fancied the challenge of seeing if we could haul ourselves out of it!

Returning with a respectable amount of wet and muddy clothing, we clambered back to the hut. Tired but happy, we thanked Sam and Chris for their guidance and patience. Everyone was made to feel very welcome as the new provisional members and the seasoned spelunkers mixed happily. At the strike of half past seven, a huddle formed against the back wall of the cottages in the cold but dry weather, ready for the fireworks. With everyone bringing their own firework and a launch team as faff free as could be imagined, a continuous stream of sparks decorated the pitch-black skies.

Racing back to the warmth of the open fire and a cold beer, I was fortunate enough to be sat just offset from an older member in a cave rescue jacket. This, it turned out, was a particularly well-chosen spot to be educated in the customs of the Club, following the distribution of the Penwyllt songbook. With a strong voice and warm accent, the elder they called Mr Francis led an enthusiastic recital of some wonderful songs, instantly melting any hesitancy from the new arrivals. Even as an introvert, I was soon enthused to bellow out the verses with uncharacteristic vigour.

A master of his craft, he led the group in many of the songs, showing no fear of using gesticulations and impressionism to set off the songs like a Chinese storyteller embellishing his tales! The combination of the roaring fire, plentiful beer and the irrepressible voice of Mr Francis made it a warm and welcoming evening in a place I knew I would like to return to.

*Not sure my aching muscles could have moved fast enough to do this... (©Claire Vivian)*



# The P Factor

## Alison Maddocks

With trepidation did I agree to pen something when requested ('commanded?') by Lel. I'm no longer a very active caver though a pretty long-standing member of 'The Club'; and have been privileged to be so for a significant part of my life and have made many lovely friends over the years. Lel requested, and I quote, "*anything really*", "*just reminiscing*". Hmm; assume that "*anything really*" does not extend to a polemic on The Epidemiology of Preschool Thermal injuries and Association with Child Safeguarding. I digress. It'll just have to be 'reminiscing'. So, where to start? No idea. The beginning? Tricky. Therefore, I've resorted to that well known algorithm of using a sort of abecedarian ruse of using a single letter as pointer on the jumble of multiple memories over five decades. Though it will only mainly be the first two (late sixties and seventies).

- Personalities - (President PIWH, Photography, Pals)
- Passages (PPP, Pom Pom)
- Parties (Piss ups / plastered)
- Publication - (Plastered)
- Permanence

**Personalities**

The Club has certainly not been lacking in colourful, interesting, different and amazing folk over the years; impossible to name you all; many of you may be wasting your time reading this! But one can't libel those passed on so I will mention PIWH, perhaps the biggest P of all. Many of my early caving trips were with Peter and Gwyn. Gwyn Sanders, from Clydach a kind, gentle, generous man who could make anything tool wise and who died tragically young; he'd worked for years at 'the front' in the Nickel Mond in Clydach. I'll say no more but I always spare a thought for Gwyn as I cycle past this place. Back to Peter, though I'm sure others will reminisce on this Caving Club giant. He'd returned from somewhere on a yacht in the late 60s and never seemed to change over the ensuing decades. His love of young children was legendary (sic); the curry on the head of a small Day child at a Party in Pen y Cae went into the annals of Horrible Histories. Incidentally he also slept in our Pigsty that same night which was demolished soon after.

Hand in hand with Peter, of course, goes Photography; and I won't attempt to pay tribute to his skills and enthusiasm as others will surely do so, though his passion for it did seem to make some of those trips in late sixties and early seventies rather long. Though always worth it. We even got Peter to North Wales a couple of times. He didn't bat an eyelid on the rather scary scramble of Amphitheatre Buttress. Peter also hosted convivial weekends in Rhayader. Who could ever forget The Crown? The quirkiest pub ever!

Other sadly departed Personalities and friends (Ok - Pals) include Bill Little, John Bevan, Alan Coarse, Robin Williams, Colin Fairburn, Clive Jones, Bob Sanders, Bill Clarke (Willy Fossil), Bruce Foster, Mick Day, Penny Salt, Roger Flaherty, Mike Ware and many many others from more recent times. Sincere apologies for not listing more. Those above are some of the earlier caving buddies. I could relate many anecdotal tales about these lovely people, but they can be saved for another day: e.g., Roger losing (all) his trousers in a sump in a Mendip cave; Bruce's indomitable climbing style on Cloggy with foot drop; Mike Ware and Princess Margaret's visit to Dan-yr-Ogof and so on. Though never a Club member, Eddie Greaseproof from Brynaman was a very unusual and different character. He was a fount

of knowledge on Ogaf Pasg and other caves around Herbert's quarry.

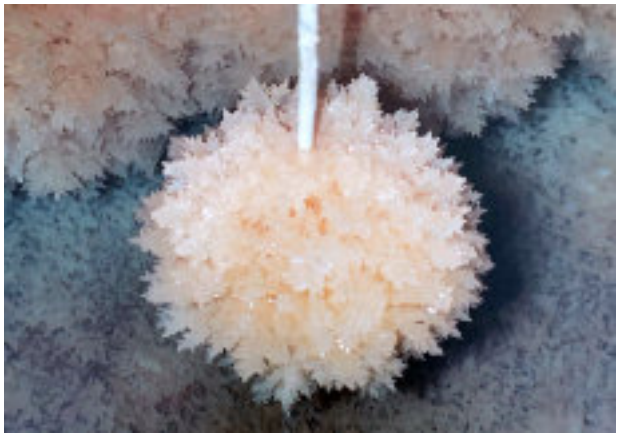
*The Long Crawl. (©Ken Maddocks)*

**Passages**

When I think of the DYO Long Crawl, I remember Neil Jones getting stuck there, his femurs just too long for the tightest bends! This reference to Long Crawl leads naturally to this huge part of the Speleological lexicon and I'll be brief here as most of you have more knowledge in your little fingers of cave passages than I will ever have. Getting successfully through the Long Crawl was a major milestone for me and then The Green Canal… My first time through this was in old clothes - the nearest I have ever come to drowning; it was absolutely terrifying. I couldn't afford a wetsuit in those early days (I was very fortunate to acquire the wetsuit of Edward Aslett soon after, another tale…). But those early trips in DYO were well worth it, a stunningly beautiful cave. Reaching The Far North on several occasions was simply wonderful and I'll always treasure these memories as well as a recent trip to the 1937 series with The Freems. I never thought I'd visit DYO again.

One final anecdote on the Long Crawl. A flatmate in the early seventies had squeezed through the Long Crawl prior to the well reported discovery; his initials (PO) in the mud at far end of Long Crawl were noted.

Peter's Pretty Passage has to be mentioned (prize for best alliteration!) was another rewarding enjoyable trip. And of course, Pom Pom passage: The only decent cave photograph I've ever taken (thanks to PQ and LW).



*The Pom Pom. (©Alison Maddocks)*

Further afield, an adventure in Ogof Draenen with the recently departed Nig Rogers stands out. This was a thirteen-hour trip and I think the only time I was involved in finding (and naming) virgin passage. Unforgettable.

I think I understand why folk spend years on digs as the final prize is so fantastic if they 'go'. Clive's tale of his efforts in Cwm Dŵr was always a tearjerker. Though my trip to the absolutely grotty passage in IA's dig above my old home did not leave me convinced that Xanadu was anywhere near with undiscovered caverns[1].

**Parties**

But we did have our own veritable Pleasure-dome; or rather, DO have.

*The HQ in 1970. (©Ken Maddocks)*

Everyone must have many anecdotes of happenings and daring dos in these legendary evenings - pig roasts, communal singing, discos, live bands, soup dragons, fireworks, fancy dress. The list is endless, though in the early days, we did seem quite fond of going Borcen (good Welsh word starting with P in fact, mutates to B, look it up!). The new showers allowed an extension of such nefarious activities. Steep stairs at HQ were not (are still not) wholly compatible with being 'three sheets to wind' and on a very early visit I was quite horrified to hear someone just about to be thrown downstairs in a domestic. At the tender age of 19, I found this horrendous. Everyone was happy the next day. Likewise, the pint of beer, no spilling, carried by an allegedly blotto lady as she was hauled horizontally through the Club may be an anecdotal tale.

Not a very happy memory was the night of a joint 50th birthday party when Rhiannon (my younger daughter) fractured her femur playing one of those beloved Long Common Room games, though the First Aid response to this accident was exceptional. All that training paid off, (diolch ++ LW). It took her many years to return to the Club, though I have taken her two little girls underground so all's well that ends well. I also recall a certain member (RR), had a potentially nasty injury to his neck in another daft 'challenge'.

We went further afield for our revelries as well. The nights at Saul (Forest of Dean), with the potentially lethal canal for late inebriated swims, were pretty wild. Trips to Alstonfield and Tremadog were often exciting too!

And wherever there were parties there always seemed to be Land Rovers in various state of repair.... not always at HQ either.

*Hauling the Land Rover (©Alison Maddocks)*

**Publication**

Speaking of being plastered - another small P, but it was a good milestone for me. My first publication was a result of some research underground. Following the rescue in Agen Allwedd in 1981 when it took some two days to retrieve the injured caver (compound femoral fracture), we obtained various fast setting modern compounds and tested their use on simulated fractures underground. Mainly to see if the casts could get wet and if the victim could start to weight bear and help themselves more in an evacuation following injury[2].

**Permanence**

This has been a rambling and a tad disjointed account of some earlier personal recollections of life as a member of The South Wales Caving Club. To finish, I'd like to touch on a rather esoteric concept of why I think the Club is so important, namely it's Permanence.

Rather an odd attribute you may think, given that the membership changes year-on-year. Folk come and go, yet it still moves on as a discrete entity. But it does exist, and I have been very grateful for a lot of support over the years. Recently, it has been great to have somewhere to go and relax happily and have fun, not always easy as an elderly single female; it's interesting and rewarding to see younger members carrying on and providing the support, hospitality and welcome that has always been there.

This has not been an easy year for the Club (and many other similar institutions). It's strange how a microscopic particle can wreak so much havoc, not just on our own community but the whole world. We had a scary time many moons ago when the threat of IRA bombs seemed to be everywhere; a meeting (Party?) arranged in Manchester by JR,

*Looking at the OFD survey at the HQ (©Brian Jorgensen)*

*Alison in the kitchen at the HQ (©Brian Jorgensen)*

sticks in one's mind when we were hyper-anxious about being in a pub just in case. As we keep being told things have been much worse, but personally, I somewhat begrudge the year out of my life when I haven't got so many left.

But maybe next year will be better? I Certainly hope so.

**References**


1. "*In Xanadu did Kubla Khan*
   *A stately pleasure-dome decree:*
   *Where Alph, the sacred river, ran*
   *Through caverns measureless to man*
   *Down to a sunless sea.*"
   -Samuel Taylor Coleridge, *Kubla Khan*
2. Stone A., M. Borroff, P. Matthews, A. Boycott, & B. Jopling (1981) "*The use of alternative casting materials underground*" *Trans British Cave Research Assoc* 8(4), pp.245-252

# Trying not to wilt at Penwyllt: An introduction to cavers and other subterranean species

Jane Sarginson

It was the night before New Year and all through Penwyllt all the creatures were stirring, especially the kids.

When Jenny Burrows suggested coming down to the Club for New Year's Eve for the first time, I really should have known better. I only knew about five people to talk to. Two of them were children refusing to sleep and another two, their parents were trying to get them to sleep. So, I was down to one person who I couldn't find. The soup dragons were on a mission, and someone had hung a sign on the Long Common Room door announcing hymns would be at 21:00. To say I was confused would have been an understatement. I already knew cavers were strange, but I didn't know that they were religious! Although, I had done some praying myself earlier that day after getting a little 'wedged'. I really wasn't sure whether or not I should go in but fortunately I was quickly washed in on a tide of people. Only to end up stuck on the back bench and being held in place by the chair in front of me; surrounded by a couple of geologists, several pyromaniacs and a group doing a whiskey tasting and being quizzed about who I was. At the time, my caving credentials mostly revolved around remembering to check that the wellies remained on the toddler that I had just been handed, and that I could also reliably be expected to have a pocket full of Haribo.

This was the point I worked out just how nice the members of the SWCC actually are and how willing they are to share their knowledge, in detail, on any subject you could imagine, but particularly caving. The whiskey helped, as did the singing. It probably should be a little concerning that two of the first things I ever learnt about the SWCC is that the number of caving related euphemisms that they can fit in a single song is truly spectacular and that a lot of the male members of the Club are scared of marmite jars. I didn't initially believe that this was an actual thing, but the level of detail and debate that went into the description of the best extraction process did eventually convince me. Cavers are definitely a weird sub-species, who breed remarkably well, despite apparent attempts to render themselves incapable of breeding at all.

At the time, I didn't know that it is perfectly acceptable to exit the Long Common Room by climbing over people and through furniture. Rejoining Jenny and her bottle of wine took a little while, but I did eventually manage it. It is fair to say that I, along with many others, don't have the best recollection of the rest of the evening but I do know that it took me over an hour to go get a beer after the group propping up the kegs unsuccessfully tried to persuade me that cave diving was a good idea. The food was really good and that at one point I tried and failed to climb through the back of a bench. I also agreed to the Columns the next day because "*it is an easy, quick trip*."

It turns out that nothing is easy when you are massively hungover and don't actually know what you are doing. Fortunately, a sore head really cuts down on the level of embarrassment you feel when somebody twice your age and three times as fit as you, pulls you up a muddy slope by your collar just to stop you embarrassing yourself by flopping around like a landed fish, or courteously lets you stand on their head for similar reasons. The Columns are really interesting, and this was probably the trip that convinced me that maybe I should try caving with adults a bit more often.

Many of the more interesting experiences of my life over the last few years have involved the Club and the willingness of its members to drag along anyone in the vicinity who is willing come on whatever mad scheme they are currently planning. It is always a pleasure to come down even if I generally have to remember to wear long sleeves for a week afterwards.

# *Oma Rakas Luolamökki - A Finnish Perspective to the SWCC HQ*

**Velma Aho**

In the spring of 2009, I was making plans with fellow Finnish cave enthusiasts, Miri Pihlaja (now Simey) and Dare Talvitie, to visit caves in Wales. At that stage, the only non-show caves we had seen had been tiny, and mostly made up of granite boulders. We'd been dreaming of exploring 'proper' large limestone caves for a while, but the reason we were looking at Wales in particular wasn't originally because of the caving scene. Instead, a friend of mine was an exchange student in Cardiff, and I wanted to visit her; when we realized that South Wales is a caving region, it seemed like a good opportunity to get two birds with one stone. Our choice of which specific club to approach was also serendipitous, mainly based on South Wales Caving Club having a nice and informative website, and more importantly, a HQ that provided convenient and cheap accommodation close to caves.

I remember the excitement on the day when Dare and Miri picked me up in Cardiff, and we drove through the dramatic landscapes of the Brecon Beacons to Penwyllt. Climbing up the hill towards SWCC Headquarters, with the track getting gradually worse and worse, we found ourselves wondering if this really was the right place, and what on earth we'd gotten ourselves into. We had seen the episode of the Doctor Who spin-off, Torchwood, where the HQ plays the part of a cannibal village, so that might have affected our perceptions... Once we got settled in, my first impression was entirely positive. On 9 April 2009, I wrote, loosely translating from Finnish, the following description: "*The hut turned out to be very comfy and awesome — a well-equipped kitchen, really nice showers, a cave library and walls full of cave photos. There were also plenty of helpful locals around to show us the premises.*" The Club hut surpassed our expectations in every way, and it was the perfect starting point for beginners. It was easy to find experienced cavers who were happy to introduce us to the wonders of Ogof Ffynnon Ddu.

According to my notes, I've visited SWCC HQ an additional nine times since 2009. That's not a huge number, by any means. I imagine many Club members visit more often than that every year. Comparatively rare as my visits may have been, this still makes Penwyllt the single location abroad that I've visited the most often. Skimming through my blog posts, I was surprised to discover that I had already called the HQ my 'Welsh home' in 2010; clearly, that first visit had left me feeling very fond of the place. Those feelings have not faded over the years. In 2018, I described it as "*oma rakas vanha luolamökki*", or in English, "*our own beloved old caving hut*."

Other things related to the HQ that came up as I scrolled through my blog posts from the past 10 years included, funnily enough, several mentions of how good the showers are, especially after long, cold hours underground. In one post from 2010, I described them as offering such a "*superbly enjoyable experience that I didn't want to leave at all.*" The kitchen, of course, has received several comments as well, as has the cosy fireplace in the Long Common Room (LCR). Surprisingly enough, I also came across a mention of a leaky pipe in the ladies' toilet in 2013, which I wouldn't have remembered at all without my blog. Clearly, the good things at the HQ surpass the bad by such a margin that bad things are quickly forgotten (and concerning this particular issue, I also wrote that Brian Clipstone 'magically' fixed it as soon as he arrived).

The most important recurring theme in my blog posts are the evenings spent in the LCR, having conversations with countless people, including Club members and occasional visitors (cute dogs also get

quite a few mentions). Over the years, I've described encounters with fellow cavers from such exotic places as Aberystwyth University, Australia and Croatia, and of course, many SWCC get-togethers, from New Year's parties to singing together, which took me by surprise, but only in a good way: as I wrote in 2013, "*I do always enjoy singing, and many of the older gentlemen turned out to have great voices.*" Still, as great as the parties are, what I love even more are quiet mid-week stays. It's during such times that you really get to know people and hear the most candid caving stories. I summarised these feelings perfectly during a trip in 2011: "*This is how I most enjoy spending time at the HQ; sitting by the fire, sipping a cider, and having a mellow chat about past and present adventures.*"

*(©Jules Carter)*

# *Life at SWCC - a personal account of busy Club weekends*

**David Eason**

I first recall reading about the South Wales Caving Club in my university days when my interest in Dan-yr-Ogof beyond the show cave was suddenly kindled for reasons I can't wholly remember. I had visited the show caves on several occasions as a child which must have sparked my original interest in caves. I ended up reading about the 1937 exploration of DYO, the subsequent 1946 exploration and the forming of SWCC with the opening of OFD1 that same year, and then ultimately the 1966 exploration of DYO and thinking, "*I'd like to be a part of something like that one day.*"

After getting into caving and digging 'properly' on Mendip in the early 2010's and then paying a visit to SWCC in 2015 and spending time in OFD, I took the plunge to enquire about joining SWCC. Fast forward to June 2017 and I found myself at a provisional members weekend. Having been a regular at the HQ since then, here is a short account of my personal experiences of a typical busy Club weekend. I write this with a degree of nostalgia and sadness when I reflect on the current situation and am hopeful that we will see such days again. I also reflect on Noel Dilly's excellent piece about the early days at Penybont; let's hope that spirit can be found again, and the next generation inspired to carry on.

**Reaching out (and turning up!)**

After several email exchanges with Claire, asking to join in on a summer provisional members weekend, I signed myself up intending to join-in on the June 2017 weekend. The day soon came around and so it was time to head to Penwyllt. I was a little anxious I must say, as I made my way over to the Club, and upon arriving, found it was a hive of activity, actually having to park at the Cwm Dwr carpark, it was so busy. As I immediately learned, this particular summer provisional members weekend had landed right at the end of Working Week. Attempting to not get in people's way who appeared to be incredibly busy trying to finish off their working week HQ jobs before folk turned up, I got chatting to various people and immediately found kindred spirits with plenty to talk about.

I'd managed to get onto a DYO round trip on Saturday morning led by Andy and Antonia with two other provisional members. This ended up being such an excellent experience, not only seeing this wonderful cave beyond the show cave for the first time 'in person' but getting the high-resolution-detailed description from Andy (as well as making friends in the process).

From then on, these busy weekends were always great to be at, with all sorts of characters present. One of my favourite busy 'members weekends' since that first day was the August bank holiday weekend in 2019, which became known as the 'Tigers' weekend, with the intention of providing multiple days of longer challenging trips. As well as spending a day digging on the Black Mountain, I managed to get on a trip to the Far North in DYO. This was something I'd always wanted to do and being a little apprehensive at first as a result of the heavy festivities the night before, ended up having a great trip and possibly one of my favourite caving trips so far (if you've been there, you would understand why we do it, if there are indeed many more miles to this system). It was such an excellent weekend with some fairly epic trips had by all in Daren Cilau, Ogof Draenen and OFD. It was great to see all generations of SWCC present on that weekend.

**Beer and Discussion**

Typical Friday and Saturday nights on these busy Club weekends are a great place to have a few beers

and have proper chats, with some often-fiery debates in front of the fire (which was alight pretty much all year round in fact). It was on my second trip to a committee weekend, in July 2017 that I met Jem Rowland. I'd known the name from old newsletters describing the adventures of latter-day members during the 'golden age' of Swansea valley caving exploits, and here was the man himself providing me first-hand accounts of all these tales and characters. Once I'd explained my enthusiasm for digging, and digging engineering on Mendip, I think I then accidentally signed myself up to the Black Mountain digging team! Since then, I think we all tend to enthusiastically argue about how best to proceed with various projects. We all have a great enthusiasm for the elusive miles of cave passage left to be discovered under the Black Mountain and this is always a 'hot topic' in the evenings for discussion. The Long Common Room is a fantastic place to be when it is full of lively discussion in front of the fire with good friends and good beer.

**Faffing and Digging**

There is always the inevitable faffing time in the morning in one form or another. This is generally something unique to caving I have found, spending ages chatting and kitting up, only to find someone is missing key bits of kit, often en-route up the mountain (or at the cave entrance, or perhaps at the tricky crux series when you need the particular item of tackle or spare battery). As I mentioned earlier, after getting signed up to the digging team, I tend to spend my time digging on the Black Mountain on my regular Club visits, usually as some form of 'tech support' I suppose. We all have opinions on how to progress, or where to dig, and how to maintain the drill! I can't put into words why digging trips out on the mountains are so enjoyable and I know not everyone will agree with me on this one. There's something great about the long and often wet and cold walks all the way over to the Giedd valley, where someone will share an often-excellent Club anecdote from years gone by. We often say that a book should be written including some of these stories as they'll one day be lost. Paul Quill, Jem, Carlo, Tony or Martin usually has some excellent and amusing story of some Club adventure home and abroad in years gone by. On a fine day in the Giedd valley, with the sun on Fan Hir, I can't think of a finer place to be. Even just a trip up to look at the karst landscape is excellent, and to see how ever-changing processes are modifying the landscape. No dig should be shunned and anyone actively putting the effort in should have some respect on the inevitable spectrum of unavoidable politics, old and new. There must literally be miles of cave passage, albeit complex and faulted, under this landscape. I might occasionally go caving too from time to time!

**Looking to the Future**

Alas, I have digressed somewhat from the subject. Given the current turmoil in the World, it's presently hard to imagine seeing busy weekends at the Club HQ again. I am ever optimistic that people can find that spirit of the Club once again, and a new generation will find the next big cave system on the other side of the valley, providing more endless, enthusiastic discussion in front of the fire in the Long Common Room. Perhaps we need to create this book of anecdotes to capture the past years and perhaps this publication may serve to capture some of that spirit.

# 50 Years of SWCC and Me

## Gary Jones

When we were young, we ran wild over the bays and hills of Gower. Then we had bicycles and explored the Neath and Swansea valleys. We were looking for caves, looking for adventure. The places we visited sounded like a lexicon of old Welsh. Llethrid, Llygad Llwchwr, Cil Yr Ychen, Ystradfellte, Paviland. While on a swim-through visit to Porth Yr Ogof I met other cavers (which was quite a rarity) and I was invited to the Headquarters of the South Wales Caving Club at Penwyllt. What an invitation!

*Gary in typical 1980's caving kit, outside the front of the Club. (©Liz Jones)*

That first visit stays like Technicolor in my memory. It was so exciting. Dan-yr-Ogof was a cave much publicised by newspapers, television and magazines. It was a wonderful new discovery and access was very carefully controlled - but I was invited in! A guest of SWCC! Ushered past the tourists, wading chest deep through the lakes, climbing up to the beginning of what had been publicised as 'The Long Crawl' was breath-taking. The crawl itself was even more of a surprise. Low, gritty and constricted I went through it, fighting down claustrophobia and panic until we emerged to see Cloud Chamber. Galleries beyond 'the crawl' seemed a complete wonderland. Everything was new and waiting to be explored. Anything seemed possible. Around the next corner would be new cave!

I didn't realise at the time, but I had been recruited simply to act as a Sherpa carrying digging tools in and out of the cave. I was a sort of human mule train, but I didn't mind. It was a privilege to be there. From that day on I was hooked.

I had arrived at just the right time. Exploration was taking place in Dan-yr-Ogof and Ogof Ffynnon Ddu at a rapid pace and extra hands were always needed. Carrying climbing kit, survey gear or diving equipment was a job I enjoyed. I felt useful. It was hard work, but I was one of the team. I was made to feel welcome. I soon signed up to weekends at 'the Club', planned to coincide with exploring various new sections. Also, I was just a big kid and very glad to be treated as an adult and someone who could look after myself. My first application to join the Club was, however, refused! I was thought to be too young - but after a few months (and grumbles by other Club members who wanted me to carry their kit), I was accepted.

*A Gary selfie in Porth yr Ogof – the year I joined SWCC 1969. (©Gary Jones)*

It seemed like every time we went caving, we found new passages. It felt wonderful as week after week there were new adventures. I could cycle from home to the Club or, if I was feeling rich, get a bus, or maybe a lift. It was almost too easy. Also, 'the Club' offered an almost infinite capacity for misbehaving! This was the first time I was regularly away from home and parents. I was a Valley Boy brought up next to the chapel in a fairly closed community. At the Club, things were very different indeed. There was booze, girls, access to the pub and some very, very wild parties. Skinny dipping in the river and 'sunbathing' on the moorland were regular features. Busloads of students often stayed at Penwyllt and partied all night. This really was too much for me and my schoolwork began to suffer.

No one in our family had any experience of higher education or even completing their secondary education. I thought I was expected to get a job and so I felt a bit lost. It was some of the older members of SWCC who either taught at university or were involved in education who put me right. I was persuaded to 'get educated'; grants were available… money! I could leave home, but it was not all that easy.

Caving remained a centre focus. With growing confidence, I went on trips to Europe and organised caving trips there. I started travelling to other caving areas and as I did so the weekly trips exploring at Penwyllt became less and less. In fact, new cave passages at Penwyllt became harder and harder to find. I eventually ended up as an undergraduate at Bristol University (and later as a postgraduate at Bath, and eventually at Birmingham University). Living away from the Swansea valley meant I had to travel long distances if I wanted to keep up with the latest at SWCC.

I married Liz (who had been coming to Penwyllt for some time, along with Sussex University caving club). This was, for me, the single biggest event of all those years. I struggled to finish my university courses and we settled down into family life. Liz and I were regular visitors at Penwyllt, but things now required a lot more organising. I helped with renovation work in Married Quarters, spent time with others from 'married'. We also had wider horizons. We went to the Alps, climbing and caving (I later organised a big SWCC trip to the Dachstein ice caves); I was Secretary for the International Conference camp held at Penwyllt; Liz and I visited archaeological caves as well as sporting cave sites. Then we had children! With the children, came buying our own home and having a career to pay for it all.

I guess our two children, Rowan and Rachel will have their own views of what life was like at Penwyllt for caving children. Nappies and sleepless nights gave way to playing in the Club treehouse, endless bonfires or wandering the moorland behind the Club with its 'dens' and hide-outs. It was a real privilege to be a parent when SWCC was the background. The Club parties had moderated somewhat, and trips organised by SWCC often accommodated parents and families. There were also nostalgic glimpses of my own earlier and wilder years at the Club. I wrote the Penwyllt Song Book, and to see it still in use fills me with pride. Daughter Rachel was voted onto the Club committee. I also received the Queen's Golden Jubilee Medal for long

*Rachel. Big changes! She was "Gary Jones' daughter". Then she joined the Committee and I became "Rachel Jones' father"! (©Gary Jones)*

service to Cave Rescue, something else I am very proud of.

My work career was, by this time, very demanding and eventually it effected my health. I was a Senior Executive in the Civil Service when I took early retirement. But this was really a move to another sort of work. A new chapter opened up as I used work placements as an opportunity to visit caves in other parts of the world. I had contracts in South America, Middle America, Africa, India, China, as well as having more time for holidays in Europe. Also, by now Liz and I had grandchildren! One of my greatest caving trips came at this time. My own father came with me and my children and their children to visit the Club and pop into Top Entrance. It felt I had come almost full circle.

I am very glad of my time at Penwyllt with SWCC. I arrived when the Club was doing some of its best exploration and I was privileged to be part of that. Many of the friends I made then have remained friends for the rest of my days; most of my oldest friends are from the Club. Also, the Club, collectively, has seen me change and hopefully improve with years. Though when I am at Penwyllt, I feel like Peter Pan, a boy who never really grew up!

*Liz and Gary outside the Club front door 1983.*

# *Wales - what captures my soul on every visit?*

**Roo Walters**

I know I miss the 'Land of my Fathers' when I'm away and I know that feeling is deep, though I have never lived here. I had Welsh parents that brought me up in Twickenham. How messed up has that made me feel over the years? Does this make that yearning stronger? I know I can't live here, for to risk losing that yearning, would be like losing a friend; it is almost too precious. The Welsh have a word to describe it - Hiraeth; and as far as I know, no language has a word so profound.

Visiting graves of my forbears in Ffarmers and Ffaldybrenin, graves going back three hundred years, doesn't bring sadness. Now it brings joy, comfort and deep peace. These days, when I walk the valleys of Rhandirmwyn, where I walked as a boy, playing with Nain and other long departed relatives, nothing else matters other than 'just to be'. It is the same amongst the cold slates of Snowdonia, where, though I never knew him, Taid's family was a part of the community for as long as the hills echoed with picks and chisels. The dark, hanging, slate slopes worry me, reminding me of life's fragility. To visit the museum and see pictures of relatives, proud amongst quarrymen, strong and committed, makes me want to sing. I love the Welsh choirs, always have. Where are they now?

Being farmers or miners, few of my ancestors served in the war. Some of them would have left the valleys where they were born, as did Nain and Taid. They became teachers, breaking out from the valleys, eastwards to England. It must have been a wrench, to settle in Bath and teach in Pilning, together overlooking Wales across the shared waters of The Severn. Teaching became the new family line, and my father learnt his trade and met my mother at college in London which led to my beginnings. Though I loved to visit Wales, my 'Hiraeth', developed as an adult, with coming to SWCC to go caving. An instant familiarity, from places I must have been through as a child, to a language so familiar, yet I don't speak. With people to whom I belong, it stills feels warm when I visit, and I always take a few moments, just 'to be' here.

SWCC means much to many people, for a lot of reasons. It is a family, with its squabbles and battles, but it serves its members well. Like all families, it can be hard work, but 'family' runs deep. For me, it has connected me to my past, a past I don't fully understand but I'm keen to explore as much as the caves. Nain couldn't understand caving. As far as she was concerned, she'd been to college, so her offspring didn't have to go underground anymore. However, it was Nain, perhaps understanding my 'Hiraeth' for caves, that leant me the cash to go on my first full caving expedition to Indonesia. It was in the hills of this far off land that I saw the importance of ancestry, of keeping the 'spirit' of those departed, alive within a community and within individuals. And perhaps Nain knew that caves and a better understanding of ancestry, would lead me back… to Wales.

(Thanks to Andy Freem for suggestions)

# *Cave Rescue and the South Wales Caving Club*

## Jules Carter

*Parts of this write-up have been adapted and developed from previous articles by Gary Evans and Bob Hall (History (smwcrt.org)).*

Caving is an inherently risky activity, but that's part of the appeal and challenge of caving. And whilst we all aim to avoid an accident underground, incidents can happen, thus it's comforting to know that an established cave rescue system is in place should the unthinkable happen. In the SWCC area, cave rescue provision is provided by the South and Mid Wales Cave Rescue Team (SMWCRT). The team doesn't sit alone, forming an active part of the wider network of cave and other rescue teams across the UK via the British Cave Rescue Council (BCRC) and its affiliation to Mountain Rescue England & Wales (MREW). Today, SMWCRT has around 140 team members from across the country, is well equipped, and has strong links to the emergency services and other volunteer rescue teams across the UK who it can call on it for support and vice versa. This is important, as while serious cave rescue incidents are rare, when they do occur, they can be very protracted and last a significant time e.g., in an incident in OFD in 2006 over 140 people were involved from at least four teams, and the extraction took around 28 hours!

### Shared Origins

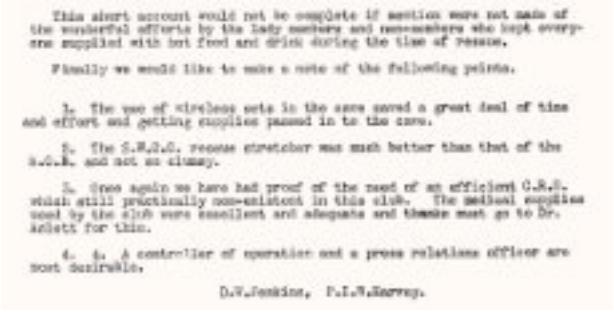
Prior to the establishment of the SWCC, no organised cave rescue coverage existed in the South Wales area, apart from the mine rescue setups for the numerous mines that still existed in the area at that time. After the inaugural meeting that set up the SWCC in 1946, attention was soon put to considering the provision of cave rescue in the region. The result was the formation of the South Wales Cave Rescue Organisation (SWCRO), establishing what is now today the South and Mid Wales Cave Rescue Team. Cave rescue in the region thus shares its origins with the SWCC, making the SMWCRT one of the oldest extant cave rescue teams in the UK. Much has changed over the years and the extent of the team's remit is now very different from those early origins. From initially supporting cavers exploring the caves of the Swansea and Neath Valleys, the team's area of responsibility has expanded dramatically to all South and Mid Wales. The role of the team has also considerably evolved and SMWCRT now responds to a wide range of incidents in the region on behalf of three Police Forces and two Fire Brigades.

### Becoming a Team

For many years following its formation, the SWCRO remained effectively a part of the SWCC as this was the only club in the area and hence provided the equipment and the personnel for cave rescue in the South Wales region. Initially, the rescue team was run on a fairly informal basis, formed from a ragtag assemblage of personal and improvised gear, but as caving became more popular in the area, and the Club grew, it was becoming clear that such provision would need to become better organised.

This was highlighted after the first significant rescue for the team that occurred in OFD1 in 1951 (Railton and Little, documented 1996). Two members of the Club, Lewis Railton and Bill Little, entered the cave to survey in the RAWL series. The weather was reasonable when they entered but during the afternoon it started to rain heavily and the streamway in the cave became impassable, trapping the two men in the cave. Fortunately, they were well provisioned and remained in the cave for the next two days until water levels subsided and they could exit. This incident, later, became the impetus for opening up the 'flood escape route', and subsequently the development of the classic OFD1 'round trip'! Whilst the incident was in many

ways proven to be not too serious, as the two men were hardy souls and well equipped for the experience, it did highlight the need for better organisation and control of the cave rescue provision in the area and was probably the key driver for starting the planning, creativity and hard work that continues today to build and maintain an effective rescue team.



This short account would not be complete if mention were not made of the wonderful efforts by the lady members and non-members who kept everyone supplied with hot food and drink during the time of rescue.

Finally we would like to make a note of the following points.

1. The use of wireless sets in the cave saved a great deal of time and effort and getting supplies passed in to the cave.

2. The S.W.C.C. rescue stretcher was much better than that of the N.C.C. and not so clumsy.

3. Once again we have had proof of the need of an efficient C.R.C. which still practically non-existent in this club. The medical supplies used by the club were excellent and adequate and thanks must go to Dr. Aslett for this.

4. (a) A controller of operation and a press relations officer are most desirable.

D.V.Jenkins, F.I.N.Harvey.

*Summary from the rescue report from the Bridge Cave rescue in the early 1950s*

More serious rescues were soon to follow, which included incidents in Bridge Cave and OFD in the 50's. These involved dealing with serious challenges such as boulder falls and broken limbs. The experiences gained were reflected upon and used to further improve key aspects of cave rescue, such as the equipment used, communication systems and control of an incident. A key challenge of the 50s' was also the availability of transport, though the amount of alcohol in the vehicle's driver didn't seem too much of an issue from reading some of the reports of the period!

"*The exhilarating experience of driving through the dark at somewhat more than the usual speed was only marred by the comments of our driver as to how much liquid refreshment he had consumed.*"

Steadily, response to rescue incidents improved as experience, equipment and techniques developed. Major incidents such as the Llethrid Swallet rescue of 1964 also started to give cave rescue real credibility with the Police. Eric Inson reflected on this incident in his SWCC 60th anniversary speech in 2006:

"*The first major rescue I remember was from Llethrid Swallet on the Gower in the early 60's, when a man sustained a broken leg. Unfortunately, the Police Chief at the time dismissed us as a bunch of amateurs and called the Mines Rescue, who were completely out of their depth. We ended up having to hospitalise the casualty overnight in the cave. Dr Rob Williams (Lisa's father) set the leg, and I was sent to a local hospital for supplies, bed pans and such-like. The next day, the rescue officer Gordon Clissold told us to get in and get the casualty out, which we did, in a short time.*"

After the incident, the SWCC received a glowing letter of praise for the role the cave rescue team ultimately played in the rescue. But change was afoot as caving in South Wales was gaining popularity, especially with the excitement and pace of major cave discoveries that were occurring in the 1960s. This was attracting more people into caving and more clubs were forming - SWCC was now no longer the lone club in the region.

**New Teams**

In 1968, the Gwent Cave Rescue Team (GCRT) was formed, in response to the new discoveries arising in the Northern outcrop area of the Brecon Beacons, and was based around the newer clubs, primarily active in the Llangattock area. Initially, there was little formal relationship between the two CRT teams now covering the region, with both operating more or less independently of each other.

However, incidents in the early 1970s highlighted the need for better cooperation between the two teams, and tentative moves were made, with a view to rationalising the situation. Little was done until after a major incident in Agen Allwedd in 1974, when Roger Solari tragically lost his life in a cave diving accident. Although the separate nature of the teams had no effect upon the outcome of this particular incident, it was realised that the lack of equipment compatibility and a lack of awareness of the other team's abilities would be disastrous in an incident bigger than either team could handle alone. Thus, after a series of meetings, a new umbrella organisation was established in 1975. This involved the SWCRO title originally established by the SWCC being formally relinquished and adopted as the name of the new organisation, whilst the original SWCRO team was re-formed into the 'West Brecon Cave Rescue Team' (WBCRT), focused on covering the caving area to the west of the A470 road.

The justification for the formation of the SWCRO was born out in 1980 when the WBCRT and GCRT combined in the rescue of Tim Flanagan from Agen Allwedd. Supported by other regional teams, the incident took over 50 hours, involved some 280 underground rescuers and clearly demonstrated the need for rescue teams to be able to work effectively together!

**Further Change**

At this stage the WBCRT was still effectively an extension of the SWCC, but this was now affecting the team in several ways. One such issue was attracting cavers into the team from outside the SWCC. Given the growing number of cavers, and cave systems, it was important to widen the team's membership. The team also needed to be considered as a fully separate body from the SWCC for other key reasons, including being able to operate as a charitable body, extending the opportunities to apply for grant support, and to widen transparency in the way the team operated within the national body, the BCRC.

As a result, a reconstitution of the WBCRT took place in 1991, formally separating the team from the SWCC. All the equipment, much of which had been purchased by the SWCC, was transferred to ownership of the WBCRT, and a formal agreement was signed regarding the continued use of the rescue stores and garage at Penwyllt. The SWCC Rescue Officer would no longer automatically be the Hon. Sec. of the WBCRT, and the constitution was modified to give all member clubs the same status and to allow non-Club cavers representation on the WBCRT executive. Since the WBCRT and SWCC shared a common origin, this was challenging and seen as a retrograde step by some. But caving was changing, and rescue teams were having to modernise and become more accountable in the way they operated - these were changes necessary to ensure the team was compatible with national frameworks to take the team forward.

During this period there was also a growing concern that the cover for Mid Wales was inadequate, and that cave and mine activity, both sport and commercial, was increasing in the region. A previous attempt to form a Mid Wales team, under the SWCRO umbrella, had failed. Instead, the responsibility for cave and abandoned mine rescue within this extended area, eventually came under the remit of the WBCRT (Thomas, 1992). For this, a system of Mid Wales Wardens was established, and a trailer with a specialist cache of equipment stored at a suitable site in the Mid Wales area. Practice and training events now regularly take place in the mines of Mid Wales, which has also become an opportunity to visit unusual sites and train with other teams and mine enthusiasts.

**The National Scene**

As caving grew in popularity and, following high profile incidents such as the Neil Moss tragedy in 1959, there became an increasing need to bring the various cave rescue teams together under a representative body. This led to the formation of the British Cave Rescue Council (BCRC) in 1967. Despite initial enthusiasm, this ultimately failed to fulfil its role and became a very unrepresentative body. A crux meeting was called in 1980, to decide upon the fate of the BCRC. The decision on the table was whether to dissolve the BCRC body, with each cave rescue organisation subsequently representing itself, or the reformation of a properly representative body to speak with one, agreed voice. The latter course was taken and the BCRC moved forward to become an internationally recognised and respected body, and an active part of the framework forming Mountain Rescue England & Wales. A fundamental feature of the BCRC is that each cave rescue organisation is responsible for all aspects of cave rescue on its own patch. The BCRC is simply an executive body to represent agreed policies nationally and internationally, to disseminate information and assist member organisations in any way possible.

**Modernising Skills and Equipment**

Never standing still, the 1990s saw extensive work to build up the capability of cave rescue through further developing skills and equipment. An excellent example of this has been the development of the advanced first aid capabilities for cave rescue as a whole. Much of this had originally been driven by SWCC stalwart Bob Hall adapting the famous 'Bangor' outdoor focused first aid course for cave rescue. This was later built upon by Lisa Williams, Gary Evans and others to develop the specialist Advanced First Aid course for Cave Rescue. Initially accredited by British Red Cross and the British Cave Rescue Council, the course has continually evolved to ensure it is fully endorsed and recognised by the MREW. This has involved a huge amount of work by the BCRC and key CRT teams to provide advanced first aid training of an extremely high standard and that supports all cave rescue teams in the UK.

*Advanced First aid training course during the COVID-19 Pandemic*

Equipment and techniques were also moving onward. Available equipment in the early days was basic, and many ingenious devices and designs appeared over the years, usually developed and built by members of the rescue team. Examples are the floating stretcher, which was designed and tested in the early 60s. Also, the use of stemples which were introduced in South Wales at this time. Other developments included the introduction of the ticket board at the SWCC to enable tracking of groups going underground to take place and the introduction of the first purpose-built telephones intended for cave rescue use. The WBCRT was also instrumental in the change to different rope colours for pitch hauling. They managed to persuade Edelrid to dye ropes specifically for this purpose.

A key technology area that has seen major development is in the use of various wireless communication systems. In the 70s, some British cavers started experimenting with Very Low Frequency (VLF) transmitters to try to establish radio-communications between the surface and a cave. After some years of trying and inventing the

*Experimenting with the concept of the Floating Stretcher*

right antennas, they succeeded in their plans. These first cave-radios were pretty big and used a lot of battery power, so cavers were dragging around considerable weight! But things soon got smaller and lighter. By the 1980s, underground communication was further revolutionised by the introduction of the Molephone, a system that uses magnetic induction to transmit messages through solid rock. The Molephone and its various successors such as the Ogofphone quickly became the principal method of communication for cave rescue teams and were capable of reaching depths of around 150m.

*The ogofphone*

Further technology improvements came in updated systems such as Nicola and the Heyphone. In 2001, working together with the Cave Radio & Electronics Group, the BCRC issued over fifty HeyPhones to the UK's cave rescue teams. This was the first time that a national organisation has systematically equipped its rescue teams with such advanced equipment. The WBCRT were the first team to receive the new Heyphones, and we soon had occasion to test them for real. A caver dislocated his shoulder some 5km into Daren Cilau - a formidable cave to require rescue from. Whilst the injured caver slowly made his way to the Hardrock camp, two of his companions made a strenuous exit and raised the alarm. Many hours later, the medical team was able to communicate with the surface to report that the casualty had been attended to, and would not require a stretcher carry (which, it had been estimated, would take up to three days to complete). Use of the Heyphone, and of a single wire telephone in the entrance crawl series, considerably eased the logistics of this rescue, demonstrating the importance of working communications! Despite these improvements in technology, these systems still remain a challenge to operate reliably, and improvements continue to be made with updated versions of both Nicola and a 'micro' Heyphone in planning at the time of writing. Commercial systems have also been developed such as the text-based system 'Cavelink' which is now the main system for several of the UK cave rescue teams including the SMWCRT.

Great creativity has been shown by many SWCC members involved in the team over the years to develop and improve the equipment for carrying and handling an injured casualty. Protecting a casualty from hypothermia is one of the key challenges in a rescue. Club stalwarts such as Clive Jones looked at this problem and came up with the idea of a shredded space blanket material that both trapped and reflected heat that became commercially developed as 'flectalon'. This material is used as the insulation in the main casualty blankets used with the stretchers as it packs well and works when wet. However, this is also being improved at the time of writing with Derbyshire CRT leading the development of a new version.

Further examples of innovation have also come from Brian 'Jopo' Jopling, who developed the 'little Dragon' or airway warming device. Using the heat generated when soda lime is exposed to carbon dioxide, air is warmed before being breathed in, supporting the psychological and physical comfort of a casualty.

Jopo has also played a key role in developing the main stretchers used by the team. For many years, various types of stretchers have been either specifically made or adapted from mountain rescue stretchers. These tended to be bulky, heavy and difficult to move underground. When the classic 'Neil Robinson' stretcher was developed this was quickly adopted for use in cave rescue, but again was still heavy, tricky to carry to an incident, and was difficult to use with additional layers such as a casualty bag system. However, around the 1990s stretchers made of polyethylene were becoming available. These had the advantage of being rollable, and hence easier to transport. Jopo refined these ideas, developing a two-piece modular system - one part forming a rigid spinal splint, the

other a wraparound to 'cocoon' the injured person. Later, a short version of this system was developed for use in tighter passage and boulder chokes. The team trialled the first version of this in the Cwm Dwr chokes, made memorable for the squeals that came from the volunteer casualty as their gonads were squeezed a little too tight by the thigh straps... Suitable changes were made to the production models! More recently, the SMWCRT led on a UK wide project to tweak and redesign this stretcher concept, most notably adding a neck block system to the spinal splint which has considerably improved C spine stabilisation. Supported by the BCRC these stretchers have now been rolled out to interested teams across the UK.

*Stretcher carry in awkward cave*

**Into the New Century**

As the team entered the 2000s, a great deal of hard work and planning had come together. A successful application to the Heritage Lottery Fund secured substantial funding that enabled the stores at Penwyllt to be completely refurbished, equipment upgraded, and the Land Rover replaced.

In 2003, SWCRO was dissolved to simplify the National Structure and WBCRT and GCRT became members of the BCRC in their own right, rather than under the SWCRO. Liaison arrangements were put in place constitutionally to ensure the two teams remained in close contact. However, the Gwent team was starting to struggle as it was not getting enough cavers engaged to properly support running the team. In 2009, the Gwent CRT was sadly dissolved, resulting in responsibility for the Gwent caving areas, along with ownership of the Whitewalls stores and equipment, being transferred to WBCRT. This involved a huge amount of work, rationalising and replacing equipment and systems. It also meant that the title 'West Brecon' was no longer relevant to the massive area now covered, and the Team voted in the 2010 AGM to change the name to the name used today, the South & Mid Wales Cave Rescue Team.

*Senedd member Kirsty Williams opening the refurbished rescue stores with Gary Evans*

Thus, started a new era in the identity of the team, and one that brought it to media attention through the part played in a number of high-profile incidents. In 2011 SMWCRT supported efforts at the Gleision Colliery disaster when team divers dived through a flooded mine level and established that the miners had sadly perished. A few years later, the team, along with the Midlands and North Wales teams, was called to support efforts searching for the murdered schoolgirl April Jones in the Machynlleth area of Mid Wales. Then, in 2018 team members were part of the astonishing rescue of the trapped football team in the flooded cave in Thailand. In all these incidents, cavers have shown resilience and adaptability to deal with and support challenging situations beyond those normally encountered in cave rescue and proved themselves capable of working well and effectively with other teams and services.

**To the Future**

It is surprising how much a team such as SMWCRT has to keep changing and adapting. Much of this stems from the main national bodies such as the MREW, and the various legal and financial responsibilities that come with being part of such bodies. Recently, the team had to review how it recognised its team members to conform to national remits around insurance cover and numbers which resulted in a significant change to the team numbers on the call out list, and in how we now establish a caver as a team member through active participation in training and other team activities.

*End of a successful rescue*

Digital technologies are also driving change. Recent years have seen the adoption of the SMS text-based callout system SARCALL which is starting to simplify callout procedures and provide wider awareness of a potential incident to both team members and other teams. Linking to this, is the wider adoption of digital control systems, something currently being developed and adapted for use by the SMWCRT.

Other challenges lie ahead, particularly around sustaining funding and support for the team but also around the available space the team has for equipment and other resources. As ever, the enthusiasm and energy of those involved will see a way forward through such changes and challenges so, as fellow cavers, we can remain there as a resource to support our fellow cavers if ever in need.

Want to learn more about the SMWCRT? Then visit our website Home (smwcrt.org) for further information and contact information.

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# Local Caving

## *Edited by Paul Tarrant*

South Wales Caving Club has been blessed by being based in the upper Swansea Valley, a place where considerable cave exploration has taken place during the past 75 years that this newsletter celebrates. More than 76km of cave exist beyond the portals of Ogof Ffynnon Ddu (OFD) and Dan-yr-Ogof (DYO), these two caves providing exploration of the highest calibre to those fortunate enough to be in the area during the 1960s and what was a true 'Golden Era' of caving in Wales.

Several of the articles hearken back to those heady days when exploration in DYO and OFD ran largely in tandem, producing exploratory trips of sheer utter amazement and culminating in the discovery of DYO's Great North Road and in OFD, the pushing of OFD3 to Smith's Armoury, Gareth Ll Jones, Susan and Paddy O'Reilly share these early discoveries with us.

Leaving the 60s behind, Welsh caving went through further 'Golden Eras' in the 70s and 80s with finds in Ogof Craig A Ffynnon, Otter Hole and Daren Cilau, and then in 1993 with the discovery of Ogof Draenen, which stands at well over 70km long. Ali Garman has gathered together memories of exploratory episodes there.

But life does not stagnate, and Chris Jones' article on the exploration of passages in OFD3 just shows that there are still opportunities to be realised for those willing to be bold. This theme is repeated in the article on Cystanog lead mine where Phil Knight's persistence pays off handsomely with the rediscovery of considerable passages.

Claire Vivian's article on Evening Caving in South Wales relays the sheer fun of exploring the numerous caves, by those fortunate to live or be in the area and who are able to reap the benefits exploring some of the earlier 'Golden Era' discoveries.

The Theme finishes with a sensitive and fitting tribute to Dick Baynton, a hugely passionate Gower caver in the 60s who was tragically taken from this world by Polio at the tender age of 23 and who gave so much in the little time he had.

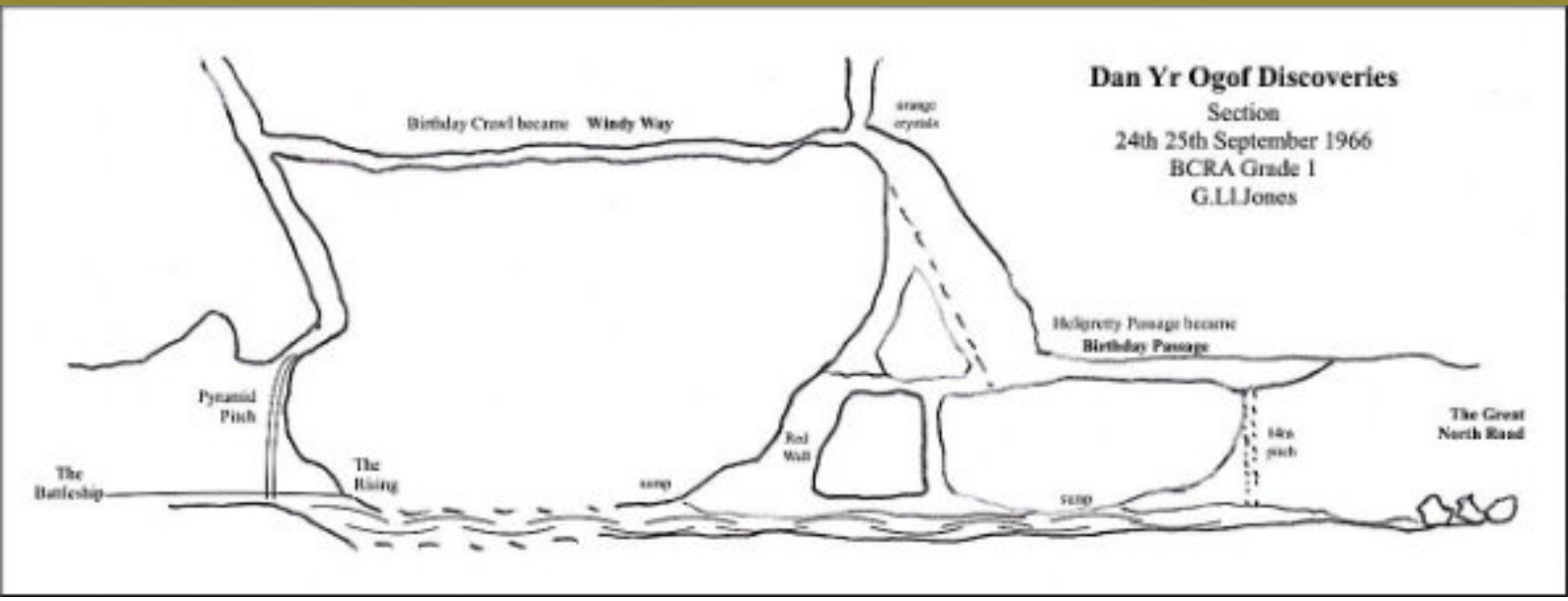
I certainly enjoyed liaising with authors and reading their exploits and hope you enjoy them too. You know they are good when you can imagine you were there on the trip being described!



◀ *Caver in OFD3 Traverses (©Mark Burkey)*

# A Breakthrough Weekend
## The Discovery of the Great North Road, Dan-yr-Ogof (1966)

**Gareth Ll Jones**




In 1965 I was caving with South Wales Caving Club member Philip Matthews in Ogof Foel Fawr. His daughter, the popular Welsh singer Cerys Matthews, later came over as our guest to the Dublin Welsh Society's 2015 Gwyl Dewi. In July 1966 the Observer colour magazine carried a pictorial coverage of the major breakthrough in Dan-yr-Ogof. This told the story of domestic science teacher Eileen Davies, who had pushed the Endless Crawl and discovered passages, decorations etc. By amazing coincidence, I had been on a visit to the show cave with my family on the same day that the breakthrough took place. So later, in the summer of 1966, I was taking a break from explorations in the Mitchelstown Caves in Ireland and was back home in Wales. Through Philip I was lucky enough to get onto a 'tourist' trip organised by Terry Moon, Tony Philpott and Alan Coase for Wessex CC and others.

We met up at the SWCC hut on Saturday 24th September 1966. Then, like many before and after us, we passed through the show cave, waded the four waist deep lakes, followed up the river and set off along the canals. The Endless Crawl was worthy of the worst expletives and condemnation possible, and proved highly exhausting when carrying tackle, but we eventually dropped into the Gerald Platten Hall. We duly admired the delicate crystal pools, the beautiful straws and helictites of Flabbergasm Chasm and the Grand Canyon and the fine straw clusters and then Terry showed me the exquisite Red Monk stalagmite. Hanger Passage led on and after the 30m waterfall, a delightful boat journey took us up the Green Canal. First the tricky Go Slower Passage, then the slippery traverses around the pools of the Go Faster Passage and finally the High Way brought us to the terminal sump, The Rising.

The actual purpose of this 'tourist' trip was to try and bypass the sump. We attempted to dig away the sandbank holding back the sump, but this was

soon abandoned, and several hilarious but unsuccessful attempts were made to build a pyramid to climb up to an aven next to the sump.

*Dinghy inflation in Dan-yr-Ogof*

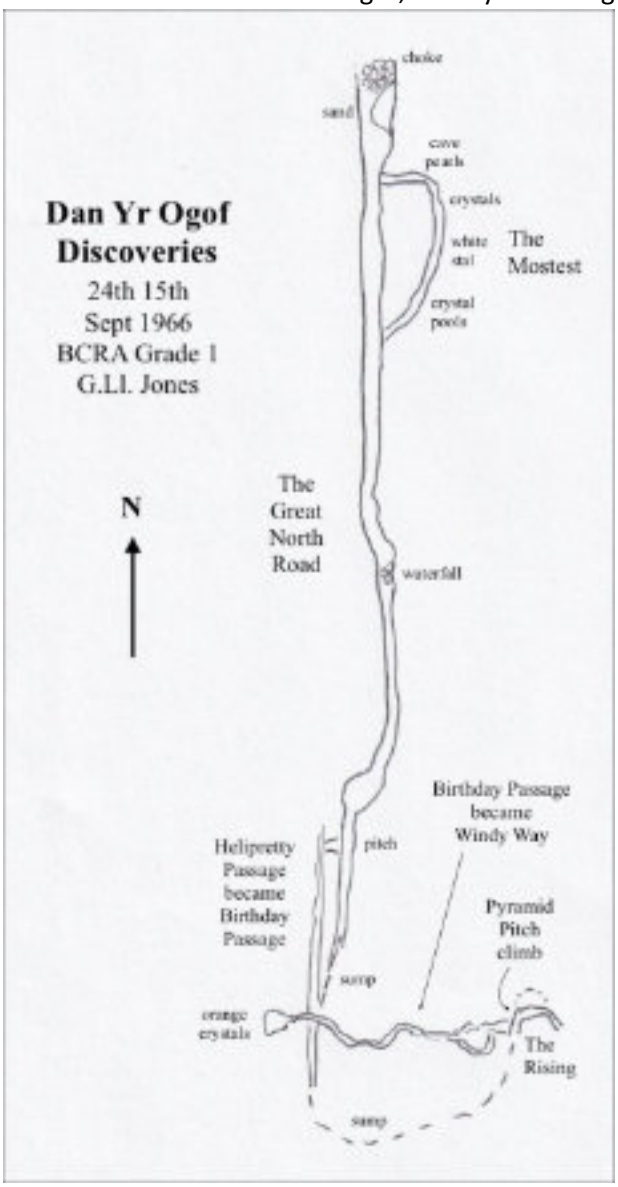
Then work started on trying to peg up into the aven. At the time I was leading HVS climbs and got a turn to try my best. I eventually got a series of pegs into a very dodgy crack and finally stepped off the top peg onto a thin ledge. There, the wall was reasonably difficult but free-climbable. The holds were there and once I got high enough to bridge into a sandy bay in the aven, I was confident, in spite of no runners. I hauled up a rope and ladder and moved up onto a ledge with a good belay and was able to bring up more of the party and we were away! In my mind, this was always the Pyramid Pitch climb, associated with those abortive attempts to build a pyramid.

We climbed up a high rift which rose sloping up and out over the passage, where Alan Coase discovered a small crawling passage in the back wall with a terrific gale blowing out of it – this was Windy Way! Tony Philpott, Terry, Alan and I followed this to a rift dropping down with many orange crystal pools at the top. The climb down was a bit dodgy and was later handlined. Alan then went down a very narrow rift in the floor to a canal sumping at both ends. Back in the other direction, we found a fantastic passage with continuous banks of helictites growing along one wall (perhaps affected by the draught blowing along it). This was named Birthday Passage - a fine present for lucky Alan Coase. At the end was a drop down into a stream passage, but with no tackle left we had to retreat. After an 8½ hour trip, I for one was absolutely exhausted.

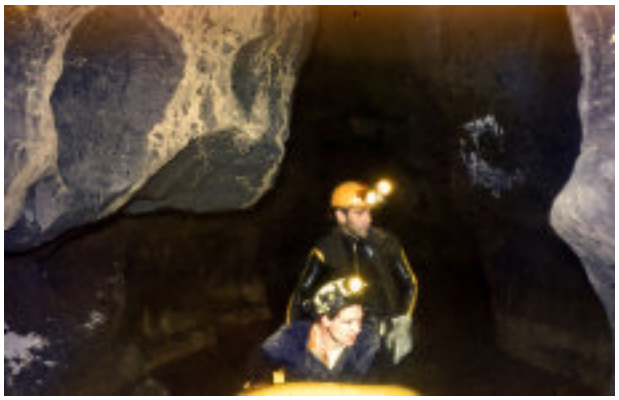
I was still pretty shattered when I got back to the SWCC hut, but the discussion that evening was all about the consequent follow-up trip the very next day and the expectation was for open passage to be found. Terry couldn't make the trip the following day and I'm grateful that he encouraged me to make what promised to be a discovery trip. I had only come along for a good tourist visit and I had already more than surpassed that goal. I just had to resign myself to back-to-back knackering trips, and so I duly signed up for the next day.

Sunday 25th September: The party was made up of myself, Alan Coase, Alan, Moira, Susan Bradshaw (later O'Reilly) and Derek. With high hopes, we underwent the agonies of the approach and Endless Crawl again, this time laden with an extra 70ft (21m) of ladder and two ropes. It's funny how much faster a trip is when you are single-mindedly going for the last end point and not bothering with tourism or side-passages.

Back at The Rising, we quickly climbed out past the sump on the ladder, thankfully left from the previous day, and we were soon tackling the 14m pitch down to the visible flowing water. I followed Alan down into the streamway and then along it as it turned into a huge passage, rarely less than 15m high and usually 5-10m wide. The stream wound its way along, sometimes with huge breakdown boulders lying in it. Various boulder piles proved difficult, though possible to climb, thus finding a way over them. However, one choke gave us particular problems. Halfway up, a tributary waterfall came in from the right, but by following



this down, we got through along the main stream again. One rock pile had a large spiky boulder, eventually being named as Pinnacle Chamber. The stream passage just went on and on, still of magnificent proportions, and a couple of interesting side passages were noted on the right.



*Green Canal in Dan-yr-Ogof*

Eventually our path was blocked by a huge pile of sand lying over a choke. We climbed over the first half, the sand concealing dangerous holes in the boulders and we got down to the stream, but the choke was impossible despite some pretty hard pushing. An attempt to climb over the choke was not pushed, but some good possibilities were noted. My caving log states that we were approximately 1 mile further on from the previous limit of exploration and the survey indicates about 1.5km.

*Terry Moon in Dan-yr-Ogof*

We started back, but almost immediately we looked at one of the obvious side passages. This proved to be one of the most richly decorated passages we had ever seen. We ran out of adjectives to describe the vast variety of different crystal pools along its whole length. In between the pools, red and orange flowstone covered the whole floor, forcing us to traverse across the walls to avoid spoiling the fantastic formations. A 10m row of pure white stalactites and flowstone covered one wall, there were pockets of cave pearls etc., etc. It just went on and on! We could think of no other descriptive superlatives, except for my suggestion of The Mostest, which was a trendy term at that time.

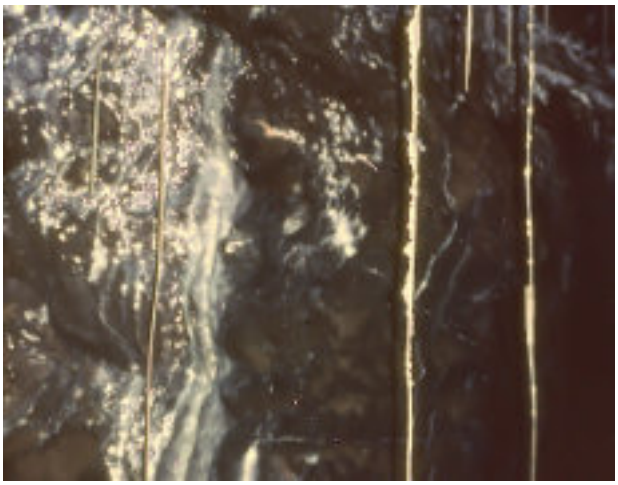
At the far end, The Mostest proved to be an oxbow that brought us back out into the main stream passage further downstream. So, we retraced our footsteps, still marvelling at the dimensions of the stupendous, fault-controlled, Great North Road and arrived back at the ladder where a photoshoot was carried out. At The Rising, Bruce Foster and a second party were rawlbolting the Pyramid Pitch for a ladder. This gave us a good excuse for letting them continue working and so we hurried on out unhindered, after a 7½ hour trip.

I was thrilled to be involved with the discovery of such a major stream passage, topped with the dazzling icing on the cake of The Mostest. It was the trip of a lifetime for me and confirmed the greater possibilities of cave discovery over those of new rock-climbing routes. I went back to college in Ireland at the end of the summer and spent some of my best misspent youth making discoveries in Reyfad and other major Irish systems, not to mention one or two new rock climbs.

*Flabbergasm Chasm in Dan-yr-Ogof*

This account is mostly taken from my caving log of the trip. Apologies to those whose names I didn't record or remember. It was interesting though to have met Susan O'Reilly as she became before I even knew Paddy. At about that time Paddy and I were 'doppelgängers', both with dark-framed glasses, black beards and long black hair. He had the Irish name and the Welsh accent, whilst I had the Welsh name and some other kind of accent! We became friends when Paddy and Susan moved over to Ireland. Now Susan is back in Ireland and has carried out some very important medical management tasks.

So, it is all about being the right person in the right place at the right time – and with the right degree of stamina!



*Flabbergasm Chasm in Dan-yr-Ogof*

# Camping at the Trident: A Fifty-Three-Year-Old Tale of Exploration in Ogof Ffynnon Ddu 2

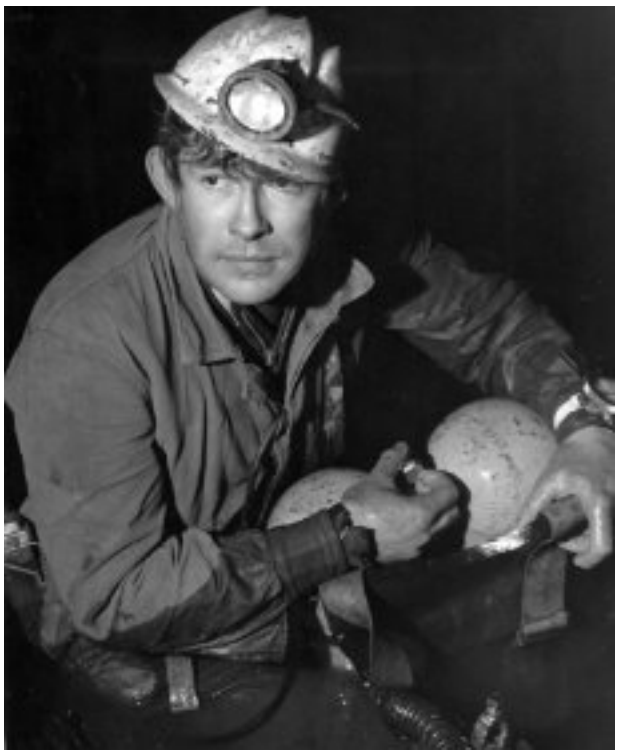
**Susan O'Reilly & Paddy O'Reilly**

Co-authors are Susan O'Reilly who writes from her perspective of those exploratory trips and Paddy O'Reilly who provided his original logbooks, sketches and photos

The late 1960s were the golden age of cave discovery in the Tawe valley. First, Alan Coase, Eileen Davies and others, pushing Dan-yr-Ogof (DYO), then a remarkable cast of characters relentlessly extending Ogof Ffynnon Ddu (OFD). Those of us fortunate enough to be in the right place at the right time experienced the challenges, risks and excitement of discovering miles of rivers, waterfalls, pitches, passages, squeezes, muddy swamps and glorious calcite formations. There was camaraderie and not a little competitiveness at SWCC, and other clubs, as we each pushed ourselves to our personal limits to pursue the dream of finding more miles of cave and spectacular sights.

After the discovery of OFD1 by Peter Harvey and others, and just after the end of the Second World War, efforts by SWCC cavers, including divers, had concentrated on extending the cave towards the sink at Pwll Byfre. It took 20 years before Dip Sump in OFD1 was successfully dived and OFD2 became a reality. At that time, in July/August 1966, the diving teams of Charles George, John Osborne, Terry Moon and Rod Stewart (plus Brian De Graaf, Clare Harvey, Bruce Foster and Mike Coburn) had overcome significant dangers to explore OFD2 all the way up the stream to the Top Waterfall. Their efforts were heroic, their trips fraught with danger. Their retreat would have been utterly compromised if anyone were to have an accident, became exhausted or lose their way in the sump or overground.

In early April 1967, the divers in OFD2 were in the Smithy on one trip, hoping that some digging and banging from the Cwm Dwr end would lead to



*Charles George - one of the divers who broke through Dip Sump*

a dry connection. As smoke seeped through from Cwm Dwr, the divers split up to follow where it might be coming from. John Osborne, on his own, made the connection through a short but tricky boulder choke. The cavers at the Cwm Dwr end had gone home for their tea by then. So, it was with considerable wit and good humour that John made his way out of Cwm Dwr to the Club, where apparently, members had difficulty believing he had got there via Dip Sump! No doubt, John had to retrace his route back to the other divers underground, lest they thought he had disappeared.

*Susan O'Reilly at the Top Waterfall, OFD2, April 1967, prior to discovery of the Top Entrance*

I suspect the divers experienced both relief and regret that the dry connection had been made from Cwm Dwr to OFD2.

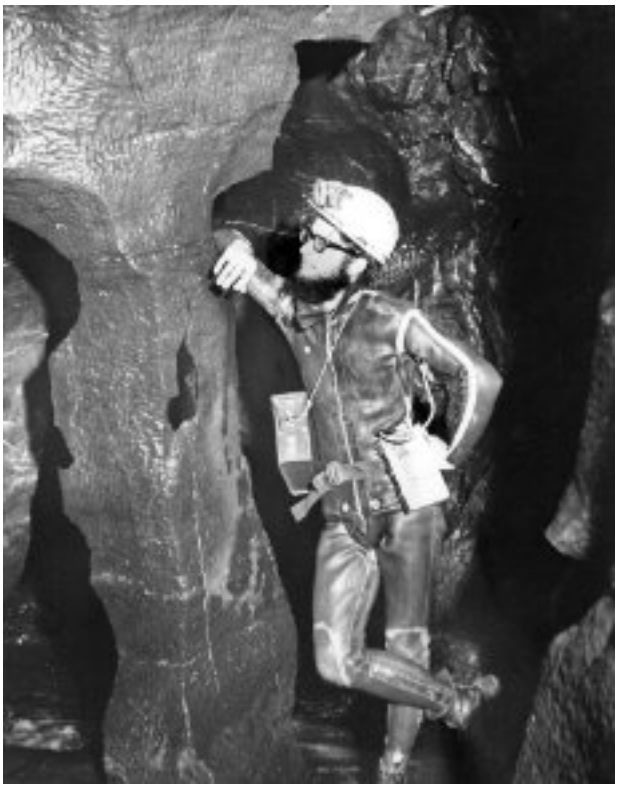
At that time, I [Susan] was a 20-year-old engineering student at Swansea University, a keen caver with the Swansea University Caving Club and, eventually, a member of SWCC. I was in awe of the divers. I had neither the courage, the experience nor the cash to emulate them. But now, OFD2 was open to us!!! We swarmed in!

Our first trip into OFD2 was on April 14th, 1967. The divers, John Osborne, Charles George, Terry Moon and Bruce Foster introduced Bill Little, Clive Jones, Paddy O'Reilly, Susan Bradshaw (me), Colin Fairbairn, Martin Gough, Roger Thomas, Alan Coase and Tony White into their world. The divers had not exaggerated! OFD2 was a complex network of passages, then a supremely sporty wet cave that ascended up waterfalls and potholes to the Top Waterfall. Our trip took 9 hours. The upper reaches above the mainstream had hardly been touched and needed maypoles and ladders to access.

As impecunious students, we made our own wetsuits, we ordered up brown paper patterns that we then used to cut out neoprene (badly) and epoxy glue together. We then tried to protect our homemade wetsuits with the cheapest brown boiler suits from Swansea market, tatty boots, a helmet and NiFe cells that sometimes leaked (I still have the scars). A carbide lamp that clogged up all the time completed the outfit. Thus equipped, we were ready for anything.

Our combined teams of Swansea University students and lots of other SWCC members forged ahead, 'maypoling' into the upper levels of OFD2. We scrambled up rifts coated with white clay, waited and watched while Terry Moon, Paddy O'Reilly or Colin Fairbairn tackled dodgy climbs, explored multiple levels of passageways, descended back to where we felt a draught or heard rushing water, all in our efforts to bypass the Top Waterfall and breakthrough to the hoped for OFD3.

Mostly we succeeded in finding more networks of passages but more often, we were disappointed to find the enticing sounds of a rushing river just brought us back down to a familiar part of the OFD streamway.



*Mike Coburn tries to chat up a shapely rock pillar*

Our trips up the stream and into the upper levels were exhilarating and exhausting. Typically, we were underground for 9, 10 or 11 hours, much of which time was spent reaching the upper levels we were exploring. We were focused on finding the way past the Top Waterfall into the postulated OFD3 as well as exploring the labyrinths of passages we discovered. On one of these trips on June 10th, 1967, with Paddy O'Reilly, Colin Fairbairn and John Osborne, Paddy and I rounded a corner and found the Trident and the Judge. After getting over our delight at this discovery, we noted that the ground was dry and relatively flat: a plan started to form.

The next week, on June 17th, Paddy, Colin, Terry and I put in a 15-hour trip and sustained ourselves with soup and sandwiches instead of our usual squashed Mars bars. Our trips were getting very extended and exhausting, especially as once again we suffered the disappointment of various mazes and pitches that just led back to the OFD stream. Nevertheless, we found Gnome Passage and noted the potential for a way on another day.

Paddy and I hatched a plan to camp overnight at the Trident on the August Bank Holiday weekend so that we could spend more time exploring the upper levels in the search for OFD3. So, in advance, on August 5th, we portered in our supplies towards

*Susan (Bradshaw) O'Reilly and Carlo Ryan at the Trident, OFD2, 1967, shortly after the discovery of the Top Entrance*

*Gnome Passage circa 1967*

base camp at the Trident. Laden with 40lb rucksacks we headed up the streamway. To Paddy's amusement, I took longer than usual to surface, spluttering, from the potholes. We scaled the maypole route, cached the rucksacks and invested a lot of time and energy finding an alternative route to our proposed campsite. This was a partial success and we finally parked our loads where Selenite Tunnel met Cross Rift. We were knackered after this 11-hour trip but well positioned for the big event planned for the 27th to 29th of August 1967.

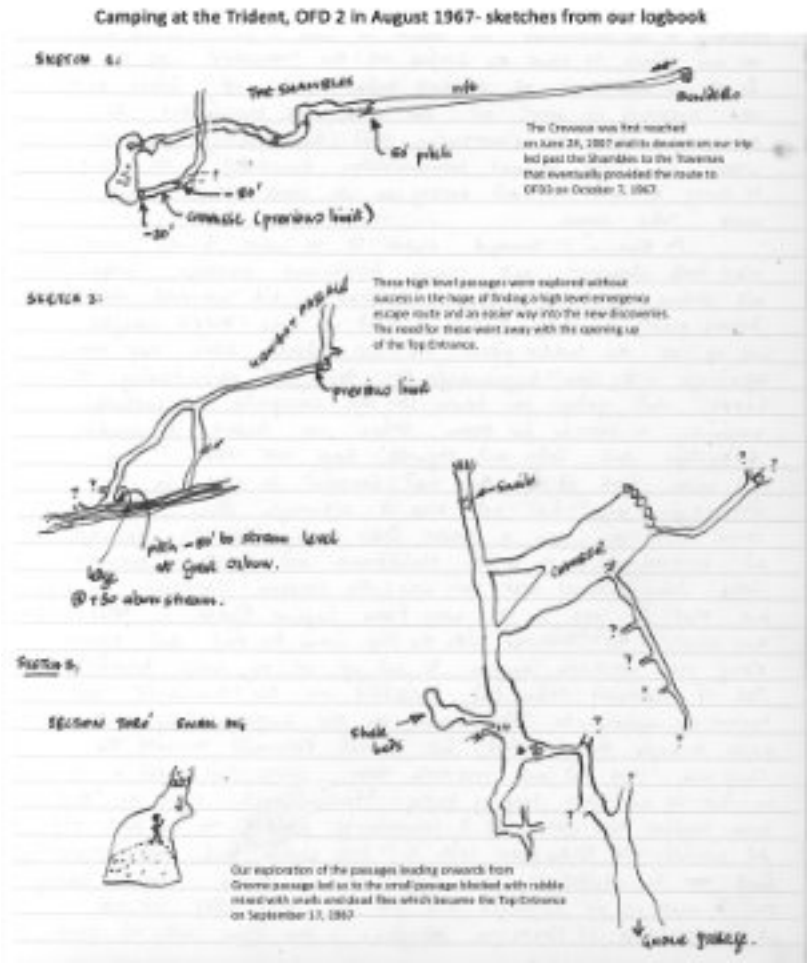
On the Bank Holiday Sunday, six of us set off from Cwm Dwr to the upper levels with Paddy and I intent on camping at the Trident and exploring as much new cave as possible over 2 days. John Osborne, Rod Stewart, Terry Moon and Martin Gough, loaded up with food and ladders, were equally focused on getting the most out of one very long day, without an overnight camp. After hauling up tackle and reaching our food cache, there was a lot of bumbling around exploring various pitches and upper-level passageways, with limited success, before we all retreated to the Trident to brew some hot food and drinks. Unfortunately for the day party, their Oxtail soup was burned and inedible.

Quoting from details in Paddy O'Reilly's logs: we next set off up Salubrious Passage, fixed a ladder into what John and Rod christened 'Ungnome Passage'. We put another ladder on a hairy pitch that Terry had previously free climbed. Terry repeated his 'death and glory' climb and fixed a handline for us lesser mortals. We were soon at the previous limit of our explorations, at the top of the Crevasse. After laddering the Crevasse and initially failing to find a way on, we then traversed over the Crevasse and laddered the other end into a fairly large hall, a calcite slope and an unstable, boulder-filled passage. Thereupon followed the unique experience of navigating past shattered walls, over, under and through huge rocks where no man or woman had ever set foot. It was one of the most terrifying experiences of my life! Rod deemed one wall we had just squeezed under unsafe; he gave it a kick and it peeled off with a thunderous roar. On we went, picking our way over huge boulders. I kicked as many unstable ones as I could down into deeper holes, the noise was earth shattering. We called this area The Shambles. We pressed on, balancing from boulder to boulder until we were stopped by a 50ft pitch which proved to be a straightforward ladder descent into a deep rift passage which we followed for several hundred feet until stopped by a boulder choke. We felt we were on the scent of finding OFD3, but it wasn't going to be today, as a rock bridge we had just climbed over collapsed with a shattering noise. Unnerved, we beat a hasty retreat!

At Bhowani Junction, some of us had a quick doze while Terry, John and Martin checked out more passages and found another inviting 60ft pitch which they saved for another day. Back at our Trident campsite, we were all pretty tired. Paddy and I changed out of our tatty wetsuits into dry clothes, fried up lamb chops and squashed chips. The delicious cooking smells drove Terry and Martin to depart for Cwm Dwr after having been underground for about 16 hours. John and Rod had a quick nap and followed them out an hour later. The campers then savoured grapefruit cocktail, coffee, cheese and bread before setting up our sleeping quarters. The floor needed a bit of levelling; our mattresses were our wetsuits, covered by a polythene sheet. We rigged up a tarpaulin to scanty projections to keep off the drips, snuggled into our sleeping bags and blew out the primus and the candle. Utter darkness and a chilly breeze! I remember saying, "*If only my mother could see me now!*"

After 9 hours of (mostly) sleep, we woke up hungry and devoured our delicious bacon breakfast. The aroma was wonderful! We were energised, in fact exhilarated, to be able to explore without another slog up the streamway. From Ungnome Passage, we turned into Gnome Passage and followed one route where only Colin Fairbairn had been before, on a different trip. Where his footprints stopped, we followed the most obvious route to a junction where we built a cairn. Heading right, we followed a lovely passage, decorated with gnomes and totem poles, for several hundred feet to a rather unprepossessing heap of boulders beneath a small aven. You must imagine our excitement when we realised there was black mould on the walls with dead flies and a moth intermingled. On closer inspection, there were land snail shells and a little further on, there was a similar scree slope completely filling the passage. There was no glimpse of daylight above, but we were convinced we were very close to the surface. We determined that our next trip would involve both a caving and a surface party and Bill Birchenough's home-made radio transmitter!

Was this going to turn out to be the Top Entrance?




and a snack, neatly packed up some camping stuff to be left behind and bagged the rest to bring out. Donning our semi-dry wetsuits, we set forth for one of our most enjoyable return trips down the stream. We tired on the last lap, slowly dragged our kit bags and ladders through the crawls, emerging from Cwm Dwr into the warmth and darkness of a summer night, just past midnight on the morning of the 29th of August. We had been underground for 38 hours.

Our trip taught us that lightweight camping and cooking good food was a useful strategy for extended exploration. With our friends, we had pursued what turned out to be the right approach to the eventual goal of reaching OFD3 and we'd found the site for the future Top Entrance.

What happened next?

Well, on September 9th, the big push was on! John Osborne went in with Clare Harvey, Hywel Ball, Martin Gough and Roger Jones in one team, while Paddy, Colin Fairbairn and I were the other team who sited Bill's transmitter for 4 hours at the 'Snail Dig' we'd discovered on our camping trip. We then set forth to do some serious surveying of the new

*Peter Harvey shovels dirt while Stewart Kirby and Rod Stewart assist*

*The watchers - Noel Christopher, Gary Jones, Mike Coburn, Liz Flaherty, Susan Bradshaw*

Still not done for the day, we followed a nearby passage into an enormous chamber which appeared to have many passageways onwards (subsequently dubbed by us as 'The Big Chamber Near the Entrance' since we and others were rapidly running out of innovative names!). We took a preliminary look into the various routes which headed off in all directions. Next time!

We simultaneously agreed that it was time to head for home. Back at the Trident, we had some soup

passageways. John's party was overdue meeting us, as Clare and Martin had minor accidents involving boulders. John brought great news that he'd made walkie talkie communication with John Harvey who was on the surface with the radio receiver. They had picked up our transmission, which only appeared to be 30ft from the top of our aven! John and Hywel next went off to set off a bang at the aven, which was felt on the surface! Next, we had a chat with the surface team. We were elated. We cooked a meal at our previous campsite and

*Terry Moon Emerges first from the Top Entrance*

headed out. Colin baulked at doing any more surveying. In his inimitable way he said, "*Well, what's the point, there will be a new entrance in a couple of weeks, and we can do it properly then*." I didn't know at the time that this 17½ -hour trip was the last time I would need to explore the upper reaches of OFD2 via Cwm Dwr.

September 17th, 1967: The breakthrough!

The underground party of Terry Moon, Colin Fairbairn, Hywel Ball and Mike Holhead set off equipped with the transmitter and a walkie talkie as well as some bang. They encountered a Derbyshire party, Clive Westlake (see his article in the 50th Anniversary Publication, No.118), Paul Deakin and Henry Mares from the Eldon pothole club, who were heading into Cwm Dwr and who were delighted to join in and help carry the gear.

On the surface, some of the stalwarts of the SWCC assembled, anticipating a breakthrough: Clive Jones, Bill Little, Peter Harvey, Paddy O'Reilly, me (Susan Bradshaw at the time), Rod Stewart, Bruce Foster and others. Our problem was how to be sure we were about to dig at the best place on the featureless moor. Depth calculations had varied from 28ft to 100ft, previously. The caving party sited the transmitter at the aven by the snail dig. Clive quartered the moor as if he were conducting an ancient druidic ritual, holding out Bill Birchenough's receiver, which was the size and shape of a steering wheel. The signal was strongest at a site he'd started to dig a week ago. Peter hammered on the rocks above, Colin did the same below, then the cavers blew up some boulders, rocks were levered out, a piece of turf torn off, smoke wafted out! A hole emerged, tools were passed to the cavers, and soon, there was a big enough gap. Paddy eagerly squeezed in to be greeted by a beaming Colin and to shake hands with Terry. The caving party emerged triumphant!

*Paddy O'Reilly exiting the Top Entrance, shortly after discovery in September 1967 (note the shuttering but no gate yet)*

Like the divers when Cwm Dwr was connected to OFD2, we felt both relief and regret that our personal adventure playground was now accessible to all! The discovery of OFD3 followed shortly thereafter. Then the commitment of 2 years to surveying the cave.

*Note: All photos circa 1967 and 2020 (edits). (©Paddy O'Reilly and Susan (Bradshaw) O'Reilly)*

*Paddy O'Reilly clearing debris to open up the New Entrance*

# *Ogof Ffynnon Ddu 3, 1967: The Next Chapter*

**Susan O'Reilly & Paddy O'Reilly**

The coauthors are Susan O'Reilly who writes from her perspective of those exploratory trips and Paddy O'Reilly who provided his original logbooks, sketches and photos.

The discovery of the Top Entrance to OFD2 on Sept 17th, 1967, led to an explosion of activity. The Club thronged with cavers intent on exploring the upper levels and bagging more discoveries. The original 'teams' of hardy OFD2 explorers set forth to explore and survey the area around the Chasm, the Crevasse and the Shambles. Within 2 weeks, a party led by John Osborne had begun some tricky traverses in the high, deep rifts beyond the Shambles and could hear the distant river rumble ahead and below. Confidence rose that they might be on the route to bypass the Top Waterfall.

*October 16, 1967: When we descended to the OFD3 streamway, water was thundering past, nonetheless Hywel Ball tried to approach the waterfall in the swirling mist. The planned maypoling of 'Niagara' was impossible so we scouted a higher-level way round it. **

On October 7th, Paddy O'Reilly, Terry Moon, Colin Fairbairn, along with Bob Pyke, continued pushing John's route at a high level, straddling the very exposed traverses, challenged by slippery footholds and loose, unstable boulders. A boulder choke blocked the way on, but Terry managed a high-level squeeze which looked down into a black hole with the sound of the river below. With some difficulty, the pitch was laddered down into the stream. Paddy descended to the unfamiliar stream bed: "*OFD3!!!!*" he shouted back to the others.

*October 16, 1967: Paddy taking a quick selfie near the breakthrough point into the OFD3 stream before joining the others to push on upstream beyond Niagara.*

They rushed upstream along a low passageway but were dismayed when they quickly found an impressive 12ft high waterfall foaming ahead of them. Downstream, after a couple of sporty pots in the stream bed, the passageway changed into a low bedding plane and sumped. The waterfall was duly named 'Niagara'. About 300 yards of river cave in OFD3 had been discovered. Maypoling the waterfall was obviously the next step.

That night, there were drunken celebrations at the Gwyn Arms. But the hardy cavers (Colin Fairbairn, Terry Moon, Paddy O'Reilly, Mike Coburn and John Osborne), arose the next morning and portered

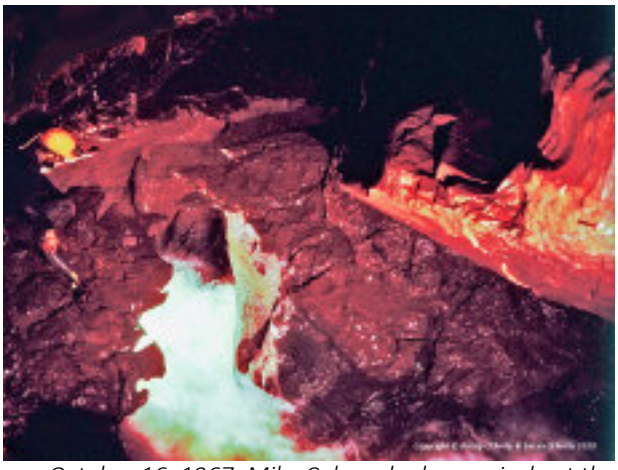
maypoles, dangling from their waists, across the Traverses and deposited them near the stream, ready for the following week's push. Clive Jones and Charles George joined in the effort to find an easier descent to the stream.

Back at Swansea University at the start of the academic year, I had been determined to do well in my courses (the unappealing alternative might have been milking cows on my parents' farm), so I had not participated in the last couple of weeks in the hunt for OFD3. Damn! Now the temptation overwhelmed me.

*Brian Jorgensen and friend on the Traverses shortly after the route into OFD3 had been opened up. Cavers in that era seemed to regard lifelines as a demonstration of moral weakness. I was not reassured to be told I would have no difficulty with the traverses into OFD3.*

One of the reasons I chose caving over climbing is that I fear exposure. Paddy blithely assured me I would have no difficulty with the traverses into OFD3. Ha! They turned out to be very scary for short people like me! And rock climbers believe in lifelines. Cavers in that era seemed to regard them as a demonstration of moral weakness.

So, on Saturday, October 14th, 1967, eight of us set off to solve the mystery of OFD3. We were the formidable team of Paddy O'Reilly, Colin Fairbairn, Terry Moon, Mike Coburn, John Osborne, Hywel Ball, Bob Pyke and me. To say we had exploration fever would have been an understatement. The weather outside was worrisome: wind and heavy rain. I survived the Traverses, sometimes almost horizontal with hands on one side, feet on the other, whereas the taller men nonchalantly straddled the over 90ft. drop with a foot on each side of the rift passage.



*October 16, 1967: Mike Coburn looks pensively at the OFD3 stream that the exploration party has just reached wondering if it is safe to follow it downstream under the flood conditions.*

When we descended to the OFD3 streamway, water was thundering past and maypoling 'Niagara' was impossible. Undeterred, Colin and John spotted a higher-level passage that we accessed with one maypole and a ladder. We reached a junction above the waterfall, where we split up to investigate staying high or descending back down into the stream. The upper level proved safer for a considerable distance, but eventually we were forced down into the stream.

The phreatic passageways were wide and low, creating the misleading visual impression that the river was moving slowly, but once we stepped into the full force of the water, up to our chests, we understood that we were in a dangerous flood situation, where losing your footing could be fatal. Paddy, a non-swimmer, was knocked off his feet by the current whirling around a bend. Mike Coburn and I lunged for him, grabbed his clothing and hauled him up onto a ledge.

We forged on to catch up with the rest of the party. They had encountered a series of impassable cascades which we all managed to traverse around just a few feet above the rushing torrent to get to wider oxbows and deeper, slower moving water again. We were very aware that in these flood conditions, during our traverse above the cascades, slipping into the turbulent water could prove fatal. I have a vivid memory of wading steadily upstream in the calmer water above the cascades, through meandering passageways, as the roof became lower and lower.

Eventually, the passageway sumped, but then, as we watched, the water level dropped slightly,

*October 16, 1967: Once we stepped into the full force of the water, up to our chests, we understood that we were in a dangerous flood situation, where losing your footing could be fatal.*

exposing an air space. The five intrepid swimmers in the party ducked through to find themselves in a large chamber and a final impassable boulder choke. The duck re-sumped on their return, but Terry and team forged their way back. Paddy, Bob and I had rationalised that we were justified in not joining them, in case they got trapped!

A tired but elated team made its way back to the Top Entrance after 10 hours underground. We deserved to be euphoric, we'd pushed OFD to its very end after more than twenty years of exploration by SWCC. And in high flood conditions: the stream was 3ft on the Step in OFD1 that day!

***Author's Note**: Quick note on why I included such a 'blurry' picture. First, it was taken at the moment we broke through and found the way barred by the waterfall; second, I was standing up to my waist in the water holding my camera on a tripod which was being buffeted by the torrent; third, it captures the feel of the moment – all misty and hazy from the raging waterfall, and you can almost hear the noise of the torrent and feel the power of the river trying to carry you away; fourth, Hywel really was pushing his luck at that moment, had he lost his grip there was no way to stop him from being washed downstream; finally, I'm amazed to have captured anything at all under the circumstances – and I think it's rare to see an image from such a dramatic moment of discovery.

*October 16, 1967: Many of the passageways of the OFD3 stream way were wide and low, creating the misleading visual impression that the river was moving slowly, yet Mike Coburn, photographed here, had to lunge to save Paddy from being swept away near where this photo was taken.*

# How We Made the 1969 Survey of Ogof Ffynnon Ddu

## Paddy O'Reilly & Susan O'Reilly

*Paddy O'Reilly coordinated the original 1969 OFD survey as well as producing it with Susan O'Reilly and Colin Fairbairn as co-authors. Susan's articles elsewhere in this publication inspired this article. Susan also provided editing suggestions.*

It was under a frosty, wintry late-November Penwyllt sky that morning in 1967 when Colin Fairbairn and I descended the narrow entrance of Cwm Dwr to begin the final survey of the OFD3 streamway. We planned to begin surveying from the point where we had entered the stream after conquering the fearsome Traverses just a month earlier. We were returning laden with survey equipment, ladders and rope and a modest amount of food to sustain us. After about 4 hours underground we finally reached our starting point and committed ourselves to the slow business of surveying in the freezing stream.

Colin looked at me in evident discomfort and the air turned blue with curses and repressed screams as he lowered himself down into the waist-deep pool that was the perfect survey station, then squatted there in a stationary position, water up to his chest while I read the compass, recorded the distance and noted the features of the passage in my notebook before he could move forward to the next station. Then it was my turn.

"*Paddy*", he said, "*I'm freezing my balls off. We really should have repaired our wetsuits for this trip.*"

I responded, "*My booties are worn through, so I haven't been able to feel my feet for the last hour or more.*"

"*It's not my feet I'm worried about*", he muttered moving ahead awkwardly rearranging his anatomy. We had a long way to go still.

*Colin Fairbairn's approach to exploring: if at first you don't succeed, try … dowsing. Following an unsuccessful dive in the resurgence near Rhongar Isaf Farm in October 1968, his dowsing attempts followed a definite pattern until it became evident he was following a drainage channel – but at least he gave us food for thought. Colin was a great friend, who tragically took his own life some years later. He is greatly missed by those of us who were deeply fond of him.*

*Survey campsite in OFD3. In 1968 Pete Ogden and I camped in the OFD3 stream passage to complete the final sections of the high-level upper passages.*

On this trip we'd had no choice but to access the cave through the lower Cwm Dwr entrance because crossing farmland was discouraged during the Foot-and-Mouth epidemic that was beginning to rage across Wales at the time, and as a consequence, the recently opened Top Entrance was out of bounds in anticipation of a full closure of the area.

That had not concerned us too much. We were by now thoroughly familiar with Cwm Dwr's narrow awkward knee-and-elbow-wrecking crawls, with the route through Cwm Dwr Jama and the tight, loose squeeze through the boulder choke into the Big Shacks in OFD2. We passed on through Nether Rawl and were soon racing along the mainstream passage, past Marble Showers, up the Maypole, along the sinuous passageway beyond and the 35ft climb into what we called the Gypsum series near the Trident in just an hour and 50 minutes, 10 minutes off our best time, laden as we were. It had taken us a further three hours to reach the starting point of our day's work.

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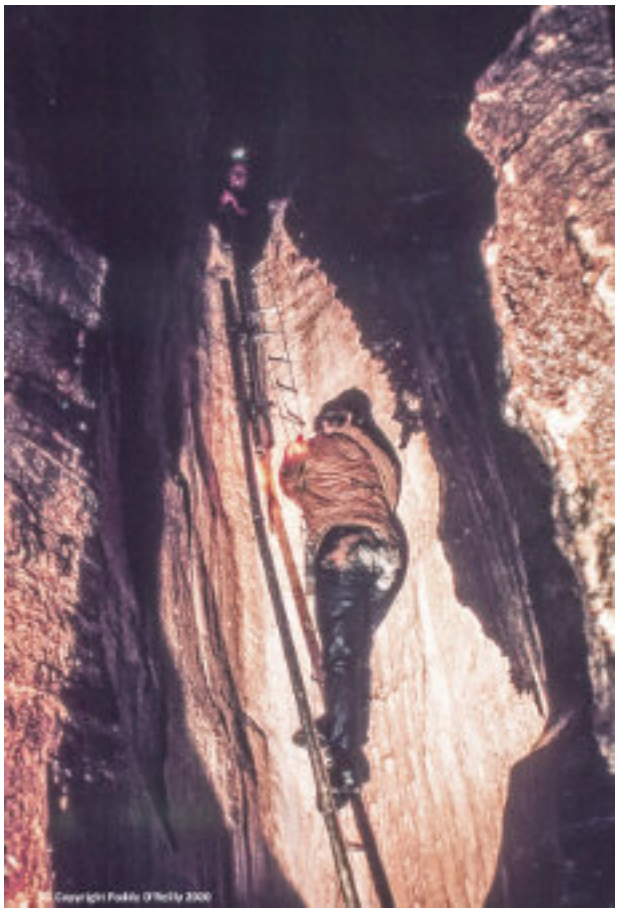
There are no straight lines in the underworld. Yet if we are to try to map the caves we discover and explore, we know of only one way to do that: to measure imaginary straight lines as we traverse the dark and damp passages and then later convert our measurements to drawings that try to convey an impression of where we have been.

*Terry Moon and Martyn Farr getting kitted up for a dive through Dip sump. Photo most likely taken in summer of 1966.*

It's a way of mapping descended directly from ancient times when early humans first scratched maps with sticks in the sand or mud as they discussed that day's hunting or gathering plan. And it's a method that is still full of the same uncertainties that existed in those times: how do you convey what you see into a form that anyone can understand and use for whatever purpose they might need? What scale is appropriate? What symbols are useful? What do you include and more importantly what do you leave out?



*Colin Fairbairn climbing Maypole Inlet June 10, 1967 shortly after the breakthrough into the upper series. Susan O'Reilly is holding the top pole which at that time was still unattached. On this trip the Trident and Judge were discovered and Salubrious Passage followed upstream for the first time.*

In the case of OFD, we were faced with additional questions. In particular, how quickly can we get an accurate picture of what has been discovered, both for purposes of safety and for leads to new discoveries? None of these issues were unique to OFD but the cave was on a scale not explored before in Wales, so those of us who were the cave explorers were soon pitched into the role of cave surveyors as well. Most of us had drifted into that role by default in any case. In my case, I had filled my caving logbook with sketches portraying where I had been and what opportunities might exist for pushing the known cave further since the first time I entered it in 1966.

*The soft white flowstone deposit perplexed us for a time when an expert on soils and minerals tentatively suggested it was a rare form of montmorillonite, a very soft phyllosilicate group of minerals that form when they precipitate from water solution as microscopic crystalline clays. It sounded plausible but later it was confirmed that it was only a form of moonmilk deposit which is common enough but not usually in the quantities seen in Salubrious Passage and Maypole Inlet.*

*Here, visiting cavers descend the new Maypole Inlet fixed chain ladder which was added sometime shortly after the opening of the Top Entrance.*

The discovery of OFD2 by the divers in 1966 and the exploration of the spectacular stream passage beyond Dip Sump focused everyone's minds on where a dry connection to OFD2 might be made. Digging began in any likely place. Clive Jones, who was a caving mentor to me and an unrelenting optimist about how to find new cave passages, had long been predicting a breakthrough from Cwm Dwr Jama into OFD2.

On April 9, 1967 he had been digging at the boulder choke at the end of Cwm Dwr along with a couple of others when it 'started to get dodgy' and they retreated to the safety of the Club. Hardly an hour later John Osborne walked in, in full caving gear, to announce that he had been in a party that had dived through Dip Sump that day and that he had found a devious, but dangerous, 20ft route from OFD2 through the boulders that Clive and others had so hastily abandoned.

We all descended to the Cwm Dwr boulder choke *en masse* a week later.

Bill Little waited patiently as Hywel Ball lay under a huge boulder, trying vainly to move a small block out of the way, convinced it was the only safe way through the loose and unstable rocks all around him; Clive re-assured us all, as only he could do, with the comment: "*It's a bad omen. I went to the tobacconist's this morning to get some tobacco*'.' Then after we'd waited a suitable time for the rest of his story, he said bleakly: "*But I couldn't. They were burying him.*" At that very moment loud hammering sounded from the other side of the boulders. And who should it be but John Osborne who had dived through Dip Sump along with Charles George and Terry Moon in the hope of connecting with us! Our mood changed immediately, and Clive's gloomy joke was forgotten in the shouts of joy as we all squeezed through into OFD2.

OFD2 was now open to further exploration by all through that dry connection with Cwm Dwr. On that very first day, Clive surveyed the stream passage as far as the first pothole. Right from the very start, exploration and surveying went hand in hand.

On my next trip through the new connection and up to the Top Waterfall I noted the many side inlets into the main steamway and was convinced that one of them would lead to an upper series that might eventually take us beyond the Waterfall and on to an imagined OFD3 and perhaps even all the way to the Byfre sink.

The Maypole Inlet provided the way into that Upper Series and when Colin and I had pushed up into the passages that we initially called the Gypsum Series, the business of the first survey of the entire OFD system had begun in earnest. Our initial sketches were posted in the hallway of the Club, hastily drawn on a large sheet of cartridge paper which were added to almost weekly as we found more and more new cave. The trips into this new series of largely dry passages became more and more extended and that sketch was our only lifeline in the event of an accident.

As a result of the Trident camping trip (see Susan O'Reilly's earlier article, Camping at the Trident: A fifty-three-year-old tale of exploration in Ogof Ffynnon Ddu 2), it was only a matter of time before the Top Entrance was opened up, the deeper recesses of the upper-level cave were explored and the long-imagined OFD3 streamway discovered. Throughout this period a great number of people explored the cave and assisted with the job of surveying as the cave was opened up and the curiosity about what the plan looked like grew apace.

By the time of my surveying trip into OFD3 with Colin in late November 1967 much of the cave had been surveyed and the list of sections to be covered was growing shorter. Shorter, but it still took another year, until November 2, 1969, for me to write in my logbook "*THE LAST SURVEYING TRIP.*" During that year, as we completed the surveys of the various sections of the cave, we faced the major challenge of compiling the data into a comprehensive and reasonably accurate reflection of what was underground beneath Penwyllt. The detail of how we tackled this additional challenge and the principles we used has been fully described in my article *High Speed Surveying in Ogof Ffynnon Ddu*.

These were days when there were no personal computers, cell phones or advanced technologies even remotely similar to those available to cavers today. But we made use of what we had. While carbide lamps were as common as electric miners lamps, they were often better for use on the longer trips underground. We had to make do with the rudimentary tools of 'plane table' surveying, the compass, clinometer, tape and notebook. We had no spreadsheets or word processors and access to printing technology was still very limited. But we had tricky engineers in the Club, such as Bill Birchenough, who had developed a transmitter that allowed us to send location signals from underground that could be detected on the surface. And we had professional surveyors in the Club like Bruce Foster who took on the business of connecting those locations with various entrances and known cave features.

*Bill Birchenough's radio location transmitter was used on numerous occasions during the exploration and surveying of OFD to try to determine the surface location of key places in the cave. Here, Carlo Ryan sits patiently by the device which he has set up in an attempt to determine whether that point is close to the surface.*

As a research student at Swansea, I was able to get access to the University computer lab which was an air-conditioned building packed with big humming machines and strictly guarded by white-coated

*Swansea University's ICT 1905 computer was housed in an air-conditioned warehouse with a large wardrobe-sized CPU, disk drives, tape drives, card readers and an operator's console for typing in instructions. These computer cards were punched by me in a separate Keypunch Room adjacent to the mainframe computer room. After punching and checking the cards they were submitted for processing. Results were generally available 24-hours later. These are the original punched cards that contain the program for calculating the x, y and z coordinates of a survey leg as well as the data for the different sections of the cave. Today's cavers could hardly imagine this process.*

technicians. There was as much computing power in that centre as would be in a child's toy today.

But access to that computing power allowed me to punch all the numeric data onto individual punched cards and obtain a printout of the x, y and z coordinates of a traverse consisting of any combination of the survey legs we had mapped, corrected to distribute any errors that had accumulated. I seem to recall that I was impressed that it could do this for 200 stations in about 15 seconds. Compare that to the sophisticated apps that are available today that claim not only to manipulate your data but also 'paint in' your scanned sketches to create a fully digital cave survey, and the digital scanners that are capable of providing a fly-through underground experience – VR-caving for the YouTube generation!

In the latter part of 1969, there was a prolonged period of drawing and redrawing as the map gradually took shape. The Board Room of the Department at Swansea University was taken over for several weeks and likewise our living room floor in the flat where Susan and I lived in Swansea. Susan, Colin and I were like family and as the primary architect I needed their support during those days when I felt as if I would never finish and that it wasn't good enough to publish anyway. Susan finally clinched the argument for me by

*Note-taking and survey checking in OFD1. Lewis Railton kindly allowed us to use his survey of OFD1 if it would assist in producing a finished product, but did not provide data. To connect his work to that carried out in OFD2 and 3 we did a line survey through the major passages of OFD1 and transcribed detail from a hard copy of his original survey complemented with our own notes. Photo taken in a corner of the Rawl Series 1968.*

quoting Samuel Coleridge Taylor with her emphasis on the middle line: "*…the sacred river, ran / Through caverns measureless to man / Down to a sunless sea.*" Of course, caves are measureless to man and no map will ever produce their measure.

So, I concluded that although our methodology was unorthodox out of necessity, our survey was perfectly valid. We believed that the cave explorer of 1970 needed a map to show what was already known and to inspire further exploration, while the cave scientist wanted to produce a map done to the highest degree of accuracy and detail possible. To achieve the kind of accuracy and detail that Lewis Railton achieved in his magnificent survey of OFD1 would probably take us another 20 years. Our map might not satisfy the purist aspiring to CRG Grade 6, but such maps would surely come – and they now have. My recently obtained copy of the new 1:1000 scale colour map of OFD produced by Brian Clipstone and published by the Club in 2017 is a stunning example of what is possible with time and the technology of today – full of detail, available in multiple media and providing the basis for both the explorer and the scientist.

Yes, I thought after viewing it, "*caverns are measureless to man, but…*"

The final draft of our survey went to the printers on November 10, 1969 and became available early in 1970 with an accompanying monograph. It had directly involved at least 55 dedicated surveying trips and a total of more than 1100 man-hours of Colin's, Susan's and my time. This does not include trips underground to verify details, or for photography or scientific work such as water chemistry and water tracing associated with the survey itself. Nor does it include the time of the many supporting players in the survey.

The early scientific work associated with the survey is described in my 1974 paper '*Morphology and Hydrology of the Ogof Ffynnon Ddu Karst Area*' which also includes a schematic longitudinal section which was not initially completed in time to include when the survey was published in 1969.

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I have digressed from my story about Colin and me quietly freezing in the limpid, frigid underground waters of OFD3 in November 1967. Despite our attempts to keep warm we gradually became colder and colder as we slowly made our way upstream surveying towards Smith's Armoury. We had brought food with us as well as my trusty Primus stove, so we stopped on a ledge and made some hot soup before hypothermia kicked in. This revived us considerably, but our feet remained numb. Eventually we came to the end of our day's surveying and as we packed away our survey materials, we both quietly dreaded the long journey out via the OFD2 stream and Cwm Dwr.

Colin broke the silence as we packed. "*I'm going to take a piss,*" he said, and then after a pause he looked me straight in the eye and said, "*…inside my wetsuit.*"

I don't recall how I responded to his ostentatious cries of delight and moans of pleasure as the warm liquid dribbled down inside his wetsuit legs and into his socks, but my logbook, written later, says I was not impressed. Nonetheless, I too was soon driven to take the same measures and – indeed – our cold feet troubles were cured. The only expense was our dignity and the possibility of nappy rash – and what price was that?

We had been immersed in the freezing stream for well over five hours and, as quickly as we could, we packed and made our way downstream, back across the Traverses and along eventually to Arête Chamber, where we were only five minutes or so away from the Top Entrance.

We paused.

"*We found it Colin. We dug it out.*"

"*Yeah.*"

Silence.

"*There can't be any Foot and Mouth germs on our boots now Colin.*"

"*Uh.*"

Silence.

I think: What if my light were to suddenly pack in…?

"*How's your light, Paddy?*"

"*Oh, in top condition, I've had eleven hours out of it already today.*"

*"Mmm. I've only got about four hours at most left in mine."*

*"Still, I've got a spare carbide."*

*"Anyway, I don't need a light from here down the stream."*

Silence again.

I think: Colin's a right old bastard – still, if he won't give in, neither will I. I know he's a bit knackered, but he won't give me the satisfaction of saying 'let's go out the Top'. I still feel quite good but what if my spare light doesn't work?

We sat there for a moment more waiting for one of us to give in first and then, together, we slipped and slithered down Salubrious Passage as far as the Trident. Another brew-up – fortification for the exit.

*"You're a right old bastard O'Reilly – you wouldn't give me the satisfaction of saying 'let's go out the Top' would you? All right, we'll go out the bottom."*

And we did. The trip downstream was little more than a daze; we were both on the edge of exhaustion and it seemed we reached the Cwm Dwr crawls without knowing for certain how we got there. Once horizontal in that narrow passageway we heaved ourselves and our packs along inch by inch. Colin, by nature a bit bulkier than me,

*Bruce Foster's contribution to the OFD3 survey was critical. Using his skills as a professional surveyor he was able to 'fix' certain points of our survey – entrances and radio-located stations –to help create a verified framework of passages that acted as a backbone for the 1969 survey. Here Bruce is triangulating a fixed point above the Top Entrance.*

*Susan (Bradshaw) O'Reilly and Carlo Ryan surveying in the passages near the Top Entrance in 1969. This was one of the earliest areas of the cave to be surveyed and the proximity of the new entrance made it easy to add extra detail and to check on detail prior to publication.*

thumped along through the passages without his light on, feeling his way along. At one point I lay resting with my cheek against the back of my hands in a small pool of water trying to find the energy to keep moving. Like a mirage, a crushed Mars Bar without a wrapper appeared in the muddy pool. Clearly it had slipped out of someone's pack. We brushed off the grit and mud and shared it silently and from the energy coursing into us we climbed onwards and upwards through the concreted chimney leading to the entrance. About halfway up I realized I had left my pack on and part of it had jammed in a crevice and I could neither go upwards nor downwards nor remove it.

We had not used a ladder on entering so there was nothing to pull up on, but somehow, with Colin pushing from below and me giving an almighty heave, I reached the edge of the entrance, hauled myself out and lay on the gravel utterly exhausted, actually sobbing, thankful for the damp smell of the earth and being outside again even in the damp and freezing night-time cold.

That's how we made the 1969 survey of Ogof Ffynnon Ddu.

**Further Reading**

Ogof Ffynnon Ddu, Penwyllt, Breconshire, by PM O'Reilly, SE O'Reilly, CM Fairbairn et al., South Wales Caving Club, 1969. Published to accompany the two-sheet survey of OFD. Recounts the discovery and exploration of OFD; provides a description of the area, the cave and associated sites; offers a summary of the geology, cave formation processes and geomorphology as known at that date.

High Speed Surveying in Ogof Ffynnon Ddu, Trans. Cave Research Group of Great Britain. Vo. 12. No. 3. pp. 149-154. July 1970. Also presented at the Symposium on Cave Surveying at the Annual Conference of the British Speleological Association, Sheffield, 1970. A detailed account the methods and techniques used to produce the 1969 survey.

Morphology and Hydrology of the Ogof Ffynnon Ddu Karst Area, South Wales Caving Club Newsletter No. 76, June 1974. Also presented at the 6th International Congress of Speleology, Olomouc, CSSR 1974. Academia/Praha 1976. A summary of the research carried out to that date and the correlation between the cave and the surface features of the area.

**Acknowledgements**

The original 1969 OFD Survey truly was a collaborative effort by a lot of people over a very short period of time. I would like to acknowledge the many Club members and guests who contributed to this work. Although I played a lead role, the work could not have been done without the support and help of a dedicated core group of people. As I was a meticulous recorder of the participants on each trip, the names below all appear in my logbooks of the time – so I believe it is fair to acknowledge people in this manner.

The following formed the core group that inspired, encouraged and supported the work, participated in the majority of the underground trips and helped with the production of the finished product: Susan (Bradshaw) O'Reilly, Colin Fairbairn, Terry Moon, Pete Ogden and Mike Coburn.

The following provided the crucial support network for the work, some by actively participating in the underground trips and others by contributing through digging, sharing their own discoveries, providing guidance with the science and photography, offering logistical support, advice, ideas and encouragement. These were the cavers who came along simply to help out by being a member of the underground party, pitching in however they could, carrying gear, acting as 'go-fers', strengthening our teams and keeping us safe. It was only through the unstinting support of these that the publication of the survey happened at all.

Our thanks goes unreservedly to: John Osborne, Martyn Farr, Carlo Ryan, Bruce Foster, Bob 'Sos' Saunders, Clive Jones, Bill Little, Ken Maddocks, Hywel Ball, Keith Ball, Bill Birchenough, John Harvey, Clare Harvey, Andy Freem, George Bray, Dai Ede, Bob Pyke, Bob Radcliffe, Noel Christopher, Richard (Dick) Arculus, Roger Smith, Charles George, Peter Harvey, Jem Rowland, Mick Day, Alan Coase, Rod Stewart, Frank Baguley, Laurie Galpin, Mary Galpin, Allison Stone (Maddocks), Noel Dilly, Brian Jorgensen, Colin Graham, Tony White, Roger Flaherty, Roger Jones, Stewart Kirby, Pete Cardy, Gareth Davies, Eric Inson, Graham Nicholson, Mike Ware, Mike Holhead, Martin Gough, Roger Thomas, Rick Darke , Peter Robinson, Idris Williams, Peter Steer, Dai Hitchings, Ken Alexander, John Neate, Killian Halpin, Peter Monk, Paul Allen, Mike Duerdin, Gerry Woolf, Gerry Eldridge, Cynon Thomas, Roy Edwards.

There may well be others whose names deserve to be here, and I apologize for not knowing who they might be.

**Author's Note**: As this article was going to press, the author became aware of a short video on YouTube that indicates that caves may soon no longer be 'measureless to man'. The video is entitled '*A 3D Point Cloud of The Big Chamber Near The Entrance in OFD2, South Wales, UK. with thanks to C.Howes, J. Calford, J. Burkey, M. Burkey and C.Gaisford for your help*'. The link is: https://www.youtube.com/watch?v=Twxe_DR7tqs&t=6s This video represents a huge step forward for cave surveying and imaging - and although it was posted on 03/01/2018, it had only been viewed by 123 people by 21/02/2021.

*50 years of evolution of the OFD Survey. Left: an image of the grubby sketch map that graced the Club headquarters in the second half of 1967, the only lifeline for those exploring the Upper series in case of an emergency. Centre: Portion of the same area taken from the 1969 OFD Survey. Right: Portion of the New 2017 OFD survey covering the same area –complete with colour scheme and QR codes.*

*Tom Foord climbing into new ground, the passage highlighted to his top left being the one discovered during the OFD re-survey (©Chris Jones)*

# OFD3 Recent Extensions

Chris Jones

Ogof Ffynnon Ddu (OFD) is perhaps the most well-known cave system in Wales, and for good reason. In its extensive 61km it boasts an extensive and sporting main streamway, a variety of interesting round and through trips from various entrances, some excellent formations and a myriad of impressive passages to get lost in. In fact, once you begin to dig deeper there is also a huge range of more challenging trips to the more remote regions of the cave. OFD is also the deepest cave in Britain, reported as 305m in depth until a resurvey in 2014 reduced this figure to 293.5m. Furthermore, the entrance is a stone's throw from the South Wales Caving Club Hut, providing simple access to the cave, showers, brews and a roaring fire.

Brief history of OFD3 – details can be found in Journals 57 & 58.

Since the discovery of the Top Waterfall and its associated sump, which prevented further progress in the main streamway, a bypass was desired to allow further progress toward the main sink of the Ffynnon Ddu – the Pwll Byfre. It was hoped Maypole Inlet would provide a simple bypass re-entering the streamway in what would be OFD3, beyond the Top Waterfall Sump. In 1967 Maypole Inlet was climbed and the passages discovered above were truly surprising. Prior to top entrance being dug, exploration trips were a major undertaking and eventually a camp set up near the Trident (see Susan and Paddy O'Reilly's earlier article – *Camping at the Trident: A Fifty-Three-Year-Old Tale of Exploration in Ogof Ffynnon Ddu 2*). Still, a route back down to the streamway could not be located, despite dropping a pitch beyond the Crevasse and exploring the shattered passageways around The Shambles. Exploration here must have felt very remote indeed!

Not long after the Top Entrance was opened, the cave was in flood (3ft above the step in OFD1) over the 14th and 15th of October in 1968. By literally following the sound of the roaring water The Shambles was passed. This was quickly followed by the wildly exposed traverses, and finally, over a year after the discovery of Maypole Inlet, OFD3 was reached and Smith's Armoury, the furthest upstream point of OFD, was discovered. In the period that followed, a few minor inlets were explored, and a major high-level route was discovered, but exploration soon returned to the easier to access and complex maze passages of OFD2 and Cwm Dwr, where there was plenty to be found.

Perhaps like many, I'd always assumed that was all there was to OFD, an excellent cave, but with potential for exploration dried up and had settled for the accounts of the original exploration in the SWCC journals – the tales of getting flooded into the far reaches of OFD3 during the original exploration are particularly enthralling and worth a read in their own right (see Susan and Paddy O'Reilly's earlier article – *Ogof Ffynnon Ddu 3, 1967: The Next Chapter*). That was until I received a phone call from Gareth Davies in 2010, he was digging in OFD3 with Joel Corrigan and Martin Groves and would like some help carrying bags. I declared them mad and declined their offer. Not long later they broke into 'Mile High Passage' an extensive section of traverses high above the main streamway in OFD3. This discovery got me thinking about the area, but it was not until four years later that any real exploration began.

**Fungal Juices Canal and Megzit – 2014-2016**

(*Cardiff Hill Divers: Chris Jones, David Powlesland, Tom Foord, Sam Deeley, Dan Workman, Matt St Clair, Megan Gorry, Meshari Alseed, Tom Lia, Jason Gotel, Peter Braidley, Dickon Morris, Gareth Davies, Rich Smith and Emily Mackinven*)

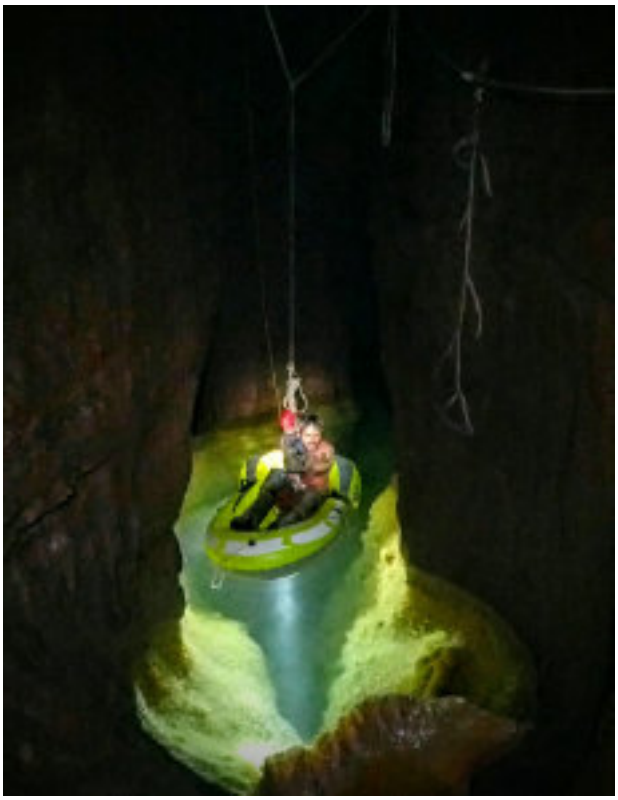
*Dropping into the Fungal Juices canal (©Chris Jones)*

Sitting alone, at the edge of the OFD3 streamway and watching the water rising, the way upstream to Smith's Armoury fully submerged and a thick layer of flood foam on the surface of the river, now a deep peaty colour, was not how I wanted this trip to end. I had been first down the pitch from the high-level passages above the streamway and as the rest of the team joined me one by one, we sat in silence watching it rise further still. We knew there would be some interesting moments to come on the trip out. The small cascades transformed to minor waterfalls, some long sections of low airspace were starting to threaten, and the two shortest in the group were failing to touch the floor for significant portions of the swim making it a speedy (and memorable) escape! Once we'd all made it back to dry land we could relax, another excellent trip with two promising, draughty leads to return to. Still buzzing from the adrenaline, we were welcomed back to SWCC by a relieved travelling salesman who, it turns out, also does a very good line in tea for the weary.

Like many successful projects, this one began with the completion of the excellent new OFD survey back in 2014. The full survey was made freely available online and due to the great detail, all the known avens across the system were highlighted. The timing was perfect; a group of us were planning an expedition to Cueva del Nacimiento in the Picos de Europa, where the exploration of new passage is almost exclusively through aid climbing techniques – we needed some practice.

Thinking that surely the avens marked on the new OFD survey hadn't all have been climbed, a few of us from the Cardiff Hill Divers began to visit and review the more remote ones, quickly finding that many had indeed been climbed. Initially, we focused on the area around the Upper Oxbow and Merthyr Vale. This resulted in some great aid climbing practice, the relocation of many old bolts, a few new loops and connections to overhead passages, but overall, some excellent trips to remote parts of the system. The area around Mutiny Junction brought our first 'breakthrough' when a brief climb up through a boulder choke entered a sizeable chamber with some walking passage beyond. A small oxbow in the region was also discovered with a tight connection soon forced back into known passage. Then, as expected, the three avens climbed soon broke down to nothing. Chatting about these minor discoveries in SWCC, we were overheard by Brian Clipstone, who proceeded to tell us of a walking passage they had discovered above the streamway in OFD3. It had not been included in the new survey and was most likely un-entered.

It wasn't long until a group of us were staring into this passage with anticipation, it was indeed large, and it was indeed walking sized. It was also on the other side of a large pitch and we had run out of our meagre selection of tackle. Returning with a full



*(Boating in OFD ©Chris Jones)*

*David Powlesland descending down back out of new passage (©Chris Jones)*

bolting kit, a simple traverse saw us fairly quickly enter the passage. However, we were soon stumped again, this time by a crystal canal (Fungal Juices), absolutely stunning and weaving off beyond the sight of our lamps. With help from a top-quality rubber dinghy the canal was passed, ending with a dense calcite choke, a draught whistling through. Unfortunately, our efforts to enlarge this failed. However, we'd discovered that this area of the cave was well endowed with inlets and avens and soon set about climbing everything we could – around six were climbed to a height of around 20-25m or so, many requiring entertaining acrobatic techniques. Again, all ended quite quickly in small rifts or closing down to mud chokes and one providing a short section of walking passage to a dead end.

In an effort to ward off the chill during these extended climbing trips, those not involved in the bolting had located a small draughting hole and began a dig, named Megzit after our super-keen French digger and the dubious political situation of the time. Megzit begins tight, quickly reaching some tight corners which very effectively removed the interest of the majority of our crew. Recruiting more small midgets to help with the digging, a final boulder was removed, and a sizeable rift was entered. They were on! Alas, a small climb led to a blind aven. However, all was not lost as a rift was spotted back on the correct side of the constrictions. This rift proved to be loose and complex, the direct line never easy to follow. Over several trips this rift was climbed to a height of 54m, easily placing the total depth of OFD back over the 300m mark, 312.5m to be precise.

Perhaps a year after we began, we triumphantly presented Brian with a survey of the extensions. To which the reply was, "*there is another bit we didn't survey…*"

**The Wee**

(*Cardiff Hill Divers: Chris Jones, Tom Foord and David Powlesland*)

If you ferret around by The Wee in the OFD3 streamway you'll find a rope ascending high into the rift above. A little bit more ferreting reveals an obscure phreatic tube, soon developing into ~50m of awkward keyhole rift; a short pitch down then leads into 200m of fantastic fossil passageway. Along this passage are several high avens and two wet inlet passages; the main way on seems to end in a large dry choke. Alas, we can't claim the discovery of this as a single set of footprints were found near the end, but the thrill of exploring this basically unknown passage was palpable. Furthermore, it confirmed our efforts over the past years – there remains a great deal of potential in OFD.

Since the time when we tied up our loose ends and handed over our survey notes, a further significant addition to the region has been added to the survey.

*Tom Foord and David Powlesland in new passage above the OFD III streamway, reached via a short 8m bolt climb (©Chris Jones)*

◀ *Tom Foord contemplating un-entered passage high above the OFD III streamway (©Chris Jones)*

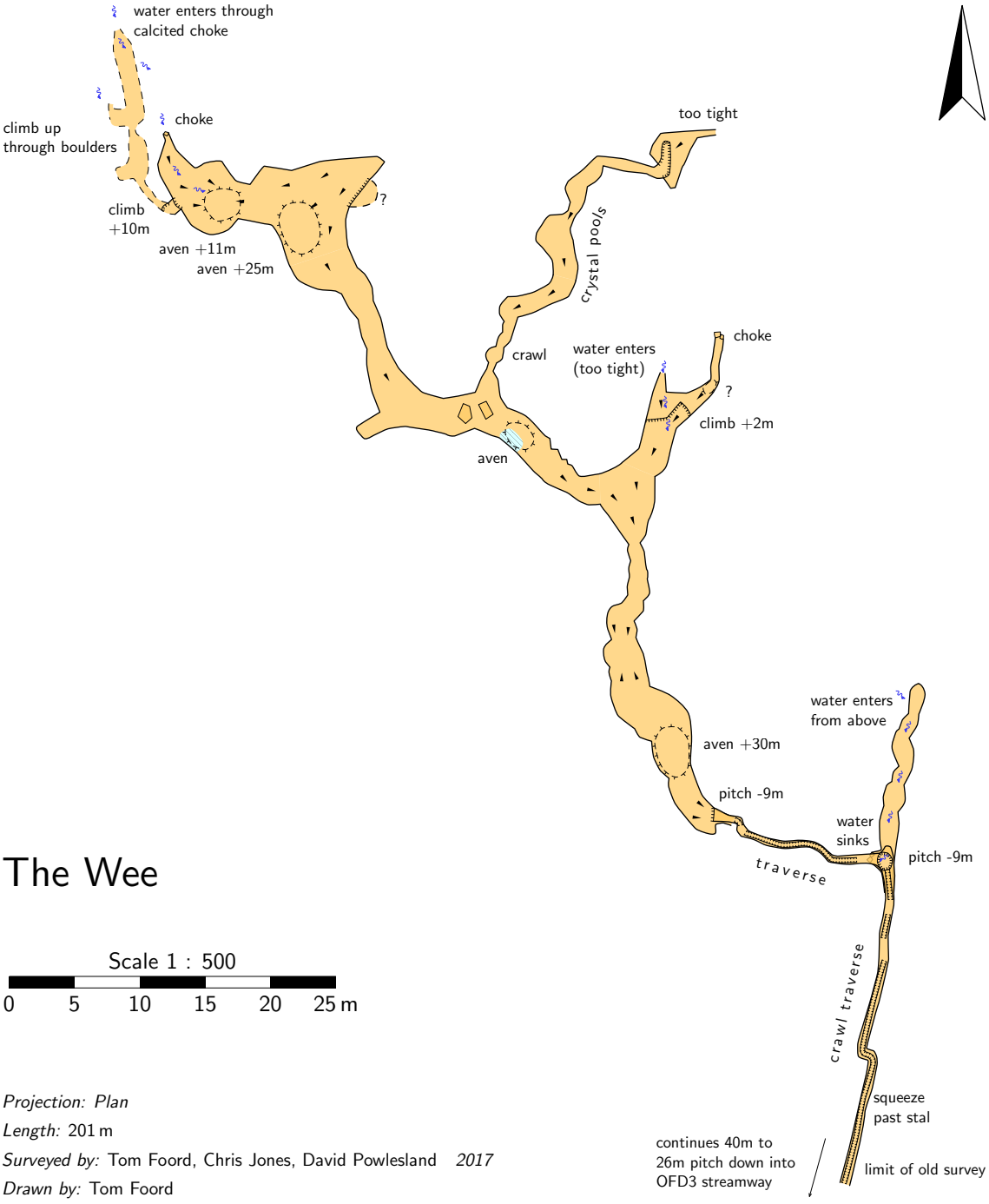
▼ *Tom Foord enjoying some acrobatic traversing above one of the aven climbs (©Chris Jones)*

*Stunning canyon passage high above the OFD3 streamway (Fungal Juices) (© Chris Jones)*

(***Below left***) *Meshari Alseed in the dry fossil passage above the OFD3 streamway (©Chris Jones)*

(***Below right***) *Bolt climbing in the OFD3 fossil passage (©Chris Jones)*

*The Wee Plan version 2*




Surveyed by Neil Weymouth in 2017, this passage is one of only two which head south from the streamway (the other being the Pom Pom in Cwm Dwr). This passage was also found in the higher fossil level near Smith's Armoury and was likely discovered during the original exploration of the area and remained forgotten since. Like our 're-discovery' above The Wee, Neil followed a single set of footprints leading for 100-150m to a mud choke and aven (climbed by Martin Groves). We would really like to hear of anyone who knows of un-surveyed passages in OFD3, as I suspect there may be a significant amount of passage to be 're-found'.

**Future**

We spent perhaps two years exploring the various regions and, on most trips, either came back with new passage or a new lead. Many trips were over 10 hours long and the caving to reach the sharp end is world class, bags-on caving. There remains plenty of scope for exploration and adventure in OFD. Some good places to look are as follows:

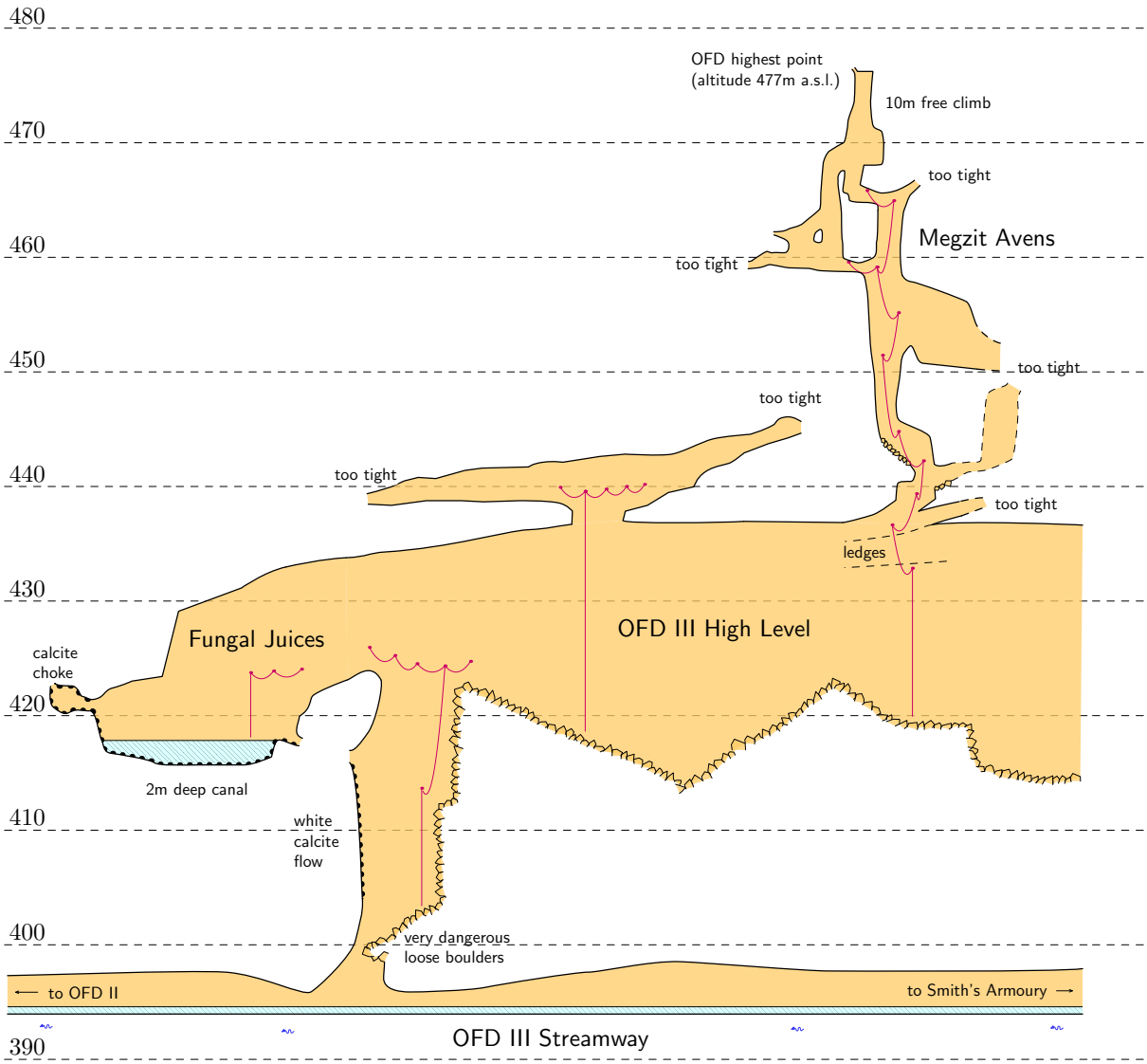
Those eagle-eyed among you will not have failed to notice The Wee now extends very close to the bottom of Hot Air Mine, 40m higher and 50m horizontal. This surface shaft has been the scene of quite a concerted digging effort by various SWCC members over the years, and as the name suggests, it must carry quite a draught! Renewed effort here provides the possibility of a higher entrance, a more complete through trip and a total depth of 335.5m.

There are numerous avens remaining beyond the OFD3 choke still to be climbed. Notably those above The Wee and in the Paul Allen Series. There remains a significant amount of rock above the tops of these avens, most of which are minor inlets; but you may get lucky.

The high-level traverses continue above the streamway from the way into the river, at least until where we were climbing and probably beyond. We have looked at around 100m of this, but much more remains to be seen. Given the size of the far upstream trunk passage, more akin to Gnome Passage or the Chasm than anything else beyond the OFD3 choke, there is every possibility that this could be re-entered. Be warned – these high-level traverses are very muddy!

Please survey what you find!

(*Length and depth stats taken from personal correspondence with Brian Clipstone, Oct. 2020*)




## OFD III High Level Discoveries

Scale 1 : 600

0 5 10 15 20 25 m

*Projection: Extended elevation*

*Surveyed by:* Tom Foord, Chris Jones, David Powlesland

# *Dig, Tape, Explore, Survey… Pinch Yourself, Repeat*

## Ali Garman (and several others)

It's been a little over 26 years since the initial Ogof Draenen breakthrough and none of the original explorers are getting any younger. For the 75th anniversary publication, the following request was made of some of the lucky early Draenen explorers…

"*So, my invitation to you is to put finger to keyboard and capture, for posterity, any special memories or events. These might be untold stories of daring does, proud discoveries close to your heart, humorous tales, misadventures that you want to tell your grandchildren, confessions or words of wisdom for future generations. Sit back, pour yourself a whiskey and raid those memory banks for inspiration.*"

What follows is a mixture of caving diaries, special memories, amusing events and old photos. The aim is to capture the excitement of the early exploration and give a sense of the responsibility that comes with such discoveries.

**Extracts from Tim Long's Caving Diary – 3rd March 1994 – Ogof Draenen Dig - *with Kevin Munn, Huw Jones, Peter Bolt***

Yet another pleasant Thursday evening spent enlarging and lengthening this squalid little hole in Gilwern Hill. It has been several months since my last trip here. On a previous trip, Ali and Kevin had hauled a boulder out of the floor and then been too short of manpower to do anything more. Since Pete had forgotten his chemicals, there was no option but to haul it out. Kevin and Pete drew short straws and got to push the boulder from underneath, while Huw and I hauled safely on a rope from above. A handled jammer assisted greatly with this task. Boulder safely out of the way. Pete fiddled with some scaffolding for a while, then we retired to the pub. Decided later that it 'really' was time to stabilise the whole place. Pete reckons that stone dust and cement will do the job.

A few days previous, Bill Gascoine carried out a preliminary dye trace. He was convinced that it was going to pop out a few feet down the hill, so he only used a little bit of dye and went for a quick walk around the hillside. No green stuff anywhere! He will repeat the test again soon with more dye and activated charcoal bags placed at strategic resurgences. We will wait with bated breath.

In a way, I hope we'll be able to stop digging!

**Digging Draenen - *Huw Jones***

8pm on a Thursday evening during 1994. People are arriving within a few minutes of each other, having travelled by various routes from their homes, mostly in Cardiff and the surrounding area. I've made a mad dash across the Heads of the Valleys road from my home in Rhymney. A quick change is made into caving gear and equipment that needs taking to the dig is grabbed. These evenings always seem to happen at a frantic pace. Kevin has brought along two tin buckets, which we'll use to haul small stuff out of the shaft. There's also some scaffolding.

I'm carrying a length of 'scaff' (scaffold) and a crowbar as we hop over the gate at the side of the adventure centre and walk round to the back. The view from the top of the tip is as glorious as ever. Next, it's straight down the steep face of the tip. As we are all wearing PVC oversuits (because of the wet conditions of the dig) and with the grass being wet with evening dew, we slide down on our backs. I have the scaff held up in one hand, the crowbar in the other, feet in the air. The trees and scree lower down are a concern, but we always manage to stop before reaching them! We drop a little lower, then cross the little gully at a rocky outcrop, traversing round on a narrow ledge.

Once at the entrance it's straight in, no hanging around. Crawl round the corner and in seconds I'm standing in the first little pot, my position during the first Morgannwg dig in Draenen on 13th February 1992 (there had been an earlier visit by Pete and Malcolm but apparently, they had spent most of their time wandering around the hillside, looking for the entrance!). Memories of being constantly dripped on, getting wet and cold in the strong draught and accidentally dropping the contents of the digging tray onto Ange (Garwood, later to become Ange Cave) below, come back to me. Just down the slope at my feet, is the first bit of scaffolding that Pete and I put in (and roughly marks where our digging began), while down below, Snablet (Peter McNab from Mendip) complained of the place constantly falling down on him. Down the next drop into the little chamber (completely excavated) and into the crawl in the undercut. This is where Bill Gascoigne broke up a large slab one evening and me, Kev and Ali each had things fall on us as we cleared the spoil but then got the first view into the crawl ahead, the first piece of open passage we found in the cave.

Onwards to the stream, easy now but originally an awkward Z squeeze around large slabs leaning against the wall. At the end I reach the choke and the infamous 'wet slot'. More memories. Ali (Garman) and I being the second and third to squeeze into it and gingerly looking around, wondering about the way on. Yes, that crawl along the stream used to be tight! The following week Ali pulled the correct rock out and revealed the drop to the lower chambers. Kev (Kevin Munn) and I waiting impatiently for news from below as we made a plainly futile attempt at drystone walling the choke, hoping to provide some stability. Dropping down and scooping gravel out of the floor of the lowest chamber with our hands, in the terminus where the shaft is now, as the stream washed it back in around our ankles.

We reach the scaffolded shaft and quickly sort ourselves out. The chamber where the shaft is located has almost disappeared, filled with spoil dug from the shaft. We are now dumping spoil in the chamber up the little slope on the right. There are five of us, a good number for the dig. One goes into the chamber, two station themselves at the head of the shaft and two make a team in the shaft itself. The person at the bottom scoops small stuff into one of the buckets (complete with drain hole bashed into the base to let the water out). When full, it's clipped onto the rope and hauled up, guided by the second person in the shaft. Larger rocks are carefully tied up in a sling and both people follow it up as it's hauled, making sure there's no one underneath! Digging happens hard and fast and halfway through the session, the roles in the shaft are reversed.

The week before the breakthrough, it had been me and Ali in the shaft. Pete (Peter Bolt) came up with

*Huw Jones in the scaffolded shaft dig (©Kevin Munn)*

the idea of a competition to see which of us could dig out the greatest number of loads. I'm sure it was just to get us to dig faster! On the evening of the breakthrough, I was in the chamber, with Ali in front of me. Malcolm (Stewart) and Moha (Nyerges, a Hungarian caver, on his first ever caving trip in the UK!) were at the top of the shaft, with Kev and Pete on digging duties in the shaft itself. Ben (Lovett) and Tim (Long) were both missing that evening unfortunately. I hadn't been in the chamber for a few weeks and thought it looked untidy, with spoil dumped willy nilly. I decided to tidy it up, moving and neatly positioning boulders at the back so that we wouldn't run out of stacking space any time soon! This, of course, turned out to be the final digging session and I spent most of it in much the same way as the very first, being constantly dripped on, getting wet and cold!

But this isn't the breakthrough night and so at 10pm precisely, we down tools and head out of the cave as quickly as we can, which is hard work in the crawls, climbs and squeezes. Once out, for some reason we don't retrace our steps back across the gully but head straight up the tip. The slope is steep and as we're going as fast as we can, we are all soon puffing away even more heavily. The slope is also slippery, and this is where I use the crowbar. I haven't brought it to dig with but to give more purchase on the slope, using it like an ice axe. Kev has gone one better and is using an actual ice axe!

Another quick change and it's off to the Lamb and Fox (our not-so-secret weapon) for a pint and a warm by the fire. When the weather is bad, we drive to the pub but as it's a fine evening we walk, leaving the cars at the adventure centre. Of course, we are muddy and so head straight for the gents to get clean. It pays to be at the head of the queue as the hot water soon becomes scalding and after the first couple of people have used it, the rest are forced to wash in cold water. I don't want to take my now dirty and wet towel into the bar, so I leave it on top of the bandit by the front door. Once, I forgot to pick it up on my way out and the following week Carol Lewis (the landlady) presented it to me, all nicely washed and dried! Into the bar and we are given a friendly smile and a cheery greeting by Carol and her husband and landlord, Brian Lewis. Pints

and packets of crisps in hand, we go and sit by the fire, reflecting on another good digging session.

If I've made this all sound a bit serious and intense, then it wasn't. There was always plenty of fun and a lot of laughs. I don't think we would have kept going if there weren't!

**Extracts from Tim Long's Caving Diary – 7th October 1994 – 12:30 am**

Awakened by a phone call from Kevin Munn: "*OGOF DRAENEN WENT BIG!!*"

And I missed it! Went to see Chris Howes' talk 'Where No Light Shines' at Gwynfa Camera Club. Kevin described rifts, chambers and passages going off everywhere! Pitches (they saved me one, thanks guys, because I've got both of the ladders!)

Aaaaaaarrrrrgggghhh!

As I understand it, things are being kept extremely quiet until the weekend, whereupon Bill Gascoine will be told, along with other Club members. Those present were: Kevin, Huw, Ali, Malcolm, Pete and Moha (visiting from Hungary). I understand that Moha 'didn't like it'.

**Extracts from Tim Long's Caving Diary – 7th October 1994 (evening) - *with Kevin Munn, Pete Bolt, Ali Garman, Huw Jones, Malcolm Stewart, Will, Moha, Andy Kendall, Rhian Hicks***

After not being able to sleep much or do a scrap of work all day, finally collected Kevin at 7pm, Huw at 7:40 ish. Arrived at Pwll Ddu to find the others already assembled. Pete and Ali had already set off to do some 'gardening' at the bottom of the dig. I was amazed at how much further the shaft had gone. I watched Malcolm squeeze gingerly through the small hole and followed him. The breakthrough is about 8ft below the scaffolding and the boulder slope threatens to collapse at the slightest nudge.

I heard Andy saying to Rhian: "*It's no good you being down there when our last survey station is up here.*" Rhian was halfway through the breakthrough squeeze.

I said, "S*od that, do it on the way out!*"

Rhian saw my point of view. "*Bye Andy, I'm off!*"

I waited just long enough to guide Rhian through the squeeze and then I set off into the rift.

I was greeted by a sight that looked something like a Swiss cheese: very light-coloured limestone in which was a series of parallel rifts. The walls were coated in a slippery mud, which makes progress somewhat complicated. Following Malcolm along the rift, he seemed to have forgotten the way since the previous night. Eventually, a call from Huw guided us down through a hole in the floor to a small chamber. Ducking under a block, we emerged into a chamber about 40ft by 90ft by 30ft tall. This was the 'big' that Kevin had referred to the previous night.

We re-joined the others at the top of 'my' pitch. It looked very inviting! Ali was just putting the finishing touches on placing a bolt while I broke out the ladders and line. No time to put on my sit harness. After throwing down some rocks and waiting several seconds for the thud, we estimated that the pitch was about 40-50ft. I attached the lifeline to my belay belt and set off down the pitch. Once over the funnel shaped lip, I could see that the 50ft of ladder was not touching the floor. I climbed to the last rung and looked around. I had emerged from a hole in the roof of an enormous chamber, quite similar to Pant Mawr Pot but larger, which appeared to 'go' in both directions. With a none-too-reliable belay, I had no choice but to climb the ladder again. My slings and SRT kit were hastily cannibalised to extend the belay by about 12ft, which left the ladder hanging about 2ft from the floor. I was too tired to attempt the descent immediately (my ladder technique is poor) so Kevin, excited by my cries of "*It's huge – it goes*", leapt for the ladder. As he descended and eventually sat in the chamber waiting for the rest of us, there were some very emotional sounds from the bottom of the chamber.

"*Bloody hell!*" cried Kevin, almost in tears.

*Malcolm Stewart on Big Bang Pitch (©Kevin Munn)*

My excitement overcame my fatigue, and I was next down the ladder, half climbing and half falling off the bottom. Next came Pete, and again cries of, "*Bloody hell, its big!*" from the ladder. Pete and Kevin took photos as the others descended the pitch. We sat in darkness so that each climber would discover the chamber as we had done. We were beginning to realise that we had found something really big!

Once everyone was down and ready, we set off, walking single file over some Aggy style mud banks to protect them as much as possible. At first the passage seemed to close down but then, swinging round a corner, we scrambled down into large passage once again. Hardly daring to believe our luck, we continued along the passage, which was snaking left and now right, ignoring leads and several large junctions. We were riding the wave of euphoria.

Ali kept saying, "*This is beyond a joke!*"

Someone said that we ought to name the passage and Huw said, "*It's beyond a joke. Actually, it's beyond a choke.*" The name seems to have stuck: Beyond A Choke.

We found the streamway and followed it down stream, passing other obvious passages for the time being. After much scrambling up and down over piles of very loose boulders, we eventually came to a pitch overlooking the stream, which continued in a tall 15m x 3m passage. At this point, we decided to turn back. Various estimates put us at between 1½ -2½ km into the system. The temperature was very warm, and we must have been under coal measures. Were we heading south towards Pontypool, or just to the Tumble resurgences where the dye trace had shown the stream in the dig to emerge?

Returning along the passage, suddenly there was a loud crash as a large boulder fell and smashed to pieces. Pete stood frozen to the spot. After a few seconds, he managed to speak: "*Get this thing off my foot!*" Ali and I rushed to his assistance to find that his foot was pinned between two boulders. After a bit of effort, Pete was freed, but my fingers were now trapped under the boulder instead.

We returned to the pitch, patting ourselves on the back. We looked a little more closely at some of the inviting side passages. The adrenaline was beginning to die down and the trip was becoming tiring.

Moha self-lined up the ladder while Huw, Kevin and Pete went to explore the other end of the chamber. It ended in a large choke filling the chamber to the roof. Huw was climbing near the top when there was a rumbling sound and the choke moved. Huw and Kevin both checked that the other was OK, then Kevin said "*Is Pete alright? Pete?*" He was nowhere to be seen. The others began to pay attention to the unfolding scene and several of us began shouting for Pete with our hearts in our mouths. After what seemed like an eternity, we heard a distant "*Hello*" from Pete. With great relief, we realised he had slipped un-noticed into a small side passage.

Eventually, after much cursing and vowing never again to use a ladder, I arrived at the top of the pitch. First job for the next trip will be to get the SRT rigging installed.

Returning along the slippery rift, we found a note from the surveyors (Andy and Rhian): Surveyed 58m, 120m to this point, gone out. We found it somewhat amusing that they had been diligently surveying this horrible rift while we had marched into around 2km of immense passage!

Finally, back in the familiar territory of the Draenen dig, the going seemed so much harder than before. I did not have the strength to pull my elbow pad up my arm. It had been a hard trip. I began to realise how unsafe the unstable entrance crawls would be for the tired cavers who would inevitably follow us. Bill Gascoigne had pointed this out months earlier. Much more work is needed.

With barely the strength to climb the hill, we arrived back at the cars to be greeted by Andy and Rhian and John (Berry, if I remember corectly), an RFDCC caver staying at the Pwll Du adventure centre.

"*Cor!*" he said, "*you get a good turnout for your digs, don't you?!*"

We had to fend off a few awkward questions; our find will not be public knowledge for a little while yet.

Somehow, the prospect of the Thursday night dig now seems much more daunting!

**Bolty is a B*****d - *Kevin Munn***

We rocked up at the Draenen car park to be met by an HTV cameraman, we'll call him Tom, and his rather nice £20,000 camera. Apparently, Pete Bolt had invited him. Pete arrived, chatted to us and with Tom and then announced that he was off on a pushing trip somewhere with his mates and could we sort out the filming!

Having caved with Pete for years, this didn't take us by surprise. We're not entirely sure what Pete had told Tom, but the camera had no case. Keeping it dry using just a bin bag and manhandling it through the entrance series, rifts and down the pitch. It was on the return journey that we had to brace ourselves along the rift while passing the damn thing from one to the next. Whilst holding it at one point I felt myself slipping and only just passed it to Huw before I fell. I broke three ribs, much to everyone's amusement, and so when Pete Francis found the bypass to the rifts and Big Bang Pitch, I believe that's why somebody ended up calling it Spare Rib.

**Life On Mars – *Steve Roberts***

Complete astonishment. That's one of the things I remember still from my first trip down Ogof Draenen, only a few weeks after it had gone from being a dig to a major cave. I was at a loose end, and rang Peter Bolt ("*Swildon's maybe?*"), who told me to get on the next train to Cardiff. The day after that, we were off on a trip down a cave I'd never heard of to look at some leads in Squirrel Rifts. On the way in, we met up with a whole pantheon of Welsh caving all-stars, each team off to their own bit of the ever-expanding map. At Squirrel Rifts, Pete poked some bang though a choke and it went BANG (echooooo…). Big chamber – how do we get into it? I pottered off down a crawl nobody seemed to have looked at, a hole in the roof, another crawl. Exploration fever had seized me firmly by this stage. Anybody else behind me? Didn't even occur to me; just, "*What's ahead? What's up there? What happens if I pull this rock out of the way?*" - It was completely different from exploring in the Picos - We went down the next pitch, found a rift and another pitch; *"Ran out of rope, your turn next."* It was just so unexpected. Here I was, on my own, in complete silence, my light the first ever on a weird, utterly untouched plain of red knobbly mud floor, disappearing off into the unknown.

**You Are Having a Laugh – *Ali Garman***

We had been systematically ticking off climbing leads in the main streamway. Just upstream of the 1st boulder choke, Huw, Ben and I had completed a relatively easy 20m climb up to a false floor. Not sure why we pushed it, but I (5'11") headed out across a particular wide traverse to reach the continuation and Huw (5'11") followed. To Ben's (5'5") dismay we found a tiny drafting side passage. I still remember his face as he reluctantly took his body beyond its limits to join us. We were all caving at our limits, which made for such a buzz and comradeship.

That tiny passage was the original route into The Score and we surveyed well over a kilometre that day. It was named The Score, because it took the cave's length to well over 20km in just over two months!

**Mud Bollard – *Huw Jones***

I was staring down a 3-4m climb in the Draenen main streamway, somewhere downstream of the chokes and Agent Blorenge. It was tricky getting up into the passage and the downclimb looked worse, an awkward move off a sloping mud bank, onto tiny holds on the vertical wall. We had a rope but there were absolutely no useful belays up in the new passage. I'd already backed my way out to the edge on hands and knees then retreated again a number of times when Kevin Munn called up from below "*How about a mud bollard?*"

"*A what?*" I asked.

"*Well, you know what a snow bollard is? Same thing but dig it out of the mud!*"

"*Snow bollards need to be lined to stop the rope cutting through, don't they?*"

"*Should be fine. You won't be putting much weight on it, just using it for balance.*"

"*Er, OK.*"

Now, digging into a laminated mud bank isn't exactly the best thing from a conservation viewpoint but it was only a small area that I'd already walked on and I really didn't want to fall! I dug the bollard, placed the rope around it and looked down at Kev, Tim Long and Ian Garman, all with their arms raised up in the air, kindly 'spotting' me just in case. I took hold of the rope and slowly and carefully backed out to the edge. A little further and I let out a squeal as I suddenly started falling; the rope had, of course, pulled through the fantastic (!) mud bollard! The next thing I knew, I was sitting in the shallow stream, which luckily had a sandy floor here. I reached down and picked up a house brick sized rock from between my legs, inches from my crotch, another piece of luck! But hang on, I shouldn't have landed in the stream at all, what's happened to my spotters?! I looked up and saw the three of them, quietly sniggering, in a group across the other side of the passage, having run away when they heard my shout! Cheers guys! I decided to call the new passage 'Fall Out'.

*Lower Beyond a Choke Streamway (©Jules Carter)*

**Calm as You Like – *Ali Garman***

A good university friend of mine, Will Knight, joined me for a pushing trip in the Lucky 13 area of the cave. We were following the mighty draft in Gone With The Wind passage. The end was a low flat bedding collapse choke, as loose as a 10 yr old pair of caving pants. Will and I took it in turns at the sharp end, carefully pulling out boulders and inserting them into the many cavities to either side. It was 'sweaty necky' work, but the draft kept us cool.

Will was at the sharp end, I was resting. Calm as you like, Will says, "*Can I have a hand, I need you to undo my chin strap.*"

A large slab had collapsed out of the roof and pinned his helmet into the floor. His head was turned away from his forward arm and he no longer had the space to pull his back arm forward. Quite a predicament!

Luckily, I was able to slide a hand up under his armpit and pop his chin strap off. We exited the choke, minus a helmet, chuckling to ourselves. The helmet was retrieved by attaching a belay belt and giving it a firm yank.

You only do these silly things, if you're having fun and we did lots of silly things. We broke through the choke that day, but to our dismay, discovered conservation tape immediately the other side. We had unfortunately turned Midwinter Chambers into a through route.

**The Flood (1996) - *Lou Maurice***

As Rhys Williams, Martin Groves and I travelled from SWCC to Pwll Du, Rhys pointed out the Riflemans Arms Pub, above where we were going. I could not believe how long it took to drive to the Lamb and Fox where we met Ali Garman and Ben Lovett in torrential rain. We were going a very long way underground (3km in fact!). It was fun romping down the streamway (which apparently didn't flood), and fun helping with the dig at the Riflemans boulder choke – with all the great banter and camaraderie that is one of the great joys of caving. We were digging the choke above the stream for many hours and got a surprise when we came down to leave and discovered the stream had risen substantially. Ali drew some marks on the wall, and we had some hot drinks.

"*The bad news is that all the marks are gone,*" said Ali, after food and drinks.

The stream had risen even more. The decision was to go out anyway and what followed was, for me, utterly terrifying. I could hardly stay on my feet and had to work very hard to push against the force of the water. Martin Groves was behind, hopefully he would catch me if I was washed off my feet. The noise was so loud that it was not possible to talk. We just kept on going, there was no choice. It took many hours longer than normal to get back. At one point we turned a corner and there was a howling draft and an even louder roar. Having heard tales from OFD, I was convinced we were about to die in a flood pulse. But it turned out to be the sound of the Agent Blorenge Inlet. The entrance series was challenging (we pretty much had to take a breath to get up the wet slot), but by then it felt the worst was over. The beer and cosy welcoming fire in the Lamb and Fox was amazing. I know a bit more about cave hydrology now, but anyway, have had a perhaps healthy fear of cave streams and flooding ever since.

*Ben Lovett, Jon Jones, Andy Harp & Ali Garman carrying scaffolding past the Rhino, Beyond a Choke Streamway (©Jules Carter)*

**Oh, To Be Invincible Again – *Ali Garman***

My first serious pushing trip upstream of Big Bang Pitch, the original pitch in. Huw, Ben and I found ourselves at the base of a 4-5m waterworn belled out climb up to an obvious inlet. It looked as impossible as it was inviting. We were young, fit and overconfident in our abilities and therefore invincible. Having 'peeled off' a couple of times, to be caught by my spotters, I'd managed to get to beyond the commit point. I now had to get into the continuation, or this was going to hurt. Calves quivering, I managed to launch / drag my centre of gravity over the lip and lay for a minute as the excess adrenaline dissipated around my body. We were then joined by Pete Bolt and one other and together we explored, taped and surveyed Waterfall Series and Boulder Land, around 2km in total.

When you are surrounded by people you trust and people who trust you, then that team can overcome amazing obstacles. Oh, to be that invincible again.

**The Stove of Destiny - *Julian Carter***

Sadly, I just missed out on being part of those first few crazy months of discovery in the Draenen system, seemingly always following the heels of various discoveries in the system. Nevertheless, it was still exciting to undertake those first trips, particular as many of those trips were in the

company of the evergreen Clive Westlake, following the still fresh footprints through the 'Round Trip' or off towards the further reaches of the cave such as the Snowball area whilst keeping an eye out for fresh leads to potentially push.

And once those trips were over, and feeling suitably battered and grubby, it was time to join the caving masses for a beer and food in the Lamb and Fox pub. Carol would serve a 'John Wayne Special', Sausage, beans and chips for £2.50. In those days the pub was alive and vibrant with cavers sharing tales of exploration, sharing survey data (!) and discussing where to push next. So sad that in following years, that spirit of shared discovery and comradeship would be soured.

At some point I started joining the Draenen Diggers on regular trips to the Riflemans dig right at the end of the main streamway. For quite a period we regularly loaded ourselves up with timber and scaffold bars, ensuring Ben Lovett had the greater share so we could slow him down a bit! And off we'd tromp the two plus hours of caving to the dig, getting suitably drenched on the way. Up through the choke on the 'ladders of doom', taking the time not to look too closely at the blocks we were squeezing between, and up into the chamber. Some six-ish hours of digging would then ensue as we dug down and along in an attempt to bypass the mammoth choke.

*Ben Lovett about to play Russian Roulette with his aged Optimus petrol stove (©Jules Carter)*

At some point we'd stop to have a brew and food. Out came the Lovett family heirloom Optimus stove that had already spent many years in a cave of one sort or another. The lighting ritual involved a liberal dosage of petrol and standing well back! Ben once got close to blowing himself up. Then it was time to head back in an attempt to gain a last orders pint, and hoping the hail and rain was not hammering down for getting changed out of the soggy caving kit – more than once borderline hypothermia felt a very real danger whilst getting changed!

Sadly, the efforts at Riflemans waned; getting enough daft souls got harder and harder as work, children and life got in the way. Sometimes we'd try again, reminding ourselves of the mud and misery, and decide we must dig there again. Somehow a year or two passes before we go again. The dig may not yet have gone, and maybe others should now take up the challenge, but all those trips have never been a waste as such things are equally about time spent in good company as they are about the challenge of the dig.

*Huw Jones at the Rifleman's Dig Face (©Jules Carter)*

**The Last Sandwich – *Steve Roberts***

Digging wasn't my thing really. Certainly not digging all day at the end of a two-hour race with Gavin Lowe down to the far end of Ogof Draenen. But, "*I've started, so I'll finish.*" It started by pulling a few bits of rock and mud out, trying to convince ourselves that, yes, really, there was a draught over the top. After a couple of trips, it became a matter of poking with a trowel at the stuff at the end of a body-sized tube (I'm not a small person), shuffling debris under my nose into half a five litre plastic container, shouting to Gavin to haul it back, initially around, under or over me… and repeat. Or, at the other end, building a cobble wall of ever-increasing length down the approach passage of ever decreasing dimensions. The passage went down, through an 'excavate dogs-front-door…' and then up. The next few trips involved Gavin's magic poking stick.

"*Look up, err no, perhaps not! Poke up hard, shuffle backwards before several hundred kilos of stuff lands on your head. Spoil tray time. Eventually.*"

"*Looks open up there,*" very, very, gingerly crawl/climb up. Open passage! For about 20ft: more boulders. Go back.

"*You can come through, I think, but I'd better stabilise it a bit first.*"

I move one rock. Scores more release themselves into the hole I'd just crawled out of. I am now on the wrong side of a collapsed boulder choke. Two hours later we are all together again: Jonathon Copper, Nobby Mumford and I field flying rocks as Gavin churns into the new end of the cave like some kind of high-speed mining device.

"*I'm through.*" A man of few words.

"*Well?*"

"*A bit of passage, haven't been any further yet.*"

"*Hang on, then.*"

I joined Gavin. "*Gavin, if this goes, do you mind if we name it after Nicola?*" Nicola Dollimore had died in the Berger earlier that year.

"*Good idea.*"

All four of us stepped forward a few paces. And then that moment of complete, almost disbelieving astonishment. We were standing on the edge of what seemed momentarily like a limitless void. Ahead – yes, there's a wall, a long way away. Left and right – blackness: huge tunnels disappearing out of sight. Spontaneously, we silently all shook hands with each other. 16th November 1996. A day to remember.

**A Day at the Circus – *Ali Garman***

I was on a digging trip going somewhere. We'd flown down the Entrance Series but could hear quite a commotion going on at Cairn Junction, where you hit the big stuff. A massive maypole had been erected, with a ladder suspended from the end. It was like a trip to the circus, so we stopped to watch the entertainment. The passage was lit up by a huge number of lights, presumably belonging to the large party required to carry the maypole into the cave. If my memory serves me correctly, Tim Guilford, was the trapeze artist who was going to entertain us.

As he began his ascent, the crowd hushed as the maypole started to bow. Some stayed silent, some muttered among themselves and others offered meaningless encouragement and advice. There was only one person with their balls on the line that day. It was with great relief that the crowd applauded Tim on the completion of his performance. He placed a bolt and was joined by two others in discovering Strawberry Passage. A spectacularly decorated extension, that visitors are asked to avoid for conservation reasons.

**Wilderness (1997) – *Lou Maurice***

The cave was silent, and totally dark. I had no idea what time it was. It could have been early morning or late afternoon. I was warm and comfortable in my sleeping bag. I felt around in the dark for my light and switched it on to look at my watch. The cave around me came to life with shadows dancing on the walls. It was the first time I had camped in a cave. I felt very far from a place of safety. A little bit afraid perhaps. But enchanted too, by the magic of the place, and the sensations that came with the feelings of remoteness and wilderness. It had taken many hours of caving to get to the camp at Mouldy Bat, We had passed obstacles like the Last Sandwich, heightening the sense of commitment, and harder work carrying the sleeping bags and food for our camp. Tim Guilford and I were exploring off Rainbow Canyon. It seemed quite a long journey from camp to a lead which Tim had noticed on a previous trip. Rainbow Canyon had a strange kind of beauty. Few people had been there, the boulders on the floor were loose. The walls were covered in crystals and we moved slowly, taking great care not to touch the walls and brush the crystals off. The dig was a small (flat out crawling) draughting passage, blocked with boulders. At one point a large rock fell, blocking Tim in. I calmly moved it – I was young and strong, and braver in those days. Then, after hours of digging, there was excitement as we crawled through and found … a chamber we could stand up in and walk across! It was a remote and wild place. Not very big, lots of fallen rocks, everything rather loose, but a solid roof at least. It was not classically beautiful, there were no formations, but we were the first people to set eyes on it. The only ways on involved more digging and we worked at it over two days, making small progress. For a short time, we lived in the Dollimore Series, passing through its huge passages, and experiencing that sense of wilderness and wonder.

**A Lifetime in Draenen - *Tarquin Wilton-Jones***

My history with Ogof Draenen dates back to shortly before the initial breakthrough. My father Ian, had been in the same club as one of the main diggers, and he had invited us for a trip. In through the entrance, down the scaffolded climbs, along the wet crawl, and down the slot into the terminal chamber. Several beddings went off from this chamber, and a scaffolded climb was very evident in the floor.

It was a month later before I found out about the breakthrough, after the rumour spread via a non-caving neighbour. We had got into the cave as soon as possible after the breakthrough, but by then it was already several km long. In fact, as it was the 3rd

December 1994, it was just about to pass the 20km mark.

It wasn't long before we had a copy of the first survey covering the Round Trip, and the very basic guide that accompanied it. The authors (both of whom are members of MCC and SWCC), had been limited to two pages of text, and for a round trip with well over 100 junctions, that doesn't really leave much space for anything. By then, aged 15, I felt that I could write something more complete, and I started my own writeup of the system. Within a couple of months, it was online (yes, in 1995), hosted by a friend.

That same description grew along with our own knowledge of the cave. We kept pace with all of the developments, and as soon as new pieces of the cave were announced, my brother Peter, my dad and I were in there, often only shortly behind the surveyors, or sometimes ahead of them. I would obsess over the reports in magazines, writing up the preliminary descriptions based on people's commentary, then going into the cave and correcting the descriptions, reciting and memorising a few km of routes each time. This is the same description that you will find in a number of publications. It is still regularly maintained, and the online version has undergone a number of upgrades over the years (http://www.cavinguk.co.uk/draenen/draenen.htm). You can even request just the selected part of the cave you are visiting, and it highlights the route needed to reach it. For a cave of this size, that can be a real benefit, so I hope you have had a chance to use it.

By May of 1996, now aged 16, we had made a few little finds, a couple of metres here and there, but nothing really significant. But we had spotted a promising little passage in Lucky 13. The series had been found by others, but a couple of passages had been pushed by stalwarts from OUCC, Tim Guilford and Pauline Rigby, and a certain Tony Seddon, to reach The Snowball, an almost unique gypsum formation that defied explanation for a couple of decades (it is almost certainly cryogenic, by the way). The passages of Going Somewhere and Midwinter Chambers joined at a junction with a side passage, which had been acknowledged and then subsequently ignored, being just one of a hundred leads in the area, and not even on the surveys. We decided to push it while on a camp whose purpose was to perform a dye trace in Big Country.

Our camp was set up in the start of Gone With The Wind, a convenient spot with a meagre water supply nearby, and a nice, sandy floor for sleeping. Our camp was of a temporary nature, and everything was brought in and out each time, in contrast to the more significant pushing camps. The passage trundled through a small chamber then shrank to a smaller passage and ended at an abrupt blank wall and sandy floor. While digging, we had set up a small hexamine stove in the chamber to prepare some packet rice with a karabiner (no tea, and no spoons, because it was our first camp, and we had forgotten those all-important ingredients), but failed to snap the hexamine (oh if only my dad had read the instructions!). After burning for a while, the moisture trapped inside it boiled, causing the block to suddenly explode, showering burning fuel around the little chamber. There was nowhere to hide, and we were all peppered with the resulting flaming missiles. The passage, which we had not discovered, became Hexamine Highway, and our series was named before it was even discovered.

The dig progressed very fast, with my dad and brother digging downwards, and me falling asleep while pulling back the drag tray. My brother, being much smaller and slightly older, managed to dig down about a metre to a dip under the wall, and after three hours, broke out into open space. He dug out enough compacted silt to allow me to get through, along a short passage into a miniature chamber with a large block of gypsum in the floor which we called the Hexamine Block. Hearts racing, it was hard not to just run onwards, but there were three of us, and the remaining person still needed the dig opened further. Once all through, we continued below the toppled rock stack called The Leaning Tower Of Pisa, in a walking sized rift, to a dead-end junction. A small passage on one side was fruitless, but on the other, a small tube hit a choke.

Peter was fully into digging fever, and attacked the choke with a crowbar, removing it from existence while we laughed at how surreal it was. The next junction had some small gypsum crystals, Walls Too Good To Be True - OK, it wasn't that good - with the main way on soon reaching another junction. We followed the main passage onwards, over beautifully crumbly mud that we tried to avoid damaging, past our own gypsum snowdrifts, until the sediment nearly filled the passage. We named it the Long Straight, a rather poor name that would soon be changed. We turned around and picked the next passage. It soon ended at a squeeze, blocked by a rock. Our dad had mistakenly described it as a top hat (it was a triangle, like an Asian conical hat). This became Top Hat Passage. We followed it through another squeeze to a choke that has never been passed.

We then went back to the camp to sleep, it was already well into the early hours of the morning, and we had not eaten. We shared soup from a saucepan without any cups or spoons. We slept only three hours, waking up freezing. We borrowed a spoon and surveying equipment from Tim's camp (he was not there to argue, and hopefully wouldn't mind).

At Walls Too Good To Be True, we took the other passage, which became Worm Hole Series. After several twists and little interruptions, a drop into a

lower bench brought us to a good-sized chamber. An ongoing passage soon ended, named Bee Keeper's Passage after its fossils.

Our first breakthrough was done. But this was the start of our long trips. We were back again and again, and trips lasting a whole weekend became our norm. In on Saturday, one hour to the drinking pool, under two hours to Hexamine Highway, camp at Big Beauty, out on the Sunday. The next trip saw only a small extension, Satan's Knockout, but it offered no more useful passage. The passages almost certainly relate to the Last Sandwich anyway and are unlikely to reveal anything new.

We attempted to push the Long Straight, and a great deal of work by Peter and our dad, while I was once again falling asleep with a drag tray, took the passage through a low section to a dip, then back up to a dig face. While digging, I had heard their rather extreme laughter, commenting about a "*kangadile*" - my younger sister's word for a dinosaur - and assumed I had just missed the joke. Then they asked me if I could put the candle and lighter into the drag tray, I had presumed they wanted to test a draught. The lighter had not worked. They started out, got it to light, and took it back to where they had been. It promptly went out. The oxygen levels had been dangerously low, and their laughter was a result of hypoxia. Very lucky that they had recognised the symptoms. Death By Kangadile! A far more fitting name.

Our next dig was at the junction just before the dismantled choke. A floor tube offered a sandy prospect, and my dad enlarged it to crawling size. Pausing to tell me to shut up and stop bashing things (hey, I was a 16-year-old kid), he was surprised to hear that I was already being silent, and the noise he could hear was his own heartbeat echoing. The passage he broke into got its name Heartbeat before it had been entered. A junction with a dead end on one side, and an enlarging passage on the other. This ended at a tight squeeze, "*Ah ha ha, you can't expect me to do that!*" (named after the popular exclamation of the friend who hosted the description). We had forgotten survey equipment again. Peter and I measured the only thing we had, a piece of string. Five arm spans plus a bit, it was probably 10 metres. It was actually 9.4 metres, but we calibrated and recalculated the survey length accordingly, and besides which, surely, we would redo it properly later. We had an old army compass with only 5-degree increments. After surveying, Peter had to head back to camp as he was unwell but had a quick dig first to confirm that the squeeze might be pushable.

Almost as soon as he had gone, our dad pushed through to reach a major junction. At the junction, a large rock was wedged between the walls. I tested it carefully, and only stood on it when confident that it would take my weight. The new passage was much bigger, a well-developed rift. We randomly chose one of them, and I followed Upbeat past many gypsum formations. Crystal covered walls, snowdrifts. An oxbow avoided the best of the gypsum. A twist, a turn, and it became crawling sized, passing numerous small side passages. Eventually, it choked. We surveyed back with our string and rubbish compass. 50 metres.

Back to the junction, and dad got the better passage. Downbeat was bigger, passing under numerous roof tubes, soon reaching a large passageway with a silted passage on the left - Death By Kangadile's likely end. A lovely little oxbow with rock bridges - Draebridge Rift - was bypassed to reach a dig. We pushed through into what looked like a Trunk Passage, which sadly was much smaller than it looked, so the name is sarcastic. It ended too tight, and our glory was over. We surveyed back out. In one trip, we had doubled the length of our series, from 370m to 740m.

Back at the junction with Heartbeat, I stood on that same boulder, and that was my mistake. It rolled, twisted, and pinned me to the wall. My right leg bent at a ridiculous angle that should not have been possible. My right leg was touching the left wall, and there was no way I was getting out of this intact. My hysteria is something I am told about, but I have no memory of it. My dad, fuelled by adrenaline, lifted the boulder off me and threw it down the passage. On a later trip, we tried to move it with a crowbar, but even with two of us standing on one end as a lever, it just wobbled a little. I am lucky to have come out of it with my femur in one piece. Some bruises, a lot of pain, and a memory of why virgin cave needs to be treated with respect.

Peter was too ill to see the extension. The survey we made with that string remained the only survey for two decades. Subsequent trips pushed all the side passages and avens, and if we add on the unsurveyed stuff, it was just over 1km in total. The survey proved to be incredibly accurate, as Upbeat was shown to be near to the original Hexamine Highway, and a vocal connection turned into a round trip, with just a 2m closure error over 200m. That's grade 5 done using grade 2 equipment.

Draenen remains one of those special caves. I have been fortunate enough to explore several other little finds. We pushed into 85m of virgin passage leading into one of the best decorated chambers in Dog-leg Complex, but sadly we were not the first to find it. I have found another 75m of streamway while surveying with Brynmawr Caving Club. Found 50m in Underworld Series, 20m at the bitter end of Luck Of The Draw's 700m crawl, and a few more little scraps. Even now, a recent dig uncovered just 8m of passage filled with anthodites, and another 12m that was just sitting there in an undercut that nobody had looked in. Draenen is one of those magical places where passages just wait to be found by those willing to put in the time to do it. It doesn't take an evening trip though; it's not that sort of

cave. The rewards await those who are willing to take the time and effort to push properly.

It is still one of my most visited caves. Over 100 trips have been devoted to writing the description, and I have covered over 60km of the known cave. But that still leaves several km of the most awkward places to get to - the ones you leave until last. But that just means I have some more years of exploring, to see the places that very few people have ever been privileged enough to see.

**The Ladder – *Huw Jones***

If you climbed any ladders in Draenen, in the early days after the breakthrough, they were more than likely ex-Polytechnic of Wales Caving Club ladders. At the time, like myself, a number of Morgannwg members were 'ex-Poly' of Wales people, including a couple of the Draenen diggers. During the time when Draenen was being dug out, the Poly club folded but the equipment was kept by ex-members who lived locally. So, pitches such as Big Bang and Balcony were rigged with ex-POWCC ladders. When the choke at Riflemans was passed into the upper chamber, a ladder was rigged in the choke, bypassing a tight, crawly loop. This ladder was also ex-POWCC and was derigged from the climb up to Ladder Passage, in the Upstream area of Draenen, where it had been left hanging for at least the previous couple of years.

Fast forward a few more years and I was digging in the upper Riflemans Chamber with Ali Garman, Ben Lovett and Julian Carter. When it was time to go, Jules led the way down through the choke and down the ladder. When he called up that he was out of the way, I got on the ladder and started to descend. Suddenly there was a ping, and, with a little yelp, I was falling! One side of the ladder had snapped and pitched me off. I landed with a thump, in a funnel shaped depression below the ladder, winded. Hearing the kerfuffle but not knowing what was happening, Ali called down from above.

"*What's happened?*"

"*The ladder's snapped and Huw's fallen.*" Jules called up.

Audible sighs of relief reached us through the choke and Ali called down "*Oh, that's OK then. We thought the choke had collapsed and we were trapped up here!*"

"*Er, Huw's ok by the way.*" Jules informed them!!

**Exploration (1997-2007ish) - *Lou Maurice***

For many years, weekends were spent camping in a shed next to the Lamb and Fox pub, welcomed to a remarkable extent into the community by landlords Brian and Carol Lewis, and other locals from the Blaenavon area. Those days were fun – drinking in the pub late into the night; the hut rammed full of caving friends; planning exploration trips. Trips were long – usually between 8 and 15 hours,

*Ali Garman, Rifleman's dig, top of the main shaft (©Jules Carter)*

sometimes even more. We focused on the Wessex Series, Life On Mars, Dollimore, and Big Country which might lead to the big blank on the map where the main streamways might meet to form the 'mystery streamway'. It was sometimes just Tim Guilford, Ben Lovett and me, but we were joined by many cavers over the years – Lev Bishop, Peter Bolt, Joanne Whistler, Chris Denshan, Claire MacElwain and many others. We had so much fun, and great excitement as we explored and surveyed short sections of new cave, which inevitably led to – more digs! Mostly we found a few 10s of metres, sometimes a few hundred (in Life On Mars). The most extensive exploration I was involved in was Prisoners Of War off the end of War Of The Worlds where we mapped a couple of kilometres. It was not big or well decorated by Draenen standards, but it was remote and wild, and will always hold a special place in my memory. The physical and mental skills I learned in Draenen enabled me to explore deep caves in the Picos; and prepared me for caving, paragliding, canoeing and sea kayaking expeditions in remote wilderness areas around the world where self-sufficiency, commitment, stamina, and careful risk judgements are required. The Draenen days were great days, with great people, and I feel very lucky to have had those opportunities. It is good to remember the good times. But I am also deeply saddened by the caving community's failure to embrace the concept of wilderness conservation. The far sighted Morgannwg cavers who discovered Ogof Draenen sought to maintain it as a single entrance system, which would have preserved the unique remoteness and wilderness of Ogof Draenen that we experienced. But other cavers disagreed and forced another way, with other entrances, and that opportunity was lost.

# *The Mines of Cystanog, Carmarthen – An Introduction*

**Paul Tarrant**

Historically, the economy of the county town of Carmarthen was based on dairy and sheep farming, and, before the arrival of the railways, it was also an important inland port. What is less well known is that to the east of the town, in the parish of Llangunnor, lay a small but fairly rich metalliferous orefield, which, for a while, also played a part in the economy of the town.

The earliest written record of metal mining in this area is a lease dated 1755 for lead ore, copper ore, calamy (zinc ore) and other minerals on the Wenallt Tenement of Llangunnor. At this time, Carmarthen had its own lead smelting works, set up to handle the ore from the mines north of Llandovery at Nantymwyn, so the ore from Wenallt would have been smelted there. However, this closed down around 1800, after which time, any ore would have been sent out by sea. Until the Cornish miners took an interest in the Llangunnor area in the mid nineteenth century, output was sporadic. By far the largest mine in the orefield where, between 1852 and 1866, workings were pursued to an impressive final depth of 124 fathoms, was the Vale of Towy Lead mine, which worked ground under the Pant, Wenallt and Nant farms. Although the last mining in this part of the orefield was for barytes in 1970, none of the old workings are now accessible.

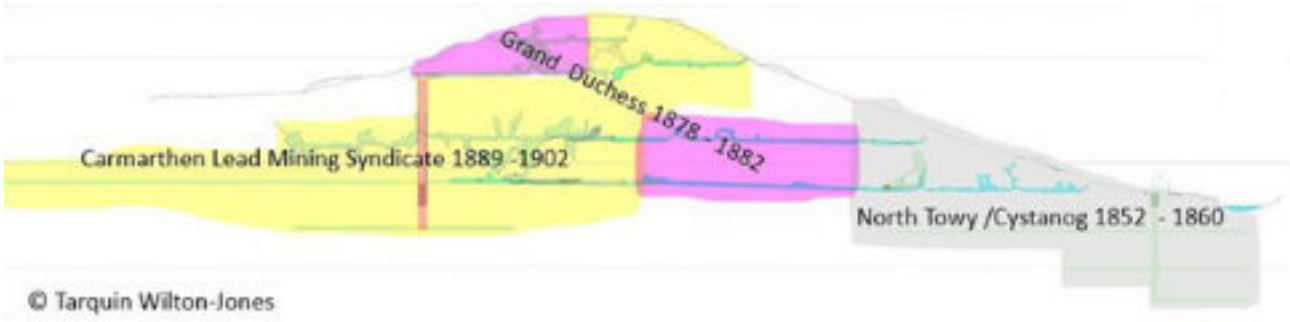
Just a little further east is the hill of Allt Cystanog where the Cystanog Mine was driven on several levels. It is in this mine, where explorations have been quietly progressed over a six-year period, which has led to the following articles written by the lead explorer, Phil Knight and Tarquin Wilton Jones. Tarquin has also created a detailed survey, which will be available for sale at SWCC HQ.

Mike Statham of the Welsh Mines Society, who has also been involved in the explorations, has researched the history of the Cystanog Mine, identifying the main players involved from the mine owners to the mine captains, right down to the men, boys and women who worked there and whose clog and boot imprints are left now in the mud of these forgotten galleries as testament to their hard work.

# The History of Cystanog Silver-Lead and Barytes Mine

**Mike Statham**, Welsh Mines Society

***Figure 1***: *Cystanog Mines – Section showing extent of workings by four companies between 1852 and 1902*




At least four different companies have worked the area between 1852 and 1902[1]. The extent of their operations is shown in Figure 1.

**North Towy and Cystanog United Lead Mines (1852-1856) & Cystanog Mine (1859-1860)**

Joseph Yelloly Watson, a father figure in British Mining, started the North Towy and Cystanog United Lead Mines in 1852. In 1853 the agent was a Captain Gilbert but by 1854 William H. Reynolds had taken on this role. According to Hall's account, in 1853 two levels south of what is now the B4300 road, Cystanog Level 1 and Cystanog Level 2, together with associated airshafts were opened up and some ore was found. This prompted the company to sink a shaft north of the road in the garden of Penlan Villa (now Riverside) to explore the ground at depth both to the north and south. However, no payable orebody was found, and the mine was offered for sale. Nobody came forward at this time but a little later it was purchased by Thomas Field. He was Chairman of the nearby Vale of Towy Lead Mine and between 1859 and 1860 he operated it under the name of Cystanog. He appointed Arthur Waters as agent, who was also his agent at Vale of Towy. Once again, no payable orebody was found, and the mine was abandoned.

**Trials by Thomas Harvey**

In 1867 Captain Thomas Harvey, also a former agent at Vale of Towy, which had only recently closed, carried out some trials which apparently yielded encouraging results, but nothing further was done at this time, presumably for lack of finance.

**Grand Duchess Silver-Lead and Barytes Mining Company**

In June 1873 '*mines and minerals under Alltgystanog, Cystanog issa and Cystanog ucha in the parishes of Llangunnor and Abergwili*'[2] was leased to a long list of people including Thomas Harvey, and Elizabeth Butt.[3] In the same year Matthew Smith,[4] a York-born draper who lived in Hexham, acquired an interest in the mine. With the help of some local people trials were carried out, and in 1878, a rich discovery encouraged them to form the Grand Duchess Silver-Lead and Barytes Mining Co., in 12,600 shares of a guinea each. Subscribers in the Company Memorandum[5] signed on 2 April, 1878 were:

David Edwards, Blue Street, Carmarthen merchant 5 shares,

William Henry Cottrell, Blue Street, Carmarthen merchant 10 shares,

John Bonville,[6] Spilman Street, Carmarthen gentleman 10 shares,

David Prosser, White House, Carmarthen farmer 5 shares,

Matthew Smith, Battle Hill House, Hexham, Northumberland draper 10 shares,

John Davi(e)s,[7] 5 Bow Street, Cardiganshire mining engineer 1 share,

James Meredith,[8] 3 New Street, Aberystwyth, Cardiganshire accountant, 1 share.

Rich, easily worked ore was found at shallow depth whilst clearing out old workings on the south side of Alt Cystanog and on roadside lodes further west. The Company referred to the western lodes as the '*Smith-shop group*', and the more extensive eastern lodes as the '*Butt group*'. However, the shallow ores were very quickly worked out, which forced the Company to concentrate increasingly on the less rich deeper deposits, which were both more expensive to mine and to dress. From a report of the Ordinary General Meeting of the Company held in November 1880,[9] it was clear that the Company was in financial difficulty, as Matthew Smith had taken out a loan and had been subsidising the enterprise out of his own pocket. Early in 1881, the Company secretary William Smith, Matthew Smith's son, advertised for subscriptions to a second share issue with the intention of raising more capital, but none was forthcoming at this time of deepening depression in the lead mining industry. This despite a report in the Western Mail dated 18 April 1881 stating that "*A large quantity of rich lead ore has been recently discovered at the Grand Duchess Mine, Llangunnor and it is hoped the proprietors will be able to employ more labour now. Great satisfaction was expressed at the condition of the mine at a meeting of the Company last week.*" Later that year the failure to raise capital forced Matthew Smith to petition for the winding up of the Company. According to a report in the Times of 6 February the petition was opposed by Messrs Donville (presumably Bonville), Davies and Harvey. The judge found in favour of Mr Smith and the Company was duly wound up. In August 1882, the Chancery Division of the High Court ordered that the property be sold by auction.

Both Matthew Smith and Thomas Harvey died in 1884, so they did not live to see the surprising revival of lead mining at Cystanog that was to follow some ten years later.

**Carmarthen Lead Mining Syndicate**

The principal source of information on this period is to be found in Volume 10 of The Geology of the South Wales Coalfield, which contains the results of a survey made in 1904. On the south side of the hill, a new shaft was sunk 55 yards from the surface location of the vein, ENE of the entrance to Penlan 1 level. A crosscut was driven to the deep adit (Level 1). This level was said to have been extended to a final length of 570 yards. The shaft was also sunk another 12 fathoms and a crosscut driven 30 yards to intersect the vein where a lower level was driven 110 yards both north and south. Two other levels were driven on the north side of the hill, the lower level (Level 2) starts 100 yards from the road and extends for 400 yards whilst the upper level was only driven 65 yards. On the south side of the hill, Penlan No.1 level is higher on the vein than Level 2 on the north side and has a length of 110 yards. Penlan No. 2 level is very shallow, and 80 yards long having been worked to the surface at the top of the bank. The Memoir further states that in the grits and conglomerates the lode carried galena, usually argentiferous, in a gangue of barytes and quartz, with a little copper pyrites, zinc blende, and fahl-ore. In the shales, especially at depth, the ore was mixed and consisted of galena with an increased proportion of copper pyrites and zinc blende, in a gangue of chalybite and quartz.

The history of this period is also documented in contemporary newspaper reports. In 1889 some local people under the direction of a Captain Douglas reinvestigated the Penlan Levels on the south side of the hill and it was reported on 21 October of that year that a lead vein 10 to 16 inches thick had been found in shallow ground only 35 yards from the outside.[10] A later report dated 15 November 1889,[11] stated that there were two abandoned levels on the Cystanog side of the hill. The deep adit (Level 1) which had been pursued 260 yards and abandoned only 20 fathoms short of the rich lode discovered by the Syndicate in the Penlan levels. The shallow adit (Level 2), described as halfway up the hill, had been driven 100 yards to reach the same vein. A few days later the Western Mail sent a reporter out to Cystanog and published a first-hand report on 20 November under the heading 'The Carmarthen Silver Lead Mines – Operations of the syndicate…' "*In the Penlan Cystanog sett on the south side of the hill two adit levels have been driven in a northerly direction by previous workers. The shallow adit has been driven about 37 fathoms on the course of the lode. In this drift some good pipes of ore have been worked right away to the surface. The deep adit has been driven north about 50 fathoms. This level is about nine fathoms deeper than the shallow one and shows a decided improvement. Several pipes of ore have been opened out and worked up to the shallow level. We (the present syndicate) have made a winze and communicated with the shallow adit. In these workings, there is now to be seen a rib of ore 3 to 8in thick and from 12 to 14ft up the side of the winze. We have also extended the level north about seven fathoms and very soon after commencing that operation lead was found, and it has steadily increased. The lead now in view at the forebreast, as you see, is from 18 to 20in in thickness, and the men who are working at it say that it is increasing as they go along, and it is likely to continue, as the*

*nature of the ground is so very favourable. I may state that the lead is thicker at the bottom or sole of the level than at the top, thereby proving that the deeper you go the better is the result. This is most encouraging, we have only to drive the deep adit on the north side about 20 fathoms south on the course of the lode in order to get underneath this lead, and this at an increased depth of about 80 yards. The shallow adit (Level 3) on the north side has also been driven south eighteen fathoms and is composed of barytes mixed with quartz and gossan and a strong mixture of phosphate of lead, which is surely very gratifying…*"

These discoveries lead to the formation of the Cardiff based Carmarthen Lead Mining Syndicate Company (Limited) in the following year, with a capital of £5,000 in £5 shares. The subscribers were:[12]

Eugen Constant Bregeon, Cardiff Merchant 1 share,

John Tregerthen Dunn shipping salesman 1 share,

Edward Powell Swansea architect 1 share,

Stephen Vivian Llantrisant mining engineer 1 share,

William Swan Stallybrass Cardiff merchant 1 share,

Edward Howell Cardiff accountant 1 share,

John Tellefson Cardiff merchant 1 share.

***Table 1:*** *Annual Output and Workforce for Cystanog Mine from the Mineral Statistics 1891 – 1902*

| Year | Lead ore tons | Lead tons | Silver oz | Value £ | Workers above ground | Workers below ground | Total workforce |
|---|---|---|---|---|---|---|---|
| 1891 | | | | | | | 8 |
| 1892 | 58 | 44 | 0 | 429 | | | |
| 1893 | 34 | 26 | 0 | 197 | | | |
| 1894 | 71 | 54 | 0 | 411 | 7 | 9 | 16 |
| 1895 | 396 | 301 | 0 | 2700 | 10 | 10 | 20 |
| 1896 | 287 | 213 | 0 | 1905 | 9 | 7 | 16 |
| 1897 | 79 | 59 | 0 | 625 | 20 | 7 | 27 |
| 1898 | 377 | 295 | 1402 | 3195 | 28 | 26 | 54 |
| 1899 | 389 | 303 | 1945 | 3788 | 36 | 23 | 59 |
| 1900 | 392 | 298 | 1960 | 4350 | 33 | 27 | 60 |
| 1901 | 445 | 338 | 2225 | 3367 | 33 | 23 | 56 |
| 1902 | 172 | 131 | 860 | 1155 | 35 | 21 | 56 |

| Name | Date of Birth | Residence | Occupation | Place of Birth |
|---|---|---|---|---|
| CHAPPEL, Thomas Semmens | 1843 | 36 Richmond Terrace, Carmarthen | Mining engineer | Ludgvan |
| DOUGLAS, David I | 1875 | Parc y groes, Llangunnor | Lead miner | Rhosllanerchcrug |
| EDWARDS, John | 1843 | 8 Garden Cottages, Quay, Carmarthen | Lead mine labourer | Carmarthen |
| EVANS, John | 1855 | Blaengwastod, Llangunnor | Lead mine labourer | Penboyr |
| HARRIES, Samuel | 1832 | Ivy Cottage, Abergwilli | Lead miner | Swansea |
| JONES, James | 1859 | 26, Ship Inn, Bridge Street | Engineer mining | Carmarthen |
| JONES, William | 1868 | New Inn, Llangunnor | Lead miner | Llangunnor |
| KINSMAN, Richard | 1871 | Parc y groes, Llangunnor | Lead miner | Crofthandy |
| MITCHELL, William | 1842 | Queens Arms, Llangunnor | Lead miner | St Day |
| REES, William | 1856 | Green Bush, Llangunnor | Lead miner | Llanarthney |
| THOMAS, Trevor Falconer | 1856 | 21 Picton Terrace, Carmarthen | Mining Engineer | Merthyr Tydfil |
| THOMAS, William | 1840 | 5 Magazine Row, Carmarthen | Lead ore miner | Carmarthen |

***Table 2:*** *List of Employees at Cystanog from 1891 Census*

| Name | Age | Occupation | Address | Birth Place |
|---|---|---|---|---|
| ARTHUR, John | 38 | lead miner | Cwmau Cottages, Abergwilli | Carmarthen |
| CLARKE, John | 20 | lead miner | 2 Chapel House, Friars Park, Carmarthen | Carmarthen |
| DAVIES, David | 32 | lead miner | 2 Old Road, Llangunnor | Llangunnor |
| DAVIES, David | 29 | lead miner | 59 Little Street, Carmarthen | Abergwilli |
| DAVIES, David | 13 | work boy lead mine above ground | No 1 Tynewydd, Llangunnor | Llangunnor |
| DAVIES, William | 44 | lead miner | No 1 Tynewydd, Llangunnor | Llanwinio |
| EDWARDS, David | 58 | lead ore dresser | Cauaugwynion, Llangunnor | Cailan |
| EDWARDS, David | 16 | lead miner | Tabernacle Row, Carmarthen | Carmarthen |
| ELIAS, Thomas | 25 | lead miner | Abergwilli Road, Carmarthen | Whitland |
| EVANS, Alfred | 48 | mining engineer | 9 The Parade, Carmarthen | Pwllheli |
| EVANS, John | 46 | lead miner | Blaengwastod, Llangunnor | Penboyer |
| EVANS, John | illegible | Lead miner | Cauaugwynion, Llangunnor | Llanboidy |
| HARRIES, David | 15 | lead miner | 52 Richmond Terrace, Carmarthen | Carmarthen |
| HARRIES, Samuel | 68 | lead miner | Chestnut House, Abergwilli | Swansea |
| HUGHES, David | 31 | lead miner | Cystanog Villa, Llangunnor | Newchurch |
| HUGHES, Lewis | 35 | lead miner | Cystanog Villa, Llangunnor | Strata Florida |
| JARY, James | 50 | lead miner | Woods Row, Carmarthen | Newlyn |
| JONES, Elizabeth | 28 | lead ore washer | Glyn Cottage, Llangunnor | St Ishmael |
| JONES, John | 63 | lead miner | Queens Arms, Llangunnor | Yspyty Ystwyth |
| JONES, John | 28 | lead miner | Parknewydd, Llangunnor | Llangunnor |
| JONES, Joseph | 39 | lead miner (employer) | 65 Richmond Terrace, Carmarthen | Carmarthen |
| JONES, Mary | 55 | lead ore washer | Glyn Cottage, Llangunnor | Llangendeirne |
| JONES, Thomas | 25 | lead mine engine driver | Queens Cottage, Llangunnor | Llangunnor |
| JONES, William | 33 | shaft banksman at lead mine | Glan Towy Office, Llangunnor | Llangunnor |
| JONES, William | 16 | lead mine labourer | 46 Little Water Street, Carmarthen | Abergwilli |
| JONES, William | 13 | working on lead mine floors | Glan Towy Office, Llangunnor | Llangunnor |
| JONES, Frederick | 39 | lead miner | Queens Arms, Llangunnor | Llanrhysud |
| KINSMAN, Richard | 30 | lead miner | Glantowy Office, Llangunnor | Gwenapp? |
| LEWIS, David | 38 | lead labourer above ground | Wardwll, Llangunnor | Cleddau? |
| MICHELL, John | 37 | lead miner | Cystanog Villa, Llangunnor | Cwmystwyth |
| MORGAN David | 26 | stationary engine driver at lead mine | 2 Church Street, Carmathen | Carmarthen |
| MORGAN, Thomas | 31 | lead miner | Penrhiw, Llangunnor | Trelech |
| MORGANS, George | 27 | lead miner | Wern, Llangunnor | Llangunnor |
| MORRIS, John | 26 | lead miner | Quarrenewydd, Llangunnor | Llangendeirne |
| PARRY, James | 47 | lead miner | Cystanog Villa, Llangunnor | Yspyty Yswyth |
| PHILLIPS, Daniel | 28 | lead miner | Wernfach, Llangunnor | Landissilio |
| PHILLIPS, Henry | 26 | lead miner | Tyrheol, Llangunnor | Landissilio |
| POWELL, William | 40 | lead miner | Star Inn, Llangunnor | Llanfihangel y Creuddyn |
| REES, Thomas M | 15 | lead mine labourer | 71 Priory Street, Carmarthen | Carmarthen |
| REES, William | 45 | lead ore cleaner | Green Bush, Llangunnor | Llanarthney |
| RICKARD, James | 41 | lead miner | Pensarn, Llangunnor | |
| ROBERTS, William J | 14 | lead miner | Cauaugwynion, Llangunnor | Llanengan |
| ROWLANDS, David | 48 | lead miner | Star Inn, Llangunnor | Llanfihangel y Creuddyn |
| SAMUEL, John | 28 | lead miner | 2 Barn Row, Carmarthen | Carmarthen |
| THOMAS, Benjamin | 16 | lead mine worker above ground | 2 Davies Town, Llangunnor | Carmarthen |

***Table 3:*** *List of Employees at Cystanog from 1901 Census*

It can be seen from the statistics in Table 1 that 1895 was a bonanza year. The mine produced 396 tons of lead ore with a total workforce of only 20 people. Possibly 1897 was spent on sinking the new shaft on the south side of the hill, after which the deep ore was extracted at a profitable rate, but nothing like the bonanza year. As well as argentiferous lead ore, in 1899 there is a record of the sale of nine tons of zinc ore and the mine is said to have produced a good deal of barytes, but no records of output survive.

There is a record of the mine acquiring a new portable steam engine in August 1901.[13] Presumably, this coincided with opening up ground below Level 1 and was needed to drive a pump to keep these workings dry.

According to the Mineral Statistics the chief Agents were Stephen Vivian[14] (1891-1892), Thomas Semmens Chappell[15] (1893-1898) and Alfred Evans[16] (1899-1904).

Because there were no other lead mines operating in the vicinity of Carmarthen/Llangunnor at this time, it is possible to identify with some degree of certainty the names of those who worked at the mine at the time of the 1891 and 1901 censuses, see Tables 2 and 3.

***Figure 2:*** *John Morris - Miner at Cystanog 1901*

After extensive research into these people a photograph of one man, John Morris born c1875, known to have worked at Cystanog in 1901, was eventually obtained from a descendent in New Zealand, see Figure 2.

In the summer of 1902[17] Alfred Evans advertised for six experienced shaftsmen to sink about 30 fathoms below the 52,[18] but by the late summer of 1902 Carmarthen Lead Mining Syndicate had ceased work.[19] In September 1903[20] tenders were invited for the purchase of the mine and in April 1905 it was reported that the mines were to be restarted under Captain Dingle of Llantrisant. Between 1906 and 1907/8 William Sutcliffe Ogden[21] employed seven men to carry out further exploration under the name of Hendir, at which time Alfred Evans was still the Agent. The Mineral Statistics recorded the sale of one ton of lead ore to a value of £10 in 1906. In January 1909 it was reported that gold had been found[22] but of course nothing came of this and the mineworks were finally dismantled in 1914 under the foremanship of R M Bright. The equipment offered for sale included three portable steam engines.[23]

**References**


1. Hall G.W. *Metal Mines of Southern Wales*. p24-27.
2. National Library of Wales, Carmarthen Antiquarian Society Collection ECE/DEEDS/SD77 LEASE of mines and minerals under Alltgystanog, Cystanogissa, and Cystanog ucha, in the parishes of Llangunnor and Abergwili.
3. Mary Eliza Butt neé Roberts was the widow of Charles David Butt, a mining agent and accountant (born in Surrey but living in Liverpool) who had died in the October quarter of 1871. She became a teacher of music after her husband's death.
4. Matthew Smith was born in York in 1807. His death was registered in Hexham in the March quarter of 1884.
5. "The Memorandum of Association of the Grand Duchess silver lead and barytes mining company limited" National Library of Wales E.C.E/DEEDS/SD 88.
6. John Bonville was the son of the late William Bonville the local coroner.
7. Captain John Davies had worked at both Tan-yr-allt Mine and Bronfloyd Mine and between 4 May 1878 and 12 February 1879 had been supervising trials at West Cwmystwyth after which he departed for Cystanog. Reference Journal of the Cardiganshire Antiquarian Society vol 8, no 1-4, 1976-1979 "The decline in mining at Cwmystwyth".
8. In 1881 James Meredith was at 3 New Street, Aberystwyth, born c1848 in Liverpool married to Sarah Jane born c 1848 in Brighton. 2 children David Crispin Meredith c1876 and Hubert Meredith c1877 both born in Aberystwyth.
9. Western Mail. 27 November 1880.
10. South Wales Daily News. 21 Oct 1889. Silver Lead Mining in Carmarthen.

11. South Wales Daily News. 15 Nov 1889. Silver Lead Mining near Carmarthen
12. The Western Mail. 23 July 1890.
13. Carmarthen Weekly Reporter. 30 Aug. 1901.
14. Stephen Vivian (1857–1937) was a very prominent Mining and Civil Engineer.
15. Thomas Semmens Chapel (1842–1897) so could not have been the chief agent in 1898.
16. Alfred Evans (1853-?).
17. Carmarthen Weekly Reporter 11 July 1902.
18. Carmarthen Journal and S Wales Advertiser 18 July 1902
19. Carmarthen Weekly Reporter 28 November 1902.
20. Baner ac Amserau 12 September 1903.
21. William Sutcliffe Ogden born 1842 in Liverpool was the son an iron founder. In 1911 he was living in Penlan Villa (now Riverside). He died on 15th May 1912 leaving £267.1s.1d to Dunbar Kelly, farmer.
22. Carmarthen Journal 19 January 1909.
23. Carmarthen Journal 9 January 1914.

# *Cystanog Lead Mine Explorations 2014 to 2019*

## Phil Knight

### The Explorations

The Cystanog lead mine has had many names over the years since mining began and journals and books listed in the bibliography will enlighten the interested, but for now we shall call it Cystanog lead mine located under Allt Cystanog, just east of Carmarthen. The mine is split into two groups; the Penlan levels atop the hill whose portals lie to the south, and Cystanog, whose adits are from river level up and where the portals are facing north.

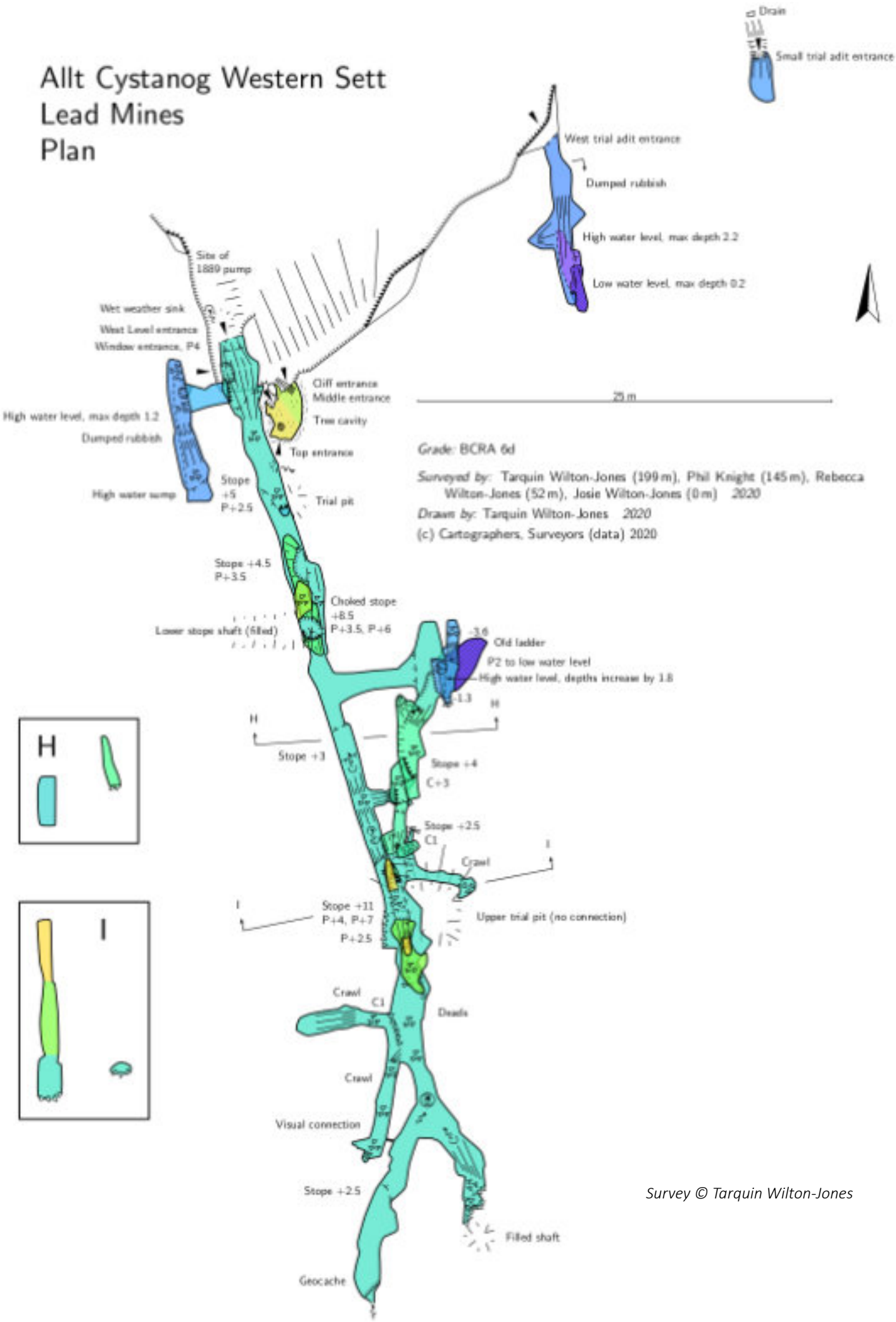
There are the remnants of a processing facility by the river Towy, opposite Cystanog level 1. The house next to the industrial remains is built upon spoil from the level, and within the grounds is a water-filled shaft of debated origins. This was plumbed to an unsatisfactory depth of a few meters with a weight on a fishing line.

From the river Towy and trending south over the hill, we find the industrial remnants followed by the first portal known as Cystanog 1, south and uphill is a spoil heap and then a depression where one finds Cystanog 2. Further up hill is an infilled air shaft and further still is Penlan 3/Cystanog 3. Atop the summit is the crown hole (the uppermost feature in altitude in this case) and then downhill southward we find Penlan 2 and then Penlan 1, a spoil heap and finally the mysterious 50m deep shaft, which ends in water.

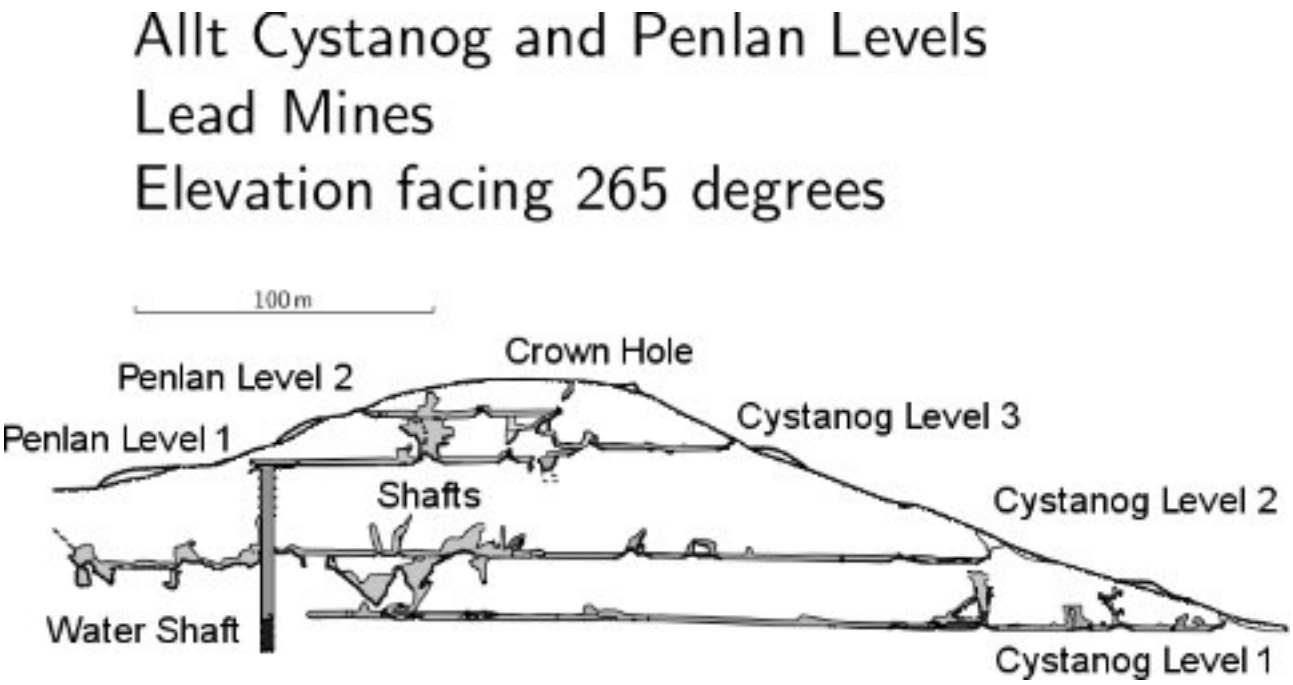
There are word-of-mouth reports that the whole sett was explorable up until the 1970s and then rot took over, along with disinterest and weather, and over the years the entrances became blocked with soil. The explorations of Gus Horsley, written up in 1988 and published as an article 'Metal Mines of West Wales' in the Teifi Valley Caving Group, Journal number 1, gave some interesting accounts of now long-lost passages and potentially lost relics. Years later, Mike Statham, adventuring with Prothero-Jones wrote up his findings on the mine. This can be found in the Welsh Mines Society newsletter number 70, 2014 and includes some superb historical accounts of the mine's life.

I have been exploring around Allt Cystanog since the 2000s, but just as an urban explorer. Everything back then interested me (and still does to this day) from mines and caves to castles, WW2 home defence ruins and rotten manor houses. Finally, over the years my pursuits of adventure were narrowed to underground explorations and a serious look at the mines around Carmarthen was made. The website Aditnow (www.aditnow.co.uk) was populated with my findings, with my main guide being George Hall's book, Metal Mines of South Wales. My attention was finally narrowed to the Cystanog lead mine. I first detected a draught at the buried portal to Cystanog level 2 around 2006, but its importance was beyond me back then. I was very poor back in the day and I actually made a small shovel from scrap metal to have a poke around in there but almost immediately lost the draught and moved on to other pursuits.

A notable incident occurred around 2004 or so when old school chum John Burke and I chanced upon the entrance to Penlan 3 or Cystanog 3. John slid on in through the entrance and proclaimed to have found machinery! Holy monkeys! Mind racing, I slid down and beheld sod all. Just a fragment of old wheelbarrow. We eventually explored to the end and found a winze lined with deads. A few months passed, perhaps likely a couple of years maybe, when at my flat near Carmarthen museum, a few friends and I beheld the horrors (delights really) of the film 'The Descent'. The next day we simply had to get underground. A small group of us crept into the darkness of Penlan 2 and with very poor lighting crept to the end. Something was wrong. The floor utilized previously used to gaze down into the




*Survey © Tarquin Wilton-Jones*




deads-lined-winze was no more! Instead, a crater awaited. This was quite a wakeup call. After this, possibly, was the finding of the crown hole at the top of the hill where a rabbit size hole was opened up to goodness knows what.

Months later, on a whim, myself and Daf, equipped with what can only be described as utter garbage, explored the freshly opened shaft. We had some blue rope and some lighting. I can't even recall the lighting, so it must have been bad! I looped the blue rope through my trousers like it was a belt, tied some knots and down I went. I'm not even sure what the other end was tied to (shudder all you wish reader and rightly so!). I descended to the chamber and found little of interest, all the while very aware that I may be above a large stope in the Penlan levels, a stope that I wouldn't dare traverse let alone descend for many moons, so quite why I went down the hole is beyond me. Fast-forward a few more years and this time I had wedged a fence post across a passage and two friends, Storm and Emily, are belaying me across the afore mentioned stope traverse underground and yes, it was with the same blue rope. I found the winze after a run in and some passage. If only my mother knew what I was up to! No worries, I was the good one, but that's a whole different story!

I joined SWCC in 2014. The next phase of exploration in Penlan commenced in 2015 in the open portions of the mine. This involved me being lowered down from Penlan 2, nearly 20m – 30m to Penlan 1 on proper rope this time with a climbing harness. The belay point was an Acrow prop across a side passage with Fred and Emily feeding me rope and taking it in on the ascent. I quickly explored Penlan 1, finding the run in inbye and the pool of water in the passage outbye. The ascent, if I recall, was very troubling as I had to free climb out of a bell chamber whilst Fred and Emily took in slack. In my defence, I was making this up as I went along and treading very carefully. As a surfer I'm very much aware as to how the situation can change in less than a heartbeat, and that nature does not take prisoners and maybe that's why I'm still here telling these tales.

The year 2015 saw me infected with the digging bug again and an attack at Cystanog level 2 was made. Permission is a tricky one. I was seeking (and in no great rush) the landowner when one of my digging team conjured up permission from the supposed mineral rights owner. Nothing more will be said of this, but I was happy to roll with it.

The first breakthrough was made after many hours of solo digging and I still recall the moment when my fork broke though the solid dirt into loose spoil followed by an outward pulse of air. I phoned everyone who had been interested but I had no takers, so I had to wait for others to be around.

The next trip was with Fred and Emily. The portal at this stage was a pit with a 6ft high wall of earth behind and rock in front with a small portal at our feet to the underworld. Fred went in first, wiggling as he went, dislodging numerous rocks and pushing in soil to make our lives easier. He is quite a large chap but fit as a fiddle. This push gained us several meters and a run in. We found a disintegrated shovel and bar in a side passage.

Many months passed with numerous incidents, but we finally secured our way through the run in. We had been through once to the next blockage to find modern footprints and upon exiting, Bill (who had joined me on several trips thus far with his friend Wyn) decided that he needed to go back in. Upon returning, he declared that the shoring had failed

behind him. It was a long time before it was open again.

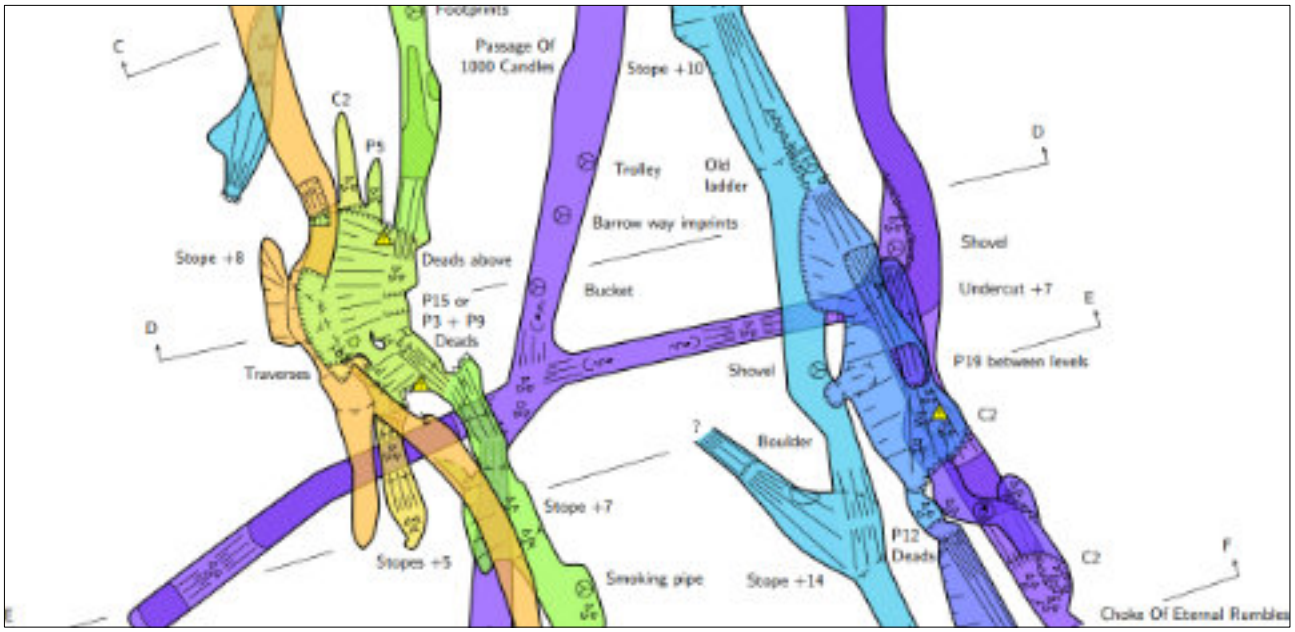
The next blockage after the secured entrance and first shored run-in was fairly easy as it was fine spoil from a failed stope's false floor. We took turns digging upward, following the solid roof and before we knew it darkness beckoned. The others wanted to save further exploration for another day, but I insisted we go through. Up we went and immediately back down to a wooden wheelbarrow that was in quite a state of disrepair. We then met our greatest adversary, the Big Boulder Choke!

The Big Boulder Choke was a nightmare. It was an endless run in of rocks ranging from head size chunks to full boulders. At one point I was chased down the level by a rampant one! We finally got through by pulling endless rocks until we found stability and then shored against failure with a double level of protection, myself, Bill and Matthew (my girlfriend's cousin) were the first through. I remember us all quizzing over as to why small rocks pushed through the little black hole during digging kept hitting something that sounded like wood. Turns out it was a fine wooden wheelbarrow that was upside down and the second to be seen in this level. This was the breakthrough to the main working area of the mine and was heavily stoped and worked.

We found remnants of haulage gear, an explosives box, remains of ladders, shovels and a treacherous traverse. This area was pushed and is still being pushed years later. At the end of the drive the geology changed and entered a very unstable area. The side passage of the stope area has a run in of unknown origin and the stopes have their numerous quirks. The first has unexploded stuff in it, the second is just begging to destroy someone, the third has a mega boulder defying gravity in it and the fourth was bolted. The fourth was the safe option to bolt and upon ascending nearly halfway up, it was found to go nowhere. Oh well!

Then there were the gaping holes going down. We descended the first one with Bill and Wyn. The pit yielded nothing. The next hole after the traverse sloped down to a wall of deads, another slope and then the abyss. The team by now had lost interest due to the technicality of pushing further and my girlfriend's cousin Matthew was subsequently recruited, against his will, to accompany me in my ever more insane pursuit of cold wet rock. I bolted the top of the winze, backed up the rope and sent the rest down. I went down the slope, down the deads to the last slope and slapped in another bolt after struggling to find competent rock. I then left Matthew on his own at the top of the winze while I descended into Cystanog level 1. This was a poor move in retrospect. Anyway, inbye a run in, outbye was water. With the GoPro running I proceeded to explore. Thigh deep in water I found a T-junction. I quickly had a look and then cracked on with what I felt to be the main drive. Through thigh deep water I waded until I entered dry adit and for what felt like forever I marched onwards. I found backed up water and a run in after a fork. I had been gone from earshot several minutes by this point. I headed back, went up the rope and practically bullied poor Matthew into descending to check out the passages. He explored as far as the water. In writing this I feel I must apologise to the poor boy!

During the following descent with Duncan Hornby from Cystanog level 2 to level 1, we pushed the choke at the limit of my previous exploration and then a further run in to find ourselves next to a third wooden wheelbarrow and another run in with the sound of traffic beyond. I next descended with Bill, Wyn and Gareth Smith. We tried to dig our way out of the blockage toward the sound of passing traffic in Cystanog level 1, but it did not happen. Then Wyn lost his gusto up the rope on our ascent from level




*Allt Cystanog Central Area Plan (© Tarquin Wilton-Jones)*

1 to level 2 some 30m higher with him stuck halfway up. All we could do was shout encouragement from below. This was the first time I had been underground with Gareth. What he must have thought? Cystanog level 1 was opened as soon as myself and Gareth had a look, once back on the surface, and found 6 inches of soil blocking our intended exit. Bill and Wyn were not impressed at how close we had been.

Inbye on Cystanog level 1 is a colossal choke, named the 'Choke-of-Terror', and has been the focus of digging for what feels like years now. We were nearly through once, with open passage beyond. A roof check was made after nearly having to hold others back from proceeding. The roof check resulted in the hole closing up followed by nearly a minute's worth of void movement. Some stopes were pushed near the entrance in level 1 that resulted in very little and apart from that, interest waned for a couple of years. A few trips with Paul Tarrant ensued, I started a master's degree, and a baby sprang forth from the nice lady who lives with me and puts up with my mole-like nonsense.

Then came a rescue practice at Dolaucothi gold mines where I met Mr Tarquin Wilton-Jones. Later, we had a rather splendid trip down a set of cascades during the summer where we abseiled down waterfalls in the middle of nowhere and when done, we paid Cystanog a visit where Tarquin nearly became a victim of falling deads. Subsequently, Michael Statham contacted me as he had picked up his own Cystanog project after many years. We all had a trip; Michael, Tarquin, Paul and Pete Bolt. We entered Cystanog level 2 for a bimble and I explained to Michael that I felt the end of level 2 was near the surface. He pointed out that I was talking utter nonsense and that the end of level 2 was nearly 30m below the surface. The reason for not pushing the choke here was tenfold. The geology changed at this point, the bedding was, and still is simply poised to do damage to cavers, and we had not yet finished pushing more promising prospects. Tarquin popped his head into the end of the choke and reported a draught.

**The second phase had begun…**

We pushed the end of Cystanog level 2 and found we were midway up a shaft. We installed an Acrow prop and dropped several metres to 50m or so of passage that I am positive has not been explored since the last miners left it. By what means they got in or out is still a mystery. There were pits in the floor that were pushed in hope that Cystanog level 1 was regained, bypassing the 'Choke-of-Terror'. Alas, this was not the case. All pits just ended. One notable incident occurred. Pete Bolt of Draenen fame descended the last pitch to be explored while Tarquin, Celestine and Neil (Lord and master of the Welsh Mines Society, aka the Phantom Trencher) surveyed what we had found previously. Pete elegantly and confidently swung himself out over the pitch and descended. Not comfortable with doing that, I teetered on the edge and just as I was elegantly about to offer myself to the abyss, the floor gave way, and I was left dangling. Oh well! Down I went as if I was meant to do that. There was one stope after this with nasty hanging death above and when viewed at just the right angle, a way on, far up in the roof could be seen. We are currently pushing said way on.

The Penlan levels, driven up on the crest of the hill, proved to be quite interesting after we pushed the choke at the end of level 1 inbye to find a howling hole, likely connecting with Cystanog level 2. The hole is lined with deads on timber, so we are currently in debate as to how to proceed. Also, the portal collapsed last time, trapping Tarquin behind a run in of rocks. He emerged in one piece. This was after Tarquin's previous trip into Penlan 1 where a rock decided to pin his head to the wall as it fell down a stope. Both incidents are detailed below.

The first incident; I, Tarquin, Paul Tarrant and Pete Bolt had descended to Penlan 1 and explored, opened up the choke at the end of level 1 and returned to the top of the winze. Tarquin was at the bottom of the rope and was the last to come up. Somehow, upon putting tension on the rope for the first time, he had dislodged a rock that fell from great height and pinned his head to the wall before the rock finally hit the ground. Great profanities rose up from the abyss followed by a broken and shaken Tarquin.

The second incident, I, Tarquin and Paul Tarrant were surveying and had pushed to the end of Penlan 1, through the shored-up choke. At one point all three of us were in the terminal chamber looking down the hole with the deads on timber. Paul left as he had engagements to attend to. Tarquin and I finished up and I headed out through the choke and I felt something was wrong as I wiggled through and before I knew it, I was being buried. I pulled myself free, looked back and the hole was no more. I had Tarquin's Disto in my hand, so first thing first, put it somewhere safe. Tarquin was yelling at me and I was telling him that I'm just going to put his Disto somewhere. I then assessed the damage. Later Tarquin recalled that I wasn't laughing this off and that's when he knew it was serious. There was a lot of suspended spoil perched up in the winze and luckily only a small portion had blocked the passage. I went off looking for timber, found some and went back. I then started to make a barrier above the blocking stones to prevent more of a run in and proceeded to pull rocks from the blockage. I had a tiny view and asked Tarquin to post me the timber he had in there. With these I completed my shoring and opened the blockage more. I insisted that he pass me his SRT gear and belt, so he was as slender and snag free as possible. As he wiggled through, he had his arms out in front so I could pull him free if need be. Out he popped, we brushed ourselves down and headed up the

stope to daylight. Halfway up the rope we heard the choke fail in the distance, twice. Tarquin remarked that that place would not look the same when we returned.

During subsequent adventures Tarquin spearheaded the grand survey of the known passages in the Cystanog mine, a monumental effort and this will be put up for sale at Penwyllt.

All that is left to explore in Cystanog are terrifying and complicated climbs and digs. What will we find? Cold wet rock of course! The journey continues.

**Glossary**

*Adit or level* - Technically different things, but essentially the hole miners made that is navigable by humans. May contain a railway to transport mineral ore to surface.

*Buddle* - A container for washing ore.

*Crown Hole* - A Crown hole is subsidence due to mining activity.

*Deads* - Rocks stacked in voids to save taking the rock out of the mine. These rocks are usually found stacked to the side in wider sections of passages, stacked in abandoned side passages or often stacked upon huge timbers with walking space underneath if work was being done above, all very well and good when built, but 100 years later creates some very dangerous areas.

*Disto* - A laser range finder, see https://www.leicadisto.co.uk

*False floors* - Back in the day, these would have been a good idea. Stope out as there is ore below the floor of the passage. This of course interrupts access to other parts of the mine. Solution, reinstate a floor of timbers and planks to allows continued access whilst minerals are extracted below. Fast forward a hundred years. The timbers have rotted. Simple solution to the problem is to not walk on the rotten timber floor, but it is not always apparent as the floors are often strewn with grit and rock making it often impossible to tell what is below one's feet.

*Inbye and outbye* - I'm not sure if these are official terms, but if you're walking into the mine its inbye, if you are walking to daylight its outbye.

*Portal* - Entrance or doorway to the abyss.

*Sett* - The extent of the mining activity.

*Stope* - Pay dirt! This is what the adits or levels are trying to find. Areas of mineralization or deposit that are then removed or mined, often creating very large and usually narrow voids underground. Sometimes the deposit breaks surface. The stopes are often found with timbers wedged in the gaps. These are very dangerous places where huge boulders can be found fallen from the walls and worse still, huge boulders that are somehow held up by magic.

*Winze* - The vertical hole that connects passages or levels.

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# *Cystanog Lead Mine - Explorations and Survey*

**Tarquin Wilton-Jones**

*Phil in the entrance to Penlan Level 2 (©Tarquin Wilton-Jones)*

Phil Knight and I had met - after his failure to attend an Otter Hole trip - at a rescue practice, and then again while showing teams around Dan-yr-Ogof. Our Cystanog Lead Mines history began shortly afterwards as a trip to the Brechfa area. We spent a rain-soaked morning enjoying the flooding torrents of the forestry, abseiling down waterfalls, and swimming down swollen streams. Part way down, we had visited a short adit, and conjectured that there might be a second one following the same vein on the opposite side of the stream. A quick dig through some mud, and sure enough, an alcove revealed a short passage that had remained untouched for over 100 years. Nothing much, but it's something that gives an extra sparkle to the rest of the day.

After completing his canyoning route, we headed for the Cystanog hillside. A steep trek up through the forest brought us to Penlan Level 2. A quick through trip revealed the hairy traverse without any traverse line, a quick abseil, a crawl past a barrow, and the final passageway to surface. A brief look at a collapsed winze gave a good reminder of how unstable mines can be, as Phil had seen it before it collapsed, and presumably had triggered the collapse by walking over it to view the collar which once sat at the top.

We then took a look at Cystanog Level 2, a discovery that Phil had made some years earlier. The chokes seemed well shored, and the barrows and other artefacts seemed very well preserved considering their age. The major stopes of the main lode were

*Traverse in Penlan Level 2 (©Paul Tarrant)*

*Pete and Paul in Penlan Level 1 (©Tarquin Wilton-Jones)*

quite an impressive change from the lengthy adit that preceded them, though the traverse over a deep ore pass on a 100-year-old piece of scaffolding could have done with a better safety line. Side passages, preserved hobnail boot footprints, and crystals. There is enough entertainment. We took a quick look at the collapsed horrors of the end of the level, where the writings had predicted a way on, but the reality was a very small passage ending at a

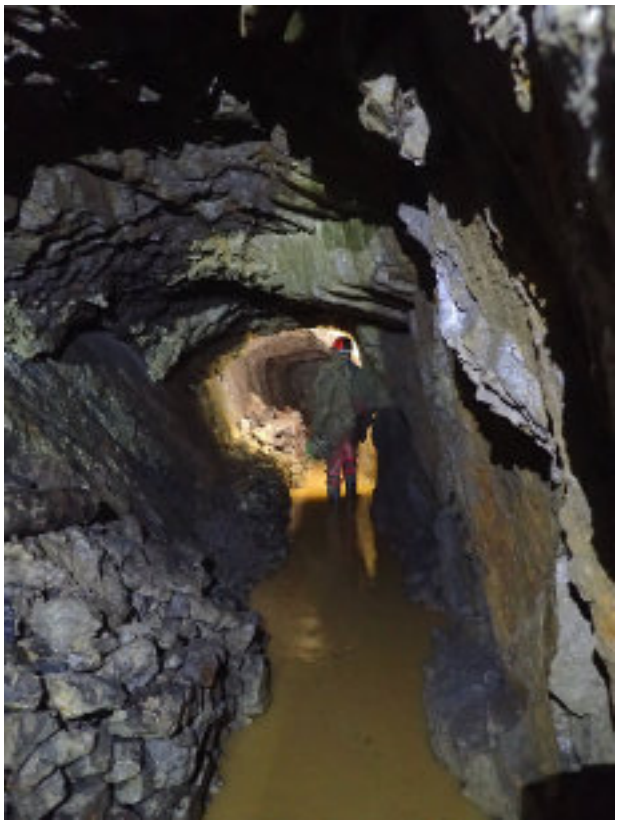
*First choke in Cystanog Level 2 (©Tarquin Wilton-Jones)*

choke. The plan was then to abseil down the main shaft to Level 1. That should have provided a through trip, but the entrance was collapsed when we checked it earlier.

SRT in the mines is pretty uncomfortable, as the rock is hard compacted shale, and bolts do not want to stay in it. Given that Phil had bolted the mines before actually learning how to do SRT properly, some of the rigs are 'entertaining', but nevertheless, I started preparing the main shaft. Part way down, I stopped to snap a picture, and while getting into position, I caused a rather large set of rocks to remove themselves from an untouched slope of deads, crashing down the shaft below me. Realising that the slope rose some 8m above me, without any remaining shuttering to hold it in place, we made a very hasty retreat, leaving things to stabilise. Instead, we took a quick look around the West Level, which is open to the road, and a place for locals to visit and dump litter - it even hosts the remains of a 1950s style car.

*Tarquin and Phil surveying at the start of Cystanog Level 2 (©Paul Tarrant)*

*Roadway in Cystanog Level 2 (©Paul Tarrant)*



A return trip with Pete Bolt showed the relative glory of the lower level. More artefacts, more formations, a lengthy canal, and remains of a railway followed. There is no historical survey of the mines - something that would normally have been expected at its closure - and the only information are the old mining reports and news articles. Often these were written to impress an owner and keep the money flowing, and did not reflect reality, so when they quote the length of a drive, there is nothing to say whether it really exists, or whether that length includes side passages, or even where to look for the rest.

*Phil with a bootcast in the Cystanog Level 2 side passage (©Paul Tarrant)*

Another visit, this time to the lower level of Penlan. Descending required the use of an acrow prop wedged across a passage as a belay, since there were no others of any substance. One person stayed at the top to monitor it in case it decided not to remain in situ. The rope then twists down a parallel shaft beneath the traverse, rubbing several times to reach the bottom. Not exactly perfect, and I am happy it wasn't my rope being used. We looked at both ends of the passage, outbye ending at surface collapse, and inbye ending at the base of an ore pass, both directions having fine collections of miners' footprints with several different boot designs.

I noticed a fresh air flow under the arched wall to one side, and digging fever grabbed Phil. After removing some of the rocks, an archway appeared with a tantalising black space. We really should have shored it up since it lies beneath a loose rubble slope, but we wanted to see where it would lead first. 5m of passage, more footprints, and a wall of deads supported on old timbers hovering above a very enticing descending hole. The draught was very strong, and we assume it connects to the stopes in Cystanog Level 2.

*Rope traverse in Cystanog Level 2 (©Paul Tarrant)*

Pete and Paul Tarrant swapped places with Phil for a look, then we started out. As I ascended, the poorly rigged rope snagged a head-sized rock, which flew down, bounced off my helmet and the nearby wall, and then my ear. In my dazed mind this was the beginning of a collapsing wall of deads nearby, and I was done for, but a while later, the pain and stars subsided, and I started back up the pitch to show off my war wounds to my worried companions. After the adrenaline wore off, we reassessed the possible connection between the mines, and the potential of the discovery we had made.

*Below the rope traverse in Cystanog Level 2 (©Tarquin Wilton-Jones)*

This all cemented in my mind that we were going to start surveying the mines. I have done plenty of smaller scale surveys in the past, always with traditional tape, compass and clino. Drawing up by hand had been useful for my first surveys, but then Survex gave so much better handling of errors. My most significant survey had been a grade 5c of Crescent Cave, which was drawn up as a bitmap; when a loop closure changed things, tough luck. It's not that this is really unusual though; after all, the great OFD survey is made using CAD applications without any way to adjust a loop closure, apart from redrawing to make things work. Accuracy is key, since it means fudging can be kept to a minimum.

*Phil exploring the sub-level between Cystanog Level 2 and 1 (©Paul Tarrant)*

*Crystals in Cystanog Level 2 (©Tarquin Wilton-Jones)*

However, I had long wanted to learn Therion, a rather marvellous program that can take all of the loop closure errors of a survey and distribute them, not just on the centreline like Survex, but also on the vector drawings. This was a chance to learn it and put it to good use. So, I gave myself a crash course in Therion, aided by a partial tutorial and the ever-helpful community. While it is extremely powerful, it most definitely helps to have a programming background, at least if you want to use the more powerful features of it.

*Phil at the collapsed stope at the old end of Cystanog Level 2 (©Paul Tarrant)*

Another major advance is the use of the Disto, which another SWCC member had purchased at great expense, and loaned to me for the start of the survey. It very quickly showed its value, and soon enough I had also shelled out for one. For the first time, I was able to do a survey using splays rather than LRUD estimates, and grade 'd' wall drawings were actually a possibility. The speed that a basic centreline survey can be done compared with traditional surveys is almost laughable, and there is

no error when transcribing notes ("*was that 15 or 75?*"). The instant feedback is extremely useful, especially when you accidentally forget that you left it in back-bearing mode, or when an iron girder hidden below rocks throws off your readings. For taking notes, I used the SexyTopo app for Android, developed by Rich Smith. A lot easier to get to grips with than TopoDroid, and a much simpler UI. It doesn't let you choose specific line types to draw, but you rarely end up using the actual lines you draw underground anyway, and typically end up recreating them. As long as you use colours and hand drawn symbols in a way that you can recognise when drawing up, it really makes little difference, and it is much faster to sketch a pitch symbol than it is to go into a menu and select a pitch line. Plus, being able to talk directly to the developer allowed rapid bug fixes to any issues that crept up.

*Phil on the first descent of Plum Shaft (©Tarquin Wilton-Jones)*

The first step of the survey was the location fix (not the usual first step, I know). Phil had 'borrowed' his employer's land survey equipment; a highly accurate GNSS device made by Leica, with its insane £23,000 price tag, and £1,200 annual subscription fee. I say 'borrowed' because he conveniently forgot to ask for permission and was told in no uncertain terms that this would not be happening again. Nevertheless, he managed to take enough readings for us to get a location fix down to within 2cm.

We had attempted to start surface surveying, but it turned out that using a laser during the day was almost impossible, and only a single leg from the first survey survived. We had also failed to use anything useful for temporary stations, so the 50m we fought for was abandoned. We began the underground survey with a team of Phil and myself, with part of it assisted by Paul Tarrant. Within one trip, we had surveyed 430m, and our loop closure accuracy showed that we had achieved the equivalent of grade 6, with wall drawings done as grade 'd', and extremely high detail (perhaps too high detail for some, but I enjoy it!).

*Cobbles in Cystanog Level 1 (©Tarquin Wilton-Jones)*

When we reached the end of the level, I once again noticed fresh air in the small passage, and Phil decided to push the choke. To our surprise, it gave in within just a couple of minutes, and we were through into a tall rise, with a steep slope down below us dropping over a pitch into a tall passage that nobody had seen since the mine closed in 1902. With no way to descend, we left it tantalisingly open, with only some splays into the misty distance.

The surface surveying restarted, attempting to survey at night from the fixed location, along the road, to the mines. One of the landowners had been particularly enthusiastic, hoping we could survey their mining heritage property too. With nobody else available, I did much of the road alone, with Phil joining me once I had reached the mines. Work was hampered by the presence of electrical junction boxes nearby, which affected the Disto readings. Once at the mines, I convinced Phil that we should not rush it, and should do a proper job, so that we could locate the tips, depressions and portals on the survey, and produce a proper cross section. This meant that a single trip was not enough, and in the end, it took 3 evening trips to do the main surface survey, and several other little patches on other trips. The first trip clocked up about 700m of data, through thick forest.

Pete and I finished surveying to a nearby deep shaft, and plumbed its depth, which ends at a 10m flooded base with no dry land. The shaft is still of

interest as it is supposed to connect to the mines, but a remote camera showed no passages. We have avoided the shaft due to the unstable timbers. We then turned to Cystanog Level 1, completing 600m of main passage and side passages, an unstable stope, and a 20m shaft. Part of it suffered severely from a powerful magnetic effect, but after resurveying that section, when closing the loop, we had got down to just 0.18% error. Pete had done a great deal of rapid centreline surveying during the Draenen exploration, but this high detailed surveying was definitely a new departure for him.

Celestine Crabbe joined me for a few trips. In spite of never having done surveying before, the results were great. Sadly, I had inadvertently knocked the Disto out of calibration while surveying over the Penlan traverse and had to perform some checks and calculations to correct the data, but after that, it was easily within the grade we needed. That trip had been particularly memorable because of the total lack of useful belay points for a traverse line. For safety, Celestine was guided across using a rope tied to a tree outside the mine, with the other end being unsupported - more of a swing and psychological support, but presumably better than a 15m freefall. We worked late into the night, extending our callout three times to allow enough time to complete the passage.

*Tallow candle in Cystanog Level 1 (©Tarquin Wilton-Jones)*

By now, drawing up was taking only a couple of days after the surveying, so those who wanted to see the results did not have to wait long. The team was soon joined by Neil Culross from the WMS, who assisted with plumbing the depth of the pond at Riverside, part of the old stone wash site. In return, Neil was fortunate enough to join us for the exploration of our major discovery in Cystanog Level 2.

The acrow prop approach was used again, this time into the sockets the miners had used, and we rigged a ladder down the slope of shale attle. Beyond, the passage lay open, but that slope was underlain by a wall of deads, poised like it would collapse. We put in a long expansion bolt on one wall, which immediately popped out again. A second one seemed to get a better grip, but this rock is not great for bolting. A second ladder was hung, sitting further from the deads, but I was not eager to be the first down. Phil took the reins and performed the ladder rebelay on a ledge of congealed debris. It definitely took a pair of plums to do it, and the pitch was named Plum Shaft in his honour (and yes, the reference to plumbum was not by chance).

*Remains of a railway in Cystanog Level 1 (©Tarquin Wilton-Jones)*

The passage at the bottom was much more substantial than we had realised, but was not, as we had hoped, a way into a continuation of Cystanog Level 1. The fractured rock walls were covered in small crystals, probably selenite. A stope and loose slope, a blind shaft, and we ended after 50m at a pitch with the way on looking possibly closed ahead. A revisit restarted the survey, with Celestine again proving to be a valuable assistant, while Phil, Neil and Pete re-rigged Plum Shaft as a much safer SRT rig and enjoyed bolting the final pitch into a tall stope. Phil had been experimenting with concrete screws, and these turned out to be the ideal solution for bolting in the shale. They grip better, and don't seem to fall out. Another apparently blind hole in the floor surrounded by precipitous deads spelled the end of the exploration. The earlier blind shaft was the last part of the puzzle, but no way on could be found, apart from a tiny eyehole continuing ahead into the nothingness. We had reached the limit of the length quoted by the miners and found the passage that mines historian

*Phil with sloping beds in Cystanog Level 1 (©Tarquin Wilton-Jones)*

Michael Statham had predicted. It is not of the same quality as the ones before it and appears to have been dug and abandoned in haste as the operation was shutting down.

Before leaving, we added on the sub-level, a deep, collapsed stope between levels 1 and 2, whose steep funnel of loose deads is the source of the choke in Level 1, and which ends at a window into the shaft between the levels, at the top of the insane wall of deads. Fortunately, the Disto allows places to be measured without having to go near them, because that part does not look fun at all.

*Neil and Phil at the twin stope in Cystanog Level 1 (©Tarquin Wilton-Jones)*

Another trip saw Paul and me surveying the crown hole which had opened up some years before on the top of the hill. This ends above a choke in Penlan that contains the skeleton of a cow and will eventually fill with soil. After that, we headed down into Penlan 1 with Phil to survey the last remaining level. This time we added some much-needed rigging at the top, restricted somewhat by the rock, but we managed to get a rig that avoided rope rubs with enough backup. Down we went, surveying both directions, with Paul having to leave after the first half. Phil and I completed the survey, including heading into our new discovery. We should have shored it up first. After surveying the top of the hole, Phil headed back out.

*Michael in the main passage below the aven in Cystanog Level 1 (©Tarquin Wilton-Jones)*

Then I heard the **clonk** ... "*uh*" *crunch*, *rumble*, "*ARGH!*" He had knocked the wood stemple that we had used to hold back the rubble. Phil's feet were buried, and he hastily pulled through, but the rocks continued to fall. The hole he had squirmed through rapidly turned into a complete blockage, and my fate was quite literally sealed.

"*Phil?! PHIL! ARE YOU OK?*"

"*Umm yeah.*"

"*I'm still in here!*"

"*Yeah*."

"*Am I stuck? Can you open it?*" Of course, I was stuck, marooned in 5m of passage.

He did the most important thing; put the Disto somewhere safe. "*Forget the Disto, get me out!*"

I am glad he took the time to protect the Disto.

He started digging, with every move causing more rocks to tumble out of the nearby ore pass and into the alcove. Grabbing any bit of wood to hand, the rocks were partly held back, and we could see each other again.

"*I need more wood.*" Pretty sure there is a joke there!

Anyway, there was a 100-year-old plank part way down the hole we had surveyed, so I reached down below the deads and carefully retrieved it. We

passed it through the tiny hole he had opened, and he was able to use it to hold back more. The hole grew, and finally there was enough space for a squeeze, up a loose rubble slope.

"*Is it safe?*"

"*Uhh. I...*"

"*Will it collapse if I go through?*"

...

"*Uhhh...*"

Phil is never like that. He always laughs at danger. Always. And he was not laughing. This was actually serious.

I took off the SRT gear that I had stupidly left on and passed it through the hole. We debated whether it would be better to wait for a rescue. They might be able to shore it up better. This was stupid. If I touched anything at all, it was all going to end up on me, but it would be my head instead of his feet.

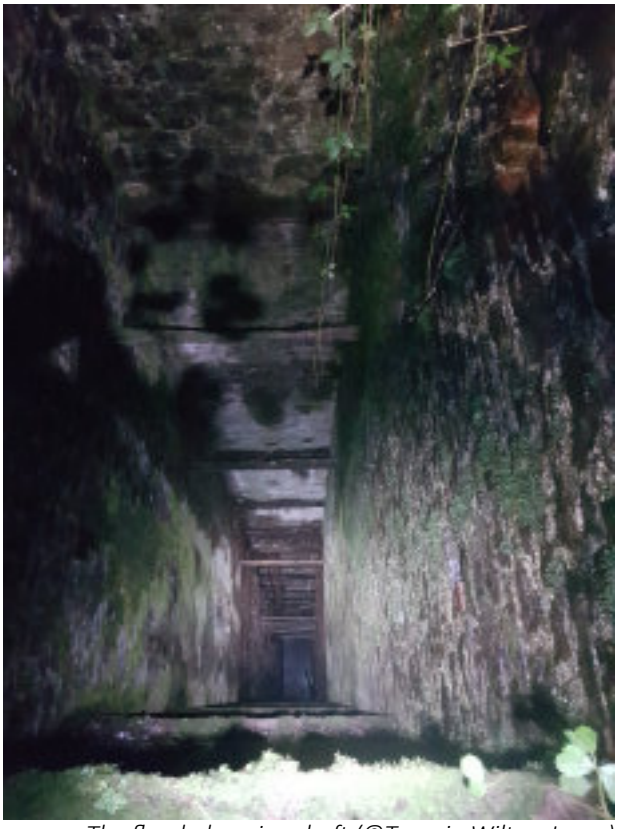
"*Look, if I touch it, it's going to collapse again. It's a squeeze over loose rocks that are holding up more loose rocks above me.*" I had to show him how unstable it was. "*Look, watch,*" and I wriggled into the squeeze. And nothing moved! Three hair-raising seconds later, and I was wriggling through to the other side while he tried to keep the rocks from tumbling. Shaking rather too much to walk properly, I sat outside my prison, jabbering like an idiot while the adrenaline wore off. We headed back to the shaft and started up. As I ascended, two long, continuous rumbles signified that his shoring had failed, and the cavitation was slowly making its way up the ore pass to the level above. It was definitely best not to have waited.

Surveying continued, with me dragging my daughter through the brambles to complete the surface survey at night. After that, we paid a visit to the landowner of the stone wash site, slowly traipsing around his garden, taking readings of all of the mining buildings that lie in ruins. The water level in his pond had dropped by nearly a metre but remained well over 4m deep. We are still unsure if this is the top of an older shaft that is supposed to be here, since it lies in a spot that was not recorded as a mineshaft on the old maps, but a series of buddles.

Digging trips and tourist trips were all that followed, as we shifted exploration to South Towy. There, the farmer had asked us to investigate the mine that his father and uncle had explored many decades before and produce a survey. The mine is used as a water supply for the farm, and spends most of each year completely flooded, so it was a rare chance to see it. 175m of passage later, it flooded again. Then there was a brief missing person search of the mines (which you may have read about on the news) before the 2020 lockdowns began.

As often happens when surveys are drawn up quickly, the recipients keep asking for more. During lockdown, an amount of time was taken to produce the features they asked for, like cross sections through all passages on the lode to show the hading.

It wasn't until the end of summer that we were able to get back to surveying. This time, attention switched to the Western sett, of which the West Level is the most obvious of the roadside levels. It already had a grade 3b survey conducted by P.R.Davies in 1982, but we noticed several small mistakes in it; missing passages, direction mistakes, and passages twice as wide as they should be. Exactly what might be expected from a grade 3b. Certainly it was not bad, but it felt wrong for it to be included in our survey like that.



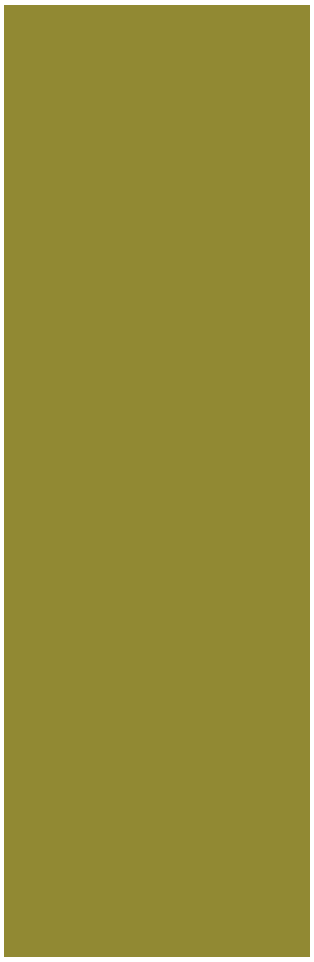
*The flooded engine shaft (©Tarquin Wilton-Jones)*

Given the social distancing limitations, help was hard to come by, so the Western sett survey was aided by family members once again, with Phil assisting with some of the more difficult parts. Part of this saw us lowering a ladder into a flooded shaft, balancing it on the mud floor so that we could climb down and take readings from a precarious position part way into a 4-metre-deep pool. We also surveyed the surface quarry containing the sett, and surface above it, finding that the terminal choke lined up perfectly with a surface depression, which should be an old air shaft. In doing so, an error became apparent in the original surface survey of the road, so a part of it was redone. A

couple of very odd passages in the subsoil were also added.

This is now the current state of the survey. The tally is 1745m underground in 11 separate segments, supported by 1600m of surface survey. The longest mines are 1100, 367 and 178m respectively; the longest accessible metal mines in South Wales (the nearby Vale of Towy is much longer, but no passage is accessible). The survey contains 375 underground legs, 157 surface legs, 3453 underground splays, 866 surface splays.

The survey is now ‘complete’ (whatever that means), for the explored passage. Of course, the plan is for this to change, but it is now ready for release. The intention is to have it released as open source; it should live on after us. It should be something that can appear in books without having to search for an uncontactable author. And we should at all costs avoid the situation where one person can prevent the survey from being released. But at the same time, it would be nice if some money can appear for that ever-persistent roof fund. So yes, you get some previews here. But if you want a printed copy in all its glory, I am hoping that the Club can help get it printed, and you can buy a copy.



# Evening Caving in South Wales

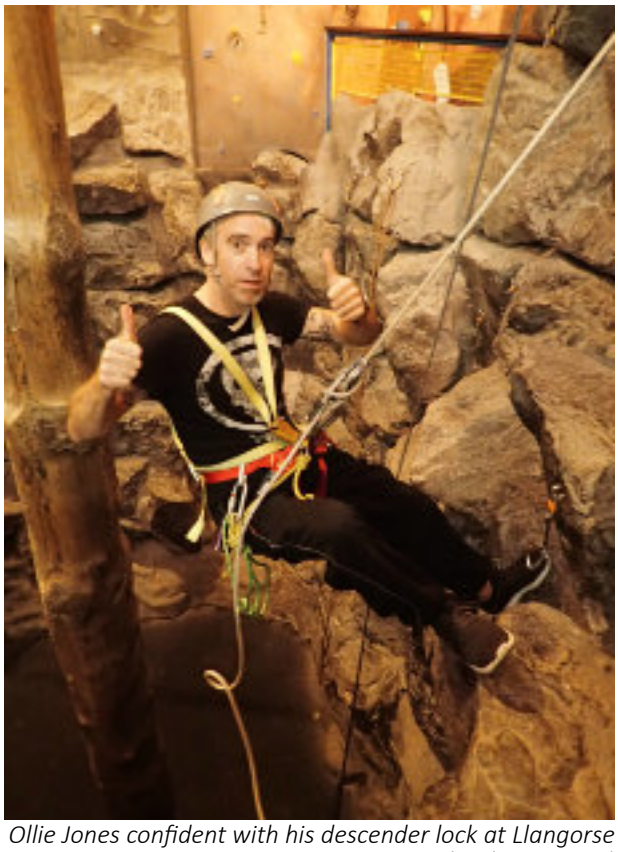
Claire Vivian (and others)

Following a tough day at work, what better way to unwind than an evening caving trip or meet-up with local caving friends?

The evening caving scene among local South Wales cavers has flourished in recent years. It's a whole side to SWCC that many members who only visit the Club at weekends may be completely unaware of, especially as most of our evening cavers are unable to go caving at weekends, and so never meet the other side of the Club. We usually average around three trips underground per month and there are often enough people attending to make up more than one group. Members of several caving clubs mix together happily, including Chelsea Speleological Society (who first started the evening scene off), Gagendor, Morgannwg and Brynmawr Caving Clubs, as well as our very own SWCC members.

*Ollie Jones at Pitch head OFD2 (©Claire Vivian)*

Caving trips usually take place on a Tuesday or Wednesday evening and we meet around 18:45 with the aim to be underground as near to 19:00 as possible. We have a closed Facebook group (Evening Cavers) that anyone is able to join; they just need to ask to be added to it by any current member of the page. Members of the page then post asking who wants to go caving, and people comment if they want to join in and make trip suggestions. Simple.



*Ollie Jones confident with his descender lock at Llangorse (©Claire Vivian)*

Caving trips often take place in OFD, but we also visit the caves of the Neath Valley, Black Mountain and Llangattock areas. The general rule for trips is

*L – R Ollie Jones, Ciaran Ryan, Glenys Hughes, Dave Dunbar, Alan Walsh, Sally Richards (©Claire Vivian)*

that they need to be finished by 22:30 at the latest as people have work the next morning. There is room for flexibility here as you chat with fellow trip members and find out what time or transport constraints they have.

The furthest we've gone on an evening trip, is probably Northwest Junction in Agen Allwedd and an OFD1 to Cwm Dwr through-trip with a small, fast, group and the shortest distance trip has been no further than the start of the Escape Route in OFD1. This is because trips can be made up of seasoned cavers, include complete novices on their first steps underground, or locals interested in the cave virtually beneath their house as in the case of the short OFD1 trip. Some trips involve SRT, such as the Nave pitches and Bedding Chambers pitch into Gnome Passage (OFD) or the Big Bang Pitch (Draenen) or Llanelly Quarry Pot. Others are wetsuit trips, like Little Neath, the Dan-yr-Ogof round-trip, or the North West Inlet in Ogof Craig A Ffynnon (OCAF). There can be something for everyone, and it can play an important role for local SWCC members, giving them the chance to meet new people to go caving with and get underground as much as possible.

As well as caving trips in the evenings, members of the group also meet up for curries, climbing, bowling and perhaps even to the cinema or theatre if there is an outdoors-related event on. So, there is also a social side to activities and people can get as involved as they like socially, or just stick to the caving. Either way, we are an active and friendly selection of local members who welcome all who want to join in.

**'What I like about mid-week evening caving…'**

***Claire Vivian***

After a day spent on the computer at work, being able to cave in the evening is a great way to relax and get fit. I have used evening trips to help build up my route-finding skills in OFD and other local caves. The time limit on trips means that we often visit caves you probably wouldn't do on a weekend, but I really like the variety of that. Bridge Cave, Town Drain, Shakespeare's Cave, Llanelly Quarry Pot, Foel Fawr, Ogof Pasg, Tooth Cave, Llygad Llwchwr, the Silica Mines may all be fairly small trips, but they are perfect for evenings and brilliant for helping people develop their caving skills.

We often have people on their first ever caving trip joining us and others have had SRT training for the first time. A lovely summer's evening walk down Bishopston Valley, looking at karst features is brilliant! So too is scrambling around on the rocks in

*The group somewhat muddied in OCAF (©Claire Vivian)*

the sunshine heading for the impressive Minchin Hole. The social side that goes along with this is also first rate. We'll often end up at a pub after a trip or organise an evening curry meet up. It turns us into a community of local cavers and that's what I like most of all; spending time with good friends and having fun…. however, my worst possible memory was probably when we got absolutely eaten alive by midges in the DYO car park after a round trip. The mental scars from that have not yet vanished from my mind…!

***Matthew Jones***

I enjoy evening caving mainly because it fits in with my life. I work most weekends and that was the greatest hurdle when I first started out caving.

It makes sense to cave in the evenings anyway; what else would I do on a dark gloomy Wednesday evening? After a long stressful day in work there's no better way to de-stress than throwing on a muddy oversuit and slightly damp wellies to go and explore hidden underground passages.

*OFD1 Lowe's Chain in heavy flood – Dan Thorne and Claire Vivian (©Paul Tarrant)*

Nothing beats the feeling of exiting Top Entrance at 21:30 on a sunny summer's evening to see the sunset over the Swansea Valley. On the other hand, there's no experience quite like getting changed on the side of the road with flurries of snow on a cold dark January evening!

You're not just confined to OFD either. One of my favourite trips was to Ogof Craig A Ffynnon to see the Hall of the Mountain King. I've been on trips into Porth Yr Ogof with buoyancy aids and wetsuits on, exploring the deep-water sections. I had my first experience using a caving ladder in Cwm Dwr 2 (not really a natural on the ladder if I'm honest!) and jumping into the river in Llygad Llwchwr. There's a massive selection of trips to suit all abilities and can be completed in under three hours.

*Smiling Lisa Boore negotiating the Pi Chamber squeeze (©Claire Vivian)*

It's not all just about the caving!!! It's a very social group and most of us are in the same boat when it comes to our weekend availability. We also have curry nights where we've raised money for South and Mid Wales Cave Rescue and had SRT training in Llangorse Climbing Centre. We even had the opportunity to hear Gareth Davies give a talk on his caving expedition in Mexico.

For me, the evening cavers group keeps me caving. If I only could cave on three weekends a year, I'd never have stuck at it. I'd thoroughly recommend the evening cavers to anyone local wishing to do more caving or if you're in South Wales during the week there'll always be someone up for a caving trip.

***Ollie Jones***

Being unreachable to the rest of the world for a few hours is lovely sometimes. I'm in another world completely when I'm underground, obviously always being very careful of where I step and of course not to get lost. Most of my caving experience

*Claire Vivian in DYO 1937 Series (©Paul Tarrant)*

has been during the week at evening time. I find it very relaxing but also a good bit of exercise for the whole body (I'm absolutely certain my back has been fixed by the caves!). After an evening session (always amazing), one thing is for certain. A good night's sleep.

OFD2 is where I've been route finding for quite a while now and know my way around quite well sometimes. It's such a nice feeling being able to put two and two together. The size of the passages and chambers never fail to amaze me and there hasn't been a time where I can't think of where to go. There's so much ground to cover. I must measure my steps sometime. Another thing which is nice about evening caving is the refreshing walk 'down' the hill back to the Clubhouse reminiscing about the trip and looking forward to the next.

*Silica Mine L – R Becky Claire Vivian, Liz Winstanley (©Paul Tarrant)*

***Paul Tarrant***

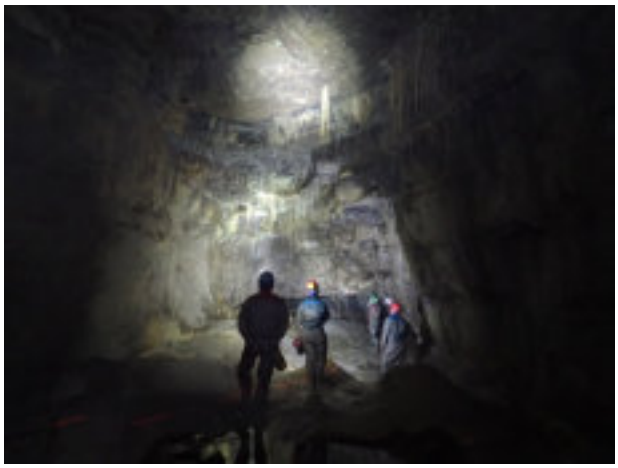
The 'Evening Caving Group' was born in early 2012 and was a collaboration of cavers living in Eastern Wales and comprising people from CSS, SWCC and Gagendor Caving Club. To call it a 'Group' is a bit formal really although the following guiding principles formed a loose ethos, these being:

- The caving trips we do need to be fun and enjoyable.
- Trips are limited to 3-4 hrs so as not to exhaust ourselves for work next day.
- Long duration digging trips certainly have their merits but we shall avoid them (see first point above!).
- There will be social events in between trips!

*Agen Allwedd Main Passage L – R Jeff, Stuart, Claire Vivian (©Paul Tarrant)*

Initially, we visited caves on Llangattock, doing thoroughly enjoyable trips in Agen Allwedd to places like North West Junction, Main Passage and Erse & Music Chambers, Ogof Cwnc, Ogof Craig A Ffynnon to Hall of the Mountain King and North West Inlet, Ogof Capel, Blaen Onneu Quarry Pot, Ogof Pont Gam - Ogof Rhin through trip, Llanelly Quarry Pot as well as aqueous trips to Porth yr Ogof and Little Neath River, Bridge Cave and the drier Dinas Silica Mines.

Claire Vivian first joined us to a well subscribed trip (there were nine of us) in the more than wet



*Ogof Craig A Ffynnon (©Paul Tarrant)*

Shakespeare's Cave in the Clydach Gorge in September 2014 and quickly followed up with a trip to Ogof Twll Clogfaen, conveniently situated on the

*OFD2 Frozen River Chloe Francis admiring fine formations (©Paul Tarrant)*

side of the A470 near Merthyr and providing a lot of fun and interest for a relatively short cave.

Increasing road works in the Clydach Gorge and the sporadic way road works sprang up at night on the Heads of the Valleys Road led to some unexpected extended journeys home, so around winter 2014 we realigned more of our trips to Swansea Valley which was easier for people living in Swansea, Brecon or the Amman Valley. Naturally we focused on OFD and Dan-yr-Ogof, with both caves providing a wealth of extremely good quality caving trips to keep the ever-growing group interested and challenged. A trip to the start of the OFD3 traverses, Moonlight Chamber, Dan-yr-Ogof Lower Series Round trip and the OFD1 round trip are some of the recent highlights.

*Something to raise a smile - OFD2 Frozen River - Claire Vivian, Chloe Francis (©Paul Tarrant)*

Through these evening trips, Claire has managed to introduce several cavers new to the area, and some novices to the sport, to the joys of OFD and SWCC, with the Club picking up new members as a result. The really good thing about evening caving is it gets you out doing the sport we all love during a time when most other outdoor sporting activity is curtailed. It is also great meeting a good cross section of people all with the same purpose in mind - to go caving. The pint in the Shunt (Ancient Briton) always tastes great after one of these trips!

*Lucy Archer and Claire Vivian in OFD2*

# *The Continuing Legacy of Dick (Richard Thomas) Baynton (1944-1967)*

***Paddy O'Reilly***

On February 9th and 10th, 1964, Swansea's Western Mail and Evening Post newspaper headlines screamed out news of a caver badly injured in a fall in Llethrid Cave. Fortunately, STRUGGLE TO SAVE HOWARD BUTLER'S LIFE was quickly followed by TRAPPED CAVER SAVED BY HUMAN BRIDGE and SAFE AT LAST as the cave rescue team swung into action and brought the young man to the surface after 25 hours, and on to Morriston Hospital for treatment of his injuries – amongst them a broken leg. Included amongst the local and SWCC cavers, who were very fast on the scene to assist in the complex rescue, was an avid young caver named Dick Baynton who lived in Swansea. Dick was not yet 20 years old when the accident happened, but he was already an expert on the underworld of Gower and knew the considerable problems to be confronted by the rescue team with a stretcher.

In the years before and after that accident, Dick caved, climbed, explored, probed and gathered as much information as he could about the caves, geomorphology and hydrology of Gower, and he encouraged and mentored many young cavers, including me. He lived for the underworld of Gower.

***Pete Kokelaar***

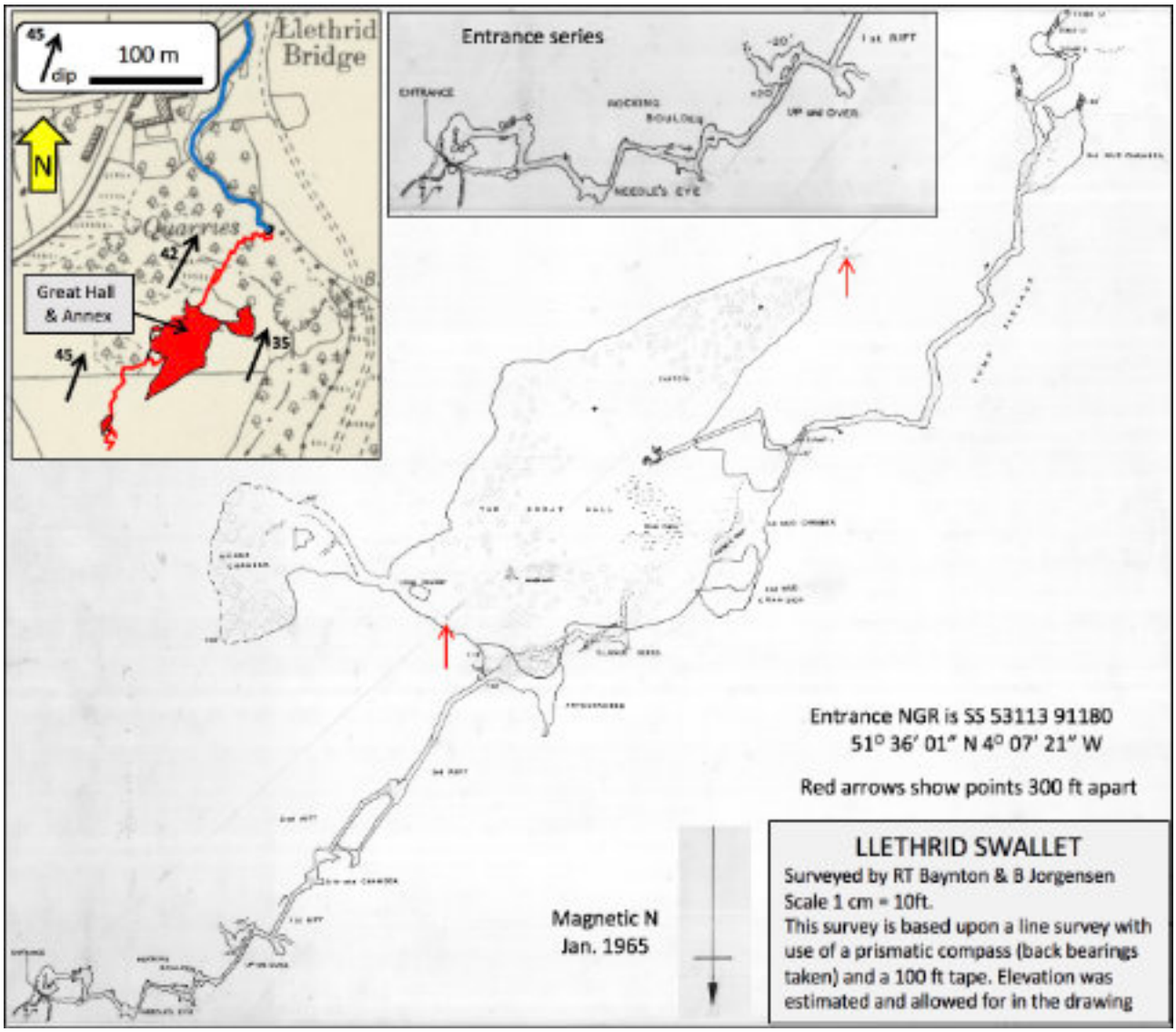
A local 'Swansea boy', Dick's tragically curtailed life was one of passion for caving and for discovery in Gower.

Dick's sisters, Liz and Judi share this background: "*Richard was critically ill with polio at 2 years of age and was not expected to survive. From that time until his early teens when the calliper finally came off his leg, his world centred around hospitals, operations, orthopaedic clinic, etc. Some form of 'normality' for Richard eventually began at this time. It is remarkable how much he crammed into those very few short years of his life when he was in good health. He died of leukaemia the day before his 23rd birthday.*"

*Dick Baynton at Pork Hall getting ready for a day's climbing on Gower cliffs*

He meticulously kept notebooks with drawings, maps and bits of various information, including

*Llethrid Swallet Cave survey made by Dick Baynton and Brian Jorgensen in 1965. The main panel is a scan of the original drawing, with hand-written original notes and names. The inset boxes are added for clarifications. The Great Hall is almost 100 m long. The photographs, courtesy of Paul Tarrant, show the considerable size of the Great Hall northeast end at the 'large boulder' and the famous curtain towards the top of the Great Hall slope.*

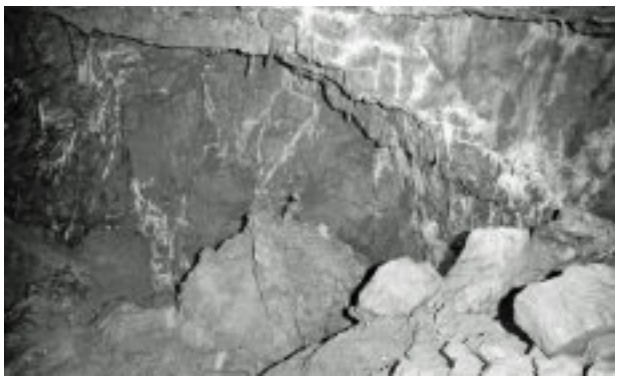



caving anecdotes. Llethrid was especially dear to him. He described how (aged 15) "*I went down my first real cave - Llethrid Swallet. Thus began my caving days.*" He was architect and driving force in the conversion of a pigsty near the Gower Inn, in Parkmill, into Pork Hall, a base from which we could cave, explore and enjoy hilarious weekends. His quest to discover cave connections occasionally led to trouble; the pumps had to be turned off at Wellhead to prevent lurid green water entering the public supply and when the river across Caswell beach similarly changed colour it made the local papers.

Dick's contributions, both to understanding Gower caves and to developing our own speleo-science approaches were immense. Through the early 60s he was friend and mentor to many of us who enjoyed his tremendous enthusiasm and mischievous sense of humour.

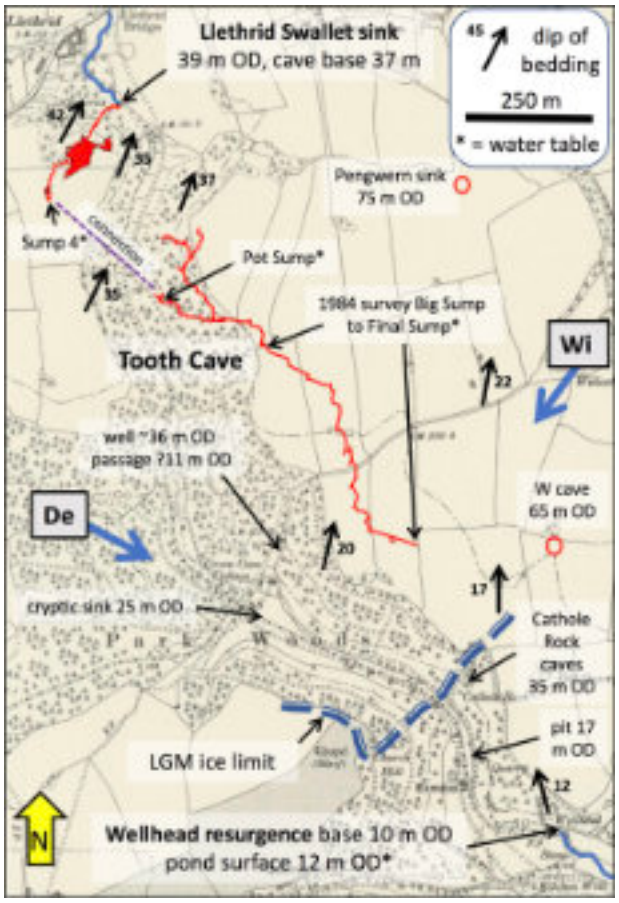
***Terry Moon***

I got to know Dick through the Gower/Swansea group of cavers and SWCC. He was very active in caving, climbing and laughing over anecdotes shared at the Gower Inn. We often slept off Saturday nights on bales of hay in a nearby barn, waking up trapped inside our sleeping bags, between the bales where we had slipped during our 'deep' sleep. Pork Hall was luxury accommodation…



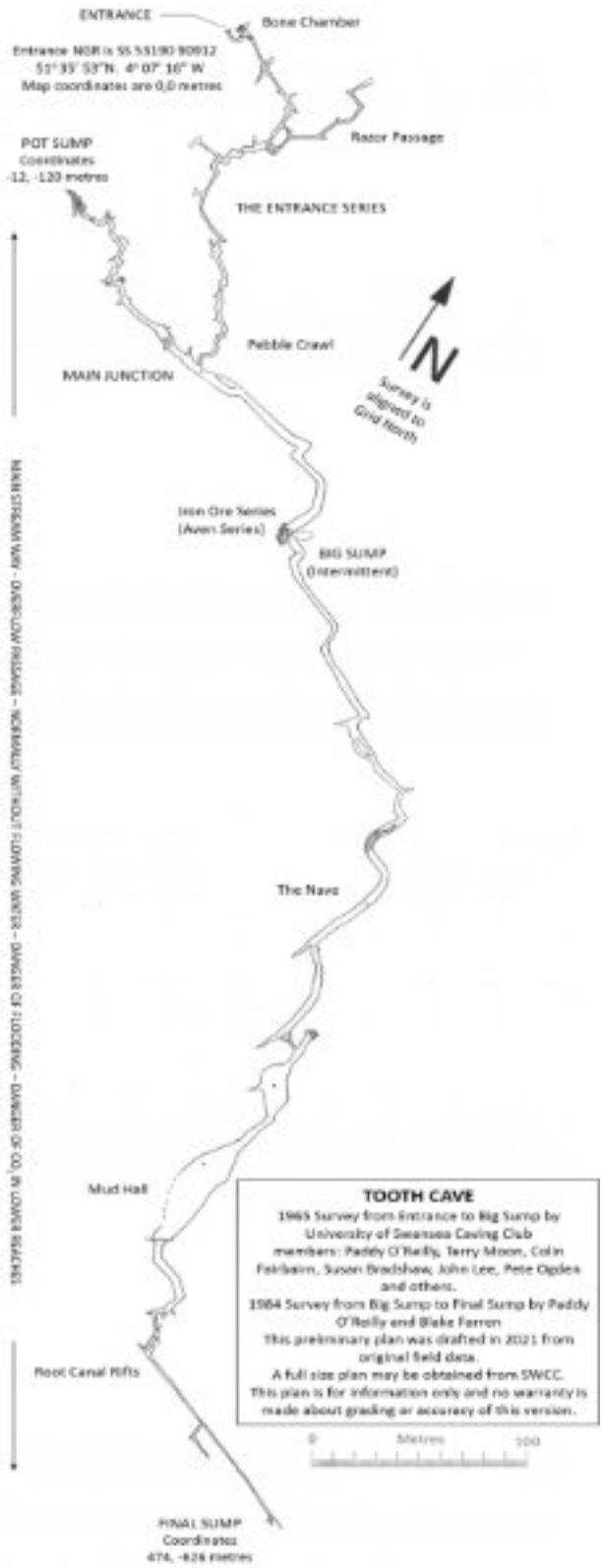
*Llethrid Gt. Hall (©Paul Tarrant)*

*The total length of Tooth Cave surveyed passage is 1494m; the full detailed survey will be available later in 2021. The photos show characteristics of the main streamway phreatic passage, including ancient sediments reworked by flood bypass streams, fine scalloping, and fracture control (The Nave) (©ogof.org.uk)*




We had been in the lower series of Llethrid when that accident happened in 1964 and, on returning, we came across a group of four cavers just below the climb up into the Great Hall from the stream passage. One had fallen and was lying on the large flat boulder below. He obviously had broken his femur and was in distress. We secured him and two others set off to raise the alarm. We lay on either side of him to keep him as warm and comfortable as possible. A couple of hours later, some SWCC rescue team members with Dr Noel Dilly arrived. He gave the necessary medication and care before the main rescue team arrived. We stayed to help for a couple

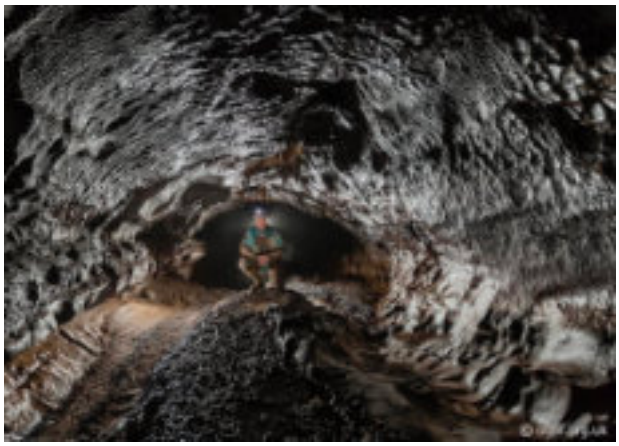
*Llethrid Gt. Hall (©Paul Tarrant)*




of hours, but as we were wet and cold and more people were arriving, we made our way out of the cave. At the entrance there were many people arranging for the main rescue, together with TV and other media. Dick was there to help get things underway, with his intimate knowledge of the cave.

I fondly remember Dick's singing. In a large echoing cave passage, he would start his Gregorian Monks'

*Phreatic Passage Tooth Cave*



*The Nave Passage Tooth Cave*

Chant, but the alternative version not the original! He was one of those early idiosyncratic members of the SWCC who knew everything about caving, climbing and living on Gower, and we very much missed him soon afterwards when he was gone.

***Paddy O'Reilly***

Llethrid and Tooth caves were Dick's all-consuming interest. By 1965, with Brian Jorgensen he had surveyed Llethrid to the highest standard then known. I became drawn in by his enthusiasm and with his encouragement I started surveying Tooth Cave in 1964 with other members of the Swansea University Caving Club. That survey progressed slowly, and we were prevented from surveying beyond the intermittent, but then full, sump just beyond the Iron Ore Series. It was to be 20 more years before I revisited the cave to complete the survey to the Final Sump.

Before he died in 1967, Dick gave me some of his papers to publish, as I was editor for the SWCC newsletter at the time. The Hydrology of Gower, his monograph, was subsequently published posthumously in SWCC Newsletters for 1968-69, volumes 58-62. Unfortunately, his Llethrid survey was never published and the working drawing that he had passed on to me remained in my possession until very recently, a period of almost 55 years.

The drawing only emerged because Pete Kokelaar contacted me in February 2021 to ask if I had, by any chance, a copy of a survey of Llethrid that he recollected had been done when he was a schoolboy caver in 1965. My treasure chest of caving memorabilia quickly provided the still carefully rolled-up, but time-worn, hand-drawn survey by Dick and Brian Jorgensen which was immediately scanned and sent back. I discovered that no other survey had been published in those 55 years, although a sketch, possibly done before or at the time of the accident, had been published. However, that sketch was not an accurate representation of Llethrid, and we are pleased to be able to share here a copy of Dick and Brian's survey with Club members in this 75th Anniversary Publication.

My treasure chest also yielded another artefact from the past: my Tooth Cave survey, which was only partly published in Speleotawe 65. It has now been re-created in full right to the Final Sump. So, the full map of Tooth Cave is also now published here for the first time as part of our tribute to a great friend and mentor who died too young.

These two maps, although relics of a golden age of Gower caving, should still fascinate cavers today. In fact, Dick's survey is already supporting exploratory work on Gower. SWCC members led by Andy and Antonia Freem, along with Pete Kokelaar and Jem Rowland, and others, have begun a quest to re-enter Llethrid Cave, closed off since 2005 as a result of a major release of backed-up sediment. Dick's caving knowledge, from the mid 1960s, is still relevant today.

All of us, and no doubt many others, will have remembered Dick Baynton fondly and with gratitude for what he gave us: Ken Alexander, Derek Davies, Dai Edwards, Colin Fairbairn, John and Clare Harvey, Dai Hitchins, Brian Jorgensen, Pete Kokelaar, Ken Maddocks, Terry Moon, Pete Ogden, Susan (Bradshaw) O'Reilly, Paddy O'Reilly, Geoff Williams.

Full-size digital copies of both maps will be available online.


BOWENS

# Technology

## *Edited by Graham Christian*

This section of the publication is devoted to a look at the caving technology of the past and how it has progressed over the last 75 years. Also, more recent changes over the last 30 years or so, where we are today and a glimpse at where we might be heading in the future.

The theme begins with Noel Dilly's fascinating series of five historically focused articles, inspired by a search through his loft, a look back to the early days of the Club when specialist caving equipment was just not available, or if it was, you made it yourself. He explores nailed boots, clothing, lighting and ladders. Noel provided a large number of photos to go with his text and it was a hard job choosing which ones to use as they were all pertinent and interesting. Those not selected for this publication will be added to the Club photo archive, perhaps to come out for the 100th anniversary publication! Noel's 'retro' reflections are enhanced by Paul Meredith's close look at the one-time ubiquitous Premier carbide lamp.

Next, we have Ian Todd's article on electronics, their evolution, and how they have made a difference, particularly to surveying. David Eason then follows through with a look at the development of the current electronics being applied to cave research and where that may be going in the near future.

Then, we explore the digital world. On the pure computing side of things, Duncan Hornby takes a stocktake on the current SWCC Blog. He reflects on and analyses information derived from data he has collected on the Blog's use. Mike Cowlishaw then presents a couple of computer programs, Mapgazer and Pangazer, that he has developed that have helped in surface reconnaissance for caves.

Finally, we take a very quick 'snapshot' (pardon the pun…) of the stunning photography that can be achieved with current mobile phone camera technology and without having to resort to a separate delicate and expensive camera. We have illustrated this largely through images taken by Sanita Lustika and Tomasz Zalewski.

Sub-editing these articles has been a pleasure and I hope the reader finds them as interesting as I did. They have certainly made me reflect on the changes that I have seen in the 44 years that I have been caving. There is further scope for articles on the changes that have occurred over time and that will carry on evolving. You have 5 years until the 80th anniversary, so get writing!



◀ *A real photographer in action. Dennis Kemp taker of great pictures, in full flow (© Noel Dilly)*

# *Reunited After Sixty Years (Noel Dilly has been up into his loft)*

**Noel Dilly**

I went up to Medical school in 1954 and by 1957 I was fully occupied with my clinical studies. In those days that meant that I had to move into the on-site student residence and was on the wards more or less continuously. My mother took the wise step of reclaiming my room at home for general use, my possessions were cleared out and some of my stuff ended up in the loft, stored in a series of cardboard boxes. These boxes eventually ended up unopened, stored in the lofts of my various homes as my life and career developed.

This year, whilst writing for the prospective 75th anniversary publication of the SWCC, I wondered if there might be anything of my caving gear surviving in the by now disintegrating boxes. Most of the clothes were in a sorry state having served as the homes for generations of mice. There were many trips with the remnants to the dustbin. One particularly heavy box broke and I discovered my long-lost ammunition tins. To my surprise and delight they were just as I had left them nearly sixty-three years ago. Their contents might prove of amusement to today's modern cavers.

There were three tins: one with my everyday caving stuff, one with my survey gear and the remaining tin contained my photographic apparatus. All the tins were covered in cobwebs and superficial rust. The various moving parts of the tins needed a fair amount of oil to be free to move once more. It was emotional to be reunited with long lost treasures.

The first tin that I opened was the general-purpose caving tin. The piece of nylon tape (Figure 1) that served as a carrying strap was still attached to the lid handle. The tin contained some interesting items and a reminder of my forgetfulness. All those years ago I had forgotten to empty my spent carbide tin, and today its contents were a simple dry powder. My spare carbide lamp was there together with its

***Figure 1*** *Ammunition tins were popular! (note that this is an older design than more recent ammo tins)*

tin of spare parts. I was amused to see that the tin also contained some cap lamp bulbs. The spare carbide bottom half for the lamp was fortunately empty, and its screw top came off easily. The small spare bottle used to store water for the carbide lamp had evaporated dry, and its lid had cracked. The candle and its tin of red head matches was still there. The shape of the candle suggested that some of my lofts must have sometimes reached high temperatures. The specimen collecting tin with its tiny ampoules was in good shape. The short strip of magnesium ribbon was black with oxidation, having been light grey when it went into the box way back. The note pad and pencil had survived as had the pencil sharpener. Surprisingly the sticky tape holding the spare carbide lamp pricker had remained in position and retained the pricker. My old-fashioned tin with its awkward lid, that held my tiny duster and a handkerchief, was still there, and true to form it remained obstinately difficult to open.

***Figure 2*** *The British Army knife - the tin opener was surprisingly useful*

The WW2 British Army knife (Figure 2) was revealed and after a little oil was returned to working order. The oil and a little sandpaper revealed the War Department arrow and the date of manufacture as 1942! The pliers that I used for crimping detonators to safety fuse also responded to similar treatment. Bill Little however did not bother with tools, he used to crimp detonators using his teeth - a technique that I had no desire to acquire. I notice with amusing recollections that the tape measure that I used for measuring the length of safety fuse was there. There was always a tendency to cut off far too much fuse and then have to wait a worrying length of time before the charge detonated. Safety fuse burned at 30 seconds per foot. When nervous, it was surprising how long an estimated foot actually became, especially if the retreat from the charge to the refuge position was at all difficult.


***Figure 3*** *Flash gun, tripod and other accessories; note the universal joint with spring clip that allowed the ammunition tin to be used as a camera support*

The spare boot laces and piece of string looked intact but disintegrated when picked up. A nice surprise was a piece of cloth that contained four old pennies and a two-shilling piece. I think that the pennies were there for emergency use. They would have been necessary to summon help using a public call box. The old Clubhouse at Pen y Bont did not have a telephone, and the public telephone was the best method. Dialling 999 was of course the alternative, but calls made this way somehow always attracted press interest. It helped that my philosophy was that if you got into trouble, you and your mates should get you out of trouble.

The second tin that I opened, a larger ammunition tin, contained my long-lost photographic gear. I opened the lid to be greeted by a collection of items (Figure 3) that had once been my pride and joy. This camera (Figure 4), which I had assumed was either lost or stolen was probably the most expensive thing that I had owned in my youth. Obviously, it was a film camera. It had both double film holders and a splendid roll film holder that could be fitted to the back of the body of the camera. I tried to recall the film size; I think that it was 820.

***Figure 4*** *The camera shown in the open position*

It was a folding bellows camera, from a bygone era. I extracted it slowly from its box and thought hard for several minutes of what I had to do to actually open it to its working position. Eventually after a lot of gentle fiddling I got it open. What a joy - it looked pristine and the lens glistened. I cocked the shutter and found the shutter release. It worked first go after all that time. I tinkered with the parallax corrector, that moved the lens up and down relative to the film holder. It was a splendid device that allowed photographs of tall structures to be taken

from their bases without distorting the vertical dimensions. Great for photographing ladder pitches. I enthusiastically thought of getting some film, taking some photographs. Then reality struck. Where would I get the film?

My black bag that was used to keep the film in the dark when loading into the film holder had long gone. Where would I find ID11 developer or even fixer? My developing tank had disappeared as had my enlarger and the printing dishes. The print glazer had long ago rusted away. Anyway, where would I keep the results. Could I still remember how to undertake all the steps in the process? Reality dawned again. I was examining a tin full of useless gear.

Nevertheless, I continued unpacking the treasures with memories flooding in tidal waves across my consciousness. My home-made mini tripod was there, made in the days before commercial versions were built. I enjoyed assembling it. There was a design fault. The legs could not be adjusted in the vertical plane. There are very few convenient flat bits sufficient to take a tripod in a cave. This problem was overcome by a then new product, the ball and socket tripod attachment.

Then out came the magnesium ribbon and the flash bulbs. Flash bulbs were nothing more than thin threads of magnesium sealed inside a plastic transparent container that was filled with oxygen. I even found the holder into which the bulbs were fitted before ignition. I did not find the long extension cable that allowed the flash gun to be operated at some distance from the camera. Often the technique for large area photography was to have helpers stationed in places hidden from the camera firing their flashes in sequence. The alternative of burning a long strip of magnesium ribbon had risks, that sometimes resulted in failure because the cave drafts would waft the smoke generated by the burning ribbon into the field of the photograph.

There was a setting on the camera shutter (marked with a 'T' in the photo, Figure 4) that allowed the shutter to open with one push of the release button, then the shutter stayed open until the shutter button was pushed again. This facility was useful for long time exposures and sequential flash photograph. The inky blackness of caves made them ideal for such techniques. However, the photographs were frequently ruined by lights being switched on in the field of the photograph.

Next out was a long flexible cable shutter release. A timely reminder of the demon problem of long exposure photography and camera shake. There was no image stabilisation when I was using the camera. My tripod when fully extended had to be allowed to settle down after the camera was attached and before any attempt could be made to take the photograph. Of course, there was no instant gratification in being able to inspect the photograph, and if necessary, have another go at improving the result. You just had to wait several days until the film had been processed and printed. Even then, when this was done commercially, there was often the irritation of your obviously dud pictures being printed and subsequently being charged for the useless prints. Home processing allowed some selection at the printing stage. The disappointment of the missed picture was just as intense.

Inside the lid of the tin, my experience-based exposure table was still in place. It was a timely reminder of the short distances over which a standard flash bulb was able to adequately illuminate the scene. The bottom of the tin contained my hand cloth, used mainly to clean my hands, and my air puffer that was used to blow dust off the lens. The camera needed a lot of care as, of course, it was neither waterproof nor very robust.

Sadly, and quite emotionally, I put the gear back into the tin and turned to the remaining tin. It was large, just like the tin that had contained the photographic gear. I was correct when I anticipated that it would contain my cave surveying kit. I cheered up immediately, only to remember reading in a recent email from the Club about a proposed surveying course. I recalled that I did not even understand what the technical words meant, and the initials of some techniques might as well have been part of an undecipherable code. Surveying was what had made me interested in caving and I was going to enjoy reacquainting myself with the gear.

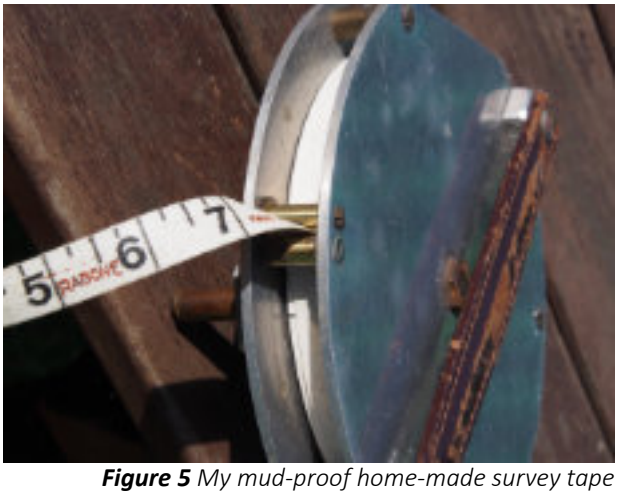



***Figure 5*** *My mud-proof home-made survey tape*

The first item out was my home-built surveying tape (Figure 5). A device I had built myself because the standard surveying tape that came in a beautiful well sealed leather case was a disaster. A few hours of dragging the tape through cave mud and the inside of the case was so full of mud that it was not possible to rewind the tape. Washing the mud out of the case just soaked the leather and the wet leather distorted, compounding the problems. My solution was to make an open tape held between

two aluminium discs. A pair of brass rollers through which the tape had to pass when rewound were fitted so that most of the mud was squeezed from the tape. I fixed a handle taken from a luggage case to the side of the tape housing, on the opposite side to the winding handle, so that it was possible to have a firm grip on the container whilst the tape was being squeezed during rewinding.

My prismatic ex-WW2 marching compass (stamped with the arrow and dated 1943) was next (Figure 6). It was pristine and not a bubble to be seen in the damping fluid. I remembered playing chess in Moscow and talking to my host about my cave surveying hobby. When I mentioned my compass, he smiled knowingly and said that his time as a Maintenance Engineering Officer with the Russian Army was frequently taken up by replacing the fluid in compasses of armoured vehicles. Apparently, the recruits would drink anything that they thought contained alcohol, and compass fluid was amongst their choice targets. The authorities' response was to refill the compasses with lamp oil. Quite a potent but dangerous laxative, and a reasonable deterrent.

***Figure 6*** *The ex-WW2 survey compass, a great compass. Reading the scale in poor lighting was a challenge*

Next out was a bundle made of a tea towel surrounding my Abney level (Figure 7). I unpacked the bundle, and there it was. I sat down on the stool in my workshop and dreamed for some time as I recalled the many problems that operating the device in a cave introduced, and the beautiful mathematics that allowed transcription of the results to Cartesian coordinates. It still had that damned bubble, that was often a source of considerable irritation. The graduated scale showing both degrees of elevation and declination, together with the second scale measuring incline ratios, were also still intact. Rubbing the scale with a 2B pencil revealed that the graduations remained even to the finest detail. One of the sighting knobs was broken, I knew that, but it reminded me of the haggling with the man in the Army Surplus shop to reduce the asking price, and to sell it to me for the pittance that I could afford.

The Abney level had at a stroke allowed us to survey to a much higher standard, and to be able to plot slopes on a single plane. Despite its simplicity of

***Figure 7*** *The Abney level and its elusive bubble*

design, it was not easy to use. Illuminating the bubble and getting it on the cross hair in the sighting tube could be a time-consuming process. However, by using it, we knew the slope of the passage with some degree of accuracy. An improvement on our previous technique of using a plumb bobbed protractor, in which case every measurement contained a good proportion of guesswork.

Then, still wrapped in the remnants of the oily brown paper that had surrounded it, came my chain. Well, it was not a real chain, but it was the best that I could do to make an accurate chain for my attempts at triangulation. I used a piece of galvanised wire left over from ladder making. How to make it really accurate as the surveying books demanded?

Quite an adventure. I was staying with an aunt whose house was just a bus journey away from the Royal Greenwich Observatory. I knew that outside the main gate of the observatory was an exhibit that contained a standard yard bar. Surely all I had to do was measure it. Off to Greenwich Park with a tape measure. A total failure! I could not hold both ends of the tape still and take the measurements at the same time. The problem was that I had to be in line with each end of the bar at the same time to eliminate the effect of parallax. On the bus back I had an idea; use a broom handle and a set square. Effort number two. Basically, I had exactly the same problem with this attempt. I did not have enough hands to do everything, holding the handle still against the bar, setting up the set square, and using the pencil to mark the broom handle. I was just about ready to give up and return later with some string to tie the handle to the bar when a park policeman turned up and asked what I was doing. I

was given time to explain my strange behaviour and he then helped me transfer the measurements.

Back home it was simple to use one end of the wire as the start point and fix talurit swages to the wire with the end nearest that end of the wire as the marker for the distance. I kept the wire taught on the bench while transferring the measurements by suspending a weight from it. My chain, defying convention, was graduated in yards, and was only ten yards long.

Triangulation was a splendid introduction to surveying. The principle was so simple. A base line was established and fixed in position as well as possible to some relevant features nearby. Then, by extending the sides in triangles from the base it became possible to position anything relative to the base. One sight was taken along the base and a second along the side. I measured the angles between the sides and the base with a home-made pelorus (Figure 8) that has somehow survived (a Pelorus being a navigational instrument resembling a mariner's compass without magnetic needles and having two sight vanes by which bearings are taken).

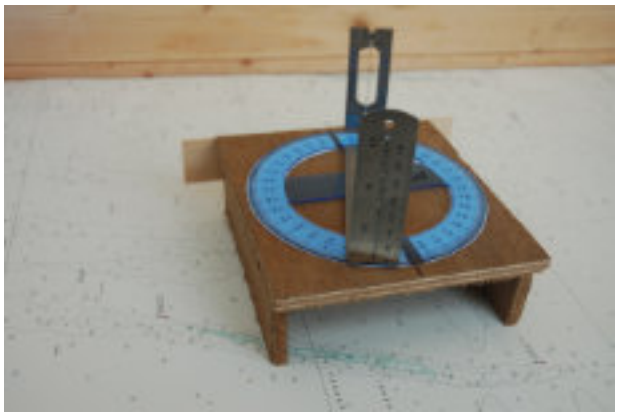


***Figure 8*** *My home-built pelorus, very easy for taking triangulation bearings*

The difference between the readings was the angle between the two sides. There was no need to use a compass as the base line was fixed and so all dimensions were related to that reference. Then came the hard lesson that despite scrupulous attention to detail, essential readings often failed to get recorded, or if recorded, were wildly wrong. Shouted numbers were a nightmare, confusion between seven and eleven, and more surprising between five and nine occurred far too often. These problems were slowly ironed out. However, there were difficulties that were beyond our technology. How do you pull the catenary out of the wire chain when it is being held on a slope? Accurate measurement was difficult until I realised that, on the scale I was plotting, the result of a six inch error was irrelevant. I could not make a pencil mark that small. If the chain was on bumpy ground what was the true distance?

Triangulation was not much good inside many narrow parts of caves - the apices of the triangles were too acute, and so the magnetic compass became the angle measuring device. Triangulation however was splendid in fixing the position to the features in large chambers and was largely used by us for that purpose. Here, fixing an underground base line was always unreliable since it depended on the accuracy of the previous tape and magnetic compass survey.

The solution to the slopes I found in a manual of surveying - use an Abney level. After that SOHCAHTOA ('Silly Old Hector Can Always Have Two Of Everything!') became almost a mantra and surveying became much more satisfying (to save the reader resorting to an internet search: sine equals opposite over hypotenuse, cosine equals adjacent over hypotenuse, and tangent equals opposite over adjacent). It is a mark on the advances in technology that the calculations that I did were done either using a slide rule or Logarithmic tables. I suspect that many of our less ancient members may not have seen such things, let alone used them.

Then one day I suffered serious damage to my ego. Frank Baguley and I had been surveying the bolder choke in Agen Allwedd to determinate how far it was from front to back. We wanted to establish how thick the choke was in case an emergency bypass tunnel to the narrow squeeze might be required. It was only a short survey of about eight or nine legs. I was plotting the results on my small drawing board in the sunshine outside the headquarters of the Chelsea Caving Club, that was the nearest HQ to the cave. Some young girls of about fourteen years or so came walking by. They thought that I was painting and came to have a look. What was I doing? I told them that I was plotting the angles and distances of some lines to find out how far apart the ends of the series of lines were

Almost at once I was told: "*You don't do it that way. Those lines are vectors, you just add them up and work it out. You don't need the drawing at all*." I obviously looked disbelieving. One of the girls said that she would show me how if I liked. Even more confident that I was calling their bluff, I moved over and offered the girl paper and pencil. She, bold as brass, took the results page. After taking my proffered pencil and paper, there was some brief adding and subtracting of lengths and angles and I was given the answer in minutes. Fortunately for me this was just before I was about to announce that I would go for a walk to give them time to see if they could do what they claimed!

I felt humbled and wondered if I had slept through that maths lesson in school. Afterwards, when my humiliation resolved, I was delighted that I had a simple and effective independent check on my laborious plotting. I quickly revised how to do vectors. The two methods never agreed, but I

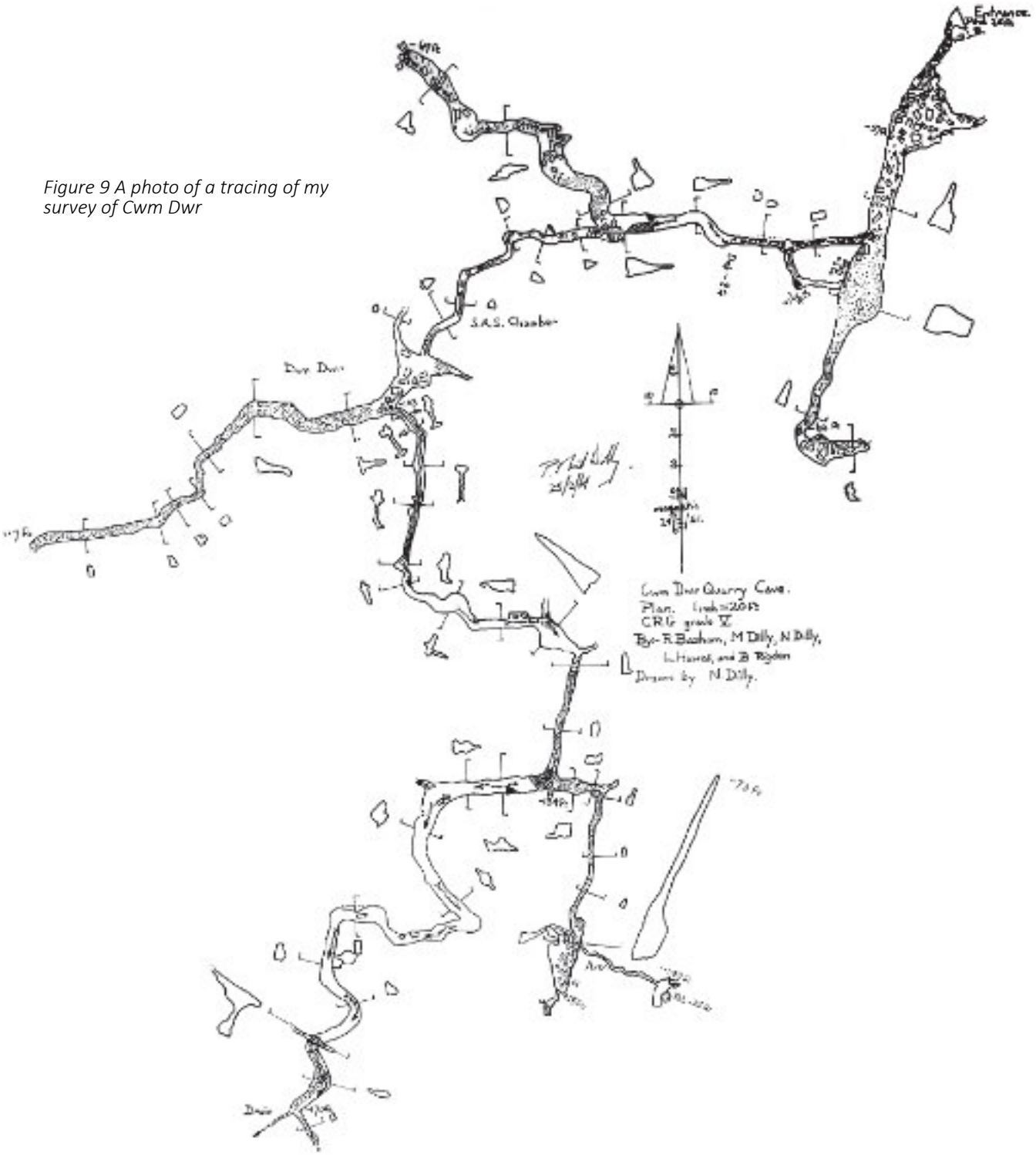



*Figure 9 A photo of a tracing of my survey of Cwm Dwr*

accepted that if they were in the same ballpark, they were confirmatory of each other.

My few surveys of a closing loop of passage always had a closing error, not always proportional to the length of passage surveyed. I never did work out when plotting the results whether to leave the error, adjust the plot in one section or to spread the discrepancy between all the stations.

I tried many differing types of magnetic compass, but most suffered the problem that if the compass was tilted the compass rose could not rotate. This was a nuisance until I found a war-surplus aircraft compass that had a hemi-spherical rose that balanced on an axis and could function when tilted to quite large angles. One other interesting problem arose. There was a serious limit to using small, easily handled compasses. With the poor lighting available, the miniature scales were very difficult to read accurately. The bigger, service-type hand-bearing compasses that had a torch built into their bases were much better, but bulkier and much more vulnerable.

I searched the house and all I could find to illustrate my surveying is a tracing of a late survey that I undertook in Cwm Dwr Quarry cave (Figure 9). It will have to suffice as my sampler. Looking at the survey, slowly I realised how long ago it all was. The happy times, the wonderful life skills and social education that was an integral part of the Club. A

club of disparate individualists who were held together by our obsession with the exciting world of cave exploration. Exploring caves in such company was a great preparation for exploring life. Caving had everything, and the experience was all the greater because you shared it with others who understood the excitement and the disappointments.

Friendships came and went but the experiences will last forever. The thoughts flew through my head; a few tears were shed for departed friends; however, they were ameliorated by the memories of the great times that we had shared in both triumph and disaster.

Daydreaming, my age and unfitness slipped away; yes, I would do another through trip! This time more slowly so that I might enjoy the cave. My one and only through trip so far had been ruined because I had seen so little. It was my first visit to OFD2, I had been away from caving for a long time forging my career. I was staying at the Clubhouse, and Paddy O'Reilly had agreed to show me the route through from the boulder choke to the top entrance.

I retired to bed early as I was anxious about the adventure. As you may know the floors of the upstairs rooms of the cottage are porous to sound. Just as I was dozing off, I heard someone downstairs greet Paddy and complain that they would have to wait ages next day whilst he took that old man (me) on a through trip. I was crestfallen as I lay there thinking of an excuse to avoid the promised

*My brother David Dilly photographing in Hangmans Wood*

adventure. In the morning I awoke angry and determined to prove the doubters wrong.

From the Grithig entrance to the Top Entrance I set a horrendous pace. I saw nothing of the cave but we got through in close to one hour. I was a pool of sweat. However, I had the pleasure of watching the disbelief as Paddy told my detractors that we had indeed done a very fast through trip. Needless to say, I was whacked by my efforts and I spent the remainder of the weekend daydreaming and walking around on the moor above the cave, wondering how the surface features related to the vast cave below. Thanks to the beautiful survey produced by this generation of surveyors I now know this. All that is required now is a trip to see and admire some of the highlights that all of you, who have inherited my Club, have found.

I look at this great Club today and I am proud of you.

*Muriel Dilly and Les Hawes developing colour film in the wilds of Yugoslavia*

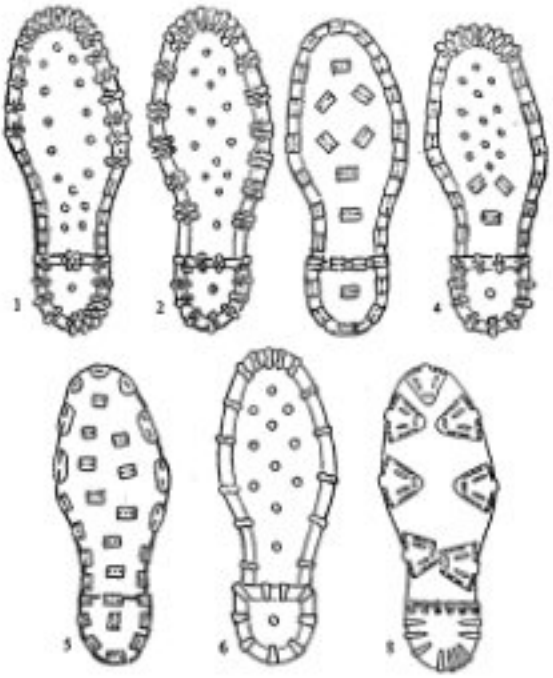
# Nailed Boots

Noel Dilly

When in 1951 I first arrived at the SWCC cottage at Pen y Bont, I was interested to find that nailed boots were *de règle*. The majority of boots were nailed with the tricouni nail. This fascinating nail had been invented by a Swiss jeweller who was quite a famous explorer and mountaineer. His invention consisted of a piece of serrated hardened steel brazed or welded at right angles to a softer metal plate that was nailed to the sole of the boot. This type of boot adornment was highly regarded by anyone who enjoyed mountaineering as an all-terrain boot. It was great on snow and ice, the only boot that gripped on verglas and also held easily on grassy slopes. The concept was that the teeth of the serrated edge cut into the substrate and held the boot in position by friction between the hardened steel teeth and the rock.

*A tricouni nailed boot*

The argument that they were ideal for caving was persuasive especially against the ex-WW2 Army surplus rubber soled commando boot. Who would want a rubber soled boot with a tread? We all knew that motor cars with treaded rubber tyres skidded



*Nailed boots from J.E.Q. Barford's Climbing in Britain 1946*

on wet roads. Caves were full of wet rock, so the boots were unsuitable. Even if you were climbing, the choice between being held in place by a solid piece of steel cutting into the rock, or a piece of rubber cut into by the rock seemed obvious and a compelling argument for a nailed boot. After all, nailed boots were prized by climbers, and we cavers were really underground climbers. Some eccentric climbers were even rumoured to wear tennis shoes!

The problem for me was that tricouni nails were expensive and demanding to fit to a boot. A commercially produced nailed boot cost eye watering amounts of money for a schoolboy to even

*The nailed boot on the porch wall of Nº8 Powell St*

consider spending. Bill Little was the expert on tricounis and fitting them. I confessed my problem. Bill suggested the much simpler and cheaper, but equally effective nail: the clinker. The clinkers were to be nailed around the periphery of the boot sole, and the sole of the boot nailed with hob nails.

There was an interesting technical problem with having a boot in which the sole protruded beyond the upper. The best rock-climbing boots were narrow soled so that the climber's weight was over the hold. With an extended sole not only was balance more difficult but there was a weaker sole to hold the push on the nail. The nails could tear out.

The term, hobnailed boot was a pretty derogatory name for boots used by most who had served in the armed forces. The hobnails covering the soles of army boots were beloved of Drill Sergeants for the crunching noise they made when hitting the parade ground in unison under marching feet of the parade. The problem for nailing boots was the nail that held the head of the nail to the boot. How to drive a nail through the boot? The technique was to soak the sole of the boot in linseed oil to soften the leather. Then use a specially designed anvil shaped like a foot that went inside the boot to hold the boot whilst the nail was driven. It was called a *hobbing foot*.

The problem was, '*what do you do with the sharp end of the nail?*' If it was outside the cavity of the boot it was relatively easy to turn it over. Nails that penetrated into the cavity via the sole were a serious problem. It is not easy to walk on sharp nails. Massively heavy hammer blows were used to the bash the nail point against the steel of the hobbing foot in an attempt to turn the point over at least against the sole. Many of us resorted to the backup protection of homemade leather insoles as an extra layer between the foot and the nail points.

All very well for expensive well-made mountaineering boots but for cheap boots a fraught experience, the nails were forever tearing out, and wrecking the boot. With cheap boots this was such a frequent experience that there was a popular climbing song of those days:

***'All for the want of a nail'***

*If it's climbing you'll go, there's a tale you should know*
*That will make you both quiver and quail*
*Of a hole in your toe where a clinker should go*
*And it's all for the want of a nail …*

*You're a thousand feet high and you're nearing the sky*
*You can't get a grip on the shale.*
*Only ten feet away, there's a perfect belay*
*And it's all for the want of a nail …*

*There's scarcely a grip for a small finger tip,*
*And a thousand foot if you fail.*
*There's a pumping machine where your heart should have been*
*And it's all for the want of a nail …*

*Well, the good Lord looked down, and he laughed like a clown,*
*"There will soon be a ruc-sac for sale !*
*If these boots don't deceive us, this guy's going to leave us …*
*And it's all for the want of a nail …"*

*They scraped his remains off the sharp rocks below*
*And gathered them up in a pail.*
*And the toast that they drank to the body that stank,*
*Was 'it's all for the want of a nail …'*

*They buried him high, where the cliffs meet the sky*
*And round him-set a white wooden rail.*
*And if you examine it, there you will find,*
*It was all for the want of a nail …*

*Now this is the end of my sad little song,*
*This is the end of my tale.*
*Don't ever go with a hole in your toe,*
*Use VIBRAMS …. They never will fail!*

I suffered so much from nails tearing out that after my first Christmas working for the Post Office delivering letters, I invested most of my pocket money savings and my Post Office earnings in a pair of real climbing boots from the doyen of boot makers Robert Lawrie. I could not afford to have them nailed by him. He did however give me a tiny carborundum stone that I could use to file off the points of the nails that would inevitably protrude through the sole as the boots wore in and the sole moulded to the foot. I bought the tricouni nails from Timpsons and with Bill Little's guidance fitted them using the family hobbing foot. It was very common in those days to fit small plates of metal to the heels of ordinary outdoor shoes to prevent wear. However fitting climbing nails was another dimension.

Fabulous boots, perfect for springtime mountaineering, and the best boots that I ever

owned. They were good for nearly everything except keeping my feet warm. The mass of metal of the nails acted as an efficient heat sink to cool my feet. I am convinced that tricouni nails are the reason that mountaineers wore two pairs of socks with their boots.

Today's conservationists would be appalled by the scratches caused by the struggles to get the nails to grip the rock. However, the marks did indicate where the useful footholds were to be found.

Tricouni was the nickname of the inventor of the nail, it was the name of his favourite climb in the Saleve, a climbing region near Geneva. I don't know what tricouni really means but it is very close to the Italian word tricorni that translates as *three horned*. Perhaps the climb has three pinnacles. The pinnacle of tricouni development was a triangular base plate that had serrated bar welded to all three edges. This plate extended from the edge of the sole to near the midline of the boot. With this shaped nail it was possible to have a boot sole nailed such that it was covered with metal triangles and resembled the segments of an orange. The ultimate, almost capital, crime when wearing such armament was to stand on the climbing rope. An expensive mistake, and it was unlikely that you would be invited to join the group again.

*Me at the OFD step showing rock polished foothold*

# *The Clothes We Wore and the Things That We Carried*

## Noel Dilly

On a recent visit to the Club, I was surprised by the multicolour boiler suits, and the whole thing brought back a cascade of memories that reflect our history.

Nailed boots as opposed to boots with Vibram soles I have written about elsewhere. The idea of a posh boiler suit for caving or even work would have raised howls of laughter in my day. What was the point of getting such an obviously expensive garment torn, soaked and muddy? Did it really have any advantages over a cheaper alternative? I almost expected to read names on the back of the suits, and to find them covered with badges, or some other even more ostentatious symbols of previous caving exploits. At least they did not have badges of rank.

Our early boiler suits were usually ex-services surplus. They often had epaulettes but apart from a variable number of pockets that was it. Each boiler suit was of a single design and colour, the range of which extended from white to dark blue. Zip fasteners were almost unknown except on an occasional pocket, and then it was usually broken.

*The usual suspects - Dai Hunt, Noel Dilly, Bill Little and an unidentified caver*

The fastenings were almost exclusively buttons. They made no pretence of being waterproof. Our suits certainly did not dry rapidly.

*The government surplus clothing option and nailed boots*

There was quite a divide between those who wore ankle Puttees, and those who claimed that they kept the trouser legs full of water for some time after it had been left behind. I usually argued that my suits had so many tears that they would empty or fill automatically, and Puttees were just an additional item of gear to forget. Others usually wore anything that was old, worn or ex-services surplus. There was little conformity or uniformity. We were a recalcitrant bunch, and the guiding principle was: did it suffice?

*Eric in his favourite gear plus his satchel*

What we wore under the external layer was I suspect in marked contrast to today. Usually, a string vest formed part of the base layer. We usually wore *budgie smuggler* swimming costumes in place of underpants. The claim was that they provided enhanced support for the wedding tackle. The photo shows Eric Inson in budgie smugglers contemplating the sump in Porth Yr Ogof. The crucial thing with that particular sump was not to dive in and try to get a speedy start. The cold water often caused a good loss of breath that started a panic. Of course, the opposite was also true, trying to overfill the lungs with air made one too buoyant and you got scared rubbing along the roof. A gentle submersion, a push with the feet, swim towards the bottom of the light and it was a satisfactory experience. To my mind the challenge was climbing out at the outside end.

*Eric Inson in budgie smugglers contemplating the sump in Porth Yr Ogof*

Above this base layer some wore long john style underclothes. Others who were ageist before the word had been invented simply associated them with old age and rejected them entirely. Instead, it was usually any old shirt and sweater, and the legs remained uncovered except for the boiler suit. The more experimentally minded members tried shorts, well-rolled-up boiler suit legs or dispensed with the boiler suit altogether and wore a wide-ranging assortment of army surplus clothes. Some even did without shorts and their leg covering was restricted to budgie smugglers.

Around this time there were some eccentrics who gave up leather boots for Wellington boots, arguing that they usually kept the feet dry, had a sole that gripped well enough, and if they filled up with water, they were easy to empty out.

All this bundle of clothes was usually held together around the waist by a belt. Some argued that a belt might get caught on an obstruction in a squeeze and

that the wearer would be irretrievably stuck. There were many attempts to make a quick-release caving belt that did not release on its own accord. They were universal failures. Gloves were well-nigh useless especially once the leather or wool got wet. My NHS issued schoolboy spectacles, the arms of which had earpieces that wrapped around the ears, were far superior to modern day glasses for staying in place during caving gymnastics and swimming. Spectacles did however need frequent cleaning underground. I kept a spare handkerchief in my helmet especially for that purpose.

*Camping gear for a weekend underground stay to try to push an enticing aven, absorbent clothes worn beneath a primitive wet suit - note also the Primus stove and pipe*

Watches were a problem, few of them being waterproof; those that were, rarely had a robust strap. One ingenious member kept his pocket watch safe in the top pocket of his boiler suit by protecting it in a knotted condom. He claimed that a stretched condom was transparent, and the time could easily be ascertained without removing it from its cover. I can still see the look of amazement on a lady visitor to the Clubhouse when he entered with the knotted end dangling from his pocket. Others achieved the same result by storing their timepieces in a tobacco tin. Some cavers would have a whistle on a lanyard around their necks. I suspect it played the role of talisman.

One of the biggest problems Eric Inson and I had was to convince our mothers not to throw away our worn-out clothes, or to not tell us to dress 'decently' before going to the Club.

Helmets were initially miners' helmets made from fibre board. Probably just about good enough protection to prevent slow collisions with the roof from causing injury, but little else. With the introduction of epoxy-based plastics the fibreglass helmet became a desirable replacement.

Those who were not strong or skilled swimmers had a variety of choices negotiating deep water in caves. The most expensive way was in an inflatable rubber boat. Surplus ex-RAF one-man life rafts were very popular in this role. They sometimes came with a fluorescence block still attached that was extremely useful in our attempts to trace the resurgence and sinks of rivers that flowed underground.

The less fastidious who did not mind getting wet and anticipated the pleasure that they could not get any wetter often used an inflated car tyre inner tube as a flotation rubber ring. Some more bold actually sat in the ring. Modern style life jackets were almost unknown. However, there was a large supply of surplus D-Day life preservers. They were totally unfitted for their intended purpose. These devices were little more than a straight length of inflatable rubber tubing in a canvas sleeve that was designed to be tied around the waist by two tapes fitted to the ends of the cover. In that position they were potentially lethal but if they were allowed to ride up under the armpits, they provided useful buoyancy. They had the advantage that deflated they could be rolled up to a small size and were easily transportable. A great contrast with the heavy and bulky rubber boats.

Keeping warm after a soaking was always a problem. Multi-layers would only provide a little help. Some tried transporting a dry layer of clothes to exchange for their wet garments after the swim. A waterproof bag was constructed from a section of motor car tyre closed at each end by trapping the sides in a clamp made of two pieces of wood the ends of which were pressed together with wing nuts and bolts! This arrangement also provided added buoyancy. It also proved bulky and awkward. One fastidious member always insisted upon changing his socks!

Then one day Bill Little turned up with a wet suit. It was the revelation that we had all been waiting for. They were not commercially available to ordinary income mortals, but sheet neoprene, the material from which they were made, was cheap and available. There followed an orgy of home wetsuit building. It was a fascinating problem making a wet suit. Very few of us had any tailoring experience, and there were no commercially available patterns to assist in cutting the neoprene. Multiple solutions were tried; amongst the best of an unsuccessful series of attempts was to dismantle some old clothes at the seams and use the flattened-out pieces as templates. I believe it was Eric Inson with his logical mind who first suggested that the best template of all was the body that the suit was intended to fit.

The hilarious sessions where sheets of neoprene were held against swimming-costume-wearing bodies were fun for all participants. The technique required several pairs of hands and the construction soon became communal. The task was impossible, the cut-outs were wildly off. However, someone suggested that they were a start. How to join the pieces together was discovered by Bill. You glued the edges together with Evostick, an early alleged

impact adhesive. The idea was that the suit with all its faults was worn, the excess neoprene was gathered together and cut away using scissors. The remainder was then glued back together. Gradual improvement of the fit usually went on for several sessions until everyone got bored and the wet suit was considered a perfect fit (usually though, it had considerable room to allow for the growth of the wearer).

This breakthrough in clothing and the many improvements that followed rapidly, such as reinforcing our seams with tape or lock stitching the seams together with nylon thread, markedly increased their resistance to splitting. This advance combined with my brother's suggestion that the zip fastener should extend a couple of inches beyond the end of the suit to make it easier to join the two sides made the suits durable. Neoprene had one unfortunate property: it stuck to the body. This made the suits difficult to put on. Bill Little solved this problem with a squeezy bottle full of talcum powder. The suit was filled with puffs of powder and became easy to don. Soon the manufacturers produced a neoprene sheet with one face lined with a slippery cloth and the talc solution became redundant. The downside of this advance was that you were no longer perfumed when you took off the suit but stank of sweat instead.

Soon commerce replaced our amateur efforts, with very durable suits of all sorts of shapes and sizes. The market had extended to include the SCUBA fraternity and had expanded to become attractive and commercially viable. The suits became relatively cheap and easy to put on and take off. The suits by themselves had revolutionised our sport. Water was no longer the killer that produced hypothermia at a rapid rate, and their buoyancy added much to the confidence of cavers who were relatively weak swimmers.

We were by this time well clothed and lit. There may be some interest in what we carried and how we carried it. Surprisingly many people carried little or nothing when caving, relying optimistically on others in the party for spares. The modern obsession of carrying a plastic water bottle had not at this time afflicted the nation. We naively perhaps thought that drinking at mealtimes was adequate. The happy murmurs of a summer's day were far too glorious to block out with stereophonic sound.

Freed from these burdens, most people indulged in one of the multitudes of caving interests and carried the appropriate kit. The photographers, cameras with accessories; the surveyors brought their survey gear; the zoology group, their collection of pots and petri dishes; and the 'old hands', their load of spares. Of course, on most trips there was communal gear such as ladders, that were spread out amongst the party.

There was no desire to graze whilst caving, so snacks were unheard of. Some of course carried emergency rations, probably in the form of a chocolate Mars bar. It was usually followed by a rapid learning experience that they need to be in a robust and waterproof container. Screw top ex-tablet tins from the chemist were popular. In those days the size of the food bars was significant, they had not yet shrunk to today's miserable proportions. The desire for regular meals evaporated in harmony with the total preoccupation of caving. A surprising number of cavers carried cigarettes, cigars, pipes and tobacco. Doll and Vesey had not then published their damming condemnation of the addiction.

The mobile phone had not yet been adopted as a permanent ear decoration with the ears trapped against the side of the head with headphones like some latter-day radio operator. Obviously, we had not appreciated the attraction of instantaneous communication or the desire to be liked by unknown people. Somehow, I don't think we missed much.

We usually carried our personal gear either about the person or in a shoulder bag of some sort. War surplus gas mask cases made of canvas were the initial favourite, but when metal ammunition tins came onto the surplus market, they were rapidly adopted. They had the advantage of being robust and waterproof. It was advisable to check their waterproof integrity. This produced the problem how do you sink a container full of air? The Club had some remnants of a weightlifting set. The bigger weights proved ideal for sinking the test tin. A good tin would withstand submersion without leaking for hours. This buoyancy proved quite a nuisance when you tried to swim an ammunition tin through a sump. A leak however usually had disastrous consequences. Leaking tins usually spelt disaster for the contents. I recall one rather amusing spin-off when my tin flooded. By the time I was sixteen I had become short sighted and required spectacle assistance to see to do almost anything except reading. I carried a spare pair of glasses in a case in my ammunition tin. The spectacle case was made from tin that was covered by a layer of material. The flooding destroyed the glue, and the cover came off my case. I had to take my specs to school, and to my surprise others imitated my uncovered tin case. I was completely outdone by one boy whose father had polished his case so that it shone like a mirror!

Transporting bulky gear in caves remained a problem throughout my time caving actively. The kitbag was the almost universal container. But within it the contents had little protection. Kitbags were difficult to carry and dragging them along the floor of a cave rapidly wore holes in the fabric. I remember one overnight trip in the USA where the kitbag was dragged along a lengthy crawl on a tin tray, noisy but effective. However, kit bags remained the best solution to the transportation problem,

apart from miniaturisation of the gear to get it into smaller containers. The Americans adapted reusable small oil drums as containers as they had the advantage of being robust and protecting the gear. Fine until they got battered and dented and it was not possible to get the lid back on.

All this specialist gear produced the problem: how did you transport gear on public transport on the journey to the Club? Again, the surplus market provided the answer. The commando Army surplus Bergen rucksack was cheap and surprisingly comfortable when compared with the alternative, the pack frame. More problematic was how did you change after caving for a swift trip to the pub before closing time? Many acrobatic balancing acts with microscopic hand towels used as a loin cloth were usually involved. There were few car boots or back seats for cover in those days. We hurried along in our damp lower layers and hoped that they would dry sufficiently. Fortunately, most publicans could distinguish us from the local tramps, and they took our money.

# Early Caving Ladders

**Noel Dilly**

When, as schoolboy novice cavers, we had to tackle pitches, we used a rope. It was an ex-brewer's hawser that had been used for lowering large beer barrels into the cellars of pubs. It never crossed our minds that the brewers had got rid of it because it was no longer fit for purpose. On longer pitches we had a second rope tied to the climber that was used to help him climb back up the rope. We all pulled on the second rope!

We knew about rope ladders, but when we were lent one to try out, we failed miserably to carry it as far as the cave. It was simply too big, too heavy and quite impractical. I discovered later that it was a pilot ladder of the sort used by pilots to climb the sides of ships. However, it looked a good idea, so I made a miniature version. It was such a task that starting out with the intention of making 100ft I ended up with only 10ft! It was still too bulky and was never used for its intended purpose.

An adventure... My first encounter with the SWCC and ladders:

*"We rounded a corner to see what we thought were three real miners, they were sitting down and holding the lifeline of a fourth member who was down a shaft on a rope ladder.*

*Were they the owners of the mine, would we be rebuked and sent packing for our trespassing? Each of them had a fibre helmet, a powerful cap lamp, and they all wore boiler suits and large boots. They were obviously older than us and well organised.*

*A pleasant hello from one of them soon dispelled our fears, and at last we were in the company of our first real cavers. Eric and my excitement knew no bounds as we poured questions at them. Any thought of continuing our own explorations were completely dismissed from our minds. Soon we were in animated conversation with Glynn Thomas, John Alexander, Malcolm Charles and Alan (I think) Mazie.*

*A pilot ladder, we failed to carry a similar one up to the Lesser Garth Cave!*

*They were in the middle of descending a shaft in the wall of a passage that we were in. Eric and I were soon invited too and had very rapidly accepted their invitation to descend their ladder and have a look at the side passage which they had just found.*

*Tying on to the lifeline and descending my first rope ladder in a cavern was a thrill hard to describe, the descriptions of Casteret, Martel and many other authors who had written of their great ladder descents flooded through my imagination as I made my first 20ft descent.*

*The end of the ladder hung over a 4ft diameter hole in the floor, the hole led down into the inky blackness below into which our ladder did not reach. When I reached the foot of the ladder it was necessary to swing about until I had set it in motion like a pendulum and asking for a few yards of slack in the lifeline leap off and land clear of the hole.*

*Once one of us was down it was easy for the rest to follow as I could now pull the bottom of the ladder to the side of the hole and they could step off onto solid ground.*

*Eric and I were soon joined by Malcolm Charles and we walked the 100ft of passage which extended out from our small chamber. Soon we returned to the ladder shaft and being intrigued by the hole we set about devising a means of descending it. It was thought that if we lowered the top of the ladder to where we were and then re-secured it to the stake at the top, we could then descend the ladder and see how far down it was to the bottom of the shaft.*

*Soon we had the ladder rigged, and Malcolm decided that he was going to descend. Foolishly he did not tie onto the lifeline. Slowly he went on down out of sight until Eric and I could just see the beam of his cap lamp. cutting the darkness below us. He reached the bottom of the ladder and after a conference we decided to lower our thick rope to him so that he could transfer himself to it while we lowered the ladder another 20ft.*

*Our rope was quickly rigged, and Malcolm was about to transfer when suddenly he let out a terrific scream and Eric and I watched spellbound as his light plummeted down into the darkness and went out.*

*We shouted down the hole to him, no reply, we yelled up the shaft to our friends to tell them what had happened. Malcolm's friends had unfortunately gone for a walk into the next chamber, so one of our chaps had to run after them and raise the alarm.*

*Terrified that Malcolm might have killed himself we continued to shout his name down into the darkness, after what seemed an age, we heard a moan from below, well at least he was still alive.*

*Further enquires as to his state for the next couple of minutes only brought unintelligible mutterings and mumbling from the darkness below.*

*Then slowly a story of a terrifying plight came up to us. He had fallen so the voice informed us over another shaft which went on down, and he was lying on the steeply sloping rim on loose running ashes just like those that surrounded the hole where we were, and he cried out that every time he tried to make a move the ashes rolled and avalanched, and he slid nearer the edge.*

*Such was the horrifying predicament that we related to Glynn and Alex who had now joined our friends at the top of the shaft*

*Eric held by me on a lifeline lent over the edge of our hole and began swinging the hanging rope backwards and forwards, shouting to Malcolm and telling him what he was doing and getting him prepared to make a grab for the rope should it brush against him.*

*This went on for some time with cries of anguish each time he felt the rope brush against him, and he missed grabbing it. The effort having caused him to slide so much further down the ash slope.*

*Finally, there was a cry and Malcolm grappled with the rope, we held tight as Malcolm hauled himself up the rope away from the pit and towards what he hoped would be a solid rock haven from the hostile ash slope. So desperate were his heaves and so slippery the slope, that Eric and I were groaning with the strain as he heaved with superhuman efforts to get off the ash slope.*

*Suddenly the rope went slack, and Eric and I found ourselves in a heap. Quickly we raced back to the edge, what had happened to Malcolm? Had the effort proved too much, and he had slid noiselessly to his doom?*

*Our shouts brought no reply, but our silence was rewarded with the sound of heavy breathing.*

*Slowly once more we dragged a confused story out of him. Yes, he had made solid ground, but now he was exhausted and would we kindly go away and not bother him anymore!*

*Malcolm confused by his fall and his recent efforts was certainly going to be an undertaking to rescue. Eventually after a great struggle lowering rope, etc., we managed to get a new lamp to him that was working so that he could see what he was doing.*

*Malcolm, complete with lamp, turned out to be just as confused and useless a creature as Malcolm without a lamp. Still, something had to be done we could not wait all day.*

*I suggested that I should be lowered down to him, this suggestion was vetoed by Glynn on the grounds that we already had to get one out of the hole, and another one would just complicate matters so much further.*

*So, a start had to be made.*

*"Tie yourself onto the thick rope Malcolm"*

*"How?"*

*"With a bowline."*

*"I don't know how to tie one"*

*Ye gods here was indeed a problem. He must tie a non-slip knot for with at least half a dozen lusty blokes hauling on the rope trying to pull him out he might easily get himself squeezed very nastily if the rope slipped.*

*Well, something had to be done about it.*

*I held Eric on a lifeline as he lent over the edge of the shaft and with the long focus beam of his six-cell monster torch he started giving instructions to Malcolm on how to tie a bowline. Malcolm of course was some 60 to 80ft below him and in a confused state.*

*It took ages, and just when everyone was beginning to despair and trying to think of alternative ideas, Eric announced with relief that Malcolm had tied what he suspected was a bowline, but anyhow he had finished it off with so many half hitches that it was a fair gamble that it would not slip.*

*Malcolm now proceeded to thread himself through the ladder rungs, so that he would have a seat in which to sit while the blokes above tried to haul him out.*

*As our forces were split, Eric and I on the platform at halfway and the others at the top, we took a rope to each group. This seemed a good idea at the time, but it very nearly led to a second disaster.*

*The bods up above being nine in number were obviously going to be the major pulling power compared with Eric and myself. Eric and I had the rope that was fixed to Malcolm's waist and those above had the rope that was attached to the ladder through which Malcolm's legs were threaded.*

*There was a long episode with Malcolm testing the knots that he had tied before he finally allowed himself to be dragged into space.*

*Eric and I found ourselves sweating and puffing furiously as we tried to keep up with the bods above, we succeeded but only just.*

*Malcolm's cries to "slow down" the rate of his ascent was for the large part ignored, as everyone seemed to wish to get him out of this fearful hole as soon as possible.*

*Quickly he approached the underside of the lip of the hole. Unfortunately, he was hanging under the lip of the hole. As we could not see him the first thing that we heard was a sickening thud as his helmet struck the rock above him!*

*Unfortunately, if this was not bad enough the blokes above continued to heave, whereas Eric and I slackened off.*

*The net result of this was that the blokes above pulling at the ladder through which his legs were threaded turned poor Malcolm upside down so that he dangled headfirst above the 80ft drop.*

*When it seemed that our lungs would burst from shouting for them to stop, they stopped. Now the fierce struggle began for Eric and me alone and already tired from our previous efforts, we had to pull Malcolm up over the lip. Malcolm was so confused with fright that he was not much help, either to us or himself.*

*We struggled and heaved and juggled with the rope, gaining six inches and losing a foot, just when it seemed we must give up from sheer exhaustion, Eric had an idea. Now each time that we gained a few inches the bods above were to take in the slack, and thus consolidating our gains.*

*After five minutes of this work, we had got Malcolm through the hole and dangling almost senseless above it.*

*With no more ado Eric explained his plan to get Malcolm onto our ledge in gasping sentences to the bods above. What Eric instructed is that when he shouted "right" he and I would yank fiercely sideways the same time as the blokes above let out a couple of yards of their rope.*

*This way Malcolm crashed in a gasping heap on the lip of the pit, and whilst Eric held him there, I rushed forwards and dragged him to the safety of the side passage. All three of us were so exhausted that we took no further part in the proceedings for at least ten minutes.*

*We then set about unravelling the ropes and rope ladder which Malcolm had tied about himself in the most amazing assortment of loops and knots.*

*When we had sorted the tangle, we had the rope ladder fixed to the top of the pitch and in a more orthodox method reassembled at the top. By the time that we had tidied up and packed the gear Malcolm had made a remarkable recovery from his ordeal."*

Taken verbatim from my diary entry Saturday 22nd September 1951 - **Lesser Garth Iron Ore Mine**

At least I then knew what a caving rope ladder looked like!

*The jig in action - unfortunately, I could not find a spare gramophone needle, so the pin has to substitute*

As I was a Sciences sixth former at school, I was allowed some art-based recreation. Somehow, I managed to persuade the head of the crafts department to let me use the superbly equipped school workshop. It rapidly became my base for ladder making. Of course, using a ladder is not the

same as making a ladder and I had much to learn. For example- how to fix the rung to the rope? There were several techniques involving either knots either side of the rung, whippings instead of knots, or as Bill Little preferred, a galvanised nail driven horizontally through the rung and rope. Protests were met with "*well it works*." A brace and bit with a spiral wood drill was fine for drilling the holes for the rope. But the fixing nail hole needed a much steadier drill such as a pillar drill.

*A vice-squeezed swage*

How far apart to put the rungs caused considerable debate. The ideal distance I found by measuring the tread on the wooden staircase at home. It was 9". The ladder builders all said 1ft. I think that they were avoiding the extra labour involved in building to the narrower gap. The rope was hemp and the rungs a hard wood. Hemp rope was already getting a poor reputation for reliability and rotting when compared to the new-fangled nylon ropes. Economics made the choice of hemp for me, reinforced by Bill's instructions always to use a safety rope!

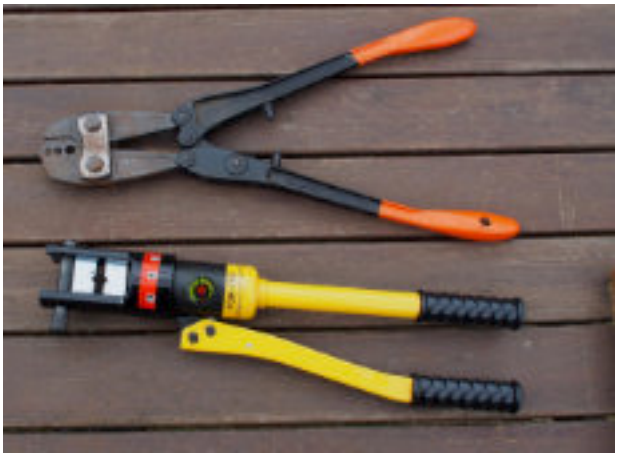
The greatest nuisance for hemp rope was rot. The ritual of drying them out after every trip was time consuming, as was the tedious but essential examination before each use. The one advantage was that Club members took great care of them. However, no one could really say that they were light and easy to carry. Many strange forms of bogies were produced to allow the load of rope ladders to be pulled cross country.

In the mid 50's Lewis Railton talked to me about some ladders that he was making that he had nick named *cheese cutters*. He explained that they were made from aluminium tubing and galvanised steel wire. Being a skilled engineer, Lewis gave metric dimensions. I ordered some materials. When they arrived, I was horrified that everything was far too small, I was about to return the goods but checked with Lewis who confirmed that they were the correct materials.

How to fix the bits together? The devil and the labour required was hidden in the building instructions.

The basic design was simple enough, thread the wire through the rungs and then fix it in place at regular intervals. First problem, how do you drill a hole accurately through a tube with a tiny diameter and steep slope? A centre punch was lethal; you smacked the punch with a hammer it just shot off sideways the rung flew off in some other direction and your knuckles bashed into the bench. I complained bitterly to Lewis. He heard me out and simply said "*use a jig.*" What was a jig? Patient explanation followed and I was sent the drawing of a jig. Far beyond me, but there was Glynn Thomas, much pleading and he agreed to make me a pair. Pleading almost to the level of begging and they did not take geological time to be produced. Glynn was above all a perfectionist, and it was hard to convey that all I wanted was something that worked.

Work with jigs was not as simple as it first appeared. Nor were some of the design features. First of all, an aluminium bar had to be pushed into both ends of the rung to support the wire and its fixings. Getting the plug in one end was easy but the remaining end was increasingly difficult because of the trapped air pressure. If you smacked it too hard with a hammer it went too far into the tube and getting it out was a time-wasting nightmare. The technique I used was to push the plugs into both ends simultaneously using the jaws of a large vice - easy as pie. The power of an inclined plain is remarkable. However, there was a hidden trap that I blundered into. If the plug was not an exact fit but slightly oversize it expanded the tube ends. Such was the precision of Glynn's swages I could then not get the plugged tubular rung into the swage. To overcome this, I drilled a hole the correct diameter for the plugs in a piece of steel and checked their size before fitting.



*The modified bolt croppers and the modern hydraulic crimping tool*

Now, to drill the holes, a hand drill was useless. Fortunately, I managed to gain access to my ex-school workshop at weekends. They had a pillar drill. I took my own tiny drill bits. The hole for the galvanised wire was simple enough, or so I thought until I removed the first rung from the jig; it had rotated in the jig between drilling each end and the holes were not in alignment. A nail the same

*The tangle of ladders before we had worked out how to fold them - the problem was that the Tackle Officer of the day (Bill Birchenough) did not want them folded in case we kinked the wire but we soon rebelled – this photo is of me in the narrow rift in Pwll Dwfn*

diameter as the drill pushed into the hole immediately after it was drilled fixed that problem.

Then emerged the nightmare problem. The tiny one sixteenth of an inch drill (1.5mm) diameter used to make the hole for the pin securing the wire kept snapping off. Of course, the whole lot was then stuck in the jig. I took the disaster and the evidence to Glynn. Then I discovered the secret of great engineers, they don't just look at a problem. They do something about it! He calmly cut my precious jig in half to release the rung and then sliced the rung to reveal the broken drill. Some quick muttering and I was told that the drill was too blunt, it had heated up under my efforts to force it through, that had melted sufficient aluminium to weld it to the plug. Had I never heard of lubrication?!

When all the rungs had been drilled, I discovered the next problem. How do you thread a spirally laid multi stranded piece of galvanised wire through a multitude of holes just a tiny bit larger than its diameter? I found a partial solution by gluing the threads of the wire together with the new-fangled Araldite. It kept failing. Glynn Thomas used a cutting torch, and as I pulled on the wire he burnt through the wire and lo, I had a welded together pointed end to the wire that made it easy to thread.

Then came the challenge of driving the pin that was to fix the rung to the wire. It had to be of small diameter so that the damage caused by driving it through or past the wire was minimal. The pin needed to be strong enough to be hammered through the hole and protrude the other side rather than just bending over. I tried all sorts of materials with little success until one evening I was playing a vinyl record on the family wind up gramophone. A gramophone needle! The shop thought me mad to order two hundred and fifty. Filing off the sharp protruding point once the needle had emerged the other side of the rung cost me a lot of skin.

The final problem was making matching loops in the ends of the wire. Use a thimble said Lewis Railton. What on earth use was a thimble? My mother used one for sewing, it was a metal truncated cone that fitted over the sewing finger and was used to enable the sewing needle to be pushed that little bit harder. I assumed it was about the correct size for the loop. I tried it, but every time I pulled the wire loop tight the thimble, because of its shape, got pushed out. I could not afford to keep the loop in place with my finger, because I needed two hands

*'Cheese Cutter' ladder on the first pitch of the Balinka Pit*

to complete the fixing. I consulted Lewis. At first, he was puzzled, then when I tried to demonstrate the problem with my thimble, he hid his face but was soon almost convulsing trying not to laugh out loud. When he had recovered, Lewis explained that it was the wrong sort of thimble. The one he was suggesting was a metal loop shaped to fit the inside of the wire loop to maintain a standard shape of the loop and to protect it from wear. An important serious lesson for me. If you don't understand, say so.

This stage in the building was fascinating, basically a tiny length of alloy tube was placed around the wires and squeezed to secure the loop. The Talurit ferrule, as it was called, was squeezed using a hydraulic press. Of course, I did not have a hydraulic press. Bill Little to the rescue once more. Hit it hard with a ruddy great hammer was his solution.

Not quite as simple as that - it had to be compressed equally all around. That involved putting the joint and sleeve between two mirror image pieces of metal that had a half of the hole the size that was required of the squeezed swage and thumping the two halves together until the two halves of the blocks were united against each other. A noisy but most satisfactory procedure. I thought of just crushing the ferrule between the jaws of a vice. It worked but the results looked anything but secure.

This immediately led to another problem - what to do with the jagged ends of the cut end of the wire protruding from the swage? They would tear into wet hands. They had to be cut off without damaging the remaining wires. The solution that I found most satisfactory was to saw carefully through most of the wire to be removed with a hacksaw, then file away the remainder by filing the protruding wires between the file and the end of the swage. The trick was to have a file, one edge of which was smooth, and to make doubly sure that it was this edge that was up against the wire that was not cut. When making the eye in the ends of the wire the classic mistake was to leave out the link that was to be used to join the ladder to another ladder to extend its length. A bit late once the loop was formed.

When a ladder was eventually built, we discovered an unexpected problem: how to roll it up to take advantage of its small size? At first, we ended up with an impossible bundle with loops of wire extending outwards in all directions from the bundle of rungs. This problem was overcome by the tedious process of rotating every other rung by 180 degrees to cross the wires leading to the adjacent rungs, and then rolling it keeping the wires in the bundle.

*For bigger pitches we use a second hauling rope - Eric Inson about to descend into Charles' Folly (plus mega torch)*

Even cheese cutter ladders needed maintenance, the galvanising could be rubbed off the wire by friction against the rock. The major protective technique was to submerge the ladders regularly in a solution of Lanolin in white spirit to stop rusting. A patch of rust on the wire was often sufficient to scrap that section of the ladder. The photo on the previous page shows a cheese cutter ladder deployed over the first 50m or so of the Balinka pit shaft. Daunting enough but imagine if we had needed to ladder the whole >200m. Climbing freely hanging ladders was a nightmare unless the correct technique was used.

Joining lengths of ladder was easy. We used individual chain links with a slot cut in the sides. Initially I cut through every other link of the piece of chain that I was using to get the individual links to cut in the gates for joining them. Then my Mother watching me one day simply said, "*why don't you cut the gates in each link and then take them apart.....?*"

Then there were the wire tethers used to secure the ladders to strong points. Unlike lengths of rope where there was a possibility to tie a knot anywhere along its length it was only possible to join a wire tether at its ends to the ladder. Shortening the wire without damaging or weakening it was very difficult.

The obvious corollary of this was that you had to know the tether length required for each pitch before you set out. This caused a flurry of rewriting the potholing guide books to include recommended tether lengths for each pitch. This produces its own set of problems. People preparing the gear frequently just guessed the length of the tethers that they were selecting. There were some heated underground confrontations when the tethers were unsuitable.

I overcame this on my tethers by adding a metal tag to one of the links that had the length engraved upon it. Someone who shall remain anonymous didn't even bother to read the labels and our party failed to bottom Penyghent Pot.

I made quite a few ladders. One of which I used at 25,754 ft on Nuptse in the Himalaya to provide a route up a steep rock and ice pitch for the climbers carrying the gear to establish the final camp before the summit. Probably the highest place a cheese cutter caving ladder is ever likely to be deployed.

Of course, after the ladders are made there is a definite technique for using them. But that is another story....

# A History of Caving Lights

Noel Dilly

The first dated use of caving lights was 15,000 years ago. They were used by the artists whose superb wall paintings decorate Lascaux Cave in France. There is strong evidence that they used a bowl of burning grease for the source of light. The grease-like tallow is a product of animal fat. This method is in sharp contrast to the flint diggers of Britain who, at about the same time, were sinking the shafts of the Dean Holes and Grimes Graves in search of flint stones. They used the light from burning wood fires to light their endeavours. These flint diggers rarely moved far from the daylight entering down the shaft.

The main difference between grease and tallow is that grease is liquid at room temperature whereas tallow below body heat solidifies. The technology of the day suggests that the grease was simply ignited in the baked earth bowl (terracotta) and allowed to burn. The users were almost certainly *homo sapiens*, since it is suspected that *homo neanderthalensis* had by this time become extinct.

Of course, cave dwellings had been lit before, but this was usually by burning large fires in the entrance chamber and the light was hardly portable. Similar large fireplaces continued to be used as a source of light in mansions and castles until about the eighteenth century.

We know that the Egyptians 5,000 years ago used candles in their mines. Somewhere in the intervening 10,000 years between them and early man someone had discovered the technique of using a wick. In the hypostyle hall of the temple at Karnak I was shown a hieroglyph that represented a candle. The spiral bit of the hieroglyph represents the twisted fibre wick, and the other symbol represents a pot with a lid. This fascinating clue suggests that the fuel of their candles was still grease that was carried around in sealed jars. Tantalisingly we don't know just how the wick was deployed. However, we do know that the Egyptians also used tallow. The puzzle is how did they ignite the solid tallow? There must have been some form of lighter spill to transfer the flame from its source.

It was a lovely story that my guide told, and I did not have the heart to disillusion her. Hieroglyphs are mainly phonetic, representing some part of the pronunciation of the represented word. The vertical spiral has such a value. However, just like English, in Egyptian a single word can have many meanings. An indication of the meaning of the word was usually a pictograph introduced at the end of the word. In this hieroglyph there was no determinant pictograph at the end of the phonetics, so the meaning is obscure. It is actually even more difficult than this; a pictograph can sometimes have a phonetic value.

Olive oil was the first oil known to have been used as a light-producing fuel by the Mesopotamians (Modern Day Iraq) in the city of Ur some 4000 years ago. Homer gives us some idea how the ancient Greeks produced light for their cave excursions. They used resinous pine torches. In cave exploration, the explorers are described as using strips of fat-enriched pine in their mouths, a highly unlikely claim. It was very common for early historians to describe events of which they had no understanding. Pliny was probably the biggest culprit; with a burning light just beneath the eyes how could the ground beneath the feet be seen?

The Greek geographer Agatharchides who visited some Egyptian gold mines 2200 years ago wrote of the miners "*they carry lamps fastened to their foreheads to give them light*". Sadly, his works were lost in the passage of time and we know no more.

The Romans expanded on these ideas. We know that for lighting their tunnels the diggers used pitch

smeared onto bundles of sticks. It is possible that this pitch came from Greece from the same pitch lakes on Ithaca that, a few centuries before, Odysseus had used to anti-foul his ships bound for the Trojan War.

The Romans also improved on the Egyptian oil lamps; instead of igniting the whole surface of the grease they had a small side aperture in the terracotta pot that was lit. This was much more economical of grease. The rest of the lamp served as the reservoir.

The Romans also had candles made of tallow, or for the very rich, beeswax. This superiority in candle manufacture materials was rapidly exploited by the purveyors of religion and, by medieval times, beeswax candles were used almost exclusively for liturgical purposes.

The Romans built many tunnels and aqueducts. Their technique for breaking rock was to heat it with fires, a risky and smoke-filled business, and then to cool the heated rock with water. These fires were often the only illumination available to the troglodyte slave miners. The stench of this operation often resembled that of vinegar. This led to the prevalent myth that vinegar was the quenching or even the explosive agent. What in fact was happening was that the engineers were using freshly cut trees for the fuel for their fires and the heat drove off the sap. The sap contained pyroligneous acid, also known as wood vinegar, which is a mixture of acetic acid and methyl alcohol. The acetic acid is what the reporters were smelling.

During the dark ages mining continued and lighting was to a large extent based upon either rushes or wood. The rush was dried, and the pith extracted. The pith was then soaked in fat or grease. The result produced a useable miniature torch. These rush lights were popular with poorer households. Candles and burning torches, often made by soaking wood bundles in pitch rather than fat, were in use during medieval times. It is surprising that the greatest mining treatise of early modern times, *De Re Metallica*, has next to nothing to say about lighting, indicating perhaps that the medieval methods were still in use. At the end of Book IV there is passing reference to the foreman issuing oil for the miners' lamps and taking back any that was unused. It does not state what kind of oil was used.

Modern forms of lighting probably evolved from the stimulus of early coal mining. In 1830 Reichenbach isolated paraffin from coal, and paraffin wax, more solid and durable than tallow, became the basis of mass production candle manufacture. Gas lighting was another by-product of this time. The gas was produced by heating coal in a closed container that distilled off the volatile hydrocarbons, and the light given out was improved immensely when Argand invented the circular wick that became the gas

*My collection of carbide lamps*

mantel. This system was used for static lighting in a few show caves.

Carbide was also a by-product of coal. It was first produced in the USA in about 1895 by heating limestone in a furnace with the by-product of the remnants of the coal used for making gas - coke. A year later both France and America produced the first bicycle carbide lamps. These lamps were immediately adopted by miners. Carbide lamps continue in use to this day in mines that do not emit explosive gasses, such as those in the Forest of Dean. The demand for carbide was so great that the Union Carbide Corporation was soon formed and became an immense success, especially when many Americans adopted carbide lighting for rural homes. It was extremely popular until about 1950 when it was rapidly replaced by Edison's electric lighting. I had the slightly scary experience of a demonstration of carbide house lighting in an up-state New York farmhouse in 1967. The house had been abandoned for several years but the owner, a fellow scholar at MIT, demonstrated it for me. The lighting in the room was splendid but the long-neglected gas piping leaked. The smell of acetylene was such that I was apprehensive of the forthcoming explosion. Fortunately, the demonstration was terminated rather promptly.

The few cavers active in the early 1900s usually relied on candles. There is a wonderful quote in an


*A candle and the pristine box in which it came*

early book about cave exploration by the Mendip cave explorer Balch, "*I can handle a candle.*"

This form of lighting was soon rejected in favour of the electric torch that was far more convenient but nowhere near so reliable in its early incarnations. By the time I started caving, widespread commercial mining had produced the electric battery-operated miner's lamp that relied on some form of accumulator for its power. A method of fixing the lamp to the head and the hazards of rock fall produced the miner's helmet. The advantage of the combination was that the lamp could be fixed to the helmet leaving both hands free. However, they were hard to get, and difficult to charge and maintain.

Torch batteries were such a drain on schoolboy finances that most of us could not afford the expense for what seemed their short lifespan. Torches, despite their obvious convenience and focusable beams, cost so much pocket money to run that we were reluctant to invest in them. Eric Inson and I did try recharging torch batteries with a modified car battery charger; we achieved interesting but useless results.

There was one rather strange consequence of cavers acquiring miner's-type lighting. Because of the loyalty of the tight-knit mining communities to the local miners, we had to take care to hide our lights and helmets when travelling for fear of being called *toffs playing at being miners*!

Fortunately, there was a Government Surplus source of Nife accumulators that had been used as emergency lighting sources on warships, that could be adapted to produce a fine light. The accumulator was brick shaped and was filled with sodium hydroxide electrolyte. The cap lamps were harvested from scrapped miners' lamps. Marrying the two together with a robust cave-proof junction was the real challenge, as was keeping the dangerous electrolyte in the accumulator. Alkali burns are serious. The accumulators were heavy and needed a broad and thick belt around the waist to support them. The cable extending upwards to the cap lamp was forever catching on projections. However, they could be switched on and off instantly. A difficulty that used to produce secondary problems was that there was no reliable indicator of how long the lighting would last. This was compounded in a party because the ages of the accumulator cells and the wattage of the bulbs in the lamps could vary widely.

There was also a requirement for a source of electricity for recharging the cells. There was a further trap for the unwary with accumulator-based lighting. The electrolyte was dangerous and could cause serious burns when it leaked out of the lamp onto the skin. The alkaline electrolyte in particular causes severe burning and scarring that takes a long time to heal and can be disfiguring.

It was essential for these accumulators to be tested for leaks by lying them on their sides for at least ten minutes before use. The fundamental problem with accumulator lamps was that they were nigh impossible to charge in the cave or in the field, and that charging took several hours. There were some ingenious home-made devices that could use a car battery for the source of charging power. Carrying around a car battery was not an easy solution.

These problems meant that most cavers in the '50s used carbide lamp lighting. They were relatively cheap then, a new carbide cap lamp cost 13 shillings and six pence, the equivalent of just over 65 pence today. Fascinating was the difference between the American and the British lamps: we got a 'take it or leave it' lamp whereas the Americans produced one to suit the user's requirements.

Carbide lamps worked by dripping water onto carbide lumps, then the gas was ignited at a small jet set in a reflector. They had about a 3–4 hour duration from one filling of the container. It was therefore imperative to carry spare carbide. What to do with the spent carbide was a thorny question. The resolution of the problem might have been easier if the nature of the residue had been more widely understood. It was just another form of limestone that had been used as the vehicle to transport the carbide that produced the acetylene. I used to bring the innocuous mess out of the cave in a tin because my mother used it to ripen the green bananas that were sometimes available in the immediate post-austerity grocers' shops, and were much cheaper than the desirable rich yellow ones. The transformation used to take about a day and a half.

Spare water was also required. Those who did not take any, arguing that caves were wet places, usually suffered the same fate I did at the hands of Bill Little. I ran out of water in the dry series. I told Bill. He said "*use your spare water*" - *"But I have just told you that I don't have any!"* - *"Yes, you do!"* - *"No, I don't!"* - *"What is in your bladder then? Pee in it!"* I did and to the cognoscenti it was obvious that I had. It produced a quite penetrating and revealing smell. I thus found out why my offer to top up his lamp whilst I was fixing mine was rejected quite so firmly. The threat of being doused in my own urine was enough to make me try to keep my head up and back straight, perhaps my one and only deportment lesson. It was surely more threatening than the usual method of balancing a book on the head.

A more uncomfortable problem was that the acetylene flame was really hot and especially on ladders it was easy to get a stinging burn to the hand. There was one great advantage over the electric cap lamp for cave surveyors; the carbide lamp was manufactured to anti-flash specifications, made of brass and did not distort the compass reading. The flame was wider than the beam of an

electric cap lamp which made the difficult task of seeing the bubble in the Abney level a little easier.

The French, of course, produced a monster carbide lamp, ostensibly for mining foremen. It was so big and heavy that it had to be carried by its hook. French cavers were, I think, the first to exploit this monster. They removed the jet from the lamp, fixed it and a reflector to their helmets and re-joined the two ends with flexible tubing. Bunsen burner tubing from school was ideal.

The result was fine, and had one extra advantage: the carbide water reaction was exothermic, and the gas canister got hot. This provided a useful hand warmer, especially after underground swims. Of course, carbide reacts with water even when it is not in a lamp. It took some time to live down an incident in Dan-yr-Ogof when, crossing a lake with Dai Hunt and David Jenkins, we tore the inflatable open and it sank. As we swam away, my carbide tin floated to the surface, leaked, fizzed away, blew its lid off, and disappeared beneath the water in a cloud of acetylene bubbles.

In the ’60s, the collapse of the mining industry brought many disasters to the mining communities. For cavers there was suddenly a plentiful supply of cheap, lead-acid and alkali-accumulator ‘nearly new’ miners’ lamps. Most of the Club adopted this form of lighting. So great was the demand for charging facilities that at one stage we had an ex-pit head lamp room charging facility installed at the Clubhouse. However, the Balinka crew photo demonstrates that in the wild in 1964, carbide was still king (only the super-ingenious like Bill Birchenhof and Les Hawes could somehow manage to keep their accumulators charged!).

While cave surveying in Bermuda during the 80s to ascertain if the cave ran beneath the runway of the American base, I acquired a useful torch-battery-operated cap lamp. It had been designed as an emergency light for the base personnel. It worked splendidly but sadly was not really waterproof unless you sealed the joint with tape.

Carbide lamp advantages: A major plus for the carbide lamp is that the flame needs oxygen in order to burn; it goes out when oxygen levels fall. Dai Hunt and I probably owe our lives to this feature. We were digging away at the sand choke in Hospital Cave when slowly our lights started to dim simultaneously. I quickly got a candle out of my spares tin and tried to light it so we should have light whilst we fixed our carbide lamps. My matches lit but went out rapidly before I could ignite the candle; I persisted for several matches until the penny dropped and we got the hell out of the passage.

Easily-repairable carbide lamps won hands down over the impossible to repair miners’ cap lamps. The miners’ cap lamps were made to be miner-proof, and they were almost caver-proof. They had to be this way to prevent miners in the pit trying to fix them, causing a spark and thus a serious explosion.

It was easy to repair almost anything on a carbide lamp, usually without any special tools; just a few

*A good collection of lights! Crew of the 1964 expedition to Balinka Pit - Starting left along the top line: Les Hawes, Bernard Woods, Gordon Clissold, Bill Birchenough, Frank Baguley, Clive Jones, Muriel Dilly, Edward Aslett, Clare Harvey, John Harvey, Terry Lloyd. Going back along the bottom starting from the right: Zlatko Pepionick, Noel Dilly, Rhydian Roberts, Joan Webley, Gwyn Thomas, John Osborne. In the centre slightly to the left: Derrick Webley*

*Above: Contents of my spares tin*

*Below: Pricker plus the sheath; one screws into the other*

*The opened tin showing matches and the sandpaper inside the lid*

spares were adequate to fix most problems. Every repair was simple to do, or to botch up temporarily. The only really terminal event for your carbide lighting was to lose the rubber seal between the carbide reservoir and the water reservoir, usually done when knocking out the spent carbide. My spares tin contained a rubber washer, a packet of cigarette lighter flints, a felt filter to protect the gas channel between the carbide chamber and the jet. A vital second pricker. The pricker was a collection of thin wires that was used to unblock the gas jet should it get blocked, usually by a carbon deposit, but it was not unknown for the offending material to be mud.

Rekindling the flame of a carbide lamp after it had been accidentally put out was as simple as it was satisfactory. The technique was to put the palm of the hand across the front of the reflector then draw it rapidly across the flint lighter. The resulting thud of the ignition explosion and the burst of light was most satisfying.

Spare lighting was of course *de rigueur*. I had a spare carbide lamp (they were cheap, and lightweight compared with alternative sources of light), and also, a complete carbide section of the lamp that had a screw top lid. This I kept charged with carbide; I had a candle plus matches in a tin etc. plus a spare wick salvaged from a shattered candle. The idea was to use the unburnt wax from the previous burnt-out candle to extend the availability of my light.

Since the flame was very hot and unprotected it could inflict burns. Therefore, many ladder pitches had to be climbed in the dark. These burns however were in the nature of a sharp pain that caused a rapid reflex withdrawal of either the hand or the lamp and it was rare for any significant damage to be caused. I am surprised, looking back, that I don't remember anyone fixing a torch temporarily to the helmet side to illuminate the carbide lamp-free moments.

The major disadvantage of carbide lamps is that the flame could easily be put out by strong drafts or water. It was usually easy to re-ignite the lamp with the flint wheel that was fixed to the reflector. However, the real problem was lighting the lamp after a thorough dowsing of the caver and the lamp in water. The wet flint was soft and did not produce a spark. Wet fingers meant that matches were difficult to use even if they had not been soaked. The usual way to tackle this problem was to carry spare matches in a tightly sealed tin.

The origin of the tins was that they had contained purchased cassettes of 35mm film. Initially it was enough to line the inside of the lid of the tin with a piece of coarse sandpaper to use as a striker to ignite the match. It was sensible to put the matches in the tin head-down so that damp fingers did not touch the heads when the matches were removed from the tin. Actually, with red headed matches almost any rough dry surface would suffice to ignite them. The problem came with safety matches. They required a special surface for their ignition. An early manifestation of the dull hand of the 'health and safety lobby'. The special ignition strip had to be cut from the match box, then glued inside the lid. It was a disaster to get it wet. I tackled the potential problem of having to work with wet hands by always carrying a handkerchief and a small square of towel in a sealed piece of bicycle inner tube inside the roof of my helmet.

There were other eccentric and totally inconvenient forms of lighting for active cave exploration.

Paraffin pressure lanterns were brilliant for lighting the underground camp site if they could be

delivered unbroken to the site. One advantage of them was that it was possible to measure how much fuel was in the lamp. AFLO's, basically a car battery rigged to a waterproof headlamp, were beloved of the early cave diver. Carrying the damned things to the dive site was onerous to say the least.

During our very early untutored explorations, Eric Inson and I once used a short length of rope soaked in petrol that we lit and threw down a shaft to try to ascertain how deep it was. Before that, we had tried a firework that simply filled the chamber with choking smoke. We could never get burning paper aeroplanes to fly in the desired direction. The arguments we had throwing stones down shafts and timing their descent to ascertain the drop nearly destroyed our friendship. Needless to say, when we found out how to do the calculations, we both said, "*I told you so.*" Our friendship was rekindled and has endured to this day.

*A coil of magnesium ribbon*

Magnesium-based flash powder, highly dangerous unless pacified, was useful for a one-off look around a large chamber. The mixture had to be ignited properly otherwise the result was *flash-less smoke powder*. Don't use a match to ignite the stuff, in my day a short length of safety fuse was best. Magnesium ribbon was however much safer and very useful to see around massive chambers. The ribbon burnt slowly, and the light would endure for some time. Visibility gradually decreased as the magnesium oxide end product dispersed into the air and produced a significant fog. When lighting the ribbon, the carbide lamp wearer had all the advantages: the very hot acetylene flame would rapidly ignite the ribbon. It usually took several consecutive matches to obtain the same result.

The fuss-free long-lasting LED lamp that is light weight and virtually indestructible must be a major step forward. Long live these ever-accelerating advances in technology. It has been worth the fifteen thousand years wait for gradual evolution of this splendid source of portable lighting.

# 'Stinkys' - A Light-Hearted Retrospective

**Paul Meredith**

The Coronavirus Pandemic has presented many of us with new challenges and SWCC has been doing its bit to support its members during these difficult times by running a number of internet-based events. One of these activities was a 'Goose Chase' which required teams to provide evidence of their oldest piece of caving equipment. This had me rummaging in my garage loft for my old premier carbide light or *stinky* as they were affectionately known. I had not used it for years and it occurred to me that many newer or younger cavers of the Petzl / Scurion generation may never have seen, let alone had the opportunity to use one.

*My old stinky - it fired up first time after probably 50 years, even using very old carbide*

I bought my stinky new in 1969. I think it may have cost 12s 6d and was probably purchased from Blacks at Colston Hill in Bristol. I used it for quite a few years before graduating to a belt mounted electric NiFe cell.

The underlying chemistry and operational principles of a stinky are very simple. If you drip water onto calcium carbide you generate acetylene, an inflammable gas which burns with a yellowish flame. Although, like much old equipment, a stinky has the advantage of simplicity of operation over functionality, it is not, like modern day lighting systems, a fit-and-forget piece of equipment. The Victorian technology requires the caver to build a close and special relationship with their lamp through extended periods of mutual encouragement and fettling. On the plus side, maintenance and the inevitable operational challenges can usually be achieved with nothing more sophisticated than a piece of wire, an old toothbrush and a pair of pliers. No modern-day electronics to blow with these babies. On the downside, of course, light output is measured in milli-lumens and the pleasant, homely and strangely comforting yellow light is often accompanied by a unique and unforgettable, odour. This is pleasant to some, abhorrent to others. Although they do not require recharging from a mains electrical supply, their limited fuel capacity means that the carbide requires changing approximately every 4 hrs and, depending on the rate of burn, the water needs topping up about every 1.5 hrs. Finding water in caves is generally not a problem but keeping spare carbide dry can be challenging.

Having purchased your stinky, you need to buy some fuel, i.e. calcium carbide. Once available from all good bicycle and / or hardware shops, the yellow and black tins which were once such a familiar part of the caving scene are sadly no more. Instead, the purchaser is faced with a sterile plastic container


*Calcium carbide - then and now*

adorned with COSHH information and warnings of hell and damnation if the bottle is opened. Strangely though, it is available on Amazon.

To prepare the stinky for use, the bottom chamber should be unscrewed, and lumps of carbide placed therein. To give an effective burn, the lumps of carbide need to be of Goldilocks size, i.e. neither too big, nor too small, but just right. The bottom chamber should only be half filled and certainly no more than two thirds. Once filled, the bottom chamber should be screwed back on, always ensuring that the rubber gasket ring is in serviceable condition. At this stage the burn jet should be cleaned using the wire pricker, an essential part of every stinky owner's equipment. The upper chamber should then be filled with water, the flip top lid closed, and the rotary regulating lever set to about halfway. A spurt of water may now blow out of the water filler cap vent. This is normal and should give no cause for alarm. Lighting a stinky is an acquired skill and involves cupping the palm of the hand over the reflector to trap the gas emitting from the jet. Hold for a few seconds to allow the gas to build up and then draw the hand sharply across the reflector, whilst at the same time causing the flint to spark. Alternatively use a match, lighter or *kiss* somebody else's lighted lamp.

In operation, the regulator lever should be kept as low as possible, consistent with providing something approaching adequate light. Users must be acutely alert to the possibility of flooding the bottom chamber with too much water. Should this happen, the only solution is to empty the bottom chamber and replenish with new carbide.

Some final words of warning. Carbide lights have naked flames. Be very careful near ropes or other flammable gases, e.g. when changing cooking stove gas cylinders. Spent calcium carbide is also an environmental disaster looking for somewhere to happen, so if you are tempted to try some retro caving, then please ensure that you dispose of it responsibly. For this reason, the use of carbide lights is not allowed in many caves, including OFD. Enjoy!

*My stinky attached to a period caving helmet and showing the wire pricker*

# The Changes to Electronics in Caving

Ian Todd aka 'Toddy'

Note: all the internet links referred to in this article are correct at the time of writing (December 2020).

When I joined the SWCC, cave surveying was done with handheld compass, inclinometer and tape measure. However, surveyors now use their solid-state electronic equivalents. This change was enabled by a number of technology developments over the years.

My first venture into electronic developments was to design and build a Printed Circuit Board (PCB) for the *Ogofone* cave radio, designed by Bob Williams. In those days, this involved sticking black tape strips onto tracing paper to define a two times magnification layout of the tracks, making a photographic transparency reduction (thanks to my employer's photographer), then using that as a negative to print onto a piece of photo sensitised copper circuit board. The board was then developed in a caustic solution and etched with ferric chloride. All components were 'through hole' then, which meant the board then needed to be accurately drilled to accommodate the wire ends. Whilst it was possible to produce simple double-sided boards for increased complexity, the procedure was difficult and prone to errors. A rather tedious process. There was no commercial PCB manufacture in those days that was affordable by amateurs.

Home computers were now beginning to be more common and a company called *Number One Systems* brought out an affordable program for designing PCBs, called *Easy-PC*. I purchased this program and found it very convenient as all the design work was carried out on the computer screen and the output was a computer file. Dave Edwards then started printing these files directly onto overhead projector transparency film with his laser printer. This was then used as a negative for the exposure of the copper board.

In 1994 a company called *PCB-POOL*® introduced a system to produce good quality boards, in small quantities, at a reasonable price. This system was capable of directly using the output file generated by Easy-PC without any photography being necessary and could produce boards with several layers if necessary. They were produced pre-drilled, with a solder mask and with component locations pre-printed on them.

Components were changing too. Many wire-ended components were now becoming available in surface mount form. Instead of having holes drilled in the board, the components could be soldered onto the top or bottom of the board. They were also, in general, much smaller.

A major change came with a company called *Microchip Technology Inc.*, producing what it called PIC processors. The first of these was introduced in 1993, the *PIC16F84*. These were effectively simple computers on a chip. With a set of only thirty to forty instructions and being RISC processors (Reduced Instruction Set Computing), they were relatively easy to learn how to program. They were also remarkably inexpensive.

Microchip also brought out sophisticated software, called *MPLAB*®, to do the program development on the home computer in assembly language. Importantly, they made it available free of charge. This of course made it very attractive for amateurs like me. Initially, all the actual programming of the chips was done using third party amateur programmers but then Microchip brought out the *PICkit*™ 1, a self-contained programmer cheap enough to appeal to me.

As the years passed, more and more PIC processors have been released with a huge variety of capabilities, like more on-board memory, Analog to Digital converters, Pulse Width Modules etc.[1]

The earliest PIC, called the *16F84*, was very popular with hobbyists. I wrote some initial assembly code for it to learn how to interface the PIC to a clock chip, a thermometer chip, some memory and an LCD numeric display in the hopes of building a temperature logger. Dave Edwards then took over the project and designed a PCB, finished the software, and built a set of data loggers. These were to continuously log the temperature every 30 minutes at the entrances to Ogof Ffynnon Ddu (OFD). These worked well for several years but had to have the data downloaded once a month due to the amount of memory available in them. After a few years, one of them succumbed to severe corrosion damage due to battery leakage, and in general, corrosion damage to the other PCBs became a problem as time went by. It was only later we discovered the benefits of spraying PCBs with an acrylic conformal coating for protection (Figure 1).

In more recent times, similar commercial data loggers have become readily and cheaply available on the internet, produced in China. These are better protected from corrosion and have a better battery lifetime.

In 1997 Neil Weymouth designed The Earth Resistivity Equipment for the SWCC and Dave Edwards built a prototype. This worked well but was rather cumbersome to use, being built into a nineteen-inch rack cabinet; it was both bulky and heavy.

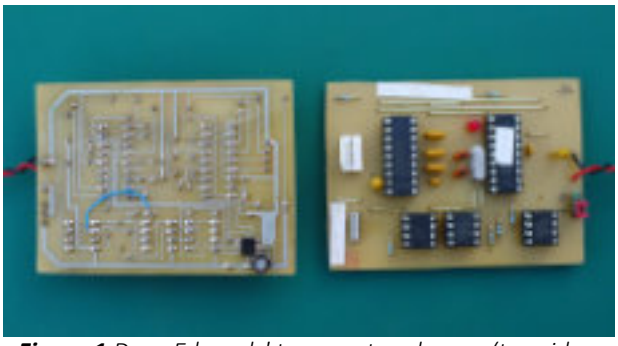


***Figure 1*** *Dave Edwards' temperature logger (top side on the right and copper side on the left)*

Clive Jones set up the *Greensites Project* at that time, designed to try different techniques in order to try and discover new cave. With my experience in designing PCBs, he asked me to look at reducing the size of the Resistivity equipment. The unit was eventually shrunk down to fit in a box of 222x148 mm and became much more manageable. This was due to the availability of the previously mentioned Easy-PC software and the quality board manufacture by PCB-POOL®.[2]

See http://www.ietodd.co.uk/resistivity/ for further details of the PCB (Figure 2).

Another development of use to us was the introduction of MEMS chips. This stands for 'Micro-Electro-Mechanical Systems'. They are produced using similar silicon etching techniques as that used to make integrated circuits, but they have some of the silicon performing mechanical functions rather than electronic.

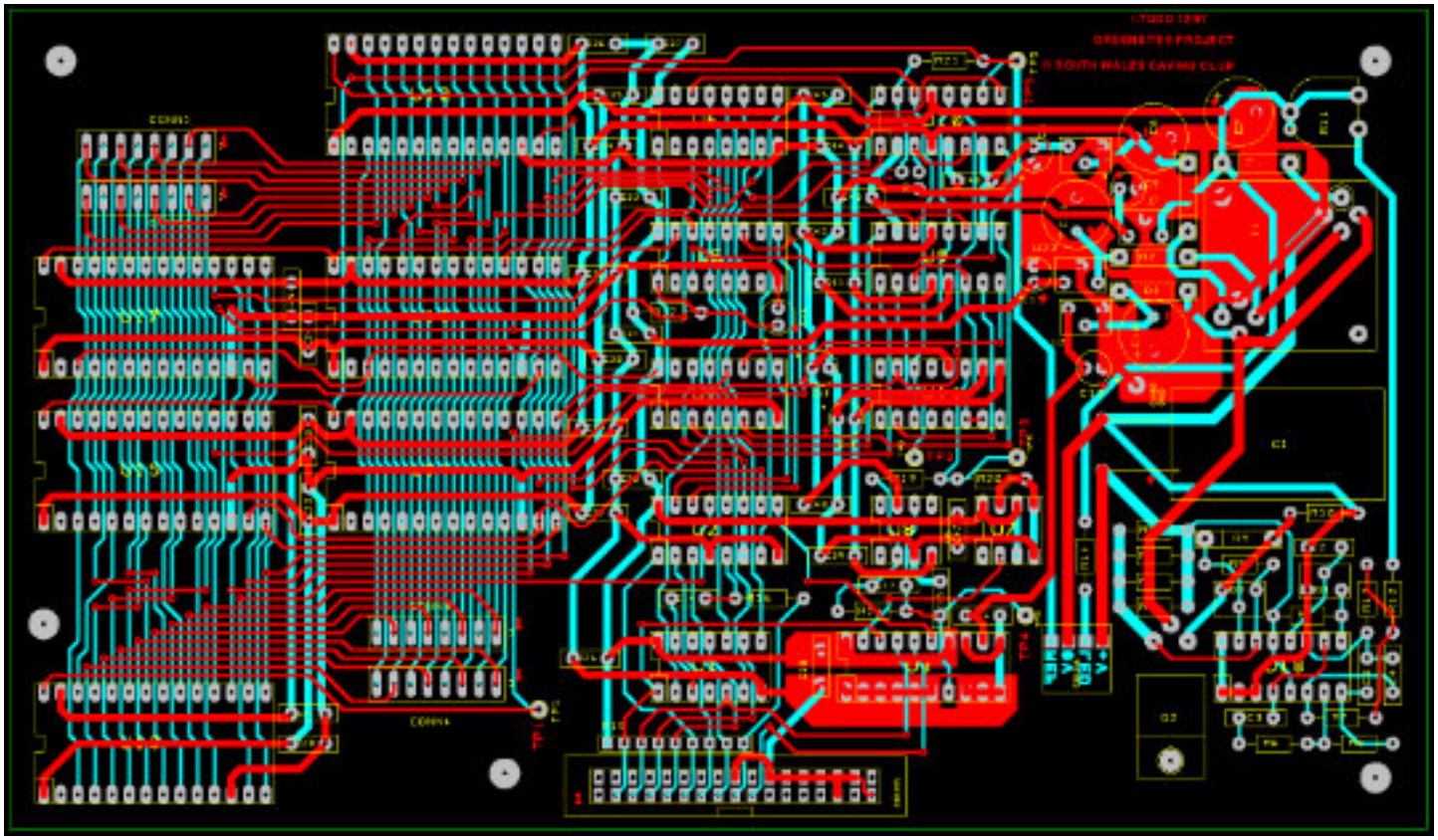


***Figure 2*** *Double sided PCB layout for resistivity box*

***Figure 3*** *Electronic Clinometer*

One of these chips, called an *ADXL202*, an accelerometer from *Analog Devices*, was useful as it was able to sense the static acceleration due to gravity. A small piece of silicon in the chip is bent by gravity to different extents depending on its angle to the force of gravity. Also on the chip is the circuitry needed to process this degree of tilt. The output was the sine of the tilt angle. This was then fed to a microprocessor, like a PIC which used a look up table (LUT) to give the tilt angle and display it on a numeric display. Eventually, I discovered a method known as *CORDIC* which was invented in 1959 to be used in navigation calculations in the American Corvair bomber. This technique enabled the PIC to do a direct calculation of the arcsine rather than having to use a LUT.[3]

Another development was the availability of small, bright laser diodes. The tape measure used to measure the distance between survey stations was replaced by devices using a laser beam to measure the distance. These emitted a brief pulse of laser light and the time taken for the reflection to return was measured. This was converted into the distance measurement. The *Leica Disto* was one of these and has an accuracy of about 1.5mm.

Using one of these laser diodes as a pointer, an ADXL202 as a tilt sensor and a PIC processor as the controller, enabled the creation of point and shoot clinometers for use in cave surveying. Quicker and easier to use than a purely mechanical clino and probably more accurate (Figures 3-6).[4]

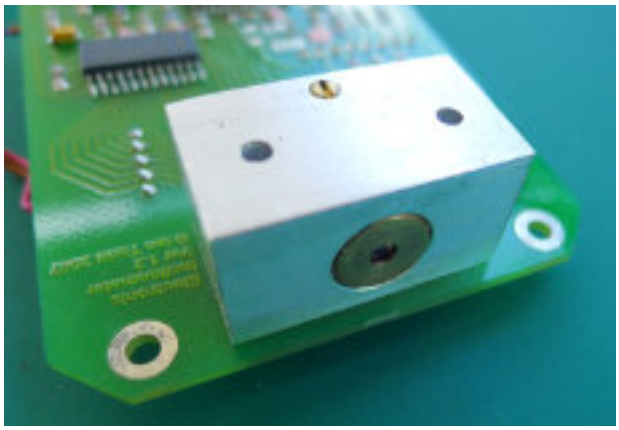
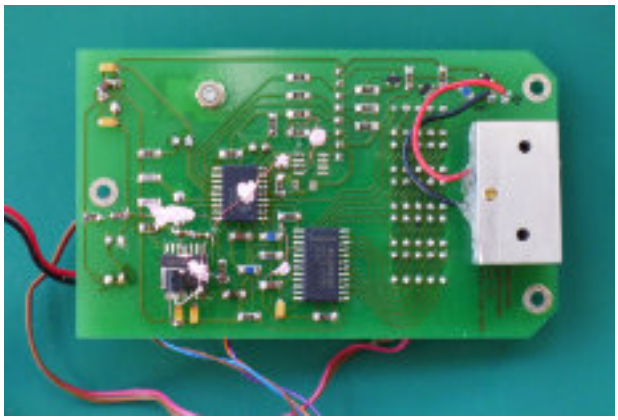


***Figure 4*** *Laser Diode mounted in a block that can be adjusted for calibration*

***Figure 5*** *Electronic Clinometer board*



The clino was to be just the first stage of a project to build a compass-clino, the *InCompass*, for surveying use.

*Honeywell* had produced a range of magneto-resistive integrated circuits. They had Whetstone bridge circuits that were directionally sensitive to magnetic fields with high accuracy. Using some of these, a tilt sensor, a PIC and a diode laser pointer allowed the building of the InCompass.

Dave Edwards and I spent happy times testing the InCompass in a field near my home where we judged we were far enough away from iron fences and pipes which distort the local magnetic field. We had a large wooden turntable on which the InCompass was mounted. Compass readings were

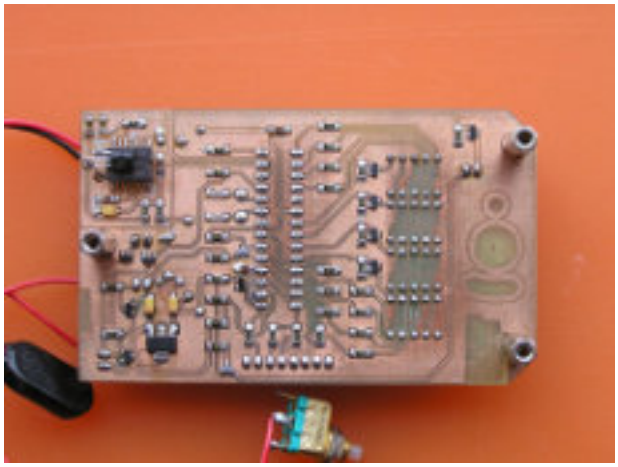


***Figure 6*** *Clinometer circuit board showing extra screening*

then obtained at recorded rotations to check for non-linearity. The local cows were very curious to know what we were doing and had to be chased away several times.

Compasses normally have to be completely horizontal to be accurate. When pointed at a survey station, the InCompass would almost certainly not be horizontal, but because the InCompass had the capability to sense its angle to the horizontal in both the X and Y axes with its accelerometer, using CORDIC calculations it became possible to mathematically rotate the compass readings to

what they would have been if it was being held level.

The InCompass then went on to be successfully used by the SWCC surveyors. Andy Dobson recounts the progress from the end-user perspective:

**Lasers – The Great Leap Forward**

*"The first change was when Brian Clipstone bought a Bosch laser range finder. This was much easier to use than a tape with no unravelling or rewinding. All the laser equipment meant survey legs had to be true. A tape might bend slightly, but a laser only goes straight. The biggest plus was on Left/Right/Up/Down as these could now be done quickly and accurately, especially up, which often previously had to be an estimate, particularly for avens. It could take several attempts for an aven as either the laser hit something non-reflective or bounced back off falling water. In tight crawls we were also able to shoot one correct leg further than we fitted. Very helpful when you do not have someone Antonia-sized on the team. We used the base of the Tippex bottle on the survey station to give a visible target with all the laser equipment.*

*Next came Toddy's electronic clinometer which was a big step forward as height is the biggest error with traditional instruments. It was particularly good on steep slopes where previously we had to staircase legs; first leg level-ish across, then next plumb down and repeat. Again, it made the legs true as it could be impossible to sight a handheld clino actually on the survey station where now it was a case of joining up the dots. I think the original was in quarter degrees (much more accurate than by eye) and went to about 75° with a Mk2 reading to 0.1° and a full plumb. One amusing reading on the Mk1 was minus zero i.e. between 0° and -0.25°.*

*The electronic compass took much longer to perfect, with Brian and I doing quite a number of trials and test data gathering in OFD2 Top Entrance. Once sorted, this again improved accuracy and ease of use being able to do a true leg even on a steep slope where a handheld compass needed to be level and like the clino could not always be read directly from the station. Having established the compass worked well Toddy then made a combined compass and clino which was a further help in ease of use. Brian upgraded the range finder to a Disto but we never had an all in one instrument - newer cavers used to a DistoX might not realise how awkward traditional ways were and how much difference electronic instruments make."*

A later development for caving was the *DistoX*, developed by a Swiss caver called Beat Heeb. This was a modification of a commercial Leica Disto which added a small extra PCB, giving it compass and inclinometer functions. So, there was now a device that could make all the necessary measurements, the distance, the inclination and the compass angle to a distant survey station.[5]

Survey data can now be put on the computers and software such as *Survex* used to analyse the results. Loop closure figures can be calculated, and three-dimensional plots can be rotated and viewed. The survey data is now directly available in digital form to be used in final surveys.

A very recent development is IoT, which stands for 'Internet of Things'. This enables remote devices, like the loggers, to use very low power radio to transmit their data to a central location. This uses LoRa (Long Range) technology which uses the licence-free sub-gigahertz frequency band and allows many devices to use the same frequency. It's claimed the technique can transmit up to 18 kilometres in open areas, but in my experience the range is much reduced if there isn't a direct line of sight between stations. A number of companies are developing devices for IoT and it may well eventually prove useful to retrieve data from remote cave locations and weather stations, etc.[6]

Although initially frowned upon by some of the senior members, computers eventually found their way into the SWCC library. Network cabling was introduced to connect many locations in the Club. For a long time, this was just internal and connected to the Club's own server, there was no internet connection. At that time the Club's web site, which I had created and ran for 10 years, was hosted on a server at my University place of employment. Eventually the quality of the BT connection to the Club was improved to fibre and a good internet connection is now available.

**References**


1. See www.microchip.com/
2. See http://www.ietodd.co.uk/resistivity/ for further details and pictures of the PCB (Figure 2).
3. See http://www.ietodd.co.uk/cordic/index.htm
4. See http://www.ietodd.co.uk/clino2/index.htm
5. See https://paperless.bheeb.ch/
6. See https://en.wikipedia.org/wiki/LoRa

# The Tools Available in the Current Age

David Eason

Who am I and what's this all about?

For those that don't really know me, I'm an electronics engineer by trade and used to enjoy building home-made guitar effects pedals and gadgets so that I could combine my musical and electronic engineering interests. I've only been at the Club as a member for the past three and a half years or so, and caving 'proper' since about 2013. I have again managed to apply some of my hobby interest and professional experiences within electronics design, albeit with caving this time.

This first happened during my Mendip experiences when I was exposed to surveying. This involved modifying *Leica Geosystems* handheld Disto surveying laser rangefinders with the original Disto X1 and Disto X2 upgrade kits, learning how the paperless cave surveying system worked and getting familiar with the Therion survey data compilation, processing and drawing generation application.

***Figure 1a*** *Radio location receiver*

I had then also gone on to repair our Mendip club's radio location equipment, although this was essentially just a case of refurbishing the equipment by creating new Printed Circuit Boards (PCBs), using the open source KiCAD schematic entry and PCB layout tool.[1] The original boards had been hand-etched and processed (and excellently put together. I recall it turned out to be a faulty capacitor in the receiver side that was the problem, but it was a good exercise nonetheless). I had also attempted to build a fairly crude hot wire anemometer from a small filament lamp with the glass removed, as a draught detector for digging. However, I can't say this was a great success! Figures 1a and 1b illustrate some early DIY projects of mine, including a radio location receiver (Figure 1a) where I'd also re-built the transmitter (not shown) and a hot-filament anemometer (Figure 1b).

***Figure 1b*** *Hot filament anemometer*

**There's more kit available than ever before: a brief history lesson**

For the hobbyist and DIY enthusiast, there's never been a better time when it has been possible to quickly build complex electronics systems for yourself at a reasonable cost. There is no excuse not to have a go if you are even mildly interested. You no longer need to buy expensive prototyping systems or learn complex and proprietary instruction sets and programming languages for micro controller-based systems. There is an endless range of microcontrollers, battery systems, plug and play sensors, motors, wireless networking and interfacing modules available, as well as an ever-expanding library of open-source software to make it all work. These range from simple 'low level' embedded systems, storing data to SD card and USB flash drives, all the way up to remote sensor nodes running web servers streaming data out to the cloud, accessible through the internet. Couple the available tools with the available knowledge base of global internet collaboration and the possibilities are almost endless.

The Peripheral Interface Controller, or PIC (and later known as the Programmable Intelligent Computer as I think it is still known to this day) was one of the first general-purpose fully 'integrated-circuit' (IC) microcontrollers widely available. It was possible to combine all the peripherals, such as analogue to digital converters, timers, serial interfaces and so on and memory in a single chip. It appeared on the scene in the late seventies in its early form and is still widely used today. It was ultimately intended for interfacing industrial control systems and computer systems. It had a relatively simple instruction set that could almost be written on the back of a cigarette packet. Other 8-bit microcontrollers were available throughout the 1980s through to the 2000s as well as 16- and 32-bit devices but had expensive and not so accessible development systems to the hobbyist and DIY enthusiast. The hobbyist community is really known today as the 'maker' community. As a side note, and almost contradicting what I am saying here, it is worth noting that Sir Clive Sinclair really started the maker revolution with his audio and radio DIY electronics kits which he sold from a small shop in Cambridge in the 1960s. More importantly, he and Chris Curry produced the first real pocket calculators and an historically important home computer kit (at a then considered affordable price). Chris Curry later went on to co-found Acorn Computers after he stopped working for Sir Clive Sinclair. Their computer kit had nothing like the computing power of the small microcontroller boards available cheaply today and was several times more expensive by today's standards, yet was considered affordable back then! Of course, semiconductor companies continued to produce their own fairly expensive and complex development boards and systems throughout the 90s up into the 2000s, but a product, and ultimately 'ecosystem', was about to appear that would change everything.

The *Arduino* platform arrived on the scene in the mid to late 2000s and was a game changer. It started as a technical university project in Italy and the Arduino Integrated Development Environment (IDE) was formed out of the 'Wiring' and 'Processing' development environments. These are/were cross platform (i.e., Windows or Mac OS) high level development tools that were very easy to use, including an electronic Computer Aided Design (CAD) tool, graphical programming and a signal processing environment and C++ computer language compatible programming environment. It abstracted all the low-level hardware set up and driver level code so users could 'plug and play' and be writing application code in no time. The Arduino IDE ultimately spun off from the Wiring project, initially using a 'standard' hardware platform based on simple 8-bit *Atmel* microcontrollers, but went on to spawn a whole generation of prototyping boards, large and small, for all applications, as well as entire ecosystems of suppliers and online collaborative networks. This has even steered the big commercial semiconductor companies into producing 'Arduino compatible' development boards for commercial applications also appealing to hobbyists and makers, which has become a big market in and of itself. Arduino had a very simple pinout, with a range of 'shields' that plugged in, providing peripheral devices and interfaces.

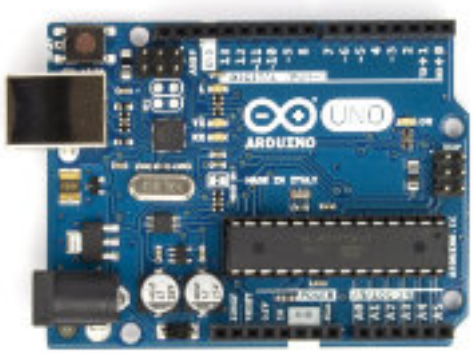



***Figure 2*** *The original Arduino UNO board. (See endnotes for copyright[2])*

Being 'plug and play' and easy to use was great for convenience sake, but it does have its downsides. With all the lower-level code hidden, the tools essentially recognise what board you plug in and select the right drivers and hardware abstraction layer code. This is good in principle, but in practice it can cause problems if you don't fully understand how all the pieces of the puzzle fit together when you are debugging an application. Figure 2 shows an image of the original Arduino UNO based around the Atmel ATmega328P microcontroller, which is the long black monolith towards the lower left of the board, near the connector.[2] There are countless variations of this board for all purposes.

As another side note, the 'ARM' microcontroller originated on the scene in Cambridge in the 1970s as the Acorn RISC Machine during Chris Curry's time at Acorn, after working for Clive Sinclair. Originally developed as the in-house processor to be used in the Acorn Archimedes, which was a later successor to the BBC Microcomputer System, it later became '*Advanced RISC Machines*' after the demise of Acorn and was another step change in cost and integrated technology. ARM effectively licences a chip design for other manufacturers to integrate into their own IC's, rather than sell physical chips themselves. The ARM 32-bit microcontroller core is now essentially abundant in almost every electronic product and system in one form or another across the globe, and has enabled high volume, low power, low-cost electronics to be readily available. My 'go to' development kit would be one of the £10.00 *ST Microelectronics* 'Nucelo' boards, that use one of the ARM 'Cortex-L4' cores providing more than ample peripherals and computational power for almost any embedded application. Even this has the Arduino hardware 'pinout' and footprint compatibility. Software is easily created using the STM32 SDK's, although for quick and easy development, tools like ARM 'Mbed' exist that provide abstraction from all the low-level drivers so you can concentrate on the application code, much like Arduino. Figure 3 shows an image of the ST Microelectronics STM32 Nucleo prototyping board based on a STM32L476 32-bit ARM Cortex-L4 microcontroller.

Skip forward a few more years on from Arduino and the Raspberry Pi arrived on the scene in a sort of

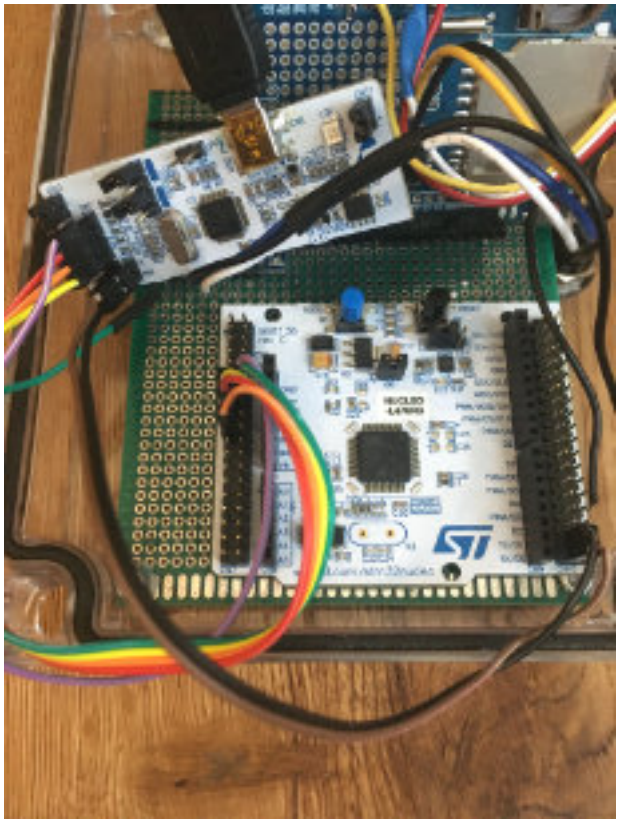


***Figure 3*** *ST Microelectronics STM32 Nucleo prototyping board based on a STM32L476 32-bit ARM Cortex-L4 microcontroller*

echo of some of the concepts of the original Acorn BBC microcomputer educational project's aims and Sinclair's home build kits. It was intended to rejuvenate the educational and industrial importance of learning how technology works and has since provided another level of high-level low-cost embedded computer platform, where a full Linux Operating System can now be easily run on a small, embedded ARM based system. Full desktop type computing power can be achieved on the Pi and it has been a huge success, satisfying its original mission intent, and has gone on to inspire new generations to create their own projects. It is used in many home projects, from sensor monitoring, to motor control, security surveillance, camera interfacing and so on. These devices can provide convenient web server interfaces to storage devices if you are hosting databases for websites, such as that gathered by weather stations and environmental data-loggers. Figure 4 shows an image of the Raspberry Pi 4 model B home computer, a fully integrated personal computer with a whole range of input and output ports available.[3] The Raspberry Pi has now got an established range of models and accessories as well its own store in Cambridge.

***Figure 4*** *Raspberry Pi 4 model B. (See endnotes for copyright[3])*

**The world of open source**

On top of all the hardware developments over the years, powerful software development tools are now freely available as 'open-source' where the original source code can be accessed, modified and redistributed under open-source licensing rules. Python is an example of a high-level language rapidly becoming as popular as the old (and still popular) C language as being the most prevalent computer language around, essentially driven by the new generation of makers and 'coders' (the latter being the maker equivalent term for 'software engineer' I suppose). With freely available web-based tools and high-level languages, web apps, mobile apps and software applications are easily created in no time at all. Software source code and ideas can be easily shared using online source control repositories such as 'GitHub' (GIT being the open source 'GNU Interactive Tools' from the Linux operating system, used for file storage, access and

source control). Hardware designs are also available more and more as open source, where the design files can be accessed, modified, redistributed and so on.

The concept of open source is world changing. It ideally encourages collaboration, sharing and teamwork. It can also speed up development time, leveraging global enthusiasts and developers, rather than relying solely on individual effort. With open-source tools, and DIY production capability at home, this has essentially massively reduced the cost of integrating high levels of technology into DIY projects and opened up all sorts of avenues. It has eroded the influence and position of large corporations in providing electronic development tools and products and has opened up access to such tools to a very wide audience of all ages and abilities, across the globe. Of course, this is also having a negative effect on industry as it reduces commercial opportunities, so projects are not always seen to make money as 'a commercial product' *per se*, but rather, the tools and hardware generate revenue and the shared projects benefit many people in different ways; people can have customised solutions to fit their needs. They can of course also go on to commercial opportunities, as prototypes are so quickly and readily realised.

It is now possible to buy a series of ready-built modules, plug them in, download software and be up and running in next to no time, so long as you understand the limitations. These things never work first time, in my experience, and figuring out what's gone wrong generally allows you to learn more about what you're really trying to achieve. You might completely change tack and do something else, or decide the original idea wasn't quite right; let's try something new.

**What does all this mean for caving?**

This is all very interesting, but what does all this mean for caving, you might ask? For a start, the Disto-X has revolutionised cave surveying, with massively improved accuracy, post processing and publishing capabilities. It is now fairly straightforward to integrate your surveys with satellite images, LiDAR images and so on. Other individuals and teams have also produced similar surveying devices achieving similar results, as the original Disto-X devices become hard to find. The 'all in one' integrated device providing accurate compass, clinometer and distance measurements, with instant data captured on an Android device (or PDA, not so long ago) has made surveying a much easier to manage process, with a much better ability to re-visit surveys, modify/add data and produce high quality documents and mapping data. Although not readily available to the hobbyist (but just starting to be so) 3D scanning has provided a useful solution in accurate surveying of caves, especially large spaces.

Plug and play sensor and actuator/motor modules are now widely available for a whole range of applications. These have certainly enabled numerous interesting cave science experiments to happen around the world. A few good examples of such modules would be the *Mikroelektronika* Click boards. One of these has been integrated into the OFD stream gauge. In this system, a so called '4-20mA current loop' interface module is used to connect to the pressure sensor, submersed in the water. The output of this is a current proportional to the pressure exerted on the sensor. In my own air quality sensor projects, I've used fully integrated 'MEMS' (Micro Electro-Mechanical Systems) barometric pressure sensors, compact laser based non-dispersive infrared Carbon Dioxide ($CO_2$) sensors and electro chemical gas sensors. These can have analogue voltage outputs or digital serial interfaces with onboard calibration that can easily be plugged in and recording data in no time. Figure 5a shows the MikroElektronika 4-20mA current loop sensor interface board; Figure 5b the *Grove* $O_2$ sensor, and Figure 5c the *Sensirion* SCD30 $CO_2$, temperature and relative humidity sensor.

During the spring months of 2020, I managed to cobble together a box that integrates a variety of

***Figure 5a*** *MikroElektronika 4-20mA current loop sensor interface board*


***Figure 5b*** *(below) Grove $O_2$ sensor*

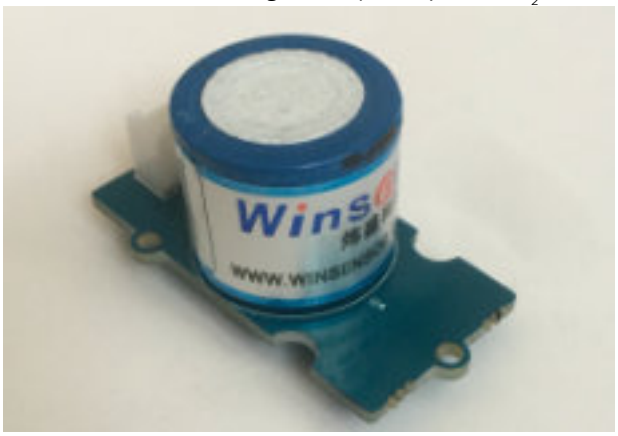
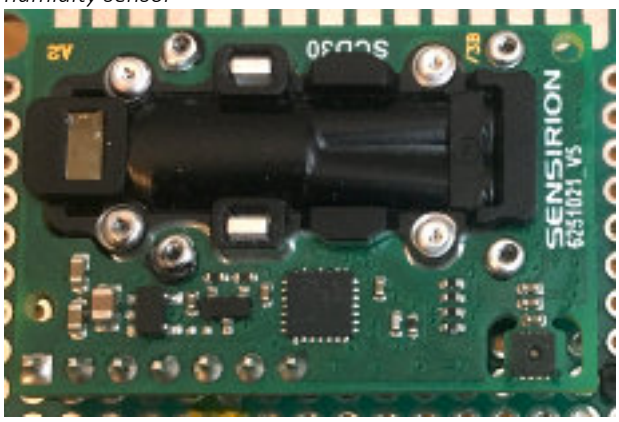


***Figure 5c*** *Sensirion SCD30 $CO_2$, temperature and relative humidity sensor*




these air quality sensors and logs the sensor data at a selectable sampling rate to an on-board SD card as a .csv file. This was intended to be placed in various caves to do a small personal study of cave air quality. The sensors included $CO_2$, $O_2$, %relative humidity, temperature, volatile organic compound (VOC) content and barometric air pressure sensors. The barometric air pressure sensor is shown in Figure 6. This is a *Bosch* Sensortec BME680 sensor module, available from *Adafruit*, one of the major online 'maker' parts stores. This part also includes a temperature sensor and provides the VOC measurement, as a resistance value. Some processing of the raw data would be needed to provide a meaningful VOC reading, depending how sensitive the sensor is to certain compounds. This would not be a completely trivial task.

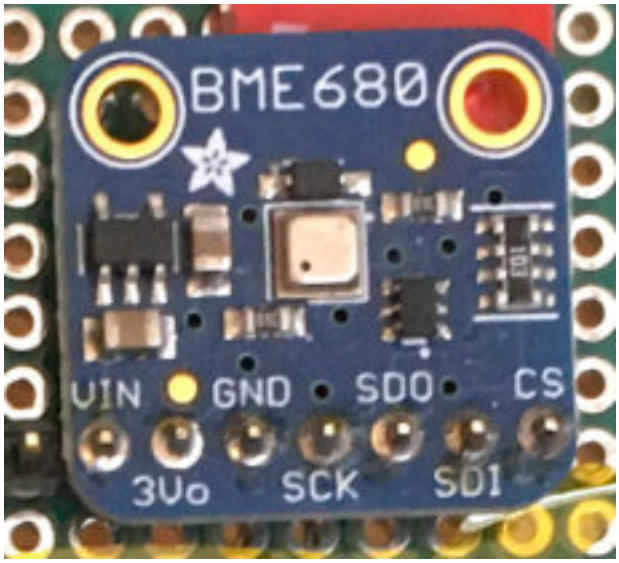



***Figure 6*** *Bosch Sensortec BME680 sensor module*

When a button on the unit is pressed, it becomes a 'real time' analyser, sampling the sensors every second and displaying results on a small white Organic Light Emitting Diode (OLED) display – another off the shelf plug-and-play module from Adafruit. All the while in the background, the data is saved to a .csv file every 15 minutes and an optional serial port can be enabled to get an output log on a laptop over USB for debugging. A real time clock is always running on the board, providing a time stamp for each sample and the sample interval can be adjusted. It's currently powered from 4 x 18650 Lithium cells with a built in USB charger. Run time is not the best however, with only just over 2 weeks logging all the sensor outputs but with further software refinement and a larger battery, this could easily be extended (or by obviously increasing the sampling intervals to half or full hours). It was never officially calibrated and although sensors like the Sensirion SCD30 $CO_2$ sensor are factory calibrated, if you wanted to rely on accurate measurements, it would be wise to take such a device to a test lab to get it calibrated. It's good to understand these limitations; in my case it's purely just to see what's going on relative to the surface, 'out of interest' so to speak. At the end of the day, it was only really a prototype to see what I could do with what I had at the time. Figure 7a illustrates the air quality logger in its early-early prototype form. The SD card is plugged into an Arduino data-logger 'shield' with the real time clock on board, in turn plugged into the STM32 Nucleo board underneath and barely visible in this image. Figure 7b shows a slightly more robust version for deployment.

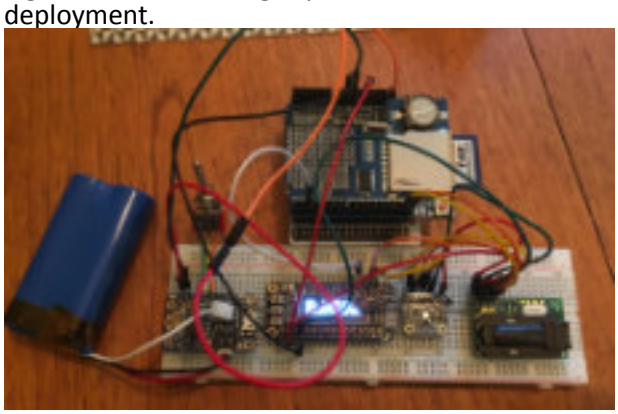


***Figure 7a*** *(above) Air quality logger in its early-early prototype form*

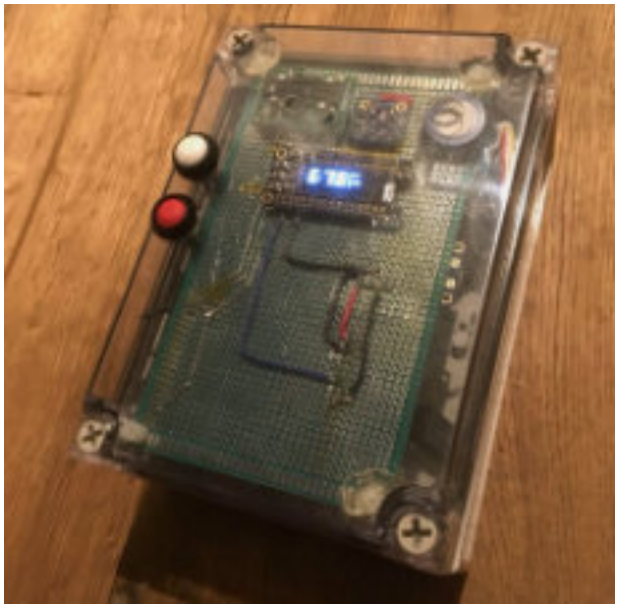


***Figure 7b*** *A slightly more robust version of the air quality logger for deployment*

The OFD stream gauge even goes a step further and provides a radio link back from the cave entrance to the hut. With its own power source, i.e., powered from a solar cell, it can be a very low maintenance system providing near real time stream level and weather data available ultimately through a web portal. In future, micro-hydro power generation from the streamway itself can be explored, opening up further possibilities for remote in-cave monitoring systems.

Others have utilised various other sensors in cave surveying and science experiments, for example from using ultrasonic sensors to measure bat activity, to applying sensors to small unmanned underwater vehicles, which have also started to make an appearance in helping to push underwater cave exploration. Ultimately, there are numerous useful sensor modules available from a lot of the online 'maker' stores (such as *SparkFun* or Adafruit) that can be used for caving related projects, be it for practical use or for scientific investigations. These range from camera modules, ultrasonic and optical range finding, radio applications and connectivity, light detection (perhaps used in dye detection experiments) and so on.

Light Emitting Diode (LED) technology has also taken massive leaps in the past decade. Initially, white LED's seemingly all had a high colour temperature (perhaps typically ~6000K) and were rather harsh. As technology changed, it was found that mixing different colour LED's together and using different phosphor coatings of the LED chips themselves produced the white LED's we know so well in our caving lamps today (and probably all around the home and in the car these days). LED lights use nominally ~10% or less of the energy required by their incandescent predecessors, with a lot less energy wasted as longer wavelength infra-red heat emission. Warmer white variants now produce more pleasing light akin to halogen (or even carbide!). It's ironic how we almost want to limit the amount of light and mimic technologies of old! Perhaps old technologies, providing a mere 1m diameter 'sphere of illumination' made some caving trips less scary when you couldn't see beyond that range! Of course, this technology has also revolutionised cave filming and photography, along with improved camera technology, getting smaller and more robust over time.

There are many off the shelf LED modules available these days allowing DIY lighting to be constructed (often off the back of the cycling lighting market), although there are some excellent bespoke lamps available for caving that are superbly engineered both in the UK and abroad. These modern lamps are robust, reliable and have decent run-times using modern, lightweight and high energy density battery technologies. Cooling powerful LED's is usually the big issue. Overheating these parts shortens their life and also alters the colour spectrum over time through accelerated ageing. Figure 8 shows an image of the excellent and popular *Scurion* 1500 caving lamp.

***Figure 8*** *Scurion 1500 caving lamp*

Speaking of batteries, the past 10 or so years have seen massive leaps in battery technology. Modern Lithium chemistry has allowed high energy densities to be realised producing lightweight compact battery systems. The ubiquitous '18650' cell (where the 18 is the diameter and the 650 is the length in tenths of mm's), is produced in vast quantities around the world using primarily a Lithium-ion chemistry producing a nominal single cell voltage of 3.7V. The most obvious place this has progressed caving is in lighting technologies, but it has also progressed cave science, surveying and film making.

These leaps in battery technology, coupled with smaller, more energy dense electric motors have made power tools lighter and more powerful than some of their mains operated predecessors. These improvements in efficiency and miniaturisation in motor size means we are doing 'a lot more with a lot less' than we used to be. This has allowed diggers to push places they could never have imagined in previous decades with compact chiselling and drilling solutions and has enabled efficient ways of bolting for SRT and aid climbing up avens. Figure 9 shows an image of a compact 1A

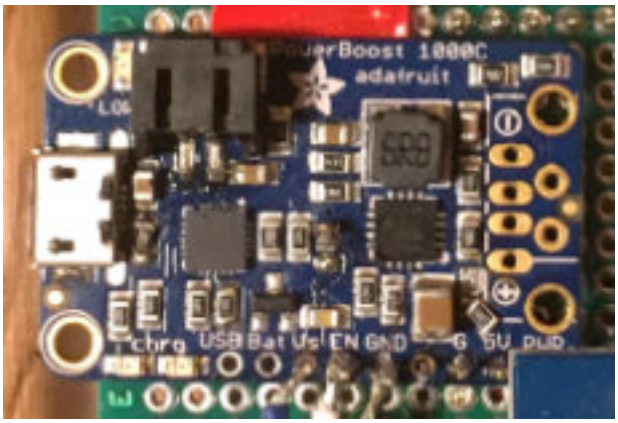



***Figure 9*** *A compact 1A Lithium battery charger powered from USB*

Lithium battery charger that can be powered from USB available from Adafruit.

**The Future**

This article barely scratches the surface of what people are up to at the moment. There's so much more to explore and with such a vast number of resources available at your fingertips I would recommend having a go at something. I think a big challenge for the DIY enthusiast was always reliability. This is becoming less and less of an issue where these professionally produced modules can be purchased and plugged in. I have found that the speed at which things can be achieved also causes reliability to be overlooked in that enthusiastic haste to deploy the project. I have a habit of shoving everything in a box once the LED's come on and then breaking it on the hour long hike up the mountain to the cave, but I'm learning all the time! Of course, in line with this article, enthusiasts can now 3D print their own enclosures to house all the delicate components. If you know local friends who can machine and build enclosures, then why not also get them involved. At the end of the day, lots of these off the shelf solutions started life as hobbyists' projects themselves.

If you are interested and have an idea then get stuck in, the possibilities are endless!

**Useful links**

Here are a few links to useful resources and information related to this article, including online stores. I am not affiliated with any of these and include them here for their usefulness in creating DIY projects of the sort discussed here:

BCRA Cave Radio and Electronics special interest group journal: http://bcra.org.uk/pub/cregj/covers.html

The Pi Hut: https://thepihut.com/

Mikroelektronika: https://www.mikroe.com/blog/

Pololu: https://www.pololu.com/

SparkFun: https://www.sparkfun.com/

Adafruit Industries: https://www.adafruit.com/

Hackaday: https://hackaday.com/

iFixit: https://www.ifixit.com/

Battery University: https://batteryuniversity.com/

Hackster: https://www.hackster.io/

Electronics Turorials: https://www.electronics-tutorials.ws/

**References**


1. https://www.kicad.org/
2. **Figure 2** © https://commons.wikimedia.org/wiki/File:Arduino_Uno_006.jpg licensed under the Creative Commons Attribution-Share Alike 2.0 Generic license (https://creativecommons.org/licenses/by-sa/2.0/deed.en)
3. **Figure 4** © https://commons.wikimedia.org/wiki/File:Raspberry_Pi_4_Model_B_-_Side.jpg licensed under the Creative Commons Attribution-Share Alike 4.0 International license. (https://creativecommons.org/licenses/by-sa/4.0/deed.en)


22:14
Not Secure — blog.blogspot.com
South Wales Caving Club - blog
Welcome to our blog! Visit our Club web site for more details and how to join.
If you would like to be able to write up your own SWCC trips please contact our Webmaster.
Thursday, 30 January 2020
Another Year in The Life Of A Cave Videographer
Here's Caver Keith's traditional annual caving roundup video. It contains some previously unseen footage. It's not been the most pr...
1 comment:
Tuesday, 28 January 2020
Skyhook and beyond
Team: Chloe Francis, Duncan Hornby, Tim Lewington, Helen Stewart & Claire Vivian Trip date: 25/1/20 A few years ago Claire and I ha...
2 comments:
Saturday, 23 November 2019
Provisionals' / beginners' Weekend, November 2019
With a record breaking 30 people to arrange
INCIDENT.
NORMALLY DRY
RAWL SERIES
SAND PASSAGE
FURTHEST POINT REACHED WITHOUT GETTING INTO SAUCH
TRAVERSE
3½ MILES SURVEYED

# Analysis of the SWCC Blog

Duncan Hornby

In 2015 the communications officer, Peter Collings-Wells, created the SWCC blog site (http://swcc-blog.blogspot.com/). This article examines the viewing statistics of the past 5 years to reveal the success of the website and its level of engagement.

The term *blog* is short for *web log*. It is a website allowing people to write on their chosen subject and, optionally, allows readers to comment. In the case of SWCC this is anything cave or Club related. It is, in my opinion, the modern equivalent to the traditional paper logbook. Any member of the Club can contribute. You simply need a login to allow you to publish on it. Publishing is at a minimum, sitting down in a nice chair, at home with a cup of cocoa and writing down your thoughts …but a few photos and links would be nice too. If you have ever written an email, or used a word processing package, then you can write a blog. You do not need to be a computer geek to contribute. Just use a login issued by the Communications Officer.

Whilst a topic could be about anything, the articles published on the Club's blog appear to be falling into 3 main categories: Club related events, trip reports and announcements. The administrative side of the website offers simple viewing statistics that are referred to as *view counts*. You can think of a view count as someone viewing the article. How they arrived at the page could be as a link in an email, the Unofficial SWCC Facebook group, links from other websites or a search engine.

Articles have been tagged by the authors. This allows viewing statistics to be grouped by locality or subject. It is this combination of tags and raw viewing statistics that I use to present the following analyses. So, sit back in your chair and get your cocoa ready as some impressive numbers are coming your way!

**Viewing Statistics**

The following analysis is for the time period when the site first went live until May 2020. View counts for 2020 are for only half a year and these were significantly reduced by the 2020 Coronavirus Pandemic.

109 articles (blogs) have been published to date, from the first blog that was created by Keith Edwards in July 2015. The 109 articles have been viewed 71,203 times. The article with the least views was published in May 2019 with only 39 views, whilst the May 2015 article announcing the new cave Ogof Marros tops the charts at 2,278 views!

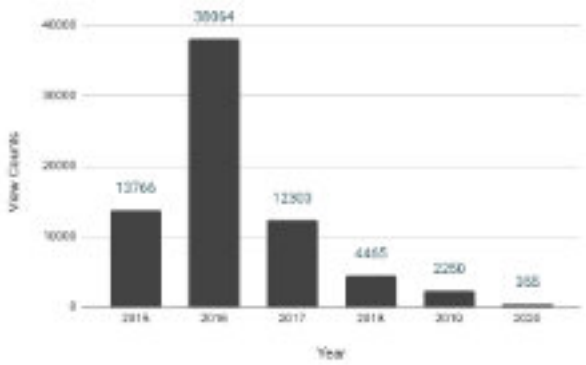



***Figure 1*** *Total number of view counts for each year*

Figure 1 plots total number of views by year and we see that 2016 was a particularly active year for viewing articles, whilst 2020, a half year count, was impacted by the Coronavirus Pandemic. Figure 2 presents the number of articles published in each year, 2017 being the most productive year with 31 articles. The number of articles produced during 2018 and 2019 essentially halved. 2020 is unusually low because of the impact of the Coronavirus Pandemic and the fact that this review took place in May 2020.

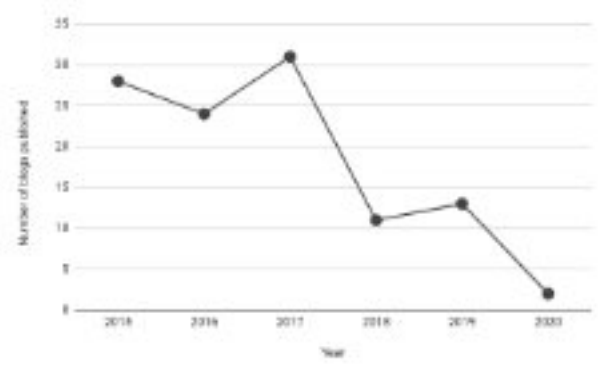


***Figure 2*** *The number of articles published in each year*

Figure 3 shows how articles were categorised into Low (less than 1000 views), Medium (1000 - 2000 views) or High (> 2000 views) viewing impact and then plotted as a pie chart. Almost 75% of the articles were of low impact with 1000 or less views. Only the Ogof Marros article exceeded 2000 views.

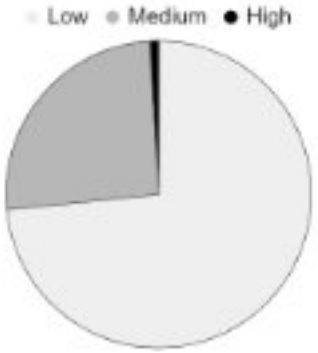



***Figure 3*** *Approximate proportion of articles rated as high, medium or low impact based upon view counts*

Figure 4 reveals an unusual pattern. Based on a total of 109 articles, each article and its number of views are plotted against its publication year, but colour coded by impact category. We see that almost all of the medium (1000 - 2000 views) cluster entirely within the year 2016, the year with the most views ...what's going on?

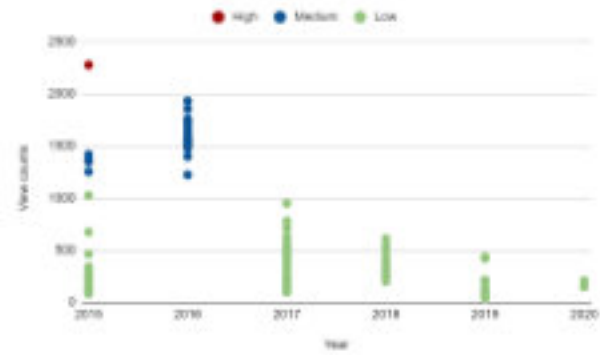


***Figure 4*** *Each article plotted as a view count against the year it was published and grouped by its impact rating*

I believe this to be the influence of another website driving traffic to the blog site. It was probably about that time I personally became aware of the caving website https://darknessbelow.co.uk. Its own newsfeed page was linking through to the Club's blog site. I can only assume the person who was doing that was highly active in 2016. If it was an automated newsfeed collection service that they were running I would have expected to see medium impact articles throughout the last 5 years and not clustered into 1 year.

This influence demonstrates that websites linking through to the Club's blog website can boost the number of people visiting the site and I feel is excellent advertising, showing the Club is very much alive and active.

| Country | |
|---|---|
| 1] United Kingdom | 6] France |
| 2] United States | 7] Germany |
| 3] Russia | 8] Spain |
| 4] Ireland | 9] Belgium |
| 5] Ukraine | 10] South Korea |

***Table 1*** *The top 10 countries sorted by number of page views since the website went live*

Identifying the country that visitors accessed the blog from is less easy to answer as the statistics page behind the website provides only an aggregated view over a set of predefined date ranges. Selecting the all-time range lists the top 10 countries (Table 1) since the blog site went live. Unsurprisingly, the people most viewing the site are from the UK but the next highest is not a European country but the USA. We do see expected countries like our nearest neighbours, France, Spain and Germany, but interestingly Ukraine and South Korea have also taken an interest in what we were doing. Selecting a different date range like week or month offers up an alternative top 10 aggregated view and at the time I was putting this document together the blog site had been viewed by people in Argentina, Australia, Hong Kong and even Turkmenistan.

A final piece of analysis on viewing statistics provides data on the most read articles. Here I report the top 5 (Table 2). These cover a range of

| Article (Title) | Number of views | Year published |
|---|---|---|
| Ogof Marros - a new cave discovery | 2278 | 2015 |
| How to have Mendip caves (almost) all to yourself? | 1933 | 2016 |
| 2015: A Year in Trips | 1855 | 2016 |
| A Highland Fling | 1761 | 2016 |
| New Year at SWCC | 1744 | 2016 |

***Table 2*** *The top 5 most viewed articles and the year they were published*

topics from cave discovery, trip reports, Club holiday and events.

### Type of Article

What were blog contributors writing about? Here I exploit the fact that each article can be labelled by the author. Reviewing the labels, I grouped the articles into 7 themes (Table 3) and 7 caving regions, then plotted them as pie charts. Unsurprisingly, caving trips in South Wales were the dominant topics but we also see the range of subjects written about and where the Club members were visiting.

| Theme | Description |
|---|---|
| Cave Trip | Article specifically about a trip, these could be an evening trip, digging, provisional weekend or a club away weekend. |
| Cave Related | The article is about caving but not about a specific trip, e.g., a video, yearly review or some club event. |
| Non-Caving Away Weekend/Event | A club meet-up but the main event is not necessarily caving; could be a walking/ adventure weekend. |
| Club Holiday | A club away trip to another country, caving may be involved. |
| Mine Trip | Article is about a mine trip/weekend. |
| Conference | Article is specifically about a conference, e.g., Hidden Earth, UIS etc. |
| Expedition | Article is about an expedition. |

***Table 3*** *Article themes based upon labels assigned by the author*

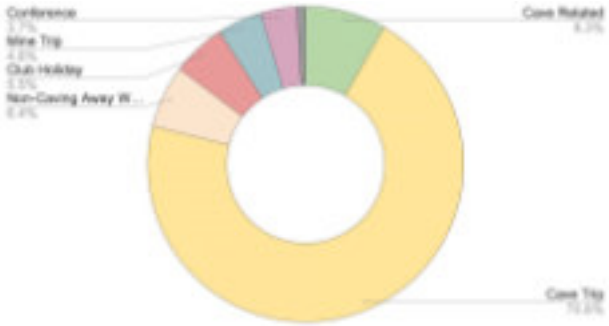



***Figure 5*** *Proportion of articles in each theme*

Figure 5 categorises the 109 articles into 7 themes. 70% are about a caving trip. This could be an evening trip by local cavers, a provisional weekend or a Club away weekend to another caving region. The least documented theme was expeditions involving Club members.


***Figure 6*** *Proportion of trips in each geographical region*

Looking at only the Caving and Mine trips (75% of the blog articles), where were these occurring? Here I assigned the articles into one of 7 caving regions, represented by a pie chart (Figure 6). Most of the 83 blog articles were reporting trips that occurred in the South Wales region (60%) with the Mendips being the second most documented region.

### Conclusions

The review of website statistics was conducted in May 2020 so represents just under half of the website access for that year. With the compounding influence of the Coronavirus Pandemic and lockdown, the downward trend from 2019 to 2020 should not be considered as a sign of a failing website. Contributors to the blog site have simply been unable to do trips and report them.

A limitation to this review is the view count that Google provides. How they arrive at that count could be described as a black box, so it is not possible to say, for example, if an article with 100 views was viewed by 100 unique visitors or just 2 visitors each looking at the page 50 times. A better interpretation of the view count is that it is a measure of how popular the article is. This figure includes return visitors.

These are articles that a minority of the members have gone to the effort to write up and share on the blog. It would be fair to say that this does not represent the true breadth of activity within the Club. There are many undocumented trips or trips published on other platforms. Only 8 members have published articles on the blog site. That is to say, approximately 2% of the Club have actively engaged with the website, despite it being open to all. An actual article may have had more than 1 person contribute to it, so the real figure is probably closer to between 10 and 20 people over the 5 years, out of a membership base of approximately 300 people.

Perhaps the most unexpected outcome of this analysis is the enhanced visitor rate observed in 2016. This only goes to show how other websites linking through can boost visitors and with that in mind if you are someone who likes to post on caving forums or other websites, then providing a link back to the blog site will have positive benefits for the Club.

Whilst the subject and locality of an article may not have been too surprising, they do offer an insight into the range of activities the Club is involved in and for caving trips where the Club is most dominant.

The site is being accessed globally and with over 71,000 views in 5 years this must surely enhance SWCC's reputation nationally and internationally. With recent membership recruitment from successful provisional weekends, having a visible blog allows new members to share their positive experiences with friends and family as well allowing

existing members to catch up with what other Club members have been up to.

**The future - a final plug for the blog site**

I believe the blog is a superior modern replacement to the traditional paper logbook. An article can be prepared at home, enhanced with pictures, web links and videos to provide a truly useful resource that can be accessed and searched anytime, anywhere and by anyone. Other Club members are documenting their digs, trips and events, often on the closed Unofficial Facebook group page. If you are not signed up or using the Facebook platform then these trip reports are inaccessible, but also quickly forgotten as they scroll off the page newsfeed. The blog on the other hand provides a permanent searchable archive of Club activity accessible to all. So, for those who upload to Facebook, give the blog site a go. It's easier than you think!

If you are concerned about how much effort it would take, especially getting people on your trip to contribute, it has never been easier. With collaborative editing provided free by Google Documents it is easy for a group of people to work simultaneously on a single article for the blog site by adding 'their bit' which may be nothing more than a few photos which can then be literally copied and pasted into the blog site.

# *PanGazer and MapGazer*

**Mike Cowlishaw**

Note: all the internet links referred to in this article are correct at the time of writing (December 2020).

Hard caving has long been supported by soft programs. My first cave survey program was written in the same year that I joined SWCC: 1974. That program calculated loop errors and survey point coordinates from raw survey data, and also printed out the survey points on fan-fold paper. Those printouts were used as the basis for many surveys, such as the Pozo de Vega el Forcau.[1]

Fast-forward a few decades, and it became clear to Speleogroup (a small band of SWCC and Oxford University Caving Club (OUCC) cavers and others with an interest in Spanish caves) that it would be useful to have more software designed to help find caves. I therefore created two programs, *PanGazer* and *MapGazer*. These give cavers new ways of looking at images and maps. They are Windows applications, but they use well-known interfaces so they also run on Windows emulators on Linux and MacOS computers. I am indebted to Bill Collis and Juan Corrin, and many others, for suggestions for these programs and for their encouragement.

**PanGazer**

PanGazer had its origins in 2017. By then, Speleogroup had a list of sites to investigate, of which one of the most intriguing was a tantalising anomaly far up the side of an otherwise solid limestone ridge which we knew had several sinks and caves on the further side (Cueva Negra, etc.). Being 200m up a very steep slope that was covered in gorse, it was always 'next year'. In 2017, however, the *DJI Mavic Pro* drone was announced, and it was clear that this would offer an efficient way to investigate such unpleasant-to-reach sites.

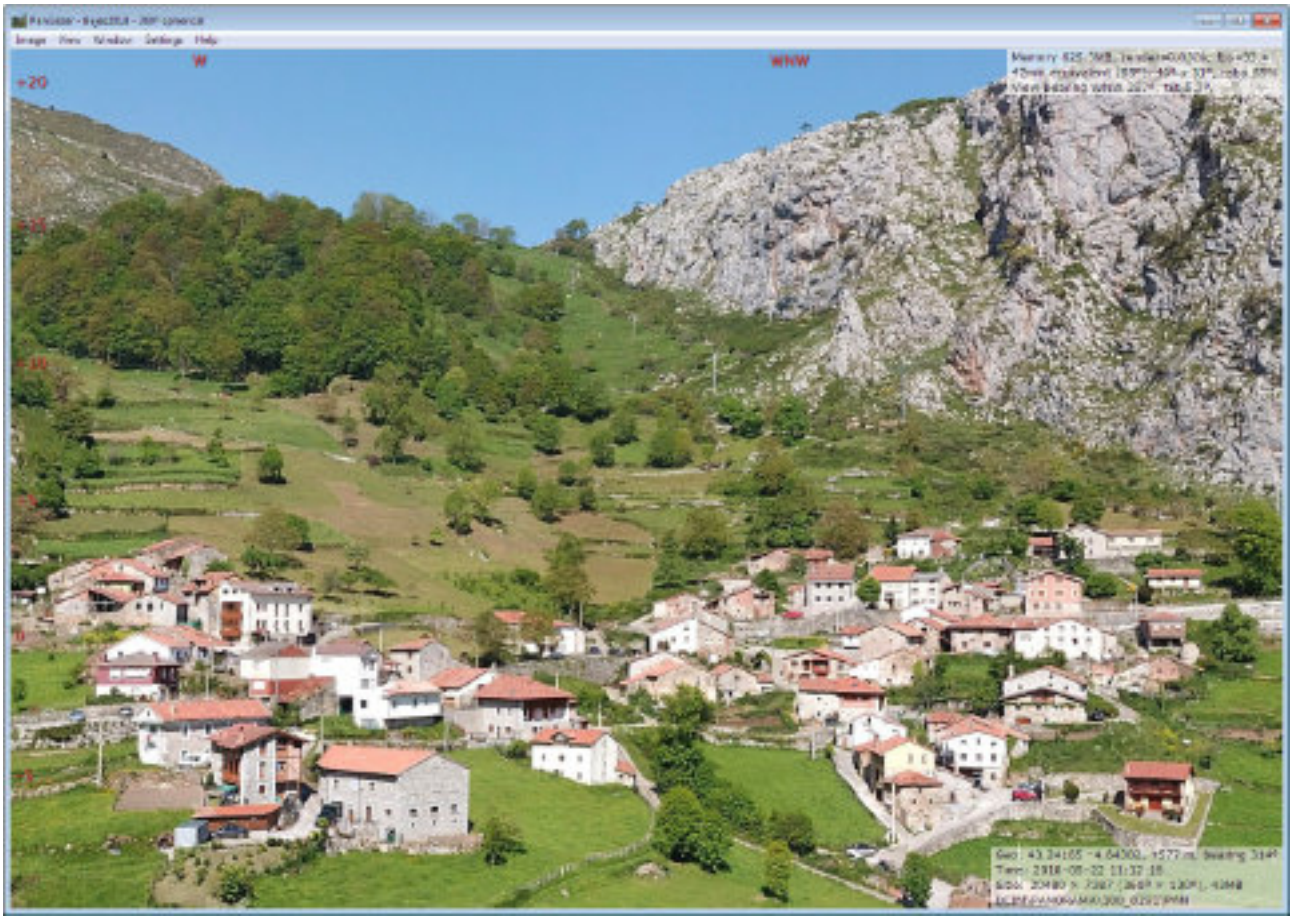
In the summer of 2017 our first drone flight in Spain investigated the anomaly.[2] Sadly, there was no sign of a cave entrance, but we achieved in minutes an exploration that would have taken a couple of hours of pain to complete on foot. Having proved the value of drones for cave scouting, we first thought that it would make sense to video entire drone flights and take occasional still images. Reviewing multiple 15-minute videos soon became tedious, and the alternative, still photos, meant that too much flight time was spent in micro-managing the camera. Fortunately, before our next trip in 2018, a software upgrade to the Mavic Pro added the ability to take spherical panoramas.

For a spherical panorama the drone takes 34 12-MegaPixel photographs. The first photo is directly below the drone; the others rotate over 360 horizontal degrees with varying camera tilts that include almost 40° above the horizon. These images can then be 'stitched' together to create a part-sphere view in a single JPEG.[3] The result is that everything that can be seen below the drone is recorded in a little over a minute.

I soon discovered, however, that the applications available for viewing these 360° images were aimed more at selling houses instead of exploring images. There was no concept of geography, such as the direction of view. I wanted a number of features that the available viewers lacked, including,

- an overlay that indicated the direction of view and tilt of the virtual camera,
- autoec detection of 360° panoramas, and their horizon,
- an option to save a 'snapshot' of a view as seen, while preserving the geographic data and updating the camera information, to allow composition of still photographs after the flight,

***Figure 1*** *PanGazer window showing Bejes, Cantabria*



- the ability to indicate the equivalent lens focal length and pel (pixel) size when zooming in or out, and,
- a simple way to show the location of the image using MapGazer, Google Maps, Google Earth, etc.

Given that I already had the code to display maps in various ways (see MapGazer, below), it was relatively easy to create a new application, PanGazer, that uses 90% of the same code but has a new user interface and displays images instead of maps. There was some interesting mathematics needed to project the spherical image onto a rectangular window, but the major challenge was to be able to do that on a large monitor and achieve acceptably fast and smooth dragging of the image to adjust the view. Fortunately, this is an application where multiple cores in the processor provide a real benefit: Four cores reduce the drawing time to 26% of that using one core, but several other optimisations were needed, too.[4]

PanGazer now has all of the features I wanted and more. For example, it also works with non-spherical images, so makes cropping and composition of 'plain' images easier than traditional applications. PanGazer has proved its worth for viewing spherical images and is now used by the Matienzo Caves Project, among others.[5] Figure 1 shows a screenshot of a view of Bejes, Cantabria, showing the bearing and tilt overlays and other status information (all of the overlaid information can be toggled on and off with the Space Bar).

**MapGazer**

MapGazer is a few years older than PanGazer (2014).[6] I created it to explore the newly available high-quality maps of Northern Spain.[7] These were already available for web viewing or by downloading to mobile phone apps such as *MyTrails*; however, the ability to view the same mapping on larger screens and also when 'offline' in Spain (many rural hotels still have limited Internet access) was the incentive to write MapGazer.

The larger view of an area soon allowed Speleogroup to find new cave possibilities simply from a better understanding of catchment areas, etc., but this was significantly enhanced after I added the ability to overlay geological maps and aerial views, with variable transparency. In the past few years this ability has led to the discovery of several new caves and interesting speleological features, including some that we'd missed despite their being in areas very well known to us.

Like most map viewers, MapGazer allows viewing and annotation of GPS tracks, and also the creation of waypoints, routes, areas, scales, and other geographic data. Other useful features include the ability to use downloaded elevation data so that

just moving the cursor to a point shows its elevation and, perhaps even more useful, is the ability to overlay images (such as cave surveys) and scale them to match the mapping. Figure 2 shows an example of the latter.

In summary, PanGazer and MapGazer are imaging and mapping tools that are tuned for cavers. I continue to update them so do please send me suggestions for improvement!

**References**


1. http://www.speleogroup.org/files/surveys/Forcau-master.pdf
2. See http://www.speleogroup.org/sg2017.html#19.06 for details and photo
3. See the PanGazer website http://speleotrove.com/pangazer/ for details
4. See http://speleotrove.com/pangazer/gnomonic_projection.html
5. http://matienzocaves.org.uk/AerialPhotos/index.htm. Full documentation and the latest download are at http://speleotrove.com/pangazer
6. You can download MapGazer from speleotrove.com/mapgazer
7. http://centrodedescargas.cnig.es/CentroDescargas/


***Figure 2*** *El Cuevón de la Pruneda survey, overlaid on 50% transparent base map plus 90% geological map, near El Mazuco, Asturias*

# The Mobile Phone Camera

## Graham Christian, Sanita Lustika & Tomasz Zalewski

When your surface dwelling friends and colleagues (or 'drycleaners' as Fungus the Bogeyman would call them) ask what you see in caves, you can now whip out your mobile phone and show them the unexpurgated delights of the previous weekend.

There are obviously the risks of taking your phone underground when it has all your contacts, emails and bank details, all of which probably would not take kindly to being dropped into a muddy puddle. However, with suitable protection, these photos show that with a bit of care your caving exploits can be recorded to stun and amaze your friends.

This article comprises some thoughts from Sanita and Tomasz plus a gallery of wonders sourced from their mobile phones, alongside photos from Tarquin Wilton-Jones and Ioan Lord, both in non-re-touched format (illustrating the quality that can be achieved with minimal effort) and enhanced format. The captions provide a little more detail. We look forward to further study and documentation in future publications.

### Thoughts on Phone Technology

***Sanita Lustika***

The phone lends itself perfectly to medium distance photos with good lighting and close ups with a nice, soft flood light that allows to capture the details.

When it comes to capturing large spaces or things far away, this seems to be where phone photography can fall short. It can, to an extent, be solved with really good lights, so a patient teammate (or a few) with Scurions are always a win.

One of my main challenges has been to keep the phone relatively safe and dry underground. I started out with the cheap waterproof phone cases from

◀ *Gareth Davies rigging a side passage in Pwll Dwfn, candid picture. This picture was taken as a utility photograph during surveying work, for later use when drawing up the survey. A phone camera allows these rapid photographs, so that hundreds can be taken as part of a survey. (©Tarquin Wilton-Jones, Samsung Galaxy S7)*

Amazon. Got through two of them very quickly. I found them to be fiddly to open and close frequently, so I knew it wouldn't be the right solution for me. Next came the mini-drybag and, while this was an improvement, it was still quite fiddly and didn't instil too much trust, especially in the entrance series of Draenen. Definitely better but still not entirely waterproof solution compared to the cheap phone cases. Finally, I've settled on Otter Box. So far it has kept the phone and other things dry with the main downside being the loud noise it makes in contact with rocks.

Some of my favourite photos have been on the Club's 2019 Cantabria trip.

**Underground Photography for Absolute Beginners**

***Tomasz Zalewski***

I have had a privilege to join the South Wales Caving Club during last Provisional Weekend (2nd November 2019). Shortly after, I took part in that wonderful trip from OFD2 to Cwm Dwr via the Skyhook, Upper Oxbow, Marble Showers and Fault Aven. During that trip, I had taken a few pictures with my smartphone, Motorola Moto G7 Plus, 'budget with decent camera' as described in reviews.

Surprisingly, my efforts have been recognised by the editors of the 75th Publication and I have been

*Gareth Davies, near The Columns pitch, lit by Jules Carter and Tarquin. An example of a proper staged photograph, taken within about 30 seconds of arriving at the site. (©Tarquin Wilton-Jones, Samsung Galaxy S7)*

▲ *Canuela Cave's entrance from the same trip has been one of the few large spaces in a cave where the light from outside was close to perfect to capture it with the phone. (©Sanita Lustika, Apple iPhone7)*

asked to share my experience of underground photography using a smartphone.

Now, I should start talking about focal length, shutter speed, ISO, aperture and exposure, etc., but I know nothing about it. I know nothing about photography. My smartphone camera is set on automatic mode and flash is always off.

The only thing that is up to me is moving my head to direct the beam of my head torch towards the object. I am using, very popular among cavers, Fenix HL60R. I was also trying Fenix HM65R but it's beam is too centred and bright, and regulating it is a bit uncomfortable.

While taking a picture, I like to put the torch on maximum output and direct the main beam to the furthest point of the picture background. Any darker spots are illuminated with a Phixton XML T2 hand torch.

Although I have very little experience with caves, I spend a lot of time in mines and have taken hundreds of pictures, which can be seen on SWCC official Facebook page.

I have had very positive feedback about them, but pictures that are admired most have been taken by my friend Ioan Lord (Director of Welsh Mines Preservation Trust and Cambrian Mines Trust) with a Google Pixel 2 smartphone.

And this is the smartphone I would like to distinguish. It is well known for its powerful camera and the Night Sight option, that makes it ideal for underground photography.

On the next page, there are pictures taken in the same spot by three different smartphones (**1.1-1.3**). The Google Pixel 2 can be bought in used condition for as little as £50; the budget Motorola for £150 and the smartphone is around £600.

There is then another example (**2.1-2.3**), where incorrect use of light from a head torch will be corrected by the Google Pixel 2 software. Again, the three types of phone can be compared.

I must point out here that some pictures although breath-taking are slightly exaggerated by Pixel 2.

The outdoor picture (**3**) was taken at midnight on New Year's Eve 2020. Although it was a very bright night with a full moon and its light reflected by snow it was nowhere near what you can see in the picture.

However, this is what Pixel 2 is capable of in low light.

*Narizon-torca Palomas Cave with the crystal pool amongst other fantastic formations was an absolute photographer's dream with ability to get close to most of them. (©Sanita Lustika, Apple iPhone7)* ▼

***1.1*** *Cwmystwyth. Google Pixel f/1.8 1/2 4.44mm ISO50 12.2 MP 4032 X 3024 1.1MB (©Ioan Lord)*

***1.2*** *Cwmystwyth. Motorola Moto G7 Plus f/1.7 1/20 4.28 mm ISO1575 15.9 MP 3456 X 4608 5.1 MB (©Tomasz Zalewski)*

***1.3*** *Cwmystwyth. Google Pixel 5 f/1.7 1/12 4.38 mm ISO976 12.2 MP 4032 X 3024. 7.7MB (©Tomasz Zalewski)*

***2.1*** *Cwmystwyth.*
*Google Pixel 2 f/1.8 1/17*
*4.44 mm ISO514 12.6 MP*
*4152 X 3024 1.1 MB*
*(©Ioan Lord)*

***2.2*** *Cwmystwyth.*
*Motorola Moto G7 Plus*
*f/1.7 1.20 4.28 mm*
*ISO2113 15.9 MP 4608 X*
*3456 4.6 MB (©Tomasz*
*Zalewski)*

***2.3*** *Cwmystwyth.*
*Apple iPhone7 f/1.8 1.4*
*3.99 mm ISO320 13.6 MP*
*4504 X 3024 797 kB*
*(©Ioan Lord)*

▲ ***3*** *The Arch, Cwmystwyth. Google Pixel 2 (f/1.8 1/2 4.44mm ISO1276 12.2 MP 3025 X 4032 3.6 MB)(©Ioan Lord)*

Most people nowadays have smartphones equipped with even better cameras, but they can be very expensive and fragile.

There's no need to take your main smartphone underground as it will get wet, dirty and eventually damaged there. You also don't have to risk losing all your data because you can use the smartphone only as a camera, without a sim card. All you need to do is register it to the same Google (Gmail) account and your underground pictures will be automatically transferred over wi-fi/Bluetooth and visible on your main smartphone.

You still need to take great care of your underground smartphone. There is a good choice of shock and waterproof boxes, but they need to be purchased from a reputable company and can be expensive. Please, be aware that eBay's Chinese import will be useless. If you need to stay on a budget, daren drums or good quality food/lunch boxes will do the job. You can always put your smartphone into the waterproof bag before crossing the deep water or crawling in the water, but it still needs to be in a sturdy box.

Summarising, by the time this article will be published I want to be in possession of a Google Pixel 2 smartphone.

I will be using it to take great pictures and share them with SWCC members.

**Additional Photos**

***Tarquin Wilton-Jones***

Tarquin has provided several photos using his Samsung Galaxy S7. The lighting is a mixture of Petzl LED, Rude Nora, Scurion and Fenix. Of all of them, the Petzls can be problematic. Some Petzls work well, but others, the ones that use an array of individual LEDs, make the camera see only purple. So Tarquin carries around a spare Fenix to give to someone to use instead of their Petzl, if they have the troublesome version.

*Paul Fairman, Alan McBride, Louise Hull and Pete Bolt in MSAD, Ogof Draenen, demonstrating how lighting works in big passages. (©Tarquin Wilton-Jones, Samsung Galaxy S7)*

▲ *Gareth Davies, Phil Knight and Jules Carter crossing a traverse in Dan y Lleuad Wen - an example of a candid photograph made possible by mobile phones. No setup, no asking people to stop and hold a pose, just a snap taken during the action. Samsung Galaxy S7.(©Tarquin Wilton-Jones)*

◀ *Upper Oxbow. Motorola Moto G7 Plus (ƒ/1.7 1/20 4.28 mm ISO2244 15.9 MP 3456 X 4608 4.5 MB)(©Tomasz Zalewski)*

*Upper Oxbow. Motorola Moto G7 Plus (f/1.7 1/25 4.28 mm ISO742 15.9 MP 3456 X 4608 4.6 MB)(©Tomasz Zalewski)*

*Gareth Davies in the C.U.C.C. route through Pwll Dwfn, also a utility photograph for the survey. This shows how a phone camera is a major benefit in small spaces like squeezes, as it does not need complex lighting. (©Tarquin Wilton-Jones, Samsung Galaxy S7)*

**Front Cover**

*The Rising Pitch, Dan-yr-Ogof. Mike Bonner on the ladder with Laura Appleby below - Photographer Mark Burkey*

**Inside Front Cover**

*Martin Hoff at the Columns, OFD2 - Photographer Jem Rowland*
*SWCC HQ in winter - Photographer Piers Hallihan*

**Inside Back Cover**

*Adrian Brown in Llygad Llwchwr 2 - Photographer Jem Rowland*
*The Big Chamber Near the Entrance, OFD2 - Photographer Jem Rowland*

**Back Cover**

*Tony Baker in OFD1 streamway - Photographer Jem Rowland*