

South Wales Caving Club

Clwb Ogofeydd Deheudir Cymru



Newsletter 134
October 2018

Front Cover Photograph

Phill Thomas in Gouffre Betchanka

Photographer *Clive Westlake*

Inside Back Cover Photograph

Lilo Hòekèr in Gouffre Betchanka

Photographer *Tony Baker*

Back Cover Photograph

Nicky Bayley at Marble Showers

Ogof Ffynnon Ddu

Photographer *Mark Burkey*

SWCC Newsletter 134

October 2018

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Editorial

I'm sure you all realise that, although I am officially 'the Editor', the task of producing a Newsletter has been very much a joint effort from Bob and me, so I hope you understand why the rest of this editorial will refer to 'we'.

We have great pleasure in presenting to you Newsletter 134, the second Newsletter to be published this year. Again, we are deeply impressed by the range and depth of the material the SWCC is able to produce and publish, and this speaks volumes for the vitality of our club.

Once again, Bob and I have been gratified by the willingness of so many members to contribute articles and photographs. We would also like to thank: Ian Alderman, Keith Ball, Brian Clipstone, Martyn Farr, Martin Hoff, Brendan Sloan and Clive Westlake, for their invaluable help, support and advice. Mention must also be made of our two guest authors, Pete Kokelaar and Steve Lucas. Pete was active with several members of the club back in the 1960s and we welcome his contribution to the article on Tooth Cave. Steve has contributed a short article about bats in caves and the research he is doing with the Bat Conservation Trust. We hope to be able to publish a further article outlining the results of that research in the future.

With NL134 we have, in effect, still been playing 'catch-up', and Part 1 of this Newsletter, covering the club's activities in the Pierre St Martin system in 2017, might have been better published many months ago. However, with this truly bumper edition, we have hopefully cleared the backlog!

We recognise that, in reproducing extracts from the PSM logbook and several articles covering the same trips, we may be guilty of repetition, but the immediacy of the writing and the very different perspectives and voices of the authors convinced us that this was the right thing to do.

Looking forward to 2019, we already have several articles to hand and have pledges for another six or more. Part of Newsletter 135 will be devoted to SWCC activity in Cantabria in recent years and we would particularly welcome material relating to that. And of course, summer 2018 saw a 'Non-Expedition' to Germany which will hopefully generate further tales of derring-do. We hope that reading the verbatim logbook extracts might encourage submissions from people who would not normally think of contributing. We would particularly like to see something from any of our newer members, such as an account of a provisionals' weekend experience. We are aiming for a March publication date with a deadline for copy of **3rd February 2019**, but would very much prefer to have your contributions sooner than that!

Finally, a few words about editorial policy. An important aspect of publishing in scientific, medical, engineering and technical fields is the concept of 'peer review'. Bob and I have adopted a policy of 'peer review lite' for articles that we feel unable to assess adequately ourselves. We hope that by doing so we can ensure the accuracy and reliability of the material published in SWCC Newsletters. Careful as we have been, errors will doubtless have sneaked through and these are entirely our responsibility.

Elaine Hall

Disclaimer: The opinions represented in this publication are those of the authors alone and may not represent either the views of the editors nor the policies of the SWCC.

The SWCC Expedition to the Gouffre Pierre St Martin 2017

An Overview

Introduction

This expedition was the Club's second visit to this classic cave system, the previous one having been in 1995. Not only were both expeditions organised and led by Gary Vaughan (aka 'our Fearless Leader') but at least six of the recent participants were there for the second time. The previous visit was very well reported in Newsletter 117, 1996 and the essential features of the cave have obviously not changed. (In particular, the wretched 'parrot ladders', which we had been led to believe were gone, are most definitely still there!) Readers are urged to read the following pages in conjunction with NL117.

So, what is new? Most obviously, La Verna has now been developed as a show cave and tourists are transported by minibus to a visitor centre at the portal. Cavers must coordinate their activities with the very cooperative show cave staff and park where directed. For the SWCC, our objectives in 2017 were a little different in that teams rigged two top entrances on this occasion, and thus a wider range of trips became possible. From the equipment perspective, a step change from predominantly carbide lighting in 1995 to high performance electric light in 2017 must have reduced the faff factor, whilst lighting up the vast chambers so much more if you were a Scurion user. And, at the Tunnel du Vent, through-trippers had inner tubes to contend with rather than boats. No doubt everybody will have their view about that....!

The piece that follows consists of edited extracts from the expedition logbook. Text has been transcribed verbatim with no editorial input whatsoever. Whilst by no means polished writing, what is presented here has the virtues of immediacy and perhaps real emotion in some cases. You can *feel* a person's experience of cold on occasion!

The crucial set-up trips

30th July Rigging Tête Sauvage.

Team: Stuart Bennet, Evan Cooper, Lilo Høekèr, Clive Westlake, Martyn Farr, Velma Aho, Paul Tarrant (porter).

"Straightforward rigging on P bolts, save for entanglement with parrot ladders for first 200m. Some deviations on naturals, with minor rubs on last two pitches. Enthusiasm waned on seeing the trough (water-filled) at the bases of the pitches, so a quick solo trip saw the Salle Cosyns ropes installed – Salle Cosyns easily identified by it being written on a huge boulder in the middle of the chamber. An efficient exit was made (the ladders are GOOD going up), but the slippery tube between the 2nd and 3rd pitches was unwelcome. TU 7 ½ hrs"

See survey on following pages.

30th July Rigging SC3.

Team: Tony Baker, Martin Hoff, Gareth Edwards, Dan Liddy, Bob Hall, Phil Thomas, Paul Quill.

"We walked up with the Tete Sauvage team in great sunshine... SC3 entrance was easy to find, so easy we walked straight past it! The rigging had some problems... The rigging guide was not always correct and rope lengths were suspect. However we rigged successfully to the top of the Belfry before deciding to make our way out."

See survey on following pages.

Left: Bob exiting SC3 after portering for the riggers. Photograph: Martin Hoff



SIMA TÈTE SAUVAGE

Edición: Viana 2014

FICHA TÉCNICA

P16: pasamanos: 2 aQ (anclaje Químico)
1 cadena de descuelgue.

P45: pasamanos: 2 aQ.
Dividido en tres rápeles inferiores a 20m.
Pequeña repisa en las tres cadenas.

P50: pasamanos: 3 aQ. 2 cadenas.
Unos 25m cada rápel.

Primer cadena de descuelgue
con acceso incómodo.

Existe un estribo de cuerda en fijo
que ayuda en la aproximación.

P25: pasamanos: 3 aQ. 1 cadena.

P6: pasamanos: 2aQ. 1 cadena.

P30: pasamanos: 2 aQ. 1 cadena.
Ojo 32m de rápel.

P18: pasamanos: 3 aQ. 1 cadena.

P11: pasamanos: 2 aQ. 1 cadena.

P4: pasamanos: 2 aQ. 1 cadena.

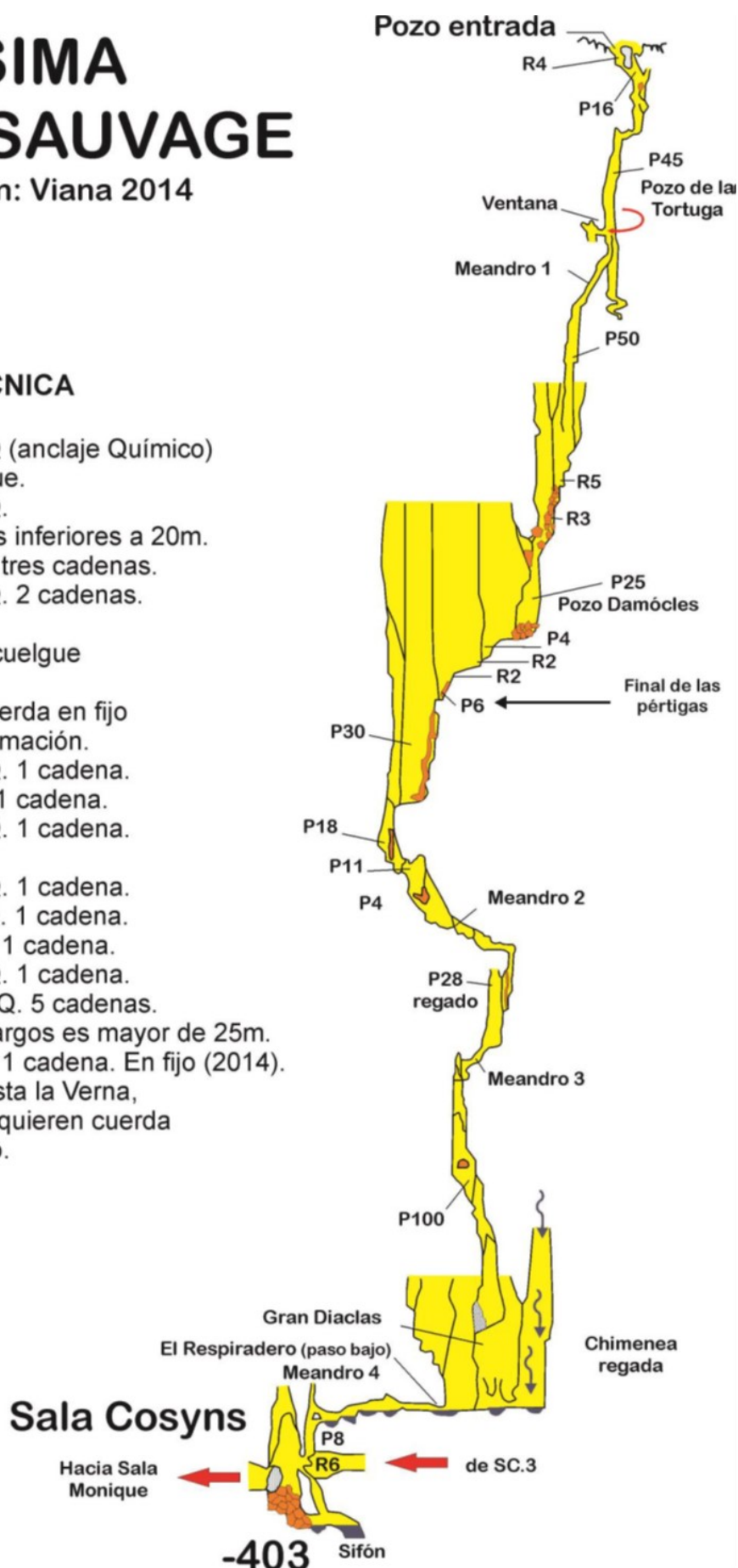
P28: pasamanos: 2 aQ. 1 cadena.

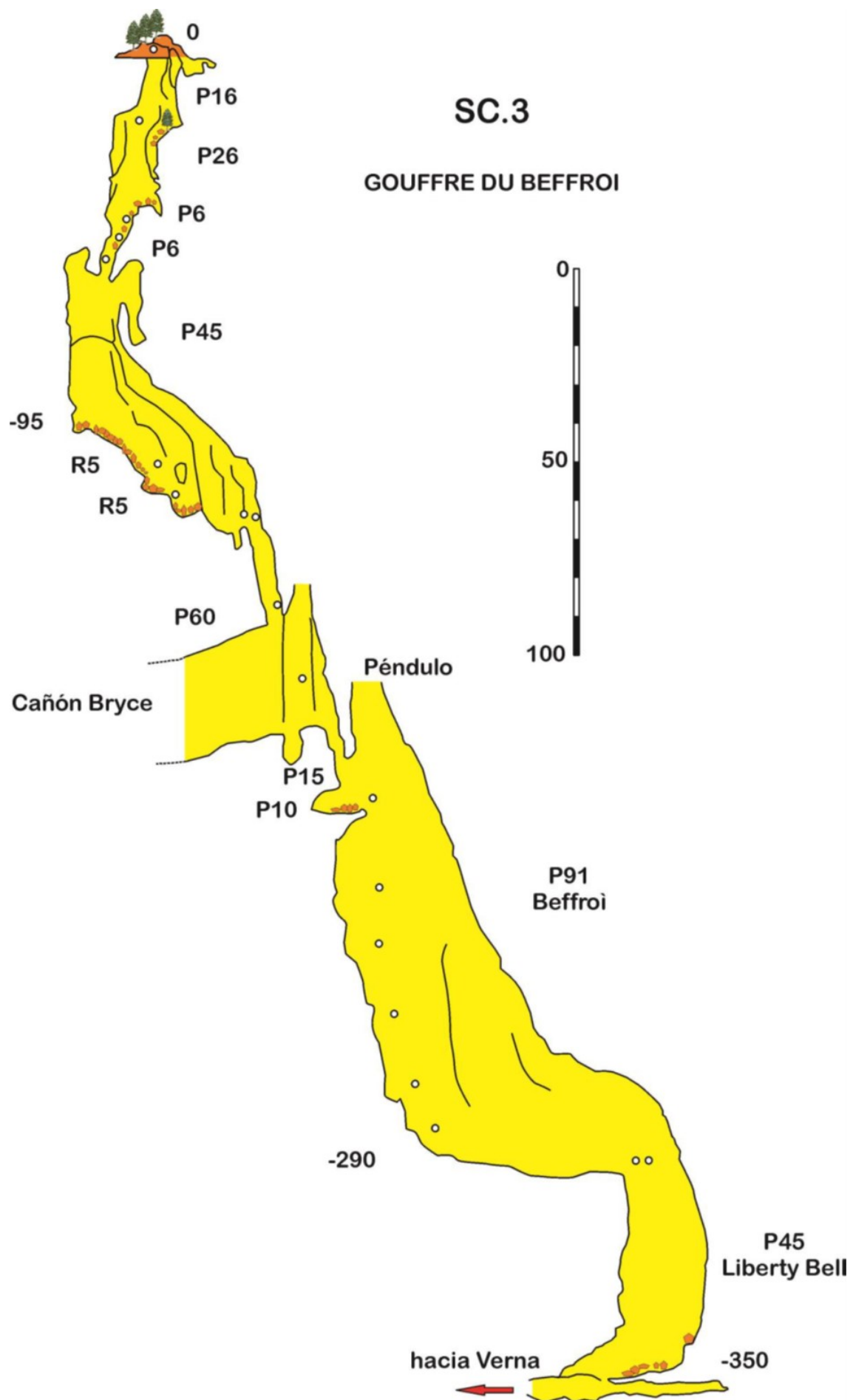
P100: pasamanos: 2 aQ. 5 cadenas.

Ninguno de los cinco largos es mayor de 25m.

P8: pasamanos: 2 aQ. 1 cadena. En fijo (2014).

P6: A partir de aquí hasta la Verna,
todos los pasos que requieren cuerda
están equipados en fijo.





31st July EDF Tunnel to Tunnel du Vent: To place and inflate buoyancy aids.
Team: Gary, Josh and Ben Vaughan; Tony Baker, Paul Tarrent, John Cliffe,
Malcolm Stewart, Helen Stewart, Brian Clipstone, Dan Liddy, Jill Brunsdon. (“+Harvey for a bit”)
A detailed account of this trip is provided by John Cliffe – see page 26-28.
But from the logbook:

“Wow! What an experience and what better way to wake up the thigh muscles! A 12 hour trip to start off with, the mission to place the floatation aids at the Tunnel du Vent. I just couldn’t believe the size of everything, nothing had prepared me for this from what I seen in the past, the boulder hopping, the light absorbed in the huge chambers, such an amazing experience, and then, “the wall of death” as someone had called it. A few members of the team, including myself watched as Gary, Josh, Ben, Tony and Dan traversed over a drop down into the passage below, eventually the remaining party plucked up the courage to go over, after a handline had been placed (more as a confidence rope than as an aid) to help us final few. We finally got to the Tunnel du Vent, and assisted in inflating the buoyancy aids, and quick snack and headed back out. A long, long day but very rewarding.”



Salle Chevalier. Here we see, “light absorbed in the huge chambers” as was described in the logbook entry above. Phototograph: Tony Baker

And from another entry in the logbook for this trip:

“Progress upstream was slow and tortuous. The Party was very big and at least on one occasion it became divided with half of the group heading into the cave and half not heading into the cave. We had a hicup at the upstream end of Salle Queffelec. The standard route utilises a 10m down pitch on the right hand wall (facing Upstream). This had either not been the route in 1995 or collective memories had forgotten all about it. A historical and now seldom used route was found on the opposite side of the passage with an exposed but easy traverse leading to a steep descent over mud and boulders to reach the floor of the passage. A traverse line was (later, Ed.) installed on the traverse, natural thread at the downstream end and a standard hanger into a spit at the upstream end. This route is much faster than the 10m pitch. Arguably less safe.....

..... Massive team effort to inflate inner tubes had most of them ready to sail within about 40minutes. Each buoyancy aid was equiped with a polyprop ‘painter’ for chaining the boats together.

'Captain' Dan offered to take them through together with the foot pump and puncture repair kit. 7 boats were placed on the upstream shore of the Tunnel. The boat used to return was tied to the end of the in-situ pull cord. Dan was quite chilly after his sea fairing adventure, everyone else was already on the way out so a good fast pace was made from Tunnel Du Vent to Sala Navarra where we caught up with the main group (and the French group)....

..... Slow progress out to EDF tunnel all out by about 11:00pm 12 hour trip!!! Suggestion—Smaller groups to collect inner tubes—max 5 people. Many thanks to all for what turned out to be a very hard day's work."

Familiarisation trips

1st August Another trip into the big stuff

Teams: Martyn Farr and Phill Thomas; Martin Hoff, Paul Quill, Clive Westlake and Bob Hall; Josh Young, Lilo Hòekèr and Velma Aho. *"(Teams on trip, which were more or less independent and merged and split up various times..)"*

"The second trip through the EDF Tunnel towards the canal was slightly shorter (8.5 – 9.5 hours)...

We had some slight route finding troubles which meant it took us 5h to reach the Lepineux memorial, but only 3h to return. On the other hand we got to see an interesting flood bypass route with ropes and climbs (SRT gear recommended if you end up on this route, but you're better off just following the stream). First impression of PSM in general. THIS PLACE IS TOO BIG! Slightly unnerving to be honest. Spent time going round in circles in Salle Casteret, and the part of the group that didn't turn round at the Lepineux shaft also apparently did the same in Salle Navarre. In other words, good time was had by all!"



***Paul Quill contemplates one of several memorials to Loubens to be found in the cave.
Photograph: Martyn Farr***

2nd August Tête Sauvage to SC3

Team: Josh Young, Lilo Hòekèr, Evan Cooper, Dave Coulson.

"The way down seemed a bit dodgy with the rope rub. The short duck near the bottom is nothing to be concerned about. There was a small amount of navigational issues, including looping back on ourselves, but 2 hours after hitting the bottom we found the SC3 rope. Much, much prussiking later and we were greeted by the sunset over a sea of clouds."

2nd August EDF Tunnel to beyond Lépineux shaft

Team: Dave Dobson, Andy Dobson.

"Remembered about 1% of it from 1995!"

The long through trips

2nd August SC3 to EDF Tunnel

Team: Tony Baker, Stuart Bennet, Gary Vaughan, Jules Carter.

"Trip to finish off rigging SC3, and proceed out via thro' trip."

And in another hand...

"Additional notes: Great trip. SC3 is a real 'must see' shaft. Two hours to reach the bottom of Liberty Bell Pitch including the rigging of Belfry + Liberty Bell Pitches. The 1 ½ hours caving from SC3 -> Salle Cosyns is varied. The first 15 minutes is very 'Mendip style' but the passages steadily increase in size to become very pleasant, in fact very nice."

This trip features in both Tony's article (page29) and Jules' article (page 33)

3rd August Tête Sauvage to EDF

Team: Velma Aho with American guests, Andy Filer, Mindy Filer and Brian Loudan.

"managed through trip with some route finding fun (last boulder choke in the river was the worst! Do not trust the arrows!!) and lots of shuddering because of cold water (we were all cold long before the lakes!) A tough trip, but what a cave!!!" "Total 12h 15min"

4th August Tête Sauvage to EDF

Team: John Cliffe, Bob Hall, Martin Hoff, Clive Westlake.

"Gouffre de la Tête Sauvage to Salle de la Verna..... 11hrs 50min. One of my better day's caving. CDW"

A longer account of this trip appears as part of John Cliffe's article (26-28) and further accounts form the Appendix on pages 62 and 63.

4th August Tête Sauvage to EDF

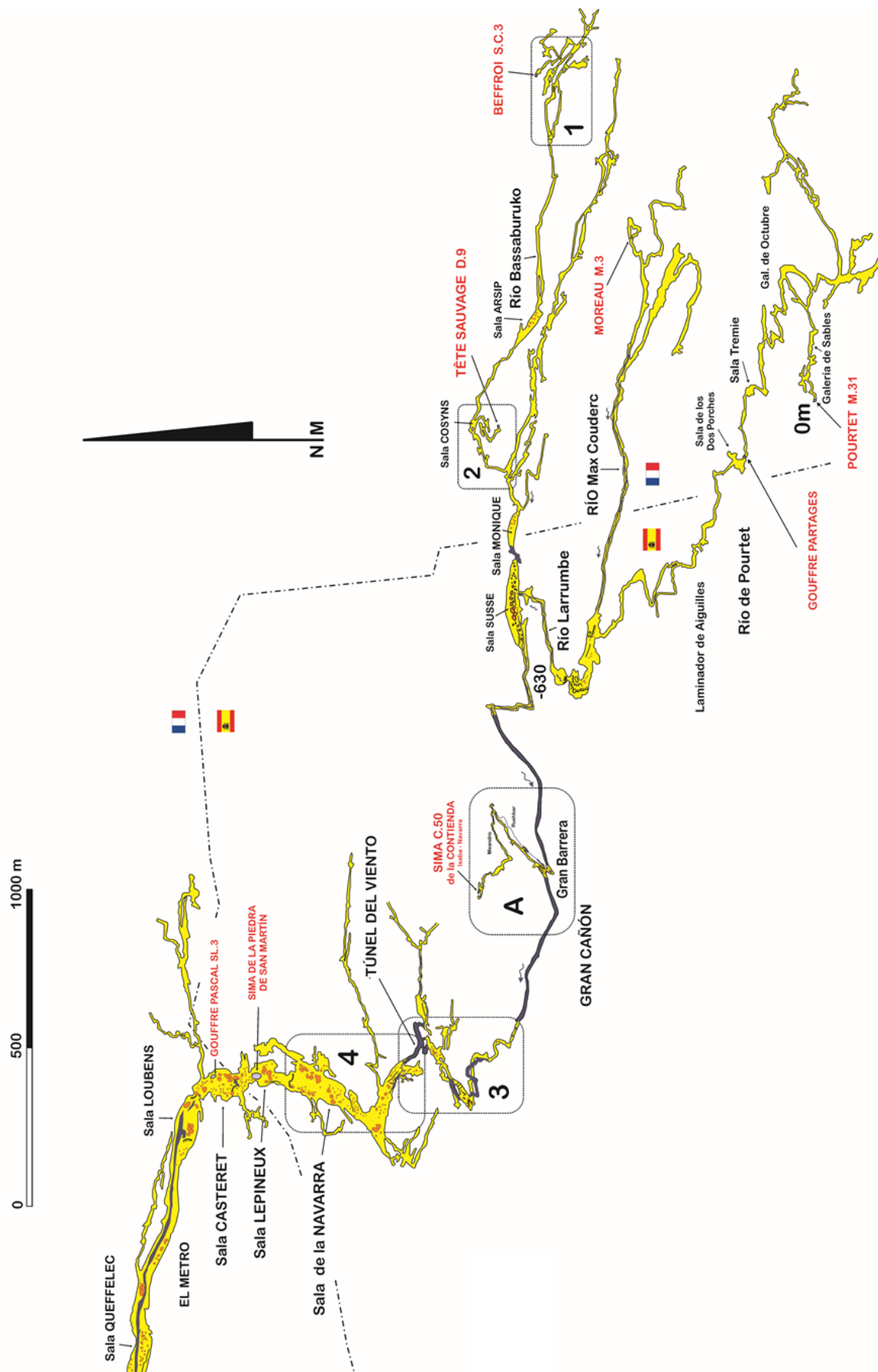
Team: Martyn Farr, Malcolm Stewart, Helen Stuart, Phil Thomas, Jill Brunsdon.

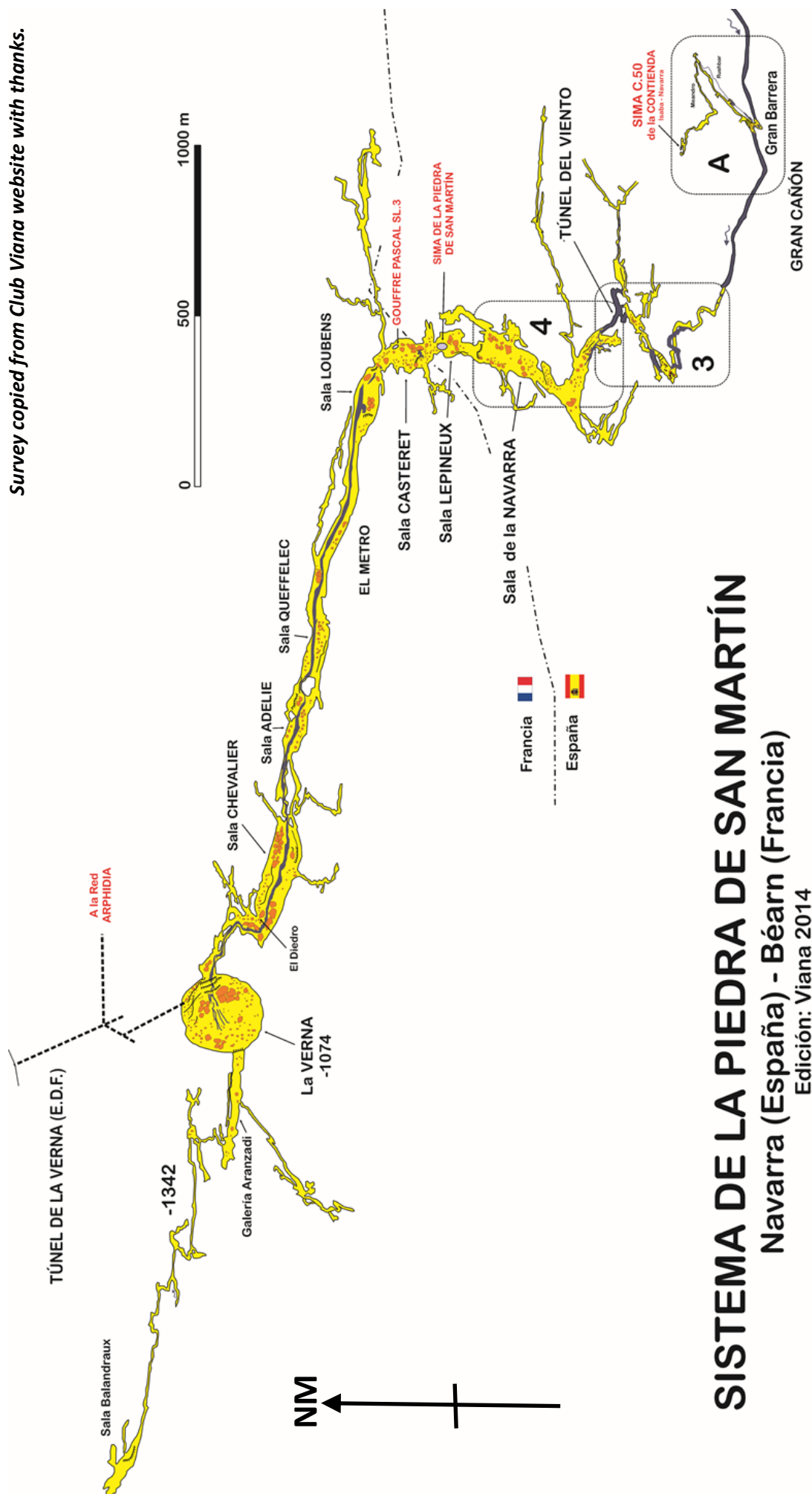
"We were the first team into the system, arriving just before the French party. There were a few doubts whether or not I (in particular) had enough experience to do this trip – several discussions, with various members of the Exped at the campsite eventually assured me that I was capable of doing the trip."

The author's self-doubt was a common theme on the campsite before big trips with several people vacillating and others suffering sleepless nights with the looming challenge in their minds.

Continuing:

"The SRT down to the bottom was just terrific, a slight wobble on one pitch head (which a talk to Clive the previous evening soon put paid to this) and I was 'back in the game' descending one pitch after the other, enjoying every moment. All the party reached the bottom by 10:30am."





SISTEMA DE LA PIEDRA DE SAN MARTÍN

Navarra (España) - Béarn (Francia)

Edición: Viana 2014

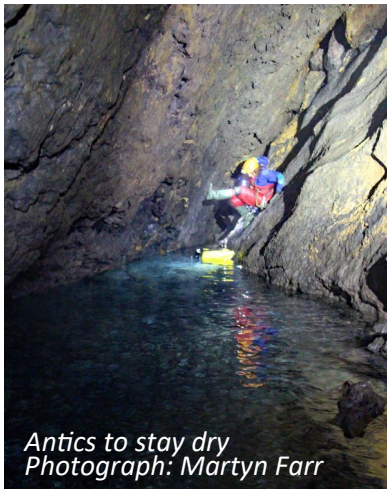
And in a different hand:

"The "refreshing duck" after the last big pitch leads to the final scruffy rope down to the 'confluence'.

From here the team plunged downstream, from obstacle to obstacle, chamber to chamber. The printed description was very useful, the printed survey less so.

Sections of the cave blurred into each other. The boulder chokes in Grand Canyon proved fun, with a sporting traverse over deep water in a widening slanting rift proving fun for all – but other parties found a way to avoid this obstacle totally!

There is a section of deep water wading at one point, avoided by most by using traverse ropes on the right hand wall (this shortly after a rope climb up a chimney). Jill and Helen chose to avoid these traverses by jumping/diving or leaping off the wall, seeking a totally immersive experience in the caves snow-melt water. Phil, Martin and I could not understand this approach (why not stay warm and dry?) but it's a free country and everyone has the right to self expression.



*Antics to stay dry
Photograph: Martyn Farr*



*Fine river passage in Grand Canyon
Photograph: Martyn Farr*

Gary's two cairns at the dog kennel crawl to Tunnel de Vent were very helpful and guided us through to the 'boats'. Our flotilla passed the tunnel (and returned the rings) without capsize or sinking, showing a superior quality of seamanship." (As illustrated below.)

After that it was just the long arduous plod out of the cave..... 13 ½ hours"



*Helen demonstrates "superior seamanship" in the
Tunnel du Vent. Photograph: Martyn Farr*

4th August SC3 to EDF Tunnel

Team: Dave Coulson, Evan Cooper, Josh Young, Lilo Hòekèr

"Total 12h"

4th August SC3 to EDF Tunnel

Team: Dan Liddy, Gareth Edwards

"Mostly straight forward route finding. Relatively swift progress to Salle Cosyns. Took a bit of time to find the route up to the chamber before the tunnel del vienro. Fell out of rubber ring almost immediately in the lake. Managed to sail successfully at the second attempt.

Back to the start: I forgot my undersuit. Left it hanging on the pole for me Tarp back in the campsite. As a result I did the cave in two pairs of thermal shorts. My own and borrowed the ones Dan walked up in. This turned out to be quite good because much of the trip included wading through waist deep water, so being in shorts meant there was less to get wet.

End of the trip was very tired. Took quite a long time." "12 hours"

5th August SC3 to EDF Tunnel

Team: Brian Clipstone, Dave Dobson, Andy Dobson.

An account of this party's trip forms a separate article by Andy Dobson on page 36.

6th August SC3 to EDF Tunnel

Team: Richard Sore and Gareth Davies.

"A much anticipated trip. After the usual set-up of vehicles which necessitated Richard sleeping in the control tent (his van at EDF), an 08:20 start was had with Alan kindly dropping us off at the village of PSM at 09:05 for the walk up. With no map & lots of cloud SC3 was found & underground we went for 10:15am an excellent series of abseils was had with Richard leading the way & 75mins later we were in the streamway. Ropes were a bit dry & slow otherwise all well. A further 75min of caving in Mendip style passage we arrived at the waterfall at Tete Sauvage. Route finding at this point was straight forward by use of a compass (cave runs almost continually W) & small survey. Fairly easy caving but with a lot of gaining the water then leaving it to avoid getting to wet. At the point we were feeling very confident & wondering what others were having issues we got lost – cave taught us a lesson. General feeling is in places there are an excess of markers & in others not enough. We found an old camp site & slid down a rope & up another before finding a sump with water flowing W so we followed it for some 300m in water that at times was over our heads & cold. The river passage ended at another tight rift sump as opposed to the big clear one we'd just left. After a rather cold 15min trying to find a dry exit we turned around as Richard was shaking & Jibbering wreck. Fortunately whilst swimming back he noticed a break in the passage wall & Gareth was happy to climb up to get out of the cold water. After 40/50m of dry passage a marker was spotted & a loop of infinity soon led to the rubber rings after 15mins of caving. After this a fast pace was maintained to warm up – Gareth had lost 'rock, paper, stone' to return the tyres. An uneventful exit was had through big stonking passage & red rose were met in Salle Chevalier who were lost. After showing them the way out we raced off & exited at 19:08pm Just shy of 9hr mark very happy but slightly annoyed at Nav error."

De-kitting, de-rigging trips

7th August Tete Sauvage to EDF Tunnel

"Top quality or 'Well Tidy' trip thro' the fine geological diorama that is the PSM. 1 ½ hours down Tete, into the 'canyon' and just enjoying the caving. As this was the second trip thro' the cave we were able to enjoy the scenery more than before, and even ironed out a few 'glitches' on the way encountered in the previous trip. At the 'Tunnel de Vent' we managed to take out a good percentage of the tubes and other kit, before embarking on the trip out 2-3 hrs later we arrived at the Verna all lite up for the tourists – what a huge dammed space!"

8th August EDF Tunnel to Tunnel du Vent

Remove Equipment. *"TEAM BANANE"* - Gary, Ben and Josh Vaughan.

"We entered the cave at 10:15 and set off up the system at a steady pace The progress was uneventful until we reached the etrier just below Salle Lepineaux. Surely all of the sound of tumbling scree and rocks indicated another group approaching. None was forthcoming. We plodded up the scree slope straining our ears for sound of the 'other party'. They were obviously not coming out of the cave so ergo we presumed the early tourist bus had delivered some 'speleos' moving at a good pace ahead of us. We topped the climb in Salle Lepineaux—nobody in sight!!! It was then that another avalanche of loose rocks cascade from high above our heads smashing onto the floor and sending scree running this way and that! Our mystery cavers was in fact just the Lepineaux shaft doing its thing! The added moisture from the previous days rainfall had obviously made things a little interesting needless to say with loose rocks falling from above every 15 seconds or so we did not stay long at the top of Salle Lepineaux. We pressed on to Salle Navarra and without incident to the Tunnel du vent arriving just before 13:00pm. Josh and Ben set about deflating the remaining inner tubes on the downstream shore whilst I borrowed the CSCA boat and crossed the lake to retrieve the small yellow tackle sack with footpump and puncture repair kit....."

..... Exited the EDF tunnel at 15:30, would have been a bit earlier but Ben took a nasty fall knocking his shin in the river passage above Salle Verna. Progress after that point was a bit slow. Total Trip time 5 ¼ hours."

8th August De-rig SC3

Support Team: Dan Liddy, Jules Carter, Dave Coulson, Phill Thomas

"Met TS thro' trip – who were derigging SC3 on way up – and placed ourselves at useful points in cave to take bags of rope out. All went surprisingly well!"

Through-trip Team: Richard Sore, Gareth Davies, Velma Aho, Morgan Specht.

"Walked in, dropped bags at Tete Sauvage and headed down. What a fantastic cave! Ladders added lots of interest, dropping my tackle sack part way down a pitch was a mistake (IDIOT!!) and the "duck" wasn't so bad."

"Getting from Tete Sauvage to SC3 was fun! Gareth (as usual) set a ferocious pace! I contributed by saying "This looks very familiar" every few minutes & then crawling off in the wrong direction by myself."

"(Interesting side note -> I followed a drafting crawl a few hundred metres to a river. It was way-marked every 5 – 10 metres, well worn & looked like 'the way'. Where did it go??)"

Gouffre Bechanka

Rarely does a cave have so many alternative names. Bexanka is the Basque rendition, Bechanka the French, and it is variously a 'Grotte', 'Gouffre', Abîme or Aven Géant. To cap it all, some references use 'Bexanka Ko Leccia'.

The cave lies to the north of St Engrâce, off the D149 near the hamlet of Cihigue. The 25km drive takes about 40min but is worth the trouble. At least four parties made the trip and found the cave both interesting and photogenic. The account for the 5th August trip gives a good description of the approach to the cave. John Cliffe's article (pages 26-28) includes mention of his trip.



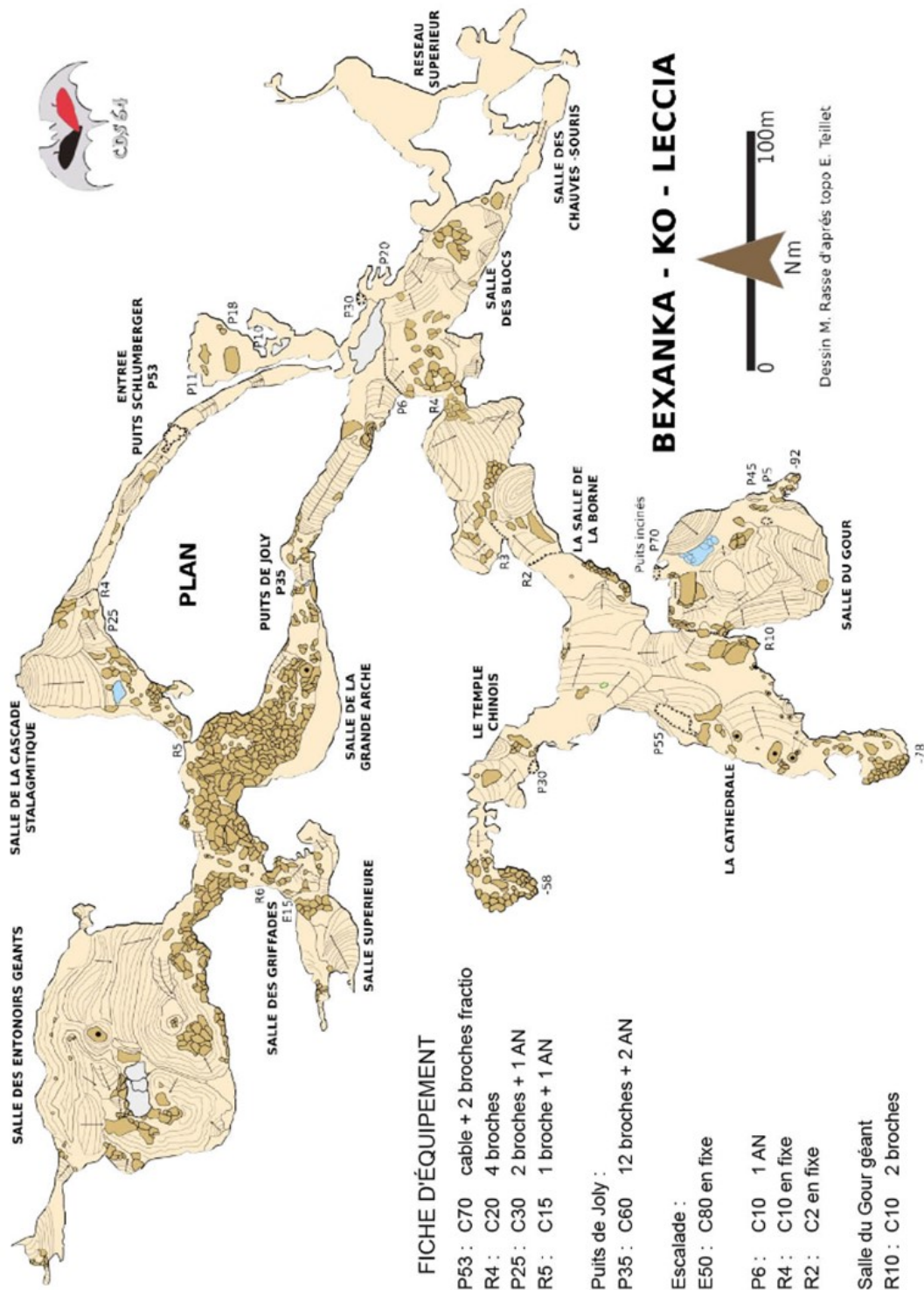
Above map copied from Pyrénées-Atlantiques Departmental source at:
http://www.pyrenees-atlantiques.gouv.fr/content/download/24145/157249/file/Nouveau_p%C3%A9rim%C3%A8tre_Carte%20n%C2%B08.pdf

5th August

Team: Velma Aho, Stuart Bennet, Jules Carter, Gareth Davies, Richard Sore

"Located as shown on IGN map, take road from Cihigue, turning soon into gravel track. Heading uphill, a 'propriété privée' sign is found – park just after, opposite a stone post box." (This is in the vicinity of the 397m spot height on Map above.) "Change & follow track steeply uphill, along two concrete sections. Leave track as obvious horizontal path appears – track continues right to a house. Horizontal path goes through fence/gate; turn right steeply uphill once in open field. When wood to right peters out, ascend to right through bracken, for ~ 50m, to wooden shack next to entrance. Fine entrance pitch needs rigging from boulder belay & hangers on cable at top. Rebelay (P-bolts) ~ 30m down. The rest of the cave has good rigid ladders or hand lines, though a short rope (10m) might help on some muddy slopes, THE EXCEPTION BEING Puits de Joly: the ladders stop at a broad ledge 15m from the floor. Take a 25m rope & ~ 4 maillons for this.

Salle Des Entonnoirs Geants has excellent cauliflower formations & is very big. Looking out across the roof from the top of the slope is good too. Salle des Griffades is gained by a slightly exposed climb, and could be omitted. Likewise, Salle des Blocs need not take too much time. On the way to La Salle de la Borne there is a fine streaked cone of flow; worth a look. Le Temple Chinois is very good – keep going through a small section to reach fine helictite grottos (on the left after the constriction). La Cathédrale has an enormous column & several 'organ-pipe' formations. Salle du Gour is reached down a hand-line climb – back from, and to the right of, the window looking into the Salle. The fossil pool & flow formations are magnificent."



The origin of this survey uncertain. It is very widely reproduced across many websites.
Our thanks to the original surveyors.

Evan Cooper in one of the well-decorated chambers in Gouffre Bechanka.

Photograph: Clive Westlake



7th August

Team: John Cliffe, Evan Cooper, Becky Specht, Morgan Specht, Phill Thomas, Clive Westlake, Josh Young

The change in gorgeous sunshine with excellent mountain views put us all in a good mood to start the day..... until we realised it was all rather steeply uphill from there. A short while lost in the woods eventually led to the cave, all credit to John's map reading skills.

The trip would be worth it just for the entrance shaft. A long descent off a steel cable provides an excellent vantage point to enjoy the tall mossy formations. This drops onto a rocky slope where you can lie down and watch the rest of the team following. We immediately followed the glorious leader Clive in precisely the opposite direction from where we should have gone. (Naturally, all blame was placed on the description).

Trudging back up the slope and into the cave took us through some large muddy chambers which, as someone pointed out, would have been rather impressive had we not all done PSM & La Verna just a couple of days previously.

In no time the dodgy ladders (with far too many missing rungs for my liking) of the puits de Jolie were found. I shot down, then rigged the pitch significantly less quickly. A long slog up the far wall marks the beginning of the really interesting speleothems. The path leads down, around, over, under, & through a variety of stalagmites and streaky flowstones before, at the end, the piece de resistance. The cathedral contains a never ending supply of enormous sparkling formations.

Here we heard the dreaded sound of Clive opening his camera box.

An hour or so later and we set off out, involving a few fun rock slides & several uphill clammers. Clive and Phill had waited back for a snack break so the rest of us found ourselves under the open entrance pitch well ahead of them. Up we went, one at a time, until we were huddled in the shack out of the approaching thunderstorm.... and no-one at the bottom. Where were the other two? Evan ended up biting the bullet and went back to search for them. Despite having a survey, compass, description, and at least 80 collective years of caving experience, they had completely missed the entrance.

Soon enough we all made the trek back down through the cow fields, and making the drive back through the french countryside after an excellent & entertaining day out."

8th August

Team: Tony Baker, Bob Hall, Lilo Hòekèr , Martin Hoff, Paul Tarrant

".....We visited most of the cave..... A good place to perfect photographic techniques."

9th August

Teams: Brian Clipstone, Andy Dobson, Dave Dobson; and Jill Brunsdon, Martyn Farr, Helen Stewart, Malcolm Stewart

After a trip similar to those described above, the following observation may be helpful to those who follow:

"We got very hot & all took our oversuits off during the trip – if you don't mind getting a bit of mud on your undersuit just wear that. No need for SRT between the pitches – easier to dekit & re-kit. Also only after rope climb up slope (hand jammer handy) no need for SRT kit after this – ropes are so knotted you cannot SRT them & perfectly OK as handlines."



Lilo Hòekèr appreciating another beautiful chamber in Gouffre Betchanka. Photograph: Tony Baker

Practical Considerations

Gary Vaughan

Booking A Slot in the PSM – Where to start and where to end up.

I started to book the July 2017 trip by e-mail dated 29th July 2016. Access to the area is managed by L'Association de Recherche Spéléologique Internationale de la Pierre St Martin (ARSIP). I had tracked down the ARSIP portal on the internet and downloaded the e-mail addresses for Mathieu Rasse and Michel Douat. I recognised Michel's name as being the contact from the 1995 expedition. ARSIP website and filled out



Visite des cavités du massif Pierre Saint Martin / Larra

Demande d'insertion au planning

EQUIPE Nom du groupe: South Wales Caving Club Responsable: Gary Vaughan Nb. Presonnes: 25 Adresse postale: 419 Wimborne Road East, Ferndown, Dorset, BH22 9LZ E-mail: gary@dorsetland.co.uk Téléphone: 4.47837E+11		SEJOUR Dates de séjour souhaitées: 29.7.2017 Lieu d'hébergement prévu: 12.8.2017 Assurance spéléo FFS: <input type="checkbox"/> Autre: <input checked="" type="checkbox"/> Si autre, précisez: British Caving Association and Private international caving insurance - Snowcard Contact à prévenir en cas de besoin: Son téléphone sur site: Autre lieu:	
Traversée PSM Tête Sauvage - Verna Equipement fixe: <input checked="" type="checkbox"/> Rappel des cordes: <input type="checkbox"/> (le brochage en place permet les 2 types d'équipement) Date équipement: 30.7.2017 Date déséquipement: 9.8.2017 Reconnaissance préalable Verna - Tunnel du Vent: <input type="checkbox"/> Date:		Visites via le tunnel de la Verna Grandes salles PSM: <input type="checkbox"/> Jusqu'à: Galerie Aranzadi: <input checked="" type="checkbox"/> + aval PSM: <input type="checkbox"/> Arphidia / Trou du Robinet: <input checked="" type="checkbox"/> (Ces visites se faisant via le tunnel de la Verna, il est indispensable d'être en possession de la fiche de passage pour obtenir la clé du tunnel)	
Traversée PSM SC3 - Verna Date équipement: 30.7.2017 Date déséquipement: 7.8.2017 (le brochage en place est prévu pour un équipement fixe) Reconnaissance préalable Verna - Tunnel du Vent: <input type="checkbox"/> Date:		Autres visites sur le massif PSM / Larra Conné Peyret via GL 102: <input checked="" type="checkbox"/> via GL 4: <input type="checkbox"/> Gouffre du Couey Lodge: <input checked="" type="checkbox"/> Gouffre des Bourruques: <input checked="" type="checkbox"/> Autres (précisez):	
Espace pour vos messages Cher Mathieu et Michel En 1995 SWCC apprécié deux semaines à explorer le système PSM. Maintenant, 22 ans plus tard, le club souhaite revoir le système et répéter certains des voyages qu'il a entrepris en 1995. Le leader du voyage 2017 reste la même personne qui a organisé le voyage 1995. Je serais très reconnaissant pour votre aide dans l'organisation de l'accès au système pour la période 29e Juillet - 12ème Août 2017. Merci.			

Envoyer cette fiche par mail à Mathieu Rasse : cds64@ffspeleo.fr avec copie à Michel Douat : mcm.douat@wanadoo.fr

I started to chase this down in September 2016 and was grateful to get what I considered to be an early reply to my enquiry on the 6th September 2016 which, translated, read as follows:

"Your request has been registered. Please contact us again in the spring for details of your explorations. Caving friends Mathieu."

I interpreted this as a green light, we were in effect good to go. Game on!

On the 21st July 2017 I received the following, translated, e-mail from Michel Douat.

"Objet : planning traversées PSM 01/08/2017 – 12/08/2017"

Attached is the planning of "Traversées de la Pierre Saint Martin" from August 1st to August 12th.

You are 5 teams. See: <http://arsip.fr/calendriers-des-activitees/>

Please contact us and decide how you will organize the Tête Sauvage equipment. There can be only one rope per shaft for safety reasons."

Planning des traversées PSM 01/08 - 12/08/2017

Groupe / Team	Contact	01/08/17	02/08/17	03/08/17	04/08/17	05/08/17	06/08/17	07/08/17	08/08/17	09/08/17	10/08/17	11/08/17	12/08/17
South Wales Caving Club	Gary Vaughan gary@dorsetland.co.uk												
ESD 77	Bernard Vidal bvidal77@free.fr												
Explo Terre	Laurent Festor l.festor@montpellier.aeroport.fr												
Aventures 78	Laurent Moysset laurent.moysset@fenwick-linde.fr												
Red Rose Cave and Pothole Club	Steve Gray steve@gocaving.net												

Later on the 21st July I replied to all parties and during the week that followed coordination between the SWCC, RRCPC and the three French clubs was established. The PSM was going to be a busy place!

On the 27th July 2017 Michel Douat sent one final e-mail, the attachments to which are perhaps the most important information for anyone planning a trip to the PSM. They included rules, below, and the all-important permit.



Road, tunnel and la Verna chamber: access rules for the cave

La Verna chamber was opened to the public on 01/07/2010. Cavers are asked to behave like gentleman towards the visitors and come in groups of maximum 10 people.

Caving associations and clubs are allowed to use the road and tunnel leading to La Verna, providing they respect the following conditions (as stipulated in the municipal by-law of 18 June 2008):

- ☐ Contact in advance the coordination ARSIP. Download file « *demande d'insertion au planning* » in: <http://s391384129.onlinehome.fr/arsip/index.php/agenda-des-activites-speleo.html>
- ☐ Insure all participants for caving and the risks involved
- ☐ Fill out, sign and depose the ARSIP form before collecting the key to the tunnel-entrance in « *Auberge de la Verna* » in front of the church in the upper village of Sainte Engrâce.
- ☐ Respect the rules concerning the road, tunnel and caves.

Rules concerning the road, tunnel and PSM caves :

- ★ Caver's vehicles must be parked on the high point of the access road just before it descends into Arphidia ravine (position: UTM WGS84 : 30T 679.455 E 4761.557 N). Beyond this point vehicle-access is forbidden. See map. Controls are frequent. Please leave the authorization given to you by the Arsip ("fiche de passage") behind the windscreen of each car. It must be well visible.
- ★ The bus and other vehicles carrying visitors to the cave for the SAS La Verna PSM have priority on the entire access road.
- ☐ Entrance by the tunnel: if a group of visitors is waiting please contact the guide. After opening the door, leave the key behind the little statue of Santa Barbara (to the left, above the entrance). Other cavers might need it to go in. Once everybody has entered, close the door. Don't use the tunnel lights.
- ☐ Exit by the tunnel: the door opens by pushing on the lower bar.
- ☐ Respect the other visitors. Close your lights if asked by one of the guides. Don't use flashlights during tourist visits.
- ☐ Respect the hydro-electric installations of the SHEMA and the interdiction to circulate on them.
- ☐ Don't use pyrotechnic lighting (flares) in the cave.
- ☐ Don't leave any rubbish: everything that you have taken in must come back out and be brought down to the valley.
- ☐ Don't leave equipment in place in the most visited parts of the cave (La Verna and other big chambers).
- ☐ Aranzadi climb : the ropes in place are meant for belaying with a jumarc. Climbing must be done on the rocks, not with the rope. Do not use a descender on these ropes: use your own ropes for going back down.

★ *The rules starred above are explained in more detail by Tony Baker on the following page*

I did e-mail the Salle de Verna showcave company separately on the 20th April 2017. They responded very quickly on the 21st April with the following.....

"Dear Mr Vaughan,

Access through the EDF tunnel is free for cavers (providing you're member of a club and have insurance). You do however, need an authorization to use the road, and are not allowed to use the last stretch, along the Arphidia ravine. The ARSIP provides the authorization. With this, you go to Burguburu, the little bar/restaurant/ hotel opposite the church and they give you the keys. When using the narrow access road during visiting hours please make sure you always follow one of our vehicles ; this avoids difficult crossings.

Best regards, Marco Van der Kraan SAS La verna PSM"

All in all, I found the communication with the regulatory organisations in France to be good and friendly. A certain amount of patience is required at times but everything seemed to work well. The other visiting clubs all met up with us on the campsite, some bearing gifts of wine and some bearing gifts of beer. I found the level of collaboration to be excellent throughout and would not hesitate to collaborate with the same organisations again. I hope the above information is helpful.



Access to and from the EDF tunnel via road

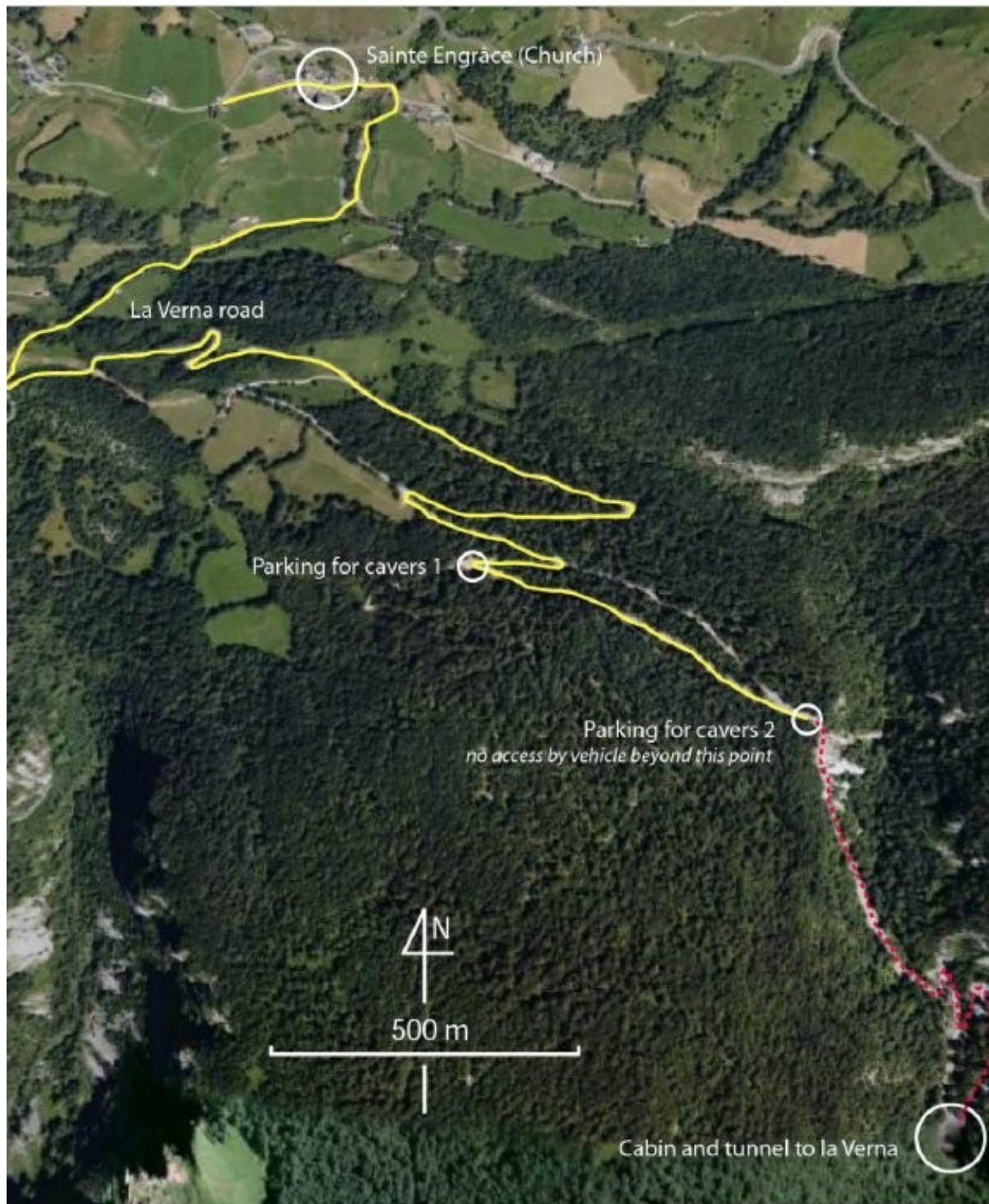
Contributed by Tony Baker

When SWCC went to the PSM in 1995, access to and from the EDF tunnel was via a steep zig-zag track that climbed up the side of the valley from the road. It was a steep and tiring hour-plus walk up, especially with caving gear, and a seemingly never-ending descent after a long through-trip. Since then the Salle de Verna has been turned into a showcave and the operators have built a single-track concrete road that their minibuses use to take visitors from the showcave office in the nearby village to the EDF tunnel and back again. The showcave staff are remarkably welcoming to the caving community and are happy for cavers to use the road, but there are strict rules on this that must be understood and observed. There are virtually no passing places on the several miles of concrete road and you must avoid a situation where you come face-to-face with a showcave vehicle travelling in the opposite direction. This means you can use the road in either direction early in the morning (before the showcave trips begin) or in the evening (when they have finished), but during the hours of operation you *must* follow a showcave vehicle up or down the track. As a courtesy all cavers should start by calling in at the showcave office and announcing themselves, and the staff will give you a full briefing about use of the road and about parking. You will be asked to wait for the next vehicle to go up and to follow it, and to use one of the two designated parking areas, both of which are a 10-15 minute walk from the cave entrance. Parking elsewhere is a real no-no. If you exit the cave via the EDF tunnel during showcave hours, you are asked to wait in your car until a descending vehicle goes past and then follow it down. At busy times the showcave vehicles' trips up and down the hillside are carefully synchronised, so even if you think you are just a few minutes behind a descending minibus you might meet another on its way up. Disregarding the rules could jeopardise cavers' continued access to the EDF tunnel and undermine the goodwill that exists between the showcave and cavers.

As an aside, it is highly recommended to visit the Salle de Verna while the showcave is in operation and the lights are on. The lighting has been done sympathetically and an interesting added touch is that mannequins dressed in caving suits have been positioned around the chamber, which helps give an impression of the scale of the place. Having been to the Salle de Verna before the lighting was installed, I can assure you that it's impossible to fully appreciate the place with just caving lamps.

TIP: In advance of a through-trip it's worth parking a car at the designated parking place, near the EDF tunnel, the evening before. Once the showcave operation has finished for the day you can take two cars up the road, leave one ready for your exit next day and get a lift back down in the other. (Or, as I did, take a bicycle up in your car, leave the car and cycle back down to the campsite.) Just don't forget to take your car keys on your through-trip! This is preferable to shuffling cars first thing in the morning.

Access to the EDF Tunnel Explanatory Plan



Cave Rescue Information

In case of accident phone:

06 20 65 74 59 or 06 88 58 99 83 (Spéléo Secours des Pyrénées-Atlantiques
or 112 or 18

Or 08 00 121 123 (Spéléo Secours Français)

Booking a campsite for the PSM.....

When it came to booking a campsite we had insider knowledge based on our experiences in 1995. The campsite at St Engrâce had served us well in 1995 and although it was a bit of drive to get up to the ski station, access to the EDF tunnel was a short fifteen minute drive. I started the booking process with the campsite on 20th September 2016 and was most pleased to receive a reply four days later confirming our request.

On the 3rd July 2017 I received the following from Camping Ibarra...

“Bonjour . Je viens vers vous car je voudrai savoir à peu près combien de personnes il y aura dans votre groupe du 29 juillet au 12 aout afin de savoir combien d'emplacements nous devons réserver . Merci . A BIENTOT . M ERRECARRET ..

Hello . I come to you because I want to know about how many people there will be in your group from July 29 to August 12 to find out how many locations we have to book. Thank you . SEE YOU SOON . ERRECARRET ..”

On the 5th July I replied as follows.....

« Cher Maryse, Voici les noms et les dates de séjour au camping.

Il pourrait y avoir une certaine variation à ce moment-là, mais nous espérons que la liste vous donnera une bonne idée de l'espace dont nous aurons besoin.

(Here followed a list, with dates, of 37 potential campers.)

Meilleures salutations

Gary »

A word of warning. Although St Engrâce is up a little bit of a backwater and not exactly the centre of the universe tourism wise, this campsite is quite popular. It is very well run, clean and tidy and obviously used as a base by a good number of caving clubs working in the area. With hindsight I think we were lucky to get the space that we had. We were also lucky that it didn't rain (hard) during the fortnight as not all of the pitches are free of the risk of water pooling on the surface in times of wet weather. The owners of the campsite are a super-friendly, lovely couple who seemed to go out of their way to look after us. We were offered all sorts of fridge space and electricity charging facilities in the basement garage beneath the main bar. I would not hesitate to use this campsite again and I would strongly recommend it to other groups planning trips to the PSM.

The reader is referred to page 18 of SWCC Newsletter 117. Here they will find a sketch-map of the campsite. Little had changed in 22 years, although our pitches in 2017 were a little closer to the site entrance. (And the outdoor urinals are still right next to the sinks!) Ed.



Camping Ibarra. Photograph: Tony Baker

Managing Expectations. How to co-ordinate forty people – Dream on!

Those familiar with SWCC trips over the past thirty years or so will by now have gained an appreciation for how it works. The planning starts with a main meeting held each day at about 8.00pm ish. Plans and aspirations are discussed and we gently try to tease out of everybody what they hope to do the following day. Nobody gets told what to do and nobody gets asked to do something that they can't do or don't want to do.

If the weather is nice everyone brings a fold up chair and we sit in the sun drinking beer (or wine) and work out what we have achieved so far and then what needs to be achieved over the coming days. The two main areas for discussion are what I call 'house keeping', the day to day stuff that keeps the group fed, stabled and watered. If we have a broken part, who can get it fixed? If we are missing a key component, who can source it?



A typical 8pm meeting gathered at the control tent. Photograph: Gary Vaughan

The other main talking point at the evening team talks are the plans for the following day's caving, walking, canyoning, climbing etc. Groups emerge, morph and alter, to try and ensure that everyone who wants to do something the following day can fit in somewhere. Mission critical tasks such as rigging a shaft or de-rigging a shaft get discussed first. Mission critical support roles such as sherpas and drivers get tacked on to the plans as and when we have a clear idea who the crew for the task are going to be. Anyone who wants a quiet day lounging in the campsite is under no obligation to take on any particular task. Generally speaking, people taking a day off caving are usually very helpful with house keeping tasks, and that level of support is important in keeping things ticking along.

There is quite a bit of infrastructure in the setting up of camp. We always try to have a control tent with mains lighting, dining tables, benches and cooking rings. My impression is that on this PSM trip all of these facilities were quite well used, which gives me a certain amount of pride in the way SWCC does the clockwork caving thing.

Looking to the future, I can see that there might not always be a socking great Transit van to lug steel poles and canvas around Europe. We might not always have the spare capacity to move wooden benches from Penwyllt to Tête Sauvage. The Speleo Club Avalon were pitched up next-door to us on the campsite and were sporting some modern-style meeting equipment, large tents with zip-in-zip-out side walls and collapsible light-weight tables and benches. Perhaps a consideration for the next ten years of overseas caving equipment is some lighter weight gear?

A personal view of Pierre Saint Martin 2017

John Cliffe

"I did not know how long I had been down. It would have taken a slight effort to disengage my watch from the three sleeves that covered it, and the effort seemed not worthwhile. It was cold; or rather, to be exact, I was cold."

These are the words used by Haroun Tazieff in his account of the first descent into the caves of Pierre Saint Martin (PSM) in 1951 in his book *"Caves of Adventure"*. To a lesser extent, they could apply to me. I am wet from crawling through a duck and wading in waist deep water and now we have stopped in the Galerie des Marmites in the middle of a seven kilometre through trip of the same cave system. I am cold. Martin Hoff, Bob Hall, Clive Westlake and I have just caught up with another South Wales Caving Club (SWCC) group -Martyn Farr, Jill Brunsdon, Helen & Malcom Stewart and Phil Thomas at a short but awkward pitch, hence the wait.

A trip like this is of Alpine proportions and is a worthy destination for the SWCC expedition 2017. This is only the second of their biannual summer expeditions that I have attended (The other was a trip to the bottom of the Gouffre Berger in 2007.), although I have been a member of the club for about 30 years. Work always seemed to get in the way of summer trips, but now I am retired I have the time but am far less confident of my stamina for such things – hence the slight worry about the cold.

About 40 SWCC members and friends arrived a few days ago and are camping in Saint-Engrâce in the French Pyrenees. The first few caving trips were to rig two shafts at the top of the system, Tête Sauvage and SC3 (also known as Gouffre du Beffroi) and to place inner tubes to be used as "boats" at the Tunnel du Vent about halfway through the system. Here the stream narrows into a deep 50m long lake, which would need to be crossed on any through trips.

In an attempt to provide hydroelectric power in the valley, the EDF (The French National Electricity Company) tunnel was blasted in the late 1950s to capture the stream in the system. The attempt failed but the 700m tunnel intersected the Salle de la Verna. A truly massive chamber. (It is claimed to have a diameter of 250m, a height of 194m, a surface area of 5ha and a volume of 3.6 million cubic metres. (Wikipedia report that a hot air balloon for 4 people was flown in it in 2003.)) This chamber is now a show cave but trips are fairly limited. Clients meet at the bureau in Saint-Engrâce and are transported by minibus up a narrow road to the locked steel door. Cavers can obtain permission to use the tunnel but are required to time their car journeys up and down this narrow road to either be outside the show trip times (before 09:30 or after 19:00) or to closely follow the minibus. This is to prevent vehicles meeting whilst going in opposite directions, which would annoy the show cave staff and disrupt their schedule.

I was one of a party of twelve who followed a minibus, parked where asked, some distance from the cave entrance, and walked up with an inner tube in my tackle bag to the EDF tunnel. It enters near the bottom of the system and all being well would be the exit for through trips. Some of the party had been on the previous club expedition to the PSM in 1995 and would also use the trip to refresh their memories. Most, though, were going into the cave for the first time. The door has a small grill in it from which came a cold, noisy wind. I opened the door and the wind turned to a gale and the noise to a roar. It takes a very determined effort for one person to shut it again on their own.

The advantage of going into the Verna when the show cave lights are turned on is to appreciate the staggering size of the chamber. When coming out they were off and even the strongest lights in the party barely showed the opposite wall.

Although the Verna is the largest, it is not the only big chamber in this system. From the end of the show cave (which is really just the one chamber) the route is varied and at times confusing. Our party (now ten – Cheryl and Denise only went to see the Salle Verna) became separated and the correct way on was lost for a while. After finding each other again and exchanging a few words about keeping together we then found the right way on from the streamway up an awkward climb in a slot using an in-situ handline. Above this was the 380m x 60m wide Salle Chevalier, another massive chamber where we came across a French party who appeared to have gone wrong as well. If it were not for the markers (red and white tape, reflective tape, cairns and other bits and pieces) progress would be slow and problematic. Even with the markers it was all too easy to get disorientated. One can only imagine the difficulty that the first explorers had with carbide lights and no way-markers to help. There was no bottom entrance in those days either. We climbed up to the top of the Salle Chevalier where the roof lowered to meet the stream again and the passage narrowed. Here the wind is strong again and the way on is to partly crawl along some ledges above the river to avoid getting wet; with the air temperature around 5°C it is worth staying dry. The narrowing leads into the large Salle Adelie and then the larger Salle Queffelec. At the end of the Salle Queffelec you arrive above an 8m drop into the Metro. This was already rigged but we had only brought cowstails with us. We could have abseiled down but we needed to return this way. Gary Vaughan said that on his previous trip to the Tunnel de Vent (in 1995) no SRT was required and that up on the other side of the passage there was a scramble down. We found this and Gary made his way across this loose boulder slope with a significant drop falling away to the right and said it was OK. It was OK for him and some of the party but certainly not for all. We did however have some polypropylene rope with us, which we were going to use to put a line through the Tunnel de Vent, and we improvised a traverse rope. This felt a bit more psychological than a real safety rope. I had to hold the far end of the rope on a pointy rock that acted as an anchor whilst coaxing the more nervous across. (On the next trip this rope was replaced with a proper caving rope and a spit anchor.)

The Metro is about 600m long and 30/40m wide with the river showing in the boulders in the bottom for most of this. The route is along the right-hand wall until a boulder slope leads up into Salle Loubens. We had been going for some hours by now and the effects of the size, distance, ups and downs and the mostly very uneven floor were beginning to tell. We were not sure how much further we still had to go to get to the Tunnel de Vent, knowing that we would then have to retrace our steps. Anyway, Salle Loubens led to Salle Casteret and Salle Lépineux (all big boulder chambers). Salle Lépineux is the site of the first entry into the system via the Lépineux Shaft, a large slot in the roof of this cavern, in 1951. The explorers used a winch on the surface to lower cavers down this shaft for over 350 metres. The following year a larger group returned with a purpose designed electric winch with the intention of exploring the system further. Whilst being winched up, the cable or its attachment to Maurice Loubens' harness broke and he fell to the chamber floor, to die many hours later without regaining consciousness. (Haroun Tazieff's book *"Caves of Adventure"* is an account of these two trips and is well worth reading.) There is a memorial to Loubens in Salle Lépineux on a large boulder. From this memorial our route goes up a steep boulder slope for some way then levels off before coming to a 10m drop down a wall with a rope in situ. Although some used SRT kit on subsequent trips it was an easy climb and I found it quick and easy just to scramble down it with the rope as a handline. (Interestingly, on the following day another SWCC party arrived at this climb from the bottom on their way in without knowing how! They eventually abandoned their trip to the Tunnel de Vent because they could not find the way.)

The next section, Salle Navarre, is confusing and the most complex part of the trip. However, using the markers and a little trial and error, it led us to the Tunnel de Vent. (In 1985 ARSIP (the association devoted to the exploration of the PSM), became so fed up with rescue call outs due to lost and overdue groups that they took out the proliferation of old markers and put in new ones to properly guide the way.)

Due to the restricted nature of the passage at the appropriately named Tunnel de Vent, the wind was again strong and felt icy cold. Although we hadn't been in any water on our trip, my furry suit was wet due to sweating and it didn't take long to feel very cold. It wasn't too bad whilst blowing up inner tubes using the pumps we had taken with us, but when sitting around it was freezing. I stripped off and put another dry fleece layer next to my skin and sheltered out of the wind to make it bearable. Once the tubes were inflated and a volunteer had taken all of them to the other side of the lake for use by later parties on through trips (bar the one he needed to return to us), we set off out.

We had climbed about 350m up inside the mountain and covered about 3.5km and hoped the return would be quicker. With all the ups and downs and scrambling over boulders, it didn't take long to warm up again so I stripped off the extra layer and then trudged out to arrive at the entrance 10 hours after going in.

Now where was I when I started this account? Oh yes, cold in the Galerie des Marmites on the through trip waiting to climb a pitch. That morning Martin Hoff, Bob Hall, Clive Westlake, Cheryl Cliffe and I had left the campsite and driven up to the ski area of the Pierre Saint Martin and walked from there to the entrance to the Tête Sauvage. We had recovered from the previous trip to the Tunnel de Vent, and chosen today as a French party had negotiated to use our ropes the day before for their trip. I was not pleased therefore to find that not only were we behind another SWCC party who had left earlier but there were French voices at the head of the first pitch. I felt we could be in for an epic. After saying "au revoir" to Cheryl we set off into the Tête Sauvage. It is 384m deep descended in about 12 pitches. Most come one after another but with some short narrowish meanders in places. It does however feel a fairly friendly place with none of the pitches too long or the rebelayes and deviations too difficult, and certainly on this occasion no significant water. An unusual feature of this descent is the "parrot ladders" on the top 180m used by early explorers. These have a central pole with rungs going off each side – a bit like parrot ladders! -and are best ignored when SRT-ing.

In fact, we were not held up at all by the French party and only met them at the bottom of the pitches where they were changing into wetsuits. We would have benefited from these because as soon as the pitches finish there is a short duck (La Soupirall (basement window)) to crawl through, enough to get a good soaking. Whilst Martin, Bob, Clive and I were gathering in the Salle Cosyns just after the duck, the French party overtook us and then delayed us at the first obstacle on the route downstream. It was a fairly easy scramble up a loose slope equipped with a rope, into a bypass to avoid a deep pool. Fortunately, not long after, we overtook the French and did not see them again for the rest of the trip. The streamway from Salle Cosyns to the Tunnel de Vent is 3.5km and to be striding along it is a tremendous experience, sometimes walking in the streamway itself as in the Grand Canyon, traversing, climbing and descending (sometimes on in-situ ropes) to avoid the deep water sections or sumps, as in the Galerie des Marmite and Grand Corniche. There was one short abseil into a lake that was chest deep, which proved particularly entertaining!

It was a relief to reach the Tunnel de Vent with known passage to the cave exit beyond it. The float through the lake was straight forward for me with just a bit of my bum in the water. However, the others didn't like the relative instability of sitting in a tube, leaning back with legs hung over the front, so they used them as floats under their arms and around their chests. This struck me as a very cold way of doing it, especially for Bob, who took the tubes back for Martyn, Jill, Helen, Malcolm and Phill, who were now behind us. In all Bob went through three times in this fashion and paid for it shortly afterwards when he began to feel ill and thought he was suffering from hypothermia. Martin boiled up water for a water bottle which we stuffed down the front of Bob's caving suit, but we kept going slowly with Bob carrying a lightened load. We were very grateful for the way-markers, which worked well for coming out. It was with a great sense of achievement but mainly a sense of relief that we came out of the EDF tunnel into the warm evening, 12 hours after we entered the Tête Sauvage 909m higher up the mountain.

Tête Sauvage, or SC3?

Tony Baker

SWCC has visited the Pierre St.Martin system twice, in 1995 and 2017. In '95 we did through-trips descending via Tête Sauvage, and in '17 we rigged both Tête Sauvage and SC3. This article is intended to give some guidance for cavers visiting the PSM as to which through-trip might suit them best. The author has done three Tête Sauvage – EDF tunnel through-trips (two in '95, one in '17) and one SC3-EDF tunnel traverse.

First things first

You're planning to visit the PSM, you might even have dates booked, and of course you want to do the classic 'through-trip' – abseil in from one of the upper entrances, explore the system and emerge from the bottom end via the EDF tunnel, a mined entrance created in the 1960s by the French energy company who were looking to exploit the river in the Salle de Verna for a hydro-electric scheme. So which top entrance should you use? I'll come to that in a minute, but there are a number of very good reasons for entering the cave via the EDF tunnel before even starting on your rigging (or thinking about a pull-down through-trip).

The main reason for going in the bottom end first is that the lower section of the through-trip takes you to some of the most truly spectacular cave passages in Europe, if not the world. Trust me, you really don't want to be seeing the Salle de Verna, the Salle Chevalier, the Salle Adelie, the Salle Loubens, the Salle Lépineux or the Metro for the first time in the early hours of the morning after an epic through-trip of twelve or fifteen hours of hard caving. You really need to go and explore these places with no time pressure, to stand and gawp and contemplate the awesome forces of nature that created them. For those cavers inexperienced in SRT or not inclined to do through-trips, a trip to the Tunel du Vent and back is highly recommended.

Another very good reason for going in the bottom end first is route-finding. Look at the survey and you will see that there is only one main passage, split into numerous chambers, that leads from the Tunel du Vent to the EDF tunnel. Where could you possibly go wrong? The answer is: all over the place. Some of the chambers are so vast that you can't see the walls in any direction, even with the benefit of modern cave lighting. The best route through is usually way-marked, a strange sight to British eyes but one that makes perfect sense when you're there. But it's very easy to go wrong – more than one SWCC party has gone around in a circle while attempting to navigate out of a through-trip. At the end of a long trip this is very demoralizing. A familiarisation trip has a lot to commend it. When you're stumbling out, hungry and cold with tired legs, recognizing a landmark or spotting the base of a familiar climb is a huge psychological boost.

A trip in to the bottom end of the cave can also be used to experience the Tunel du Vent, and to install some means of flotation in preparation for a through-trip. The Tunel du Vent is a cold and intimidating place: it's a long, deep lake of freezing water with a howling gale blowing over it. Cavers use a variety of techniques to cross it – the French love their *pontonnières* (essentially, neck-high waders!) but British cavers will have little experience of these. I've heard of others carrying wetsuits all the way through the PSM, changing in to them at the upstream end of the Tunel and back into dry gear once safely downstream. SWCC's approach to obstacles like these has always been to use flotation, either cheap inflatable dinghies or lorry or tractor inner tubes. In both 1995 and 2017 we used trips in from the bottom end to install flotation and pumps ready for use by parties on through-trips. These are left at the upstream end of the lake, used by members of a through-trip party then ferried back upstream by a willing volunteer who can then solo back downstream in one small boat or dinghy to rejoin the party. There's a tatty wire through the Tunel du Vent that helps with pulling oneself along. In 1995 we used cheap dinghies bought from Toys R Us but these were heavy to carry in to the cave, prone to punctures, and time-consuming to inflate and deflate.

Master mariner Dan Liddy sets sail at the Tunnel du Vent. Photograph supplied by Dan.



Inner tubes were used in 2017 and proved to be far more robust as well as compact enough to be stuffed into tackle sacks when deflated, although you do end up with a wet backside when paddling through sitting in one of these. It goes without saying – I hope – that any flotation or other equipment left in the cave should be removed when you've all done your through-trips.

A trip in from the EDF tunnel to the Tunnel du Vent and back, carrying flotation, will probably take even fit, experienced cavers eight hours or more but is a fine trip in its own right. It's by far the best way to experience the most impressive parts of the Pierre St. Martin system and will set you up for a through-trip.

How to do a through-trip.

European cavers tend to take on big through-trips by using the pull-down abseil technique. This means that each party is entirely self-sufficient and avoids the need to rig and de-rig sequences of big pitches at either end of an expedition. However, pull-down trips mean that ropes have to be carried on the entire through-trip (no small undertaking in the case of the PSM), and there is always the risk of becoming stranded between pitches should something go wrong. A spare pull-down rope is an absolute essential (yet more stuff to carry through).

SWCC's approach, at both the PSM and other big through-trips like Cantabria's Cueto-Coventosa traverse, has been to rig the cave and leave ropes in situ for the duration of the expedition. This reflects the fact that we often have twenty or thirty participants wanting to complete through-trips and some of these will not have the experience or confidence to carry out pull-down trips. The rigging can be done by those with the most experience and with a major collective effort de-rigging can be quick and effective. Everything below the vertical sections of Tête Sauvage and SC3 that needs rope (mostly small climbs) has in-situ tat, so rigging and de-rigging need only involve the actual pitches.

Your approach will depend on the number of those wanting to do the trip – a small group will prefer the speed and efficiency of a pull-down trip but a larger group will benefit from rigging the cave in advance of through-trips and de-rigging at the end.

Which entrance?

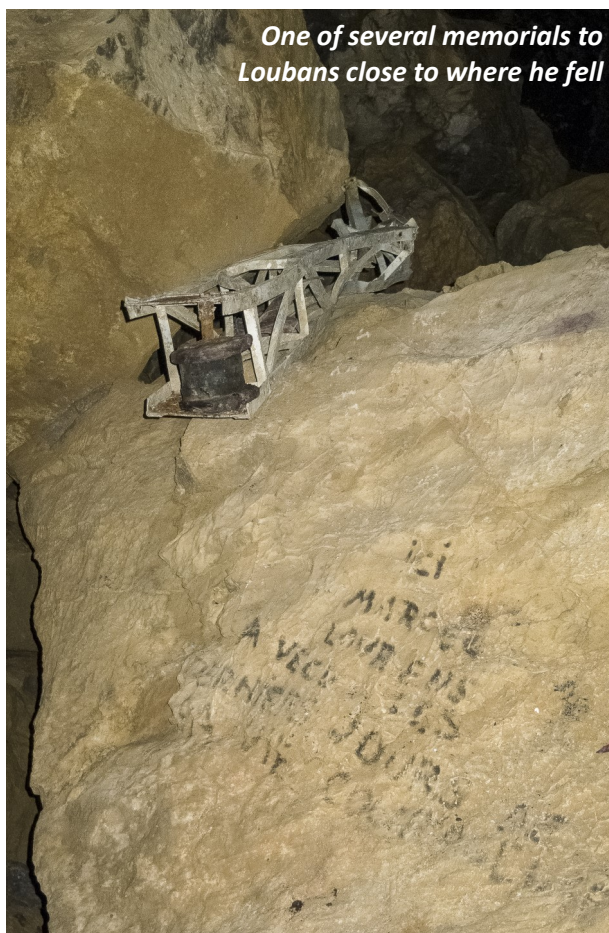
So now we move on to the question this article is intended to answer: which of the upper entrances should you choose for your through-trip? In short, the trip from Tête Sauvage to the EDF tunnel is considerably shorter than that from SC3, but SC3 is undoubtedly a finer cave and will appeal much more to the SRT enthusiast who appreciates sporting pitches. The first thing to explain about Tête Sauvage is that nearly all of the pitches are equipped with *mâts de perroquet* ('parrot ladders'). These are essentially scaffold poles with horizontal rungs through them, so named because they resemble the small ladders commonly found in bird cages. These were, presumably, installed before SRT was in common use, to allow cavers to descend the pitches without the use of electron ladders. One can only marvel at the scale of the undertaking necessary to get these things into the cave but no-one has seen fit to mount a similar effort to get rid of them (except in some cases where they would undoubtedly have hampered the use of SRT at constricted pitch heads). They tend to snag SRT kit at every opportunity and they are unsightly and unnecessary in the modern era

and it is fair to say that they devalue the experience of abseiling down the numerous pitches. That aside, there is nothing particularly challenging about Tête Sauvage and for cavers competent with SRT the trip down the pitches to join the master system at Salle Cosyns is straightforward. There are a few awkward sections between pitches, particularly if, as is inevitable on a long trip, one is caving with a sizeable tackle sack.



***The author descending Liberty Bell pitch.
Photograph: Jules Carter***

SC3 is much more an SRT purists' cave, with a sequence of impressive pitches and a magnificent final abseil, the free-hanging 54m Liberty Bell pitch. The topo (see page 7) shows an intimidating 91m pitch, Le Beffroi ['The Belfry' – SC3 was first explored by members of the BEC] but the reality of this is that it's split by a number of rebelayes and never quite feels like such a huge chasm; the Liberty Bell feels more like a big pitch. But the downside of using SC3 as the entry point for a through-trip is that you join the master system some way upstream of Salle Cosyns, and the section of cave you enter at the bottom of the pitches, the Rio Bassaburoko, is largely uninspiring and often tortuous. Routefinding from the bottom end of the SC3 pitches is not as straightforward as the survey might suggest, but there are waymarks at most junctions. At one point you end up travelling upstream, which feels completely wrong, but this is a slight diversion up an inlet that clearly avoids a constriction which bars access along the main passage. From memory, the section of cave from the bottom of Liberty Bell pitch to Salle Cosyns (where Tête Sauvage joins) took more than an hour, and you need to factor this in to any through-trip planning. For less capable cavers or those lacking experience of big European cave systems, an hour-plus added to an already long and tiring caving trip is an important consideration.



One of several memorials to Loubans close to where he fell

Whichever through-trip you opt for, it's worth bearing in mind that there is a lot of pretty challenging caving between the bottom of whichever set of pitches you descend and the EDF tunnel. The Grand Canyon is a long section of river passage where in places you are wading through very cold water. There are a number of small but awkward rope climbs or short pitches, mostly rigged with fraying tat, that hinder progress. The routefinding as you get towards the Tunn`el du Vent is not straightforward and I'm still not sure that on either of two through-trips in 2017 I took the 'correct' route. And once you leave the Tunnel du Vent, it's a long, long way clambering over boulders to the bottom end of the cave.

A Pierre Saint-Martin through-trip is a true caving classic. Most cavers will know the story of Marcel Loubens' tragic death, in the early days of the cave's exploration, and you can still read the sooty inscription on the rock where he finally succumbed, having survived for several days after a fall while being winched up the monster shaft (to the original entrance, long since closed). Part of the original winching infrastructure still lies nearby.

It's a place steeped in speleological history and it's a challenging underground environment that should not be underestimated, but the enormous passages of the bottom end are truly awe-inspiring and are a must-see for any serious caver.



From left, Gary Vaughan, Jules Carter and Stuart Bennett outside the EDF tunnel portal after their through trip from SC3.

All photographs accompanying this article by Tony Baker unless otherwise credited.

Through the Mountain

Jules Carter

The decision to join the club's Pierre Saint Martin expedition was a last minute one for me. This was down to a number of factors essentially stemming from my major caving accident in 2014, and a later operation to do some follow-on maintenance my left femur late in 2016. Thus the key question was whether both my mind and body was up to returning to major European caving...

Due to another planned trip the previous week I joined the expo a few days later than most of the rag tag team of SWCCites and associated chums. The first day was spent recovering from a solo drive across France, but most of the team were also having a slow day to recover from some long trips the previous day. That evening during the nightly team meet plans were nurtured and formed, and the next day I found myself joining the fatboy team of Tony, Stuart and the illustrious expo leader Gary to finish the rigging of the SC3 entrance, and then to continue with a through trip of the system to the Verna. A nice steady return to big caves then!



The morning saw a pretty efficient start, heading up the hill once the morning bread delivery had arrived. The car was taken to the top part of the PSM ski resort village before embarking on the steady walk along a ski piste route to the SC3 entrance. Finding the entrance proved pretty straightforward with SC3 located only about 20m off the southern side, covered in a steel cable net to prevent unwary skiers descending in the winter season!

Stuart led the charge, descending first to take up the baton to rig the last third of this 350m deep series of shafts. Somehow, I ended up following, to pick up the additional rope bags to pass to Stu when needed. The first shout of 'rope free' and I prepare to descend. I take a moment to dwell on the journey ahead, and briefly thoughts of my 40m fall down another French cave haunt the mind... A double check of the SRT kit ensues, the mind calmed, and the descent begins.

The author about to enter SC3. Pic d'Anie in the background.

Photograph, Tony Baker

SC3 is a fine vertical trip, and steadily we all descend. Every so often a voice calls out to say a section is now free as we descend deeper into the mountain. I reach a full rope bag, clip it to the harness, and continue the descent, reaching Stu as he descends the penultimate pitch. This has a couple of interesting deviations, and while Stu sorts the rigging, the rest of us gather on a large ledge above.

Soon the call 'rope free' comes, and I follow on with the rope bag for the last major pitch, the 55m Liberty Bell, to reach the master cave itself. The pitch is superb, belling out after you drop through the top slot into a huge spacious and atmospheric freehang.

At the bottom we gather and prepare for the through trip. The way on is rather disappointing, quickly degenerating into a section of small and awkward caving through various blocks. Fortunately this is fairly short and we hit a cross passage.

Stu's French is good and he had made good sense of the description, plus the route here is pretty well marked, so we avoided the mistake of stomping down the most obvious passage (unlike Clipjoint and the Dobsons on their trip!). The caving continues in sporting style via various climbs and traverses and around an hour or so later we arrived at the point where the Tete Sauvage joins the main cave at the Salle Corbys.



The author at the top of Liberty Bell pitch
Photograph: Tony Baker

After a brief stop to eat and drink we push on with the through trip. This is now known territory for Tony and Gary, but they both seem to have forgotten much! The caving follows the streamway, but with regular excursions to avoid the wetter and deeper sections of the river. We essentially stomp along in fine sections of stream passage, interrupted every so often by a choked section. Initially these are fairly straightforward, but route-finding through the last couple is more awkward. The usual markers tend to be lacking as they are probably washed away in high water conditions. Once through the last choke we gained the last part of the 'Grand Canyon' prior to reaching the connection point that takes us to the infamous 'Tunnel du Vent'. Water levels are very low, but this section still requires some wading in freezing chest deep water. By the time we reach the climb up into the Galerie des Marmites I feel quite chilled and the feet are numb. The short climb has a rope, though it is free climbable with care, but with numb feet I clip a jammer to self line up the rope. At the top we gained the Galerie des Marmites, a typical gallery passage with various pots and pits in the floor. After a short distance we encounter another short climb up, fortunately armed with typical in-situ tat. I frig up the awkward bugger, but Stu freeclimbs it – I'm not sure he enjoyed the experience too much, though, looking at the expression on his face as he grabbed the traverse line at the top! We continue, and as is usual with the PSM, what looks a fairly benign passage on the survey is more awkward and takes longer to traverse than initially anticipated! We follow the marked route, but the scale of this place is huge, and large passages seems to extend off in many places.

After much clambering over various boulder piles, and up and down various short climbs and bits of tat we start to encounter the lakes leading to the Tunnel du Vent. However the marked route we've ended on seems to be pointing to a very loose descent to reach what looked like some fixed traverse lines. Stu fairly nimbly careers down this in a cascade of rolling rocks, with subsequent splashes as they hit the lake below. I'm not so keen on this route though, and the rest of us follow our noses a bit further, encountering a short but awkward drop into the same lake a little further on. Meanwhile Stu had run out of functioning traverse line and had gone for a wade in the lake. We, though, had a tangled mess of old rope and wire traverse lines between us and the lake. Gary figured out a method of descending the tangle and we successfully drop into the lake below without too much trauma. You can actually avoid all this faff by joining the lake earlier on!

We're soon at the Tunnel du Vent section but not where the flotation aids and fixed line were located. We scout around but the route to avoid the lake is not obvious. Stu had already waded off into the lake to explore, and in the end me and Tony just follow, wading up to our necks in freezing water! It turns out this joins the fixed line through the Vent at about two thirds of the way through. We follow the line to the buoyancy rings, though in retrospect we should have just pulled ourselves along the line as we were already totally soaked. Arriving at the rings we find Gary standing there – he'd located the low and unobvious crawl that was the drier way on...

So we each chose a ring, got our arses saddled onto it and pulled ourselves through the tunnel with the impressive gale blowing through it. Arriving at the other end I'm greeted by our illustrious leader, and promptly leap off the ring without falling into the water, and shelter behind some big rocks gibbering with the cold. Meanwhile a better clad Tony follows and then heroically offers to return the rings back to the far end, falling in during the process! We quickly press on into the dry passage of the Salle de Navarre to both get out of the wind and attempt to warm up again. The scale of the cave ramps up to soddin' huge, and we take care to follow the reflective markers to avoid going round in circles! It's now a case of finding our way through the boulder piles in this huge series of passages and chambers as we steadily descend towards the Verna and exit via EDF tunnel. We tick off the classic chambers – Lépineux, Casteret, Loubens, Chevalier – famous names hinting at the rich history the exploration of this cave represents. Eventually after a number of hours of boulder clambering in huge underground spaces we arrived at the black space of the Salle de Verna where even the vast lumen capacity of our modern headlights simply disappeared into the darkness of this massive chamber.

The EDF tunnel is easily located and we stomp off to the gate, each of us having fun to quickly open the steel door and then frantically try and close it against the gathering air mass emerging from the cave!

It is still daylight, and our trip had take around ten and half hours. I'm definitely feeling it in the various reconstructed bits of my legs, and will certainly be walking a little more wonkily than normal for a bit, but what a fine piece of physio! An excellent trip in fine company – beer well and truly earned.

Back at camp, sorting food and enjoying some beer, I ponder the return to this level of caving. The accident is definitely always there in the mind, as is the awareness that I'm still uncomfortable on climbs and exposed traverses, especially since I still lack the mobility in the legs that I had before the accident. However I wouldn't have committed to the trip if I didn't think I could hold my own, and when things did feel a little too exposed I would take my time and ask to be spotted on a climb or similar. Gradually the confidence and ability starts to return, but it cannot be forced or rushed – that is dangerous to both me and my psychology as well as potentially to others. Thus I consider whether I really wanted to continue doing this sort of caving? The answer must be yes, since a couple of days later I'm doing a through trip again, this time Tête Sauvage to the Verna with Tony and Dan!

Repeating a through trip was very worth it. The first time you are focusing on the route finding, but on the next trip we were able to take in the cave more, getting a better feel for its geology and layout. During this second trip I could also feel the body handling the caving better, and we were also rewarded with the Verna being lit up for a tour party on our arrival at the chamber, giving a very impressive view of the scale of this vast chamber.

Thus another fine trip ticked off, and made all the better for the adventure and company shared, but equally an incredibly poignant journey to be able to undertake following the accident I suffered in 2014. It has been a long and tough journey, and my thanks go to so many without whom such a journey would have been much harder.

SC3 to EDF Tunnel Through Trip (The Surveying Conservationist 3 Get Extremely Damp & Frozen)

Andy Dobson

The big day dawned grey and claggy; with everything already packed we were away from the campsite at 9am. We had ferried Brian's car to the EDF tunnel parking site the evening before (with change of clothes for after the trip), to save time. Jules kindly drove us up to the Ski resort, thus avoiding the need to fetch a car back the following day. As in 1995 I was struck by how far we were driving, given we had to do the same distance back under ground. Just above the ski station we broke out of the claggy cloud into bright sunshine and a spectacular view, with the mountains standing out above a sea of cloud. Jules demonstrated the off – road capabilities of a Skoda Yeti by taking us all the way up to the top car park, not far short of Tête Sauvage.



From here we enjoyed a slow walk up in the sun. We were just starting to think we must have missed the turn off when the top of the ski lift came into view. Going past two slatted fences, then a ranch style fence and round an 'S' bend at the top end of another slatted fence, a cairn marked the path off, with three pine trees visible and a dead tree on a knoll by the entrance. The entrance shaft is covered by a wire mesh secured by maillons, just undo the ones by the pitch head, reconnecting them when through.

Underground at 11am with Brian heading off first, the SC3 pitches fully justified the rave reviews we had heard. Superb SRT with nice take-offs and spacious shafts, though with some care necessary on the scree slope above the P45 to avoid showering the person below. Pleasant pitches followed on again, to the top of the final 'Liberty Bell' pitch where a comparatively small take off bells out into a cathedral dome sized shaft with a 54m freehang to the floor. Unfortunately from here the route on was rather less attractive, a tight rift and crawl to thrutch up and along. We were so relieved when this emerged into walking passage that we stomped straight past the turn off; from the considerable wear on the walking passage, a great many others had done the same. When the passage ended at crawls, these were sufficiently similar to the route description that it took a long while to be certain we were in the wrong place. After pushing every grotty crawl and a climb up to no avail, we backtracked and Dave found the obvious way-marked climb up, at least an hour after we had marched straight past it.



We opted for the higher level route, preferring a bit of climbing and traversing to the crawls at stream level. The main rule was to keep to the left and go up if there was a choice of passages. According to our route guide this section was 600m to 'ARSIP Chamber'; however, after what felt like considerably more than a kilometre we were again starting to wonder if we had missed something. Deciding to carry on, we came to what was obviously the right chamber with the 4m waterfall and a sense of relief. Continuing on along the marked route eventually brought us to 'Salle Pierrette' (it is written on the wall so you are in no doubt), after going past where the Tête Sauvage though-route joins, without noticing the junction. At least 3 hours slower than the younger teams.



We had a snack and drink stop here. Before the seriously damp part of the trip began, I put on an additional thermal vest top before starting the wet, cold sections and was very glad of it soon after. Regrettably we found the route description stopped at Salle Cosyns, the junction with the Tete Sauvage to EDF trip, so would have to rely on the markers from here on. We had of course done the route from here out in 1995, but 22-year-old recollections were rather hazy. Given the vagueness of the SC3 description it may not have made much difference, but it is always more comforting to have some idea where you are going!



Following on along the stream we did an up – over-and-back-down bypass on ropes to the start of the deeper water. The traverse line around a deep pool had one hanger pulled out, resulting in a chest deep soaking. A drier section climbing the huge blocks in Salle Suisse gave a chance to warm up.

The Grand Canyon comes next, with pebbly beaches breaking up the splashing and wading; very scenic but several degrees too cold. I remember thinking in 1995 that it was surprising the stream did not have icebergs floating in it; however, I had not recalled just how long the deeper, continually wet, section was. Throughout the wet parts every time we started to thaw out we met the next freezing immersion. The first three boulder chokes provided no problem, but route-finding through the final choke took some time and not a little effort (and more cold water).

We were glad to climb up into the 'Marmite Gallery' and some dry caving. We had a brief stop for photos and food, though Dave had difficulty holding the camera steady while shaking with cold, so we soon plodded on to try and warm up. The high level series was much longer than we remembered, with much more 'up' involved, but we were grateful for the extra opportunity to generate some heat.



Unfortunately all good things come to an end, and then we were back to being wet and cold. The shredded traverse lines across the lakes proved a real challenge; Dave eventually managed to free his cowstails from the knitting and struggle over, but Brian found he ran out of arm strength and grip on the rope core and had to come back. Consequently I back tracked to look for a higher level bypass (I am sure we did one in 1995); after I took three wrong turns it appeared to go, so I returned to guide Brian up and over. However the rope down turned into another shredded, out-of-balance traverse at the end of the deep section and took more unnecessary effort to fight through, when a straight pitch would have landed in only knee deep water.

Finally up out of the water, we took a while searching for the way on. On his through trip Gary had put up two small cairns at the start of what he described as a dog kennel passage.

Brian spotted a small hole matching the description, which I had earlier discounted (thinking Alsatian not Chihuahua). I crawled through, then climbed down, eventually reaching the stash of inner tubes at the shore of the Tunnel du Vent.



A series of nautical mishaps ensued; despite feeling sufficiently inflated, Brian's tube immediately sank underneath him. A further session with the foot pump enabled him to cross over safely. Dave then tried one of the medium tubes but capsized after a few feet. I pumped up the one remaining large tube and Dave sailed across OK. With no lorry tubes left, I tried having one car size tube under my arms while sitting on a medium sized one. As Dave had found this was very difficult to balance on. Halfway across, where the roof lowered at the dogleg, the wind whipped me round and over, ending up with my tackle bag hung over the roof line while I was swimming / treading water. Having freed this off, I swam the rest of the way, towing the tube and tackle bag (buoyant because of the Darren drum inside).



On landing I was shaking with cold to such an extent that I could not do the return ferry to take the tubes back so Brian obliged instead. As a result we were all very wet and very, very cold. On reflection it would have been nice to have had a dingy, (Toys'R'Us boat), as we had in 1995 and stayed warm and dry and not hypothermic. Although a food stop was needed, especially by Brian, we had no option other than to start on and try to thaw out a bit, though being so cold made it awkward to go fast enough. We eventually stopped at the far end of Navarra, still shaking slightly, for a brief snack and drink.

Resuming the climb up to Lépineux shaft gave some chance to generate some heat, but the cold was still sapping. Brian was suffering with knees, legs and hips, resulting in having to climb each boulder rather than hopping them, and there are an awful lot of boulders in the 3.5km of big chamber caving on the way out! Consequently we progressed only slowly, with the

concentration on safety not speed, though this greatly reduced the warming up effect. Primarily following the higher level route along the left wall at least allowed for some walking passage to break up the boulder clambering.

To be safe, Brian used his SRT kit on the short up pitch (with a yellow rope on) reminiscent of the Divers' Pitch, while Dave and I went up hand over hand while climbing the series of ledges. After a long, slow painful plod we finally reached the last streamway section and located the short traverse route over the Hydro equipment, which cut out a fair amount of climbing and crawling. By now I had just about stopped shivering. Eventually out of the EDF tunnel at about 5am, after 18 hours underground, to find it was raining; this had the handy side effect of greatly reducing the draught, making it easy to shut the door! Finally a plod down the concrete road, in pleasantly warm rain, to the car. The fun of changing in the rain bypassed us, as we were too knackered and sore to care.

While a considerable number of senior citizens completed the Tête Sauvage trip, we had the distinction of the only 70 year old (and only 60 year old) to do SC3 to EDF. Having, in 1995, 'enjoyed' fighting off the parrot ladders, then the duck at the bottom of the pitches in Tete Sauvage, the superb SRT of SC3 proved to be a far superior trip, albeit distinctly longer both above and especially below ground. An absolutely classic major European through trip, giving a real sense of achievement as we celebrated with a beer back at the camp site.

All photographs accompanying this article are by Dave Dobson.

La Verna by Wheelchair

Elaine Hall

A less than functional right hip meant that during this expedition my mobility was severely limited. I was nevertheless determined to get to see the Salle de La Verna, so with my 'carer's' agreement - he, after all, would be the one doing the pushing - Bob and I took a tourist trip to the cave.

The showcave staff were extremely solicitous; we emerged from the bus at the top, and I was given a set of wheels, a hard hat (with a seriously unflattering plastic shower cap to be worn between head and helmet), and off we went.

The wind coming through the door is incredible, and VERY cold.

As Bob valiantly pushed me along, we got into conversation with the guide. When Bob told him about doing the TS to EDF trip the day before, the guide asked if we would be interested in hearing a bit about the geology when we arrived in the chamber. After doing his spiel for the large party of tourists who had entered with us, plunging the chamber into darkness and then illuminating it by turning on 'caving lights' on the helmets of the mannequins sited to show the scale of the place (see Tony Baker's photograph on the next page), the guide came over to us and made sure I had a good view of the vast chamber while he explained how it is believed to have been formed. Rather than try to paraphrase what he told us, I have chosen to use an edited quote from Wikipedia, as I believe it gives an excellent summary:



*Elaine in the EDF Tunnel.
Photograph: Bob Hall*

"La Verna is part of the 82km long, 1,410m deep , Gouffre de la Pierre-Saint-Martin and Gouffre des Partages cave system. Explorations still continue in this and in other systems within the extensive Pierre-Saint-Martin karst area where 13 underground rivers and a total of 250km of passages, chambers and shafts have been mapped.

Most of the Gouffre de la Pierre-Saint-Martin is formed by dissolution in Cretaceous limestones, and the main river reaches a base level where it flows over insoluble schists of the Paleozoic basement rocks. The Salle de la Verna has formed where the river flows off the schist onto Devonian limestone. Over time, the river found a route through the soluble limestones, leaving the original downstream river passage (the Gallerie Aranzadi) high and dry. The chamber was formed by a process of solution and collapse, beginning about 200,000 years ago. The unconformity between the Paleozoic and Mesozoic rocks is clearly exposed in the walls of the chamber.

(See the photograph reproduced on the following page.)

The river flowing through the chamber originated from the infiltration zones on the 2,000m high limestone plateaus, and emerges at springs 1,500m lower, in the valley of Saint-Engrâce."

The guide concluded by saying that he, at least, along with quite a few other local cavers, believed that the very bottom of the chamber is in fact a massive funnel, choked with debris washed down by the river. The fact that no lake forms at the bottom, even when the river is in spate, may suggest that there could be sizeable passageways beneath the choke. The hope appears to be that the boulders will wear or wash down, or that perhaps the floor may collapse in a similar manner to the collapses which lead to the formation of the chamber in the first place, thus opening up a whole new section of cave below La Verna.

My sincere thanks go to all showcave staff for their courtesy and assistance, to our guide for his enthusiasm and willingness to share his knowledge (in English for our benefit), and to my very patient husband for being my wheelchair engine!



The vast Salle de la Verna. Photograph: Tony Baker, taken using the ambient show-cave lighting. The red circle marks one of the mannequins placed around the chamber to emphasise the scale of the place.

Bob adds:

The geological features are apparent in this photograph. The upper-most part of the chamber is in Cretaceous limestone. The brightly lit passage towards the top-right is the entrance to the Galerie Aranzadi, now left dry by the formation of the chamber. Below this band are the steeply inclined beds of Devonian limestone through which the sinking stream passes to the resurgence. All-in-all a most unusual assemblage—two beds of limestone, one 200 to 300 million years older than the other, lying unconformably and visible in the same cave.

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3. Ford, D & Williams, P D, *Karst Hydrogeology and Geomorphology*, Wiley, 2013, Section 2.10: Paleokarst Unconformities, Figure 2.17
4. Lignier, Vincent, *Discordance Hercynienne dans la Salle de la Verna, Gouffre de la Pierre Saint Martin*, available at: <http://planet-terre.ens-lyon.fr/image-de-la-semaine/lmg251-2008-11-10.xml>

Photographing the PSM

Tony Baker

Back in 1995, I managed to take some impressive photos of the big passages in the Pierre St. Martin. These were achieved thanks to a dedicated crew of willing helpers, who gave up their time and effort to help me, clambered over boulders following my directions and fired flashbulbs on demand. This required careful synchronisation of all the bulb-firing (“3...2...1...Go!”) and many an attempt was wasted as bulbs failed to fire or fingers proved a little too trigger-happy.

On 2017’s return visit I took another set of pics in the major galleries, this time with the patient help of just one assistant – take a bow, Paul Tarrant. The essential difference was that in 1995 I was using transparency film, while in 2017 I was able to exploit the wonders of digital imaging.

The SWCC Newsletter is not the place for an extended Adobe Photoshop tutorial. I’ll explain briefly how I took these pictures, and I’ve included the ‘building blocks’ that led to some of the finished pics, but if you want to fully explore the techniques then there are countless Photoshop tutorials on the Adobe.com website and, of course, on YouTube. In particular, you need to understand how layers and layer masks work, and have a basic understanding of layer blending modes. To use this technique you’ll need a version of Photoshop, or an alternative photo-editing program, that allows the use of layers – the version that is often bundled with printers and scanners, Photoshop Elements, does not.

Here’s how it works. You need a tripod – it does not need to be a particularly sturdy one (often too heavy and awkward to carry underground) but it needs to be set up in such a way that you can avoid knocking it or moving it between exposures. I also prefer to use a remote or cable release, which removes the likelihood of moving the camera when pressing the shutter button. You’ll also need a means of firing an off-camera flash (a slave unit or wireless set-up), or use the camera’s ‘B’ setting and tell your assistant/s to fire the flash on your command.

Then set up your camera. Peering through a viewfinder into a big black void, lit only by a caving lamp, is too hit-and-miss: you need to shoot a ‘reference’ pic to see what you’re photographing. Focus the camera manually (using the distance scale on the lens if necessary). Crank the camera’s ISO setting up to something like 6400, set the aperture to f4 or f5.6, aim your flashgun into the black space in front of you, and take a shot. You’ll end up with an under- or over-exposed and very ‘noisy’ pic on your LCD screen but at least you can see if your composition is what you want it to be. Move the camera and repeat if necessary until you’re happy. *Remember to set the ISO back to something sensible (I work at 200 or 400) before taking your final photos.*

Now, take a sequence of photos with your assistant(s) holding flashes in a variety of positions. In a long straight passage or a big chamber, send your helper(s) off down the passage and tell them to point the flash in different directions at every stop. At this stage, it’s better to shoot lots of variations and edit them down at the post-processing stage. Going back for a reshoot is rarely an option in somewhere like the PSM! Shooting RAW files will give you greater flexibility when working in Photoshop later on. (Add a wireless shutter release to your cave photo equipment and you can dispense with the need for even one assistant. Put your camera on a tripod, attach the remote release’s receiver and head off down the passage, firing the shutter and the flash as you see fit. I’ve spent a few Sunday afternoons alone in Big Chamber Near The Entrance in Ogof Ffynnon Ddu doing this.) (See page 57 for an example of one of Tony’s photographs taken there. Ed.)

Don’t be afraid to use backlight, or to have the flash itself visible in the pic – you can always mask this out later on. Be careful that the areas you have lit in separate shots don’t overlap too much, as this can make the final editing more difficult. Scroll through the pics you’ve taken and make sure that you have lit all the areas you want to show up in the final picture.

Sequence 1:
Tony Baker in the Metro, Pierre Saint-Martin. Photographs by Tony Baker with kind assistance from Paul Tarrant.



Reference pic for Metro composite. Shot at ISO 6400, f3.5, on a Canon EOS 500D, lit with a Vivitar 283 flashgun.



Lit with big flashbulb. ISO 400, f8, Canon EOS 500D, RAW file.



Lit with Vivitar 283.



Lit with Vivitar 283.



Composite made from previous three images using Adobe Photoshop.



*Another edit of the sequence 1 scene.
Below, a third edit.*



The rest happens back at home on the computer. Go through all the pictures and identify the ones that can be merged into a final version – I tend to avoid adding too many pics into the mix as an end result that looks like seven or eight cavers in one passage looks a bit unnatural. For most locations, three or four separate pics put together will be about right.

Load each pic into Photoshop as a separate layer on one file. I do this direct from Adobe Lightroom (select your images, right-click > Edit In > Open as Layers in Photoshop) but you can copy and paste images onto each other to achieve separate layers. You can then toggle each layer's visibility on and off by clicking the 'eyeball' icon next to the layer in the layers tab (usually bottom right of the screen). Toggle off all layers except the bottom two. Select the second layer up.

Immediately above the list of layers is the 'blending mode' drop-down menu. By default this will be set to 'Normal'. Click on the drop-down and select 'Lighten'. Any areas that are lighter on your second layer than on the bottom one will show through. So an area that is pitch-black on the bottom layer but has a caver and a flash in it on the second layer will magically 'burn through' to give the impression of two cavers in the passage. You can at this point add a layer mask and using the 'Brush' tool (set to 100% opacity, with foreground colour black) mask off any areas that need it.

Now work your way up through each layer, using the 'Lighten' blend mode and masking where necessary. When you have finished you can flatten the image into one layer (Layer>Flatten Image) to save on storage space but I much prefer to keep a version with all the layers intact to allow for future editing. Beware that a .PSD file or a TIFF with lots of layers comprised of RAW images will be a big file!

I appreciate that this is a very brief outline of a complicated technique. Trial and error is the best way of refining your Photoshop skills here; start simple by merging only a couple of pics. Personally I dislike cave photographs that are 'over-lit' – caves are dark places and if you merge too many pictures your cave won't look like a cave in your finished pics.

Finally, the ethical question: is creating cave photos in this way 'cheating'? I don't think so. You could achieve the same result using a team of cavers, all armed with flashguns or bulbs, but of course to do so you need to be able to recruit enough willing individuals – something that any cave photographer will tell you is not always possible.

I must say a massive 'thank-you' to the unbelievably patient and helpful Paul Tarrant, without whose help I could not have done these pictures. If anyone would like a more detailed explanation of how to use this method, feel free to talk to me in person at SWCC or on the 'phone.

Sequence 2:

Tony Baker in the Metro. Photographs by Tony Baker with kind assistance from Paul Tarrant.



***Both lit with big flashbulbs. ISO 400, f8, Canon EOS 500D.
Composite image shown on next page***

Sequence 2 continued...
Composite made from two previous images using Adobe Photoshop



Sequence 3, below: Tony Baker in the Metro. Photographs by Tony Baker with kind assistance from Paul Tarrant. First images lit with big flashbulbs. ISO 400, f8, Canon EOS 500D.
Composite made from two previous images using Adobe Photoshop.





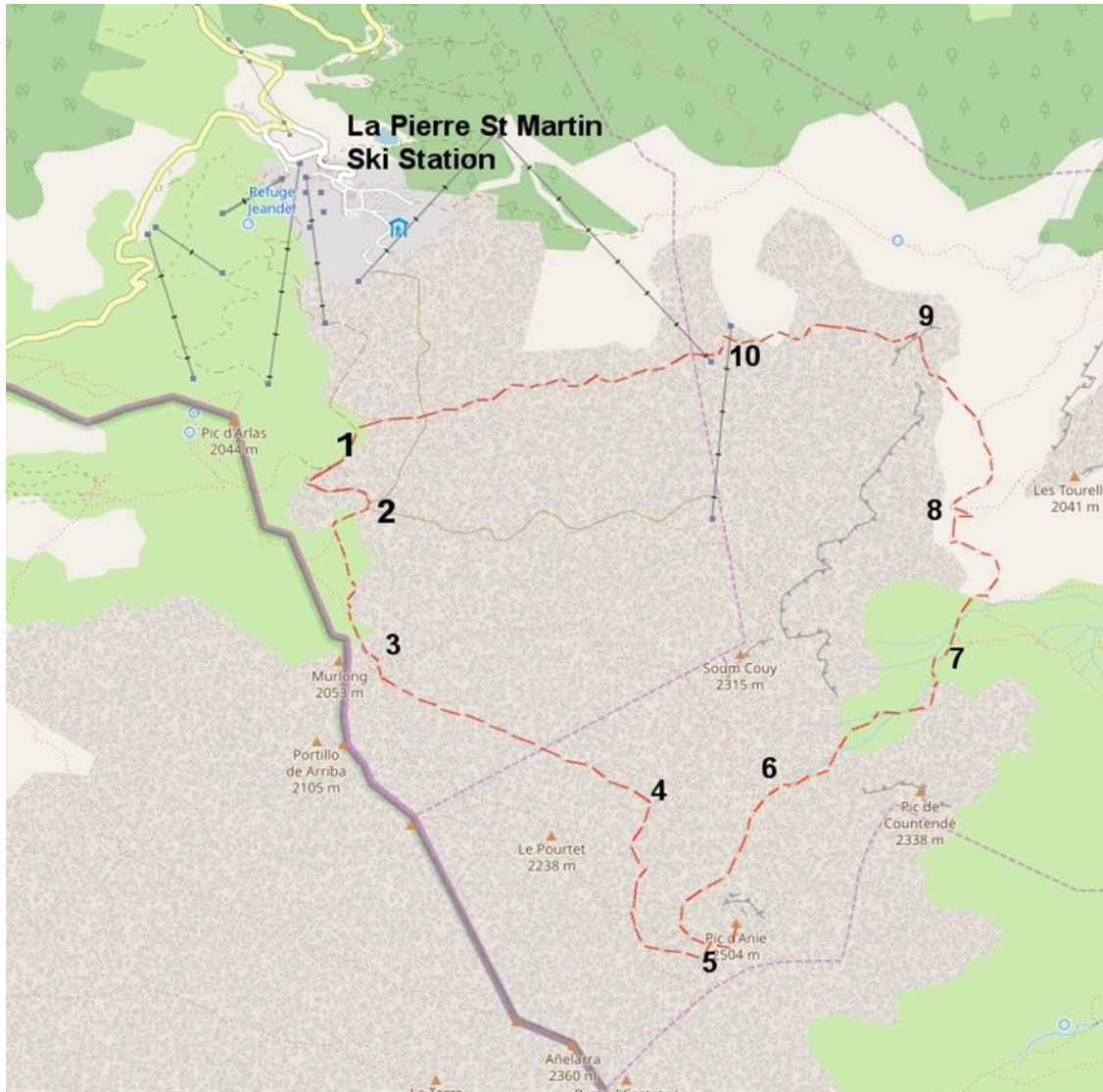
Paul Tarrant in the Salle Chevalier. Composite made up from 5 separate exposures. Lit with big flashbulbs. All photographs taken at ISO 400, f8, Canon EOS 500D, by Tony Baker.

Grand Days Out in the Pyrenees

Gary Vaughan

Part 1—The Pic d’Anie

One of the highlights of the 2017 PSM Expedition for me was a chance to re-visit the Pic D’Anie. I had been very fortunate in 1995 to choose a fine day to walk to the summit and admire the stunning views. High on my list of ‘must do things’ in 2017 was to grab the best weather on offer and to once again have a go at scaling this impressive peak.



Sketch of route, not to scale

My aspiration was to turn the walk from an ‘out and return’ style walk into a more circular route. An open mind was kept for the first ‘half’ of the walk as to whether we would make a loop out of it or return by one of the more traditional routes. The walk commenced in earnest at the spot used for car parking for rigging both Tête Sauvage and SC3, the green meadow of the Plain Pescamou, marked (1) on the route map. We had shared transport up with one of the parties making a Tête Sauvage through trip. By 9.00am the sun was baking and it promised to be an absolute scorcher of a day. Mr Quill was in fine spirit and keen to show off the latest in UV protection equipment.



Paul Quill, avec parasol, Ben Vaughan to right

A steady pace was set as we made easy going up the track to Tête Sauvage (2) and then continuing broadly south as we climbed on the grassy slopes towards the Col de Pescamou. The path is reasonably well marked from Tête Sauvage up to the first col. On reaching the Col a more major path joins from the direction of Pic D'Arlas off to the west. (3) The onwards route (3) to (4) is however harder to spot as it heads out onto the lapiaz. Care and attention is required here. Looking well ahead to spot the path assists enormously with keeping on track. There is a good track to follow but also a whole world of fissures and bluffs to dodge around. Not the place to be in mist or fog or poor visibility.



The path is virtually impossible to spot on the limestone pavement and one has to rely on the cairns and the paint splodges here and there. Wherever scree or grass has gained a foothold the path reveals itself once again like a long lost friend. The sun beat down mercilessly as our progress continued. The Pic drawing ever closer, as we wound our way through clefts and gullies, stopping to admire the destination and to take on more water became a more frequent occurrence.

The path remained faithful to the mission and about two hours after setting off from Pescamou we arrived at the southern base of the Pic D'Anie (5). The climb to the Pic from the south is steep but steady. It was here that our route merged with that of the main flow of walkers heading up from the ski station. It seemed that our route was one of the least popular and that most walkers followed the main ski piste which runs up past SC3 towards the Pic de Soum Couy. We had in fact only seen a couple of other walkers up to this point, but as we began our final ascent it became clear that the top was going to be busy.

Sarah Hards pausing to admire the view of the Pic



In spite of how the Pic appears from the west, the north and the east, the ascent to the summit can be achieved with walking sticks in hand and perhaps just the occasional steadying hand hold here and there. This is a steep walk and not a scramble. The views from the top make the slog up well worth the effort and go some distance to neutralising the effect of so many other walkers all sharing the same small patch of rock.

The extent of the limestone really comes into context from the summit as one looks back towards the ski station. There is a path across the middle of that lot..... honest! It took us about three hours to reach the top. Start elevation is about 1800m with the summit at 2504m so about a 700m ascent.

Sarah and Ben at the start of the steep ascent to the Pic



Ben at the top, admiring the view back across the limestone towards the ski station.

With the weather ideal and good time made to the summit, the decision was made to go for the more circular return via the Paz d'Azuns (8) and the Pas de l'Osque (9). The descent off the Pic was a matter of re-tracing our steps for twenty minutes or so before swinging northwards away from our approach route and starting to descend under the cliffs of the Pic towards the GR10, which we knew was somewhere down in the valley below us. The route here was again difficult to find when not on scree or grass, but the route marking was generally better suggesting that quite a few walkers make the ascent of Pic D'Anie from the Refuge Laberouat which nestles in the valley at about 1400m elevation. The objective on this part of the walk was to try and stay as high as possible and minimise the height loss. It soon became clear that there was no viable route (for us at least) from the Col des Anies across to the Paz d'Azuns and so it became a matter of dropping steadily towards the GR10 until we could cut across to the Paz.

By the time we had dropped to our start elevation of 1800m we were back on grass again with a clear track to follow. Between points (6) and (7) on our route there was no choice but to stick to the main track on account of quite steep bluffs beneath us. The route eventually descended to our lowest point of 1600m down a rocky gully that followed a small stream.



Ben and Josh Vaughan pausing for a water stop. The col to the far left is the Paz d’Azuns. The impressive bluffs are known as Les Urgues de Campalong.

Skirting the head of the main valley we were able to avoid dropping to the cabin which was another 60m or so below us, and instead a reasonable path contoured around to plop us straight onto the GR10 as planned. The pace could pick up a little now. The GR10 was a good track well routed and steady in gradient. The afternoon was slipping away as we reached the Pas de l’Osque. It was once explained to me by a landscape gardener that the best views come as a surprise, rather than a view which steadily builds, say by walking up a hill and looking back at where you have come from.

I was quite taken by the view through the Pas de l’Osque which only became apparent just as you popped up to the col itself. In theory now it was a straight walk along one of the major Grande Routes back to the starting point at (1). We had got ourselves back up to about 1900m and so had about 100m to drop to get home. The track was extremely well marked until we hit the ski runs at point (10). It all went a bit complicated then. The GR10 emerges onto a piste by a ski lift, and the general trend that you have been following for the past half an hour gives one the impression that you should head down the piste, which would probably be OK if you were heading for the ski station itself, but we needed to stay on the GR10 which ran directly to Pescamou. The trick, as it turned out, was to walk pretty much due south from the first ski lift to arrive 50m back up the slope at a second ski lift station, and here, peeling off from the left hand side of the piste were the route markers for the GR10. Sorted. A final push of thirty minutes or so brought us back to the start point after a total walk time of about eight hours. Total height gain / loss was in the order of 1000m by the time all of the ups and downs were taken into account.

Part 2—From Porte de Larrau

One of the further highlights of the 2017 PSM Expedition for me was a chance to walk a section of the Haute Randonnée Pyrénéenne or HRP for short. The section that we choose to walk was between the Porte de Larrau at the western end and a now abandoned refuge on the Spanish side of the border called Refuge Belagua.



Sketch of start and finish points, not to scale.

Because of the ridge style of the walk it was decided to do it as a car swap with one party parking a vehicle at Port de Larrau and the other party parking at Refuge Belagua. As we passed somewhere in the middle we would hand over each other's car keys and then return to camp in the other party's car. What could possibly go wrong?

Our first attempt at this walk turned out to be a bit of a damp squib. My group had parked on the roadside just above Refuge Belagua. We had plodded off across the hillside in dry but overcast conditions but as we gained height the cloud base lowered and we soon found ourselves with poor visibility and a stiff head wind. A text message from the other party confirmed that they had bailed on the trip, and so ended our first attempt.

The second attempt almost went south as well. This time we were to start from Port de Larrau and in spite of a warning of a col on the road up to the Port de Larrau, we parked up and started walking from the wrong start point. It was only after 30 to 40 minutes of walking that we realised that the spur that we were on could not possibly connect to the destination, we realised our mistake, retraced our steps and then drove the extra five minutes to the real Port de Larrau!

The other team had found the Refuge Belagua with ease and were already well under way. Confirmation text messages that we had made a false start but were now on track seemed not to elicit unnecessary concern from the other group. Once under way it was clear that we were following a very major route.



Route Map Sheet 1 showing way-points A to D

The first hour or so of the route from the Port de Larrau (point A on Route map) is all very gentle with rolling grass covered hills. The visibility was not exactly tip top on the day in question but with a clear track to follow and views both into France and into Spain to enjoy the walking was very enjoyable.

Having started an hour or more behind our counterparts we were keen to get some distance in before exchanging keys. We didn't want it to seem like we hadn't put an effort in! As it turns out, walking from west to east the easiest terrain is at the start of the walk and so we were well settled at our lunch spot at point C before those of us with keen eyesight could spot the other group off in the distance.



Josh Vaughan on the HRP just north of Gaztarrigagna—midway points A to B

With the certainty of knowing we had not missed each other on the hill, the mood became more relaxed as we set off after lunch exchanging the car keys as we passed on the track. This bit actually worked fine as it turns out. We dropped down through the col visible from the lunch time stop and contoured across the south face of Chardekagagna to gain a ridge line running north south.



The views were getting better and better as the sun started to break through on the Spanish side of the border. Although we were not aware of limestone in this particular area there were dolines and sinks here and there dotted amongst the moraine heaps and mounds. The path was still easy to follow with very pleasant relaxing gradients.

Ben and Josh Vaughan looking back from Port de Belhay (point E) towards Pic D'Orhy in the far distance.

By this stage of the day we had moved onto the second half of the Route Map, pausing for a sunny photograph at the Port de Belhay (point E). Surprisingly, here we found a gated enclosure. Descending from point E back into France for a brief spell we could see a group of Chamois watching us intently from the crags above. The sun was getting warmer which was less than optimal as we arrived at one of the steeper uphill sections of the walk taking us up to the Port de Bimblete at point F. The good news for us was that we had been to the Port de Bimblete on the previous attempt so we were now on known ground. The other good news is that it is all down hill from Port de Bimblete to the Refuge Belagua.



Route Map Sheet 2 showing way-points D to G

The day had brightened up since our mid-morning start and now the lighter warmer air in Spain was encouraging the heavier moist air in France to come and join it. As we descended we were rewarded with a fine display of the two air masses mixing and pushing against each other. All in all, another grand day out in the Pyrenees. Start elevation 1573m, end Elevation 1420m, highest point 1720m. Total walking time about 4.5 hours.

All photographs and annotated maps and plans are the author's.

Pierre St Martin Cave System

Bibliography

Compiled and annotated by Bob Hall

Part 1: French Language Publications and Resources

ARSIP, Website at: <http://arsip.fr/>

*(Association for International Speleological Research at the Pierre Saint Martin)
In French but with English option, albeit a poor translation. A wealth of information
including links to surveys and their shop selling numerous publications including
some of those listed below.*

ARSIP, Bulletins

*The original numbers 1 to 11 (1966-1976), were reissued as an album entitled:
ARSIP Special Edition 10th Anniversary 1966-1976, published in 1981.
Numbers 16, 17 and 18 are in print and together describe explorations from 1981
through to 2016 and are available via the website above.*

ARSIP, Les Traversées du réseau de la Pierre Saint Martin, ARSIP Special Publication, 2014

French edition out of print but Spanish edition still available from: <http://arsip.fr/arsip-info-special-traversees/>

Attout, Jacques, Les Hommes de La Pierre Saint Martin, Marabout, 1954

Bressan, Alain et al., Eclats de Pierre, ARSIP, 2016

*New book on Pierre St Martin and specifically Zampory areas and Llano Carreras.
170 pages topos, colour photos, covering over 40 years' explorations.*

Douat, Michel, et al., Spéléo Sportive à la Pierre Saint Martin, Edisud, 1985

Number 3 in the classic Spéléo Sportive Series. Long out of print but might be available second hand.

Henry, Yves, 30 Heures Pour Réussir la Traversée Intégrale du Gouffre de la Pierre-Saint-Martin, Solar, 1978

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Queffelec, Corentin, Jusqu'au fond du gouffre (Tome 2), Arcora, 1978

Spéléo Magazine, No.51, July 2005

Contains a useful survey, I am informed.

Tazieff, Haroun, Le Gouffre De La Pierre Saint Martin, Arthaud, 1953

Also, Arthaud 1954 – with account of 1954 expedition

Also, Éditions G.-P. Nantes, 1966 – with accounts of subsequent expeditions

www.speleo-gcpm.fr/traversee-de-la-pierre-saint-martin

<http://gspeleocorreze.canalblog.com/archives/2012/08/02/24826448.html>

<http://strates.canalblog.com/archives/2009/07/09>

The above three links are to club blogs which describe PSM trips.

Part 2: Spanish Language Publications and Resources

ARSIP, Les Traversées du réseau de la Pierre Saint Martin, ARSIP Special Publication, 2014

See above, Spanish language edition available from ARSIP.

Club Viana, <https://www.clubviana.org/navarra/>

This link gives access to a pdf containing detailed descriptions of traverses from SC3 and Tête Sauvage, but also of the Sima C50 (de la Contienda) entrance and a topo of the Gouffre Pourtet entrance. The yellow surveys and topos published in this Newsletter are from this site.

Part 3: English Language Publications

Casteret, Norbert, The Descent of Pierre St Martin, Dent, 1955

Tazieff, Haroun, Caves Of Adventure, Hamish Hamilton, 1953

Craven Pothole Club, Record no. 112, October 2013, pages 29-30

Bradford Pothole Club, Bulletin vol. 7. no. 5, December 2014, pages 32-33

Reprinting of the article in CPC Record 112.

The article is available online at: <https://www.braemoor.co.uk/caving/psm.shtml>

Eldon Pothole Club, <http://www.eldonpotholeclub.org.uk/index/homepage/79expeditions/76-2007-gouffre-de-la-pierre-stmartin>

SWCC, Newsletter 117, 1996, pages 17 – 46

(Available as pdf on SWCC website)

Some Classic Texts!



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*Dan Liddy, Paul Quill, Allan Richardson, John Cliffe, Gareth Edwards
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 Jill Brunson, Paul Tarrant, Martyn Farr, Gary Vaughan, Harvey Lomas, Denise Knibbs, Elaine Hall, Jules Carter, Tony Baker
 Josh Young, Evan Cooper, Ben Vaughan, Sarah Hards
 Photograph: Tony Baker*

And so we leave the happy crowd at Camping Ibarra, Saint Engrâce, France and return to Wales, indeed to Ogof Ffynnon Ddu, where we have some big chambers of our own.....



Photograph: Tony Baker

Hypothermia and the older caver

Bob Hall

Introduction

In this article I will attempt to set out how the physiological consequences of aging may increase the risk of hypothermia in older cavers. I will also explore how other aspects of aging may further contribute to that risk. My purposes in writing this article are threefold. Firstly, to raise awareness amongst aging cavers that they may not cope with sustained cold conditions as well as they once did. Secondly to raise awareness amongst somewhat younger cavers that their older comrades may be at greater risk in cold conditions. And finally, to suggest some steps that older cavers can take to minimise the risk to themselves and their companions.

I am writing with the expectation that the reader knows what hypothermia is, how it can occur and hopefully how to recognise and deal with it. It is not my purpose to cover these basics.

Background

During the 2017 SWCC trip to the Pierre St Martin system in the French Pyrenees, no fewer than six members over the age of 65 completed a through trip, including myself. Several accounts and musings on our experiences are presented in this Newsletter by other authors, and a common theme is how cold the trip was.

The crux of the trip was the Tunnel du Vent, which is a stretch of deep water with a low roof and a powerful, cold wind. We used rubber inner tubes as floatation aids, together with a handline to pull ourselves through. The water temperature in the cave is at best 5°C. Prior to reaching the Tunnel everyone had got pretty cold, having been wholly or partially immersed several times in the preceding hour or two.

The consequence for me of this exposure to cold was to become at least mildly hypothermic and to stumble, trip and move painfully slowly. This story is reported in the Appendix to this article and in John Cliffe's article on pages 26-28.

Physiology of Thermoregulation

How does the human body function to maintain a steady 37°C in a cold environment? What follows is my attempt at a potted summary of some important aspects of what is a complex topic. In essence we need to look at how the body produces heat, how the body controls heat loss and the role of control mechanisms.

Thermogenesis

This term encompasses all the processes in the body that produce heat. In some cases heat is a by-product of other body functions. In others, heat production is the primary function of the process. Some key processes and organs associated with thermogenesis are:

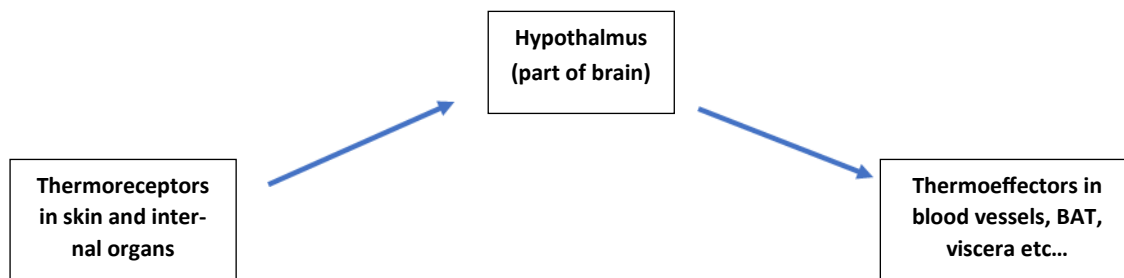
- Muscles and muscular activity. This includes voluntary activity such as prussiking and involuntary activity such as shivering, breathing and having a beating heart!
- The viscera and metabolic processes such as digestion, the workings of the liver and so forth.
- Brown adipose tissue (BAT), the 'brown fat' of the popular media, which has a specific role in thermogenesis.

Vasoconstriction / Vasodilation

Pale-skinned Europeans may talk of being 'blue with cold' or 'flushed with exertion'. These are the visible consequences of the body responding to circumstance by decreasing or increasing the flow of blood to the surface, thus diminishing or increasing the rate of heat loss. (Closely linked to vasodilation is the sweating response, to increase heat dissipation, but that is not relevant to this article.)

The role of the signalling systems of the body

To quote Morrison, 2016⁽¹⁾, “In its simplest form, the fundamental thermoregulatory network can be modelled as a reflex”. This diagram summarises the components in the process:



The thermoreceptors detect the effects of, a) the external environment and, b) changes within the body such as may be caused by exercise, ovulation, fever or medication. The brain processes that data and signals are sent to the thermoeffectors, which in turn bring about responses such as vasoconstriction, shivering or BAT activation that work to maintain equilibrium.

It should also be mentioned that, in addition to the nervous signalling outlined above, hormonal signalling has a part to play.

Behavioural aspects

Animals frequently exhibit behaviours that contribute to thermoregulation. Humans are no exception. We seek shelter, add clothing, light fires, snuggle up to warm companions and so forth. However, in the cave environment our options are limited. And, as is well known, a hypothermic casualty may not respond rationally to their predicament.

Limitations to the thermoregulatory process

Ultimately, short of basking like a snake or taking a hot bath, our source of heat derives from food, some of which is processed and set aside to fuel us between meals. To use an analogy, we have a ‘petrol tank’ in the form of glycogen stored in the liver and in our muscles, and a ‘jerry can in the boot’ in the form of fat and deeper reserves. In a survival situation, lack of sufficient accessible glycogen can compromise our ability to maintain our temperature.

The Impact of Aging

Much of what follows must be general in nature. Clearly some of us are fitter, others fatter; some wear shorts in winter, others like their open fire and so on. It is probable, however, that we can all cave more safely through increased awareness of what might apply to us or our companions.

Reduced muscle mass

In general, we lose muscle mass as we age. This has at least two pertinent impacts. Firstly, our ability to generate heat through muscular activity is diminished. Secondly our ability to store glycogen is reduced so we are working with a smaller ‘petrol tank’.

Reduced cardio-vascular fitness

If we can’t walk faster or prussik harder, the **rate** at which we can generate heat through muscular exertion is limited and, in an extreme environment, may not be enough to combat our losses.

Another aspect of cardiovascular fitness relates to the diminished elasticity of blood vessels which occurs with aging. This can impair the ability of an older person’s body to respond to thermal stress.

Reduced BAT

Until recent years BAT had been considered to be important only in neonates. But to quote, (Lee et al 2013)⁽²⁾, “...recent discoveries represent a metabolic renaissance for human adipose biology, overturning previous belief that BAT had no relevance in adult humans.”

So, the role of BAT is important. However, to quote another author, (Van Someren, 2011)⁽³⁾, *“brown adipose tissue decreases with age and is especially low in elderly people with a high body mass index (Cypess et al., 2009)⁽⁴⁾. This might be involved in the attenuated cold-induced increase in metabolic rate in old people”* and *“In summary, the importance of brown adipose tissue thermogenesis may not be as negligible in humans as previously thought. Thus, the decrease in the mass of brown adipose tissue in the elderly is a possible factor in the thermoregulatory problems of the elderly.”*

In other words, older cavers may have less potential to generate heat through BAT thermogenesis. It is also worth noting that living in warm houses, driving warm cars and preferring sunshine holiday destinations may further diminish our BAT, (Anouk, 2013)⁽⁵⁾.

Neurological factors

Speculatively it is possible that neurological factors associated with aging may also compromise the ability of the older caver to effectively regulate their body temperature when subject to cold stress; to quote, *“Older persons have a reduced cutaneous thermal sensitivity and a reduced subjective thermal perception during cooling. Thus, older people may require a more intense stimulus to perform protective actions against cold stress.”* (Smolander, 2002)⁽⁶⁾. And, again quoting, *“Age-related functional decrements in other sensory systems such as vision, hearing, and taste imply that the ability to perceive cold may also be attenuated in the elderly.”* (Florez-Duquet, et al., 1998)⁽⁷⁾.

Medication as a factor

It is commonplace in contemporary society for older people to take a range of routine medications from statins through hypotensives and anti-inflammatories to anti-coagulants, and much else besides. I myself was using both Ibuprofen and Co-codamol at the time of my ‘hypothermic wobble’, as I believe were one or two others underground that day. It is entirely plausible that some medications may interfere with the complex processes of thermoregulation to the detriment of the cold caver. Specifically, and relevant to my individual circumstances, research suggests that Paracetamol can directly lower core temperature (TC in quote below), (Foster et al, 2016)⁽⁸⁾. The authors state, *“The data obtained in this experiment demonstrates that TC is not as efficiently defended when participants ingest APAP (paracetamol) in a subneutral environment.”* If this is indeed the case perhaps we should all steer clear of paracetamol if we are likely to experience significant cold.

When asked about the impact of routine medication, Brendan, (Sloan, 2017)⁽⁹⁾, stated, *“medications - particularly cardiac meds which become much more frequent with aging - could certainly have a role.”* Indeed, (Cypess et al., ibid) reports a negative correlation between the detection of BAT in PET/CT scans of subjects and their use of beta-blockers.

Alcohol use, or indeed abuse, seemed as if it could also be a factor in the background, but this was discounted by Brendan, (Sloan, ibid), who wrote, *“One question you raised that can safely be discounted is related to alcohol and liver heat generation. Hypothermia does occur with severe liver failure, but this is for patients who are profoundly unwell (I've seen it on ICU in patients awaiting super-urgent transplant), and would not be applicable to you.”* So that was a relief!

And finally, it will not surprise women of a certain age that using HRT (or indeed not using HRT) may have an impact on their body's thermoregulatory response. (Brooks et al, 1997)⁽¹⁰⁾; (Genazzani, 2001)⁽¹¹⁾.

Social factors

Older people tend to be somewhat stuck in their ways, can be resistant to change and inclined to the view that, ‘if it ain't broke don't try to mend it’! This may lead some of us to hanging on to superannuated kit, not keeping up with modern developments in techniques, equipment and nutrition and so forth. At the same time, it is easy to be in some degree of denial about how much age has really impacted upon one's capabilities. It seems to me that we owe it to our younger comrades to take steps to prepare and compensate for our declining capabilities however we can.

Nutrition

I do not propose to discuss nutrition in any depth – it is a complex subject in its own right and could easily become the subject of another article. However, I will make two observations.

Firstly, that it is well recognised that our ability to digest and assimilate food changes as we age, so our behaviour in preparation for a caving trip needs to take that into account.

Secondly, that the science of nutrition has advanced considerably, and new insights have been put to use in the context of high-performance sports such as cycling. It may well be that cavers of any age could benefit from emulating those in some other sporting fields.

Spend your winter fuel allowance wisely!

Spend it on gym membership

There is clearly benefit in physical training. Resistance training to slow or reverse loss in muscle mass has obvious merit. Cardiovascular training to improve one's ability to sustain a high level of output and thus maximise heat generating potential has equal merit.

Don't spend it on fuel!

There is some evidence that routine exposure to sustained cold stress slows or reverses the decline in BAT and may 'train' it to respond more effectively to cold (Anouk, *ibid*). So, turn down the heating, and run and cycle in the winter with as little on as you dare. But wearing shorts and open sandals in arctic Norway is perhaps pushing it!

Be aware of the impact your medication may have

You might be advised to discuss this with your GP or pharmacist, and in some situations it could be appropriate to inform your caving comrades of your latest fix.

And finally – spend it on new kit!

Maybe some warmer, lighter, more flexible stuff could really make a difference? Perhaps warm neckware or a decent balaclava or some toasty merino socks would help you conserve those vital kilojoules.

I've never been a fan of hot drinks underground, but have been firmly persuaded of the life-saving potential of carrying the means of heating water on a long, cold, strenuous trip – thank you Martin!

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Appendix to 'Hypothermia and the Older Caver'

What follows are extracts from email correspondence between Martin Hoff, Bob Hall and Brendan Sloane discussing the 'hypothermic wobble' Bob experienced during his though trip on 4th August 2017. The team consisted of John Cliffe, Bob Hall, Martin Hoff and Clive Westlake.

A verbatim extract taken from an email from Martin to Brendan dated 14th August 2017

Off the bottom of the pitches, you are almost immediately into a very short duck - less aquatic than the one in Valley Entrance, it's essentially a brief immersion under the downlip where two low roof domes meet. I went through on my right hand side and became wet below a diagonal line from left hip up to right shoulder.

Anywhere else you'd just get a move on and warm up, but we were immediately logjammed behind a party of 5 who had someone who observably wasn't fully up to the trip and who took twice as long as everyone else on each rope. Only a handful of crappy up ropes, traverses and down ropes, nothing over 6 or 8 metres, and after a short while, though still too long for my liking, they pulled over in a chamber and let us through. Total trip time so far: three hours

Next novelty item was a chest deep wade - only a handful of metres long, water level above my navel but below my armpit. After this second soaking we were free to make our own pace, but understandably this differed within the party.

After the wade, we had half an hour of big passage boulder-hopping - imagine a dirty version of the big passage just beyond Salle Angel, without the nice dry sand and instead with looser, less reassuring footholds. Total trip time so far: four hours

Then we went into a feature called the Grand Canyon - essentially it's a long wet streamway, briefly broken by four short boulder chokes, which goes on for over 1km. Like the Red del Silencio upper streamway but with a consistent level floor, ie no ropes to swing on, not even a rubbish handline. In places this water was briefly up to and above navel level, usually more like knee deep. This was the start of properly chilling - I got cold after the duck and the hold up behind the first party and never warmed up till on the surface again ten hours later, but at my age I can support this better than the rest of my party and while it wasn't fun, it was still within the manageable zone.

Coming to the rope to get out of the Grand Canyon - only a 8m pitch up or something - I did a dozen laps of walking back up the passage till it got wet again and return to base of rope rather than stand in line and chill further. This next section, though dry, is the high level bypass to deeper water and carries a significant draught, so it wasn't a great place to hit the back of the next group to hold us up as they struggled with a short climb and a route-finding issue.

I pulled out my stove, made a warm brew for me and Clive but John and Bob turned down the offer. The warm drink served more to put off further cold decline rather than do much positive good. Total trip time so far: six hours

What came next was high level sketchy ground dry passage - a bit like the area in the Gandara left hand branch after the first up rope and before the big scratched arrow chamber leading to the stone staircase. We moved a bit more efficiently, got in front of the other party and eventually came back down to the streamway level again. It took some stupid near-acrobatics to avoid of getting snared in rubbish traverse lines to get back into waist deep wading, preferably without too much upper body exertion. A bit more loose gravel slope scrambling, more wading and a final crawl in the strongest draught yet to reach the lakes where "boating" becomes necessary.

GV had decided that proper boats were "too expensive" and that a bunch of lorry inner tubes, which all involve some partial soaking would be a better idea. Wrong. Rather than use them as unstable bum-rafts, we all opted to step into the middle of the tube, so had good buoyancy from the chest upwards on which to float and pull ourselves through on the handline. The lake was only 40m or 50m long at this point, long enough to be plenty for me.

Bob volunteered to repeat his soaking by taking the other tubes back to the upper shore, we moved to a slightly more sheltered point where I fired up the stove again and we had all had soup or hot chocolate. This again stopped further decline but the wait for the water to boil probably worked the other way against that. Total trip time so far: seven hours

At this point, the routefinding gets more stupid, my Scurion and nose work best for sniffing out where to go next and that process works best with me slightly ahead of the rest of the party. Bob asked me to wait, which I did, though when I next went to go on further, he clarified he actually wanted me to stop and not just let them catch up to closer to me.

Bob, paraphrased: "I'm feeling very trembly with the cold, I'm not breathing properly and I wanted to tell all of you once at the same time, not have to repeat myself. I can't move fast enough to generate any meaningful heat, so I need to keep my tackle sack to give me the extra physical loading and I am ok to move but I can't make any good speed..."

My analysis at this point would be that although we were all pretty chilly - apart from Clive in his vintage goon suit! - John and I were still holding our own on the decline slope while Bob was already some way further down that slope and possibly his working a bit harder to try and keep up was interfering with his body's attempts at addressing that decline, meaning he couldn't quite manage either and that's where his condition started to unravel.

While my detailed understanding of physiology is limited, my understanding of psychology and situation-management are pretty well developed.

Given Bob's willingness to keep moving at whatever his natural speed was at that point, I preferred to have him do exactly that rather than have the negotiation delay of getting him to do anything different, so I had him and John Cliffe just keep moving onwards while Bob was happy with doing so at whatever rate was comfortable.

At the same time, I pulled out the stove, boiled half a litre of water, stuck it into Clive's nalgene bottle and then we packed everything up to chase up the cave to catch Bob and John again. With the nalgene hot water bottle down his undersuit, the warmth on Bob's chest did a less efficient but still helpful version of the job a Little Dragon does, and the combination of that and then keeping moving at a naturally comfortable rate soon had Bob back towards being within normal operating modes. The difference that the warmth of the bottle made on top of continuing light exertion seemed enough to tip the temperature balance back the right way and from then on that particular problem was dealt with. Total trip time so far: nine hours

The last three hours of strenuous walking was fine, if at half the speed I needed to be doing it for me to warm up. Once he'd warmed up enough, Bob then hit the end of his stamina levels and slowed down just as Clive had also started to slow down. John and I would go to the end of the next big chamber and wait for Bob and Clive to catch up, then repeat. Bob and Clive slowed further but by the time we got out of the cave, Bob's physical condition was still stable, plateau-ed and running in tandem with ever lucid thought; he was already self-questioning whether volunteering to go back through the water with the other tubes was a genuinely rational decision or the sort of thing more allied with phantom disrobing and that kind of disturbance of judgement and state of mind. And thinking about who to harass in search of a better understanding of the physiology behind how he had ended up in that state - hello Brendan!

As an observer, the quality of Bob's self-reporting and his awareness of saying it once to all of us rather than repeating it made me think he was lucid and coherent throughout. As someone dealing with a situation, I trust Bob enough to know his own mind and was happy for him to stick with following that while I did the first thing I knew *could* help with the hot water bottle. It helped that he in turn trusted me enough to go along with my decision-making, and Clive and John sensibly said nothing and let us get on with that rather than get into an extended debate over any other options.

If he had stopped moving onwards for much longer at that point, Bob was probably stopping for some time and getting into an intervention requiring much greater input of externally sourced heat, so we would all have been getting into a very different scenario.

Bob's later observations that while he had worked on brushing up his technical ropework skills in advance, he hadn't worked at all on his stamina are fair and appropriate.

In addition to questioning just how much food and fluid Bob took in during the trip - because it's the fuel that drives the muscles that generate the warmth - I would suggest that none of us were quite adequately equipped for any sort of extended stay. We all had our extra thermal layer and balaclavas on pretty early on the trip, and though the others boiled up a treat over what for them was heavy exertion for the last couple of hours of the trip, I only took off my balaclava and extra thermal top having emerged into the ambient heat on the hillside.

In summary, we got away with it relatively comfortably due to some quick thinking and being old enough to just tinker with one variable at a time rather than go bonkers with taking drastic action and risk over-reacting in a way that would reduce later options. It never felt (to me at least) like it wasn't within our control to manage Bob (and ourselves) but it was heading far enough in that direction that there was a little pressure to get whatever we were up to right first time as we didn't have too many second chances to play with. I don't need reassurance that I did the right thing - the outcome proves that sufficiently for me.

An extract from an email from Bob to Brendan dated 15th August 2017

The PSM is an exceptionally cold cave. The show cave owners give the air temperature at the EDF tunnel entrance as 5°C but the water temperature higher in the cave is likely to be below that. Through trips inevitably involve wading in water from knee to waist deep intermittently but for an extended period and when out of the water one is subjected to a strong, cold draught in many places. Small climbs and route-finding niggles add waiting around to the mix. At one point a traverse line of 'tat' over a deep pool is in such poor state that many passing by experienced 80-100% immersion. Then there is the Tunnel du Vent which is similar to the Green Canal in length and is crossed using inner-tubes and a hauling line. Somebody in each team has to re-cross this to return tubes to the upstream end for the next party. The wind-chill during these manoeuvres is significant.

Another party set off before us but we overtook them eventually. I was wearing a new cordura-style oversuit and a medium-weight fleece with a cotton tea shirt underneath but as I began to feel the cold in the wet area of the cave I added a long-sleeved thermal top and put on my balaclava. We were all suffering from the cold to some degree.

At the Tunnel du Vent we experimented with various options of inner-tube deployment before opting to step into one and make the crossing partially submerged - we were all pretty soaked by then anyway. This seemed to give stability and avoid the possibility of an inadvertent dunking possible if one tried sitting on a tube. I volunteered to be the ferryman so was in the water 3-4 times as long as the others but was happy and somewhat exhilarated by the experience. (I've subsequently pondered on whether I was already a little light-headed through hypothermia at this stage?)

Almost immediately after leaving the waterside Martin proposed a brew and set up his cooker. (I was shivering at this stage and might have done better to have kept going.) Whilst the brew was happening I drained my wellies, sat on a campermat and ate a snicker bar. I drank the cup of soup Martin provided and also a 200ml carton of fruit juice at cave temperature.

When I stood up to repack my bag I stumbled and fell over. I was still rational and was aware that I was almost certainly hypothermic at this point. Once we set off I was very slow, moving awkwardly and feeling lethargic. I began to feel quite fearful, felt 'trembly' and breathless and after ten minutes or so was rational enough to realise that my level of exertion was not rewarming me sufficiently. I called Martin back and told the others how I felt. Martin proposed preparing a hot water bottle for me whilst I carried on moving with John in support. I struggled somewhat over the bouldery terrain and stumbled and fell at least once but felt rational and happy that I was in good hands. After ten minutes or so Martin and Clive caught up and I put a bottle (1 litre or a bit bigger) of really hot water inside my fleece over my belly and zipped up my suits and got going again. Within an hour of dry caving in big passages I was back to normal and had no problem exiting the cave.

Bats, Caves and Sex

Steve Lucas

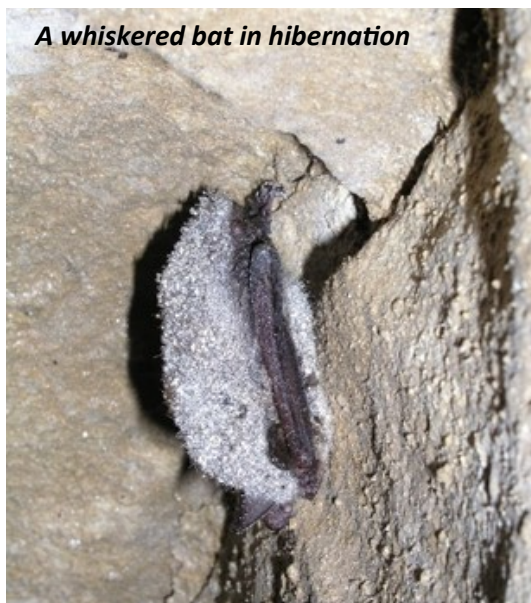
Bat conservationists and cavers haven't always seen eye to eye. Whilst there are those on both sides of the divide, who it could be said have been perhaps been overly protective in their approaches, there are others who recognise that there are legitimate interests and concerns.

The simple reality is that bats such as the horseshoe bats and the myotis bats do use caves and other underground sites such as tunnels and drains, throughout the year, but there are two particular times of the year when bats congregate in these places – autumn and winter. Cavers meet here all year round but perhaps not for the reasons I am going to explain!

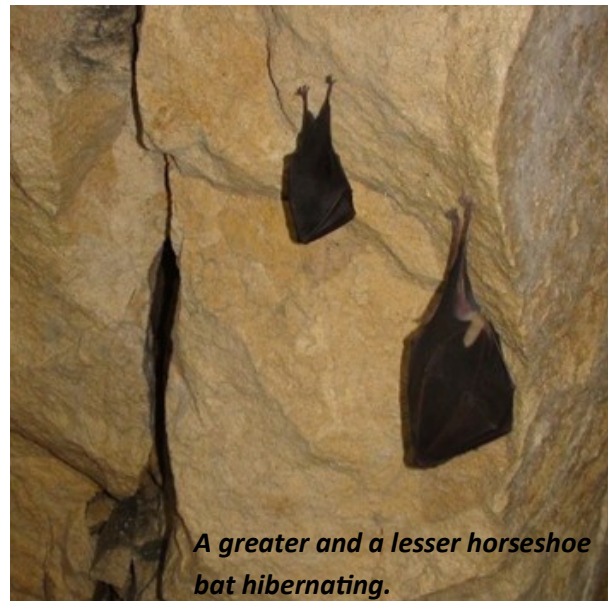
In Wales, there are 15 of the 18 UK species of bat recognised as being resident. The horseshoe bats (greater and lesser horseshoes) are the ones that are most likely to be visible as these tend to hang freely. But there are also a number of other bats, the myotis bats (Natterer's bat, whiskered bats, Brandt's bats, and Daubenton's bats – there are a couple of others), but also the long-eared bats (brown long-eared) that may either be seen clinging onto the cave wall or more likely are within the cracks, crevices and folds, which means they may not be readily seen.

During the winter months, when the availability of insects is much reduced, bats go into a hibernation phase to help them sustain their limited fat reserves until the following spring. They don't hibernate in the same way as many other mammals but instead go into spells of deep torpor or sleep, waking up periodically if they need to change where they are hibernating. This phase in the annual cycle of bats is critical as they have limited fat reserves to carry them through this period of little food.

However the autumn time is also an important part of the year for the myotis and brown long-eared bats that visit underground sites. They do this for several reasons: checking that the site is still there, and linked to this, the females are showing their young of the year where the hibernation sites are.



A whiskered bat in hibernation



A greater and a lesser horseshoe bat hibernating.

This becomes the opportunity for this group of bats to mate and this can happen from July through to October, although mating can continue right through the winter time. Now we have male bats waiting for the females to arrive and when they meet, they carry out a particular behaviour pattern called swarming when male bats chase females around before disappearing into the cave for mating. We also know that where bats swarm then they also hibernate there – but the reverse isn't necessarily true.

Photo credits: Daniel Hargreaves (top) and John Altringham (bottom). Thanks to BCT.
(Editors Note. It is illegal to photograph bats without a licence.)

Much of our conservation strategy is understandably based around hibernation and maternity sites. Research in the North York Moors has shown that bats are faithful to their swarming sites and this means that loss of a swarming site can have a real detrimental impact on bat populations. Working with the Vincent Wildlife Trust and Natural Resources Wales, Bat Conservation Trust is developing a project to identify these autumn swarming sites in Wales so that conservation effort can ensure that these bats can still reach their mating areas.

This will in no way have an impact on caving activities but it may be that you will come across bat detectors left outside near cave entrances. Some of these detectors may be small and reasonably well hidden but others may be a bit more visible. This won't be happening at every cave – we just don't have the time let alone the resources, but the project has started in a couple of areas. What we would ask is that they are not interfered with in any way and if you see anyone having an inquisitive look then perhaps challenge them – these are costly pieces of equipment and several detector have already gone missing! Also, if you do see bats in your underground travels – not for me thanks - then we would be interested to have this information, although quite how you would identify the location using a grid reference or lat/long record is probably a challenge! Do be assured that the results of this project, and any information you do share with us, will not be used against your legitimate interest in caving – after all we need to work with you.....

Steve Lucas is Bat Conservation Trust's Wales Officer and Species Policy & Legislation Specialist. slucas@bats.org.uk

Editor's Note: The British Caving Association supports the work of the Bat Conservation Trust insofar as the BCA uses the BCT Leaflet 'Bats Underground' as the prevailing guidance document on the BCA website. We have enclosed printed copies of this document for the benefit of members.

Caving in the Cotswold Massif Central, continued 2018

CDG (Cotswold Digging Group)

Andrew Ward



The author coming out of the extension pitch in Igloo
Photograph: Phil Howell of CDG

Back to the Cotswold caves for another look during the spring/summer open season (April to July). First for a revisit was Igloo, mostly to see if the boulders had stopped moving and it was as bad as we remembered from 2017. Yes, just as bad, still a highly mobile boulder pile with rocks moving more or less continually in the 2017 extension.

Route description

From the old Igloo cave through the boulders into the 2017 extension, a 1.5m drop down with two ways on at the bottom. Route one is a slight uphill squeeze past a fallen slab to a downward sloping rift 6m long and 2m high, soon ending in a too-tight way on. Route two is down and through a small tube with a drop down into a chamber 4m X 2m X 1.5m. The floor is made up of a mass of loose rock and to keep the floor company so are the walls and roof! There are hints of black space in the floor that could be an open(ish) rift; of course it could also be wishful thinking on the diggers part? Digging would be problematic as we have no solid wall to work from or to tie securing scaffolding onto. We retreated for a long think and the hope it would all change by the next open season.

Phil looking out from the 2017 Igloo extension



Loose rocks and squeezes



Igloo Main Chamber



Bottom Chamber

A bit loose - but black spaces beyond

Railing Rift

Down the track a bit to Railing Rift, a more stable cave and one with a few decorations (see photographs). Phil, Pete and Jerry had a look at the up-valley rift and found it as tight as ever with no prospect of a continuation. Rob and I had a look at the down-valley passage. Following the rift up over boulders then a 2m drop down to a reasonable sized rift that ended in a diggable choke, although it all felt very near the surface at that point. Maybe a dig for when we run out of other options.



Left: Rob in the entrance

Right: Down-valley Rift





Some of the formations in Railing Rift

Aven de Bagpath

Due to other commitments we did not get back into the Aven de Bagpath extension. This is on the list as soon as the next season opens (April 2019) photographs below.



Last pitch down into the original cave



*New cave from the previous season
Photograph: Pete Hall of CDG*

Access

Please note access to the caves is strictly controlled and any trespass will lose access, as all the sites are on private property. No access is possible from August to April.

Please contact the author using: Wardgpz@tiscali.co.uk for more information on access.

My thanks for access go to: Peter Neil and Greville Vernon

All photographs are the author's unless otherwise credited.

Editor's note: This article brings up to date explorations first described in NL133.

The Warren's-Virginia connection and a Bit on Fred

Pete Hobson

Introduction

This is a reminiscence of a time, back in New Zealand, when exploring virgin cave was a weekly or daily event but sadly part of a lifestyle that was tragically to change.

Warren's Self Respect, sometimes called Self Respect or simply Warren's, received its rather unlikely name when Warren Blake, one of a prospecting party, called to his friends that he had found a promising shaft, but was then unable to find it. Having declared that he had lost his self-respect and hunting madly, he came across another very impressive shaft.

Virginia, another cave in the area, is also entered by a shaft (36m), which drops you in to a knee-deep stream. Downstream the water flows through a multitude of passages with the stream eventually sumping before apparently reappearing in a cave named Sir Roger before sumping again. Upstream the passage is flanked by rather dirty formation, and after 80m ends in what was thought to be a deep sump. Some distance back, a small passage leads to a larger passage with deep pools that with careful maneuvering can be passed to reach a parallel streamway which can be followed up to a rather pretty part of the cave, with the water entering from under a mass of flowstone.

As a result of dye tracing, it had long been known that the waters from Warren's and a cave named Fred both flowed into Virginia and it is believed that the Fred water does not flow through Warren's because detection bags placed in Warren's did not detect dye placed in Fred. The jury is still out on whether this is the case because it is unsure where the detection bags were placed and there are several side streams flowing into Warren's, although it is most likely that this water enters from under the flowstone in the well decorated part of the cave.

Fred, Warren's, Virginia, Sir Roger, Fluorescein Hole, and various other caves make up what is collectively known as the Black's System

Long Cold Days in Warren's

One day, Kieran McKay decided that we should take a look at the downstream sump in Warren's. Great fun I thought, so off we went. It is quite a sporty trip down through Warren's; we had never been to the bottom before and I had great fun sending Kieran through very tight wet squeezes and then finding alternative comfortable routes.

Upon arriving at the sump we found it to be caused by a flow block in a high rift. The rift appeared to be about a metre wide, about thirty metres high and very mucky; certainly high enough to have a way over the top. We would return with iron-mongery.

A week later on the 6th of June 1994 we returned prepared. From Kieran's report in the HTG log book:

"Down to the bottom of cave to do a climb above sump 2hrs and 10 greasy muddy yucky metres the top was reached [for 2 hours I sat and froze on the other end of the belay rope]. A crawl and a squeeze under a beautiful flow and we predictably ended up at the top of a pitch. A 12m pitch got us back down into the stream, unfortunately 20m further the passage sumped again under another flow. Our climbing rope had been used on the abseil so we couldn't go any further. Back tomorrow.

T.U.G. 7hrs"

We climbed out of Warren's wet and muddy to a cold clear night. We walked quickly down to the van and then stripped off in a fresh southerly, before washing in the horse trough and then driving back to Waitomo.

Next day we were back. We quickly descended down to the streamway and then ran down to the first sump and after a quick climb, squeeze and abseil we were standing on a ledge just upstream of the second sump. Kieran was tied to the end of a climbing rope and I settled down to belay for the next few cold hours. Every now and then there would be some bad language and a splosh when Kieran would drop one of my spits but after three long hours and three dodgy bolts Kieran decided that there was a lead but he could not get into it; we would have to dive. We exited to an even colder night and again washed in the horse trough as ice formed on the grass around us.

On the 11th of September 1994 we returned to Warren's. We intended to look for the Fred water in the maze of passages in the lower levels coming in on the true left, just downstream of the squeeze. At first we followed stream-ways but these became too small to follow. We then started looking in the upper levels. We found passages that could be reached by climbing and would therefore need to wait for another day. Eventually we found a rock-fall chamber with a very pretty ceiling. Through this rockfall we could hear what sounded like a good-sized stream and yes, I know what you're thinking, a tiny trickle of water or a draught can often sound like a massive underground river, but Fred should be there somewhere and yet again, another project for the future. To this day, the leads found that day have not been pushed.

Virginia

It was time to attack Virginia. Kip Mandeno and Kieran had discovered 80m or so of new passage in the main streamway, upstream of the entrance pitch. The "deep sump" turned out to be a duck and after a free-divable sump and lots of mud, a sump that needed SCUBA stopped them.

On the 3rd of January 1995 Kieran and I returned with the necessary equipment and a live ferret was found at the bottom of the entrance pitch. We slimed and glooped our way up to the sump and for some reason I didn't have a wetsuit!

Kieran kitted up in the mud and groveled into the sump leaving me to try and keep warm. He pulled himself past a few submerged stals and surfaced! Not Warren's, not yet. He glooped his way up more muddy passage until he reached another sump. It took him a bit longer to find his way through this one: it was a bit tricky, a narrow wiggle through flowstone in zero viz but he eventually surfaced in a big passage. He dropped his gear on a handy rockfall and ran up 100-150m of stream passage to sump 4. He tried to find a way over the top but the last 3m of the climb was too slippery. He returned to find me shivering and we groveled out. The new streamway was named the *Ferreted Streamway* after the ferret we rescued from the cave that day.

Just over a month later we returned. From Kieran's write up in the HTG log:

"The trip entailed carrying a dive bottle each plus weights, mask and a reg up the Streamway through all the gloop, a desperate duck and a short free dive through sump one. We had to stop briefly at sump two to organize our dive gear and then dive the short knarly sumps 2 and 3. Beyond sump 3 we had a nice wander up the large section of the Ferreted Streamway to sump 4. I dived first into a narrow stall filled passage and surfaced after about 5m. Not in Warren's yet. Pete was close behind. Sump 5, which was only a few metres away, was passed with difficulty it was very low to start with. I surfaced after about 10m. More open passage to which lasted 20m to sump 6. Another short dive and we popped up in Warren's."

You might ask yourself why one bottle each? These sumps are very restricted. We passed the sumps by holding the dive cylinders in one hand between our legs or where ever we could fit them as we navigated our way through submerged stals in zero visibility. Kieran, as he said, popped up in Warren's. I was hanging back to give him a chance to negotiate the sump before following. When he surfaced I could hear him and see his lights through a stal filled tube above the sump. How we missed this tube on our earlier trips down Warren's is a mystery. This tube could easily bypass the sump with a bit of creative destruction and it just goes to show that a cave is never fully explored. In the end we had passed a total of seven sumps and a duck (which is also a sump in all but very dry conditions) to connect the two caves.

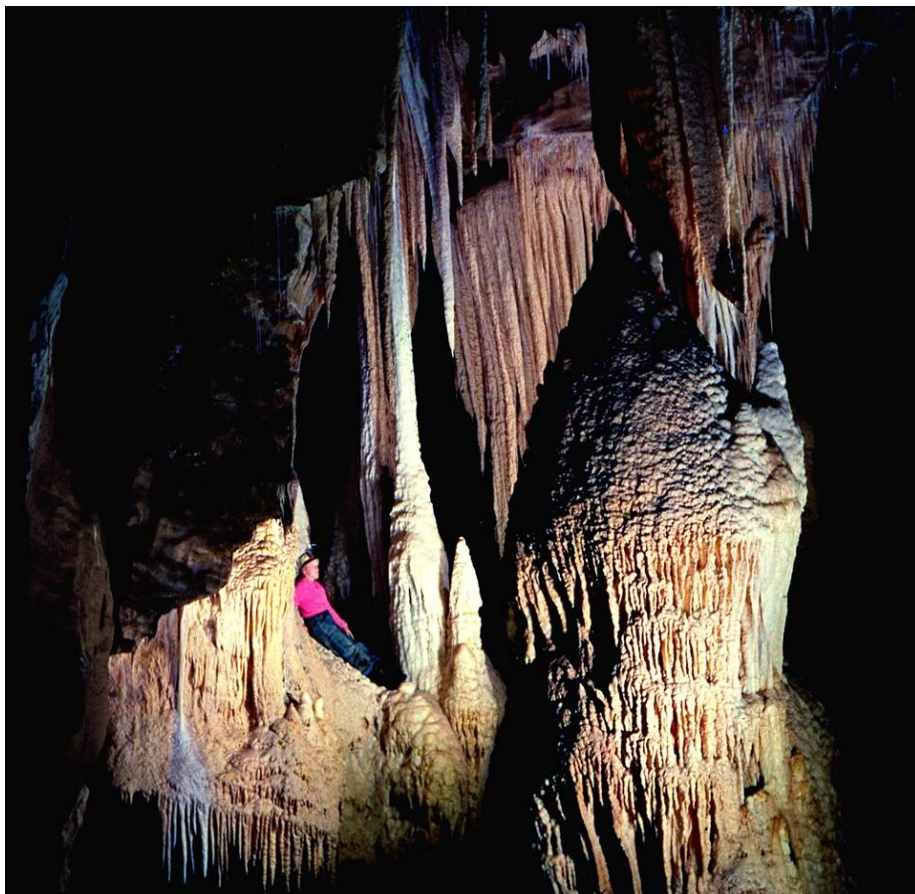
The Months and Years that Followed

Then what? The through trip and the survey have never been done. The connection with Fred needs to be made; there does appear to be a passage above the downstream Fred sump which needs to be climbed. Sometime around that period, Kieran and I visited the bottom of Fred and I attempted to free-dive the sump. I discovered that the water disappeared down a very small hole formed by flowstone. This explains why despite the large nature of the passage, the whole lower end of the caves floods in times of heavy rain. Several years later, another caver, Kip Mandeno, convinced Kieran to help porter dive kit to this sump. It was only after his very short submergence and then describing of the sump that Kieran remembered that I had already been there. Kieran and his poor memory were not popular that day!

What about downstream of Virginia and Sir Roger? About this time we dived upstream Sir Roger. Downstream Virginia was considered too much hassle to reach when there were easier options available, and to this day has never been tackled. Sir Roger's upstream sump sits at the bottom of a 40m entrance shaft; a very technical pitch involving multiple rebelay, deviations, pendulums and hanging death (loose rock). Kieran and I passed two or three sumps before finding a lake in a highly decorated chamber but the way on could not be found.

There are caves downstream of Sir Roger, and again some diving in these also occurred. There is also the possibility of another cave system entering. This involves a cave named Hochstetter Hole and again we dived in here, discovering 400m of passage heading toward the Black's system before being stopped by another sump. There is a possibility that this feeds Black's, but it could also go to a large spring that is yet to be dived and which, I suspect, never will be.

Within a few months our circumstances changed. On the 8th of May 1995 we arrived at the Pearce resurgence, in the South Island of NZ. Our intention was to dive the resurgence and to push the downstream sump of Nettlebed. Twelve days later Dave Weaver died while ascending from a depth of 75m. We carried on with the expedition but afterwards the urge to push had somehow been lost and as a result many projects were put on hold to this day.



*View across the Black Abyss toward the Temple of Pluto and the Four Pillars of Wisdom in the Upper levels of Warren's Self Respect.
Photograph: John Hobson (The author's father)*

In Praise of Dyneema

Bob Hall

What is Dyneema?

Arguably it is an extraordinarily versatile type of cordage that could usefully be carried by many cavers, as I hope to demonstrate below. Marbach(3) refers to, “this miracle fibre”. Praise indeed. Dyneema is a type of synthetic fibre made of polyethlyene, specifically ultra-high-molecular-weight polyethylene (UHMWPE). It is produced in a patented gel spinning process in which the fibres are drawn, heated, elongated, and cooled. Stretching and spinning leads to molecular alignment (up to 95%), high crystallization (up to 85%), and low density. Dyneema has extremely long molecular chains that transfer load more effectively to the polymer backbone.

‘Dyneema’ is a tradename owned by a Dutch company, DSM High Performance Fibres BV. ‘Spectra’ is the tradename of a very similar product which is owned by Honeywell in the USA. These trade-names are often used interchangeably – much as you might Hoover the floor with a Dyson! Many products incorporating Dyneema are used in industry and the military, by climbers and by sailors but generally in composite cordage, for instance by incorporating a Dyneema core within a nylon sheath. This article is about ‘pure’ or 100% Dyneema cord with a nominal diameter of 5mm.

A little history

Composite cords with Kevlar or Dyneema cores and nylon sheaths were available from the late eighties. In 1992 George Marbach, a celebrated pioneer of many technical advances in French speleology, approached the Béal company to suggest that they develop a cord made solely of Dyneema. The following year the Petzl company also approached Béal to manufacture a suitable cord for their ‘Pompe’ jammer, which some of you may remember. The result was the product featured in this article.

Key properties of Dyneema

- It has VERY low stretch and consequently very limited shock-absorbing ability. This limitation of Dyneema must be clearly understood.
- It is about as slithery as Teflon. This is another VERY important property because it requires the user to be meticulous in their use of the correct knots.
- Its mechanical wear resistance is harder to define but is certainly superior to nylon. In this context it is worth noting that its low stretch characteristic means that it is much less susceptible to the type of ‘sawing’ action that can occur where a rope touches rock whilst a caver prussiks below the rub-point. (But see further discussion below.)
- It is about three times stronger than nylon, in fact of comparable strength to steel wire rope whilst being much lighter.
- It has a relatively low melting point of about 150°C. In a largely carbide free world this is hardly important.
- It is very resistant to chemical attack – again, with modern lighting this is less significant than in the era of leaky NiFe and Oldham battery packs.
- It floats and absorbs very little water in use, thus remaining very light when wet.

Laboratory Tests, Results and Conclusions

I have been at pains to base this article on authoritative sources so make no apology for going back to the testing done by the Fédération Française de Spéléologie in 2005⁽¹⁾⁽²⁾. This was carried out at the laboratory of the École Nationale de Ski et d’Alpinisme and represents the baseline of technical understanding on which Dyneema’s use in modern caving practice is based.

First group of tests – single lengths of cord.

The table below is an extract from the results of tests done on a single length of cord with no knot and with a selection of commonly used knots. The cord had been soaked and washed before testing and knots were carefully dressed. In most cases five tests were done in each configuration and the figures presented are an average. The shock tests involved dropping an 80kg weight a distance equivalent to a fall factor of 0.2. The force generated by that shock was measured by a load-cell.

Knot	Tensile Test kN	Shock Test: number of drops sustained	Force of 1 st shock kN	Comments
No knot	9.59			+/- 5%
Bowline without stop- per knot	5.50	3.2	3.88	Slipping within the knot pro- vided the shock-absorbing ability.
Overhand knot	5.85	1	5.27	Only 3 dynamic tests
Figure 8 knot	7.19	1.7	5.87	Only 3 dynamic tests
Figure 9 knot	6.77	/		
Other knots were tested but results are not reproduced here				

It is important to bear in mind that a fall factor of 0.2 is minimal and could easily be encountered as a consequence of a simple slip arrested by cows-tails – and I’m nearer 100kg than 80kg!

The FFS concluded that the use of **single Dyneema cord was dangerous** in any application other than deviations and footloops.

Second group of tests – cord formed into a sling.

In these tests the variable is the type of knot used to close the sling. The table below reproduces some of the key results. It should be studied in conjunction with Figures (1 to 7) which illustrate the types of knot described. I feel that this is necessary because many knots or combinations of knots may be unfamiliar and some have no clearly defined names in English.

The method of testing was similar to that used in the first group of tests. But the shock test, again with an 80kg weight was done with a fall factor of 0.5.

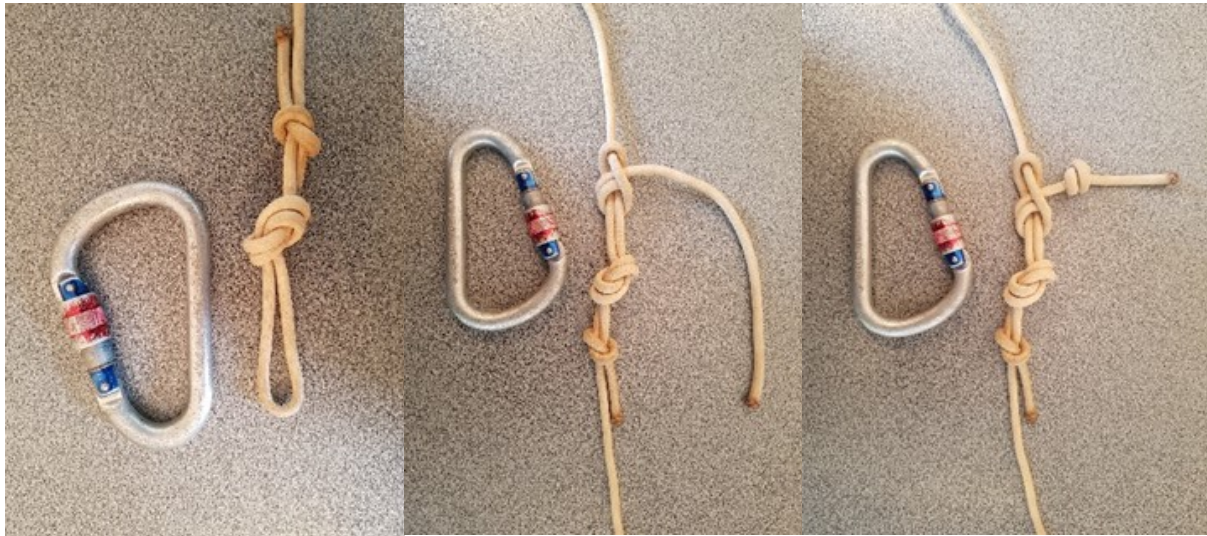
Figure 1
Open (flat) figure 8

Figure 2: Open (flat) figure 8
tightened – note the long tails

**Figure 3: Double fisher-
man’s knot - again note the
long tails**



**Figures 4, 5 and 6 form a sequence showing how an overhand loop is formed, a double sheet bend tied into it and a double stopper knot added for security.
(The final step is not an optional luxury!)**



Second Group of Tests - Table of results

Closing knot	Tensile test: Load before slippage kN	Tensile Test: Load breaking kN	Shock Test: number of drops sustained.	Force of 1st Shock kN
Overhand knot: open (flat) form	2.00	4.98 (Pulls through knot)	1.0 (Slipping)	4.20
Figure 8: open (flat) form (Figs. 1&2)	8.06	10.54 (Pulls through knot)	2.4 (Breakage or slippage)	7.40
Backthreaded Figure 8	9.16	11.95	3.4 (Slippage)	8.75
Double Fisherman's Knot (Fig. 3)		12.82	2.0 (Breakage)	10.59
Single sheet bend tied into an overhand loop with single overhand stopper	1.00	8.67 (Pulls through knot)	/	
Single sheet bend tied into an overhand loop with a double overhand stopper	1.00	12.68	2 (Breakage or slippage)	7.67
Double sheet bend tied into an overhand loop with a single overhand stopper. (Fig. 4,5 and 6)	4.95	12.13	2.6 (Breakage or slippage)	7.72

The FFS concluded:

1. The use of an open (flat) overhand knot is **unsafe**.
2. The open (flat) figure 8, backthreaded figure 8 and double fishermans are all safe. There are pros and cons to each. I personally use the open (flat) figure 8 for one-off, quick jobs and a double fisherman for slings I don't expect to untie in a hurry!
3. That if a single sheetbend is used then a double overhand stopper is **essential** but using a double sheetbend (with single or double stopper) is better. This combination of knots is especially useful when wanting to accurately adjust the length of a sling.
4. The sliding and slippage of the open (flat) figure 8 requires long tails of 8cm or more for safety.

An important point to make here is for the benefit of climbers. When testing Dyneema the open (flat) figure 8 is proven to be safer than the open (flat) overhand knot. However, when using dynamic rope to rig a double-rope, pull-down, abseil there is evidence that the opposite is true. Use of the open (flat) figure of 8 is implicated in some fatalities in the USA. This is the 'Euro Death Knot' controversy.
⁽⁵⁾⁽⁶⁾ Please research the facts before choosing your abseil rigging knots!

Further groups of tests

These were carried out principally to investigate ways in which Dyneema might be attached to semi-static rope and hangers during SRT rigging. The results are not reproduced in this article but the examples that follow reflect the 'best practice' that arises from this experimental evidence. Refer to Alpine Caving Techniques⁽³⁾ and Caving Technical Guide⁽⁴⁾ for additional information.

Getting started with Dyneema

Firstly, it is not cheap! Per metre it is significantly more expensive than semi-static rope of twice the diameter. Don't try to buy from anywhere other than a specialist caving supplier – a chandlers will not be selling the 100% Dyneema discussed here.

Secondly, FFS advise soaking for 24 hours and then rinsing to remove manufacturing lubricant. Given its incredible resistance to chemical attack, washing with mild detergent in cool water wouldn't hurt and is what I do after muddy trips.

Finally, FFS describe a quite elaborate method of preparing and sealing the cut ends. I've not quite bottomed that out and have been content with conventional flame sealing.

Applications of Dyneema in everyday caving

I have found it invaluable to carry some modest lengths of Dyneema on all my trips in the UK and abroad. A three metre length will sit comfortably in my helmet, and somewhat more in a breast pocket. These can rapidly be brought into action to provide simple aids to progression for myself or others, or to provide a reassuring handhold on an exposed move. In this context Dyneema scores over tape slings and heavier cordage by being so light and compact that you can have it with you when you need it. A further advantage is its small diameter, allowing it to be threaded through small holes and looped around small protuberances. In this context sound knots are important, but the matter of shock-loading barely arises.

In the same vein, when leading novice trips where it may be necessary to rig temporary handlines for confidence or safety, or to set up belays and lifelines in novel situations I have found Dyneema invaluable, particularly for its convenience and ease of use with small natural thread belays. And since I am likely to be carrying all the kit, the weight saving counts too. The methods of using Dyneema in these situations incorporate the techniques and principles illustrated in the SRT section of this article below.

Finally, in an emergency situation where improvisation may be crucial, having a supply of such strong, thin cord could be invaluable – provided always that you fully understand its limitations and the techniques of employing it safely. As an example of improvisation, see Figure 8, below.



Fig. 7 (left)
A 3m length of Dyneema will fit comfortably in a helmet.

Fig. 8 (right) Improvisation in action.
Needing some bracing whilst drilling the hole partly hidden to the right of the karabiner, I attached a Dyneema sling to a rusty old stud anchor with a clove hitch.
(Ignore the metalwork on the sling.)
(My descent rope to my left kept me safe.)



Fig. 9 (left)
Providing reassurance for novices on a traverse. A mid-point anchor using Dyneema in a drilled thread.

Fig. 10 (right)
Providing reassurance for novices on a traverse. A mid-point anchor using Dyneema in a natural thread which is too narrow to take thicker cordage.



Applications of Dyneema in vertical caving

Dyneema is most often thought of in the context of 'lightweight SRT' and exploratory caving where it obviously has its place.

Nevertheless, even in classic Yorkshire pots with resin anchors, you might find a few metres useful if you have just dropped your karabiners down the last pitch! And abroad, with French or Spanish 'tat' festooning pitch heads, you might be grateful for something you can trust – provided always that you fully understand Dyneema's limitations and the techniques of employing it safely.

And finally, with an influx of keen young members, there are ideas and techniques to comprehend and master in preparation for on some hardcore pushing in far flung lands!

The possible uses of Dyneema in SRT rigging are extensive and many are well illustrated and described in the technical manuals listed below⁽³⁾⁽⁴⁾. The following illustrations just give some flavour of what is possible. I see these methods of using Dyneema as:

- permitting improvisation when short of equipment
- permitting a planned and considered lightweight approach to rigging in some situations.



Before illustrating how Dyneema may be employed with conventional hangers and so forth, a mention of the Am-arge Souple, flexible anchor or AS is called for. The AS is a type of anchor designed exclusively for Dyneema (Fig 11). Apart from being very light, it is indeed, flexible in the sense of being adaptable. Key points to note are that no maillons or karabiners are required, contact between the Dyneema and rock below the anchor is acceptable (but see warning below) and an AS can be used in overhead placements.

Figure 11 (left)
Close-up of an AS



Fig. 12

AS in use. Note the open (flat) figure 8 used to form the sling and 'lark's foot' connecting the Dyneema sling to the semi-static rope



Fig. 13

AS used in an overhead bolt placement. Note how the sling is doubled so that the AS is loaded symmetrically



Fig. 14 (left)

A Y-hang rigged using an AS on one side and a conventional hanger on the other.

The sling on the AS is attached to the semi-static rope by a 'flat' knot as in Fig. 13 above.

The sling on the left is attached to the semi-static rope by a double sheet-bend with a stopper knot as in Fig. 17 below.

Methods of joining a Dyneema sling to semi-static rope

Figures 15 and 16

These two methods of attachment are topologically the same but I suspect the 'flat' or 'reef knot' form can absorb more shock. (It is the work of seconds to turn one into the other!)

*Fig. 15
Lark's Foot*



*Fig. 16
'Flat' or 'Reef Knot' form*



*Figures 17 and 18 below, show two alternative variations on the use of sheet-bends.
These have the virtue of being amenable to accurate adjustment.*



*Fig. 17 (above)
Double sheet-bend with stopper knot*



*Fig. 18
Single sheet-bend secured by threading
one end of Dyneema through the sling
and then tying off with a fig 8 knot*



*Fig. 19
Another sheet-bend combination combining
the security of the double version with the
'loop-through' shown in Fig. 18*

Connecting a Dyneema sling to anchors

As illustrated in Figures 20 and 21, below, the 'lark's foot' is the simplest approach. Obviously, a larks foot is equally applicable with resin bonded anchors ('P bolts').



Fig. 20

Note how a ring hanger can be used overhead, but an AS is very much lighter!



Fig. 21

Considerations for clipping in cowstails at anchor points

Under no circumstances is it permitted to clip directly into a Dyneema loop – the almost total lack of shock absorbing ability makes this too dangerous. It is therefore essential to clip into the semi-static rope at the knot.

Fig. 22

As always the karabiner should be clipped into both loops of a bowline-in-the bight



Fig. 23

The FFS recommend the Diju knot at single points of attachment. This is a 'bunny ears' knot in which one 'ear' is passed back through the three turns of the knot.



Some comments about rope rub



Fig. 24 (left)

Figure 24 shows Dyneema used with a conventional hanger. The long Dyneema sling is used here to avoid semi-static rope rubbing on the obvious lip. Because Dyneema has almost zero stretch, a caver bouncing on the rope below will not generate the 'sawing' effect which could occur with semi-static rope.

However a word of warning is necessary. If the caver below pendulums significantly, perhaps to reach a side window or awkward deviation, then repeated **lateral** movement could be enough to sever the Dyneema sling.

A Y-hang or deviation to move the sling out of contact would still be the preferred option!

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2. La cordelette Dyneema® et son utilisation en spéléologie, Judicaël ARNAUD et. al. Spelunca n°97 - 1er trimestre 2005
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4. Caving Technical Guide, École Française de Spéléologie, English Edition 2013
5. <https://www.climbing.com/skills/in-defense-of-the-european-death-knot/>
6. <https://user.xmission.com/~tmoyer/testing/EDK.html>

Reminder: It is the responsibility of individual cavers to satisfy themselves that the equipment and techniques that they employ are appropriate for each specific set of circumstances. No written introduction or guide can anticipate all such circumstances.

All photographs accompanying this article are by the author.

Tooth Cave

Identifying Complexities, Asking Questions, Suggesting Answers

Andy Freem & Pete Kokelaar

Introduction

Tooth Cave is the most remote of the caves for which SWCC manages access. Its full extent was discovered by club members in 1961, who broke through speleothem only a few metres inside the entrance to find the archeologically significant Bone Chamber and an active system beneath (Harvey et al. 1967).



Fig.1 Tooth Cave gated entrance

The cave underlies Green Cwm, a wooded 'dry' valley in the centre of the Gower Peninsula, and is the longest in the area at an estimated 1.5km. It forms part of Gower's most extensive karst hydrological system (Fig. 2), comprising two main inputs, Llethrid and Decoy streams, several minor sinks active during floods; two major caves - Tooth and the beautifully decorated Llethrid - and a substantial rising, Wellhead. This persistent resurgence formerly supplied Gower's water, but was problematic in that during

heavy rainfall the normally clear water would turn turbid with suspended sediment and form a fountain in the exit pond, reflecting substantial pressurization. During extreme flood events, the entire system is passed over and surface water reaches past the Wellhead resurgence and apparently the 'dry' valley has been kayaked in these conditions!

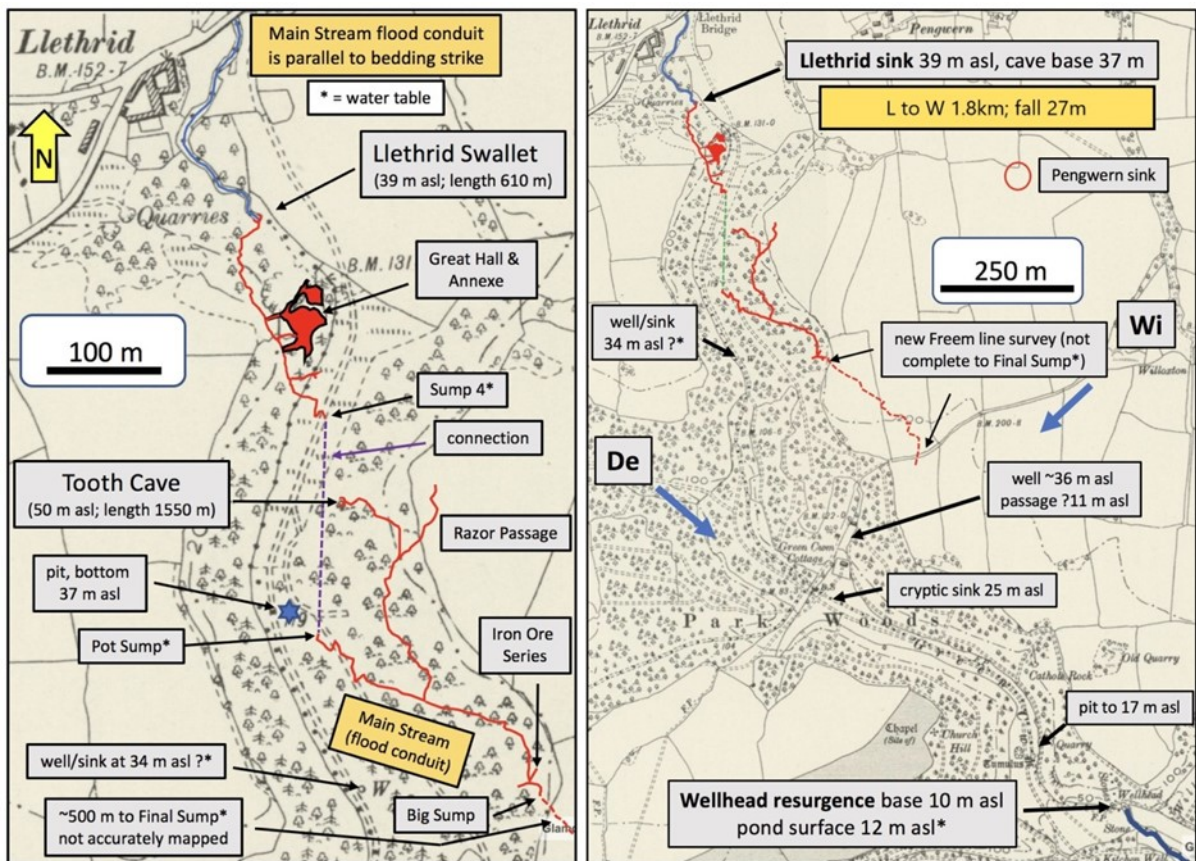


Fig. 2 Green Cwm hydrological system. 'De' and 'Wi' are Decoy and Willoxton, confluent connections proved by dye testing but with no known accessible passages, apart from a few metres dug out at Decoy Sink.

Tooth Cave is visited infrequently, typically once to five times in a year. Access is not permitted from November to April, due to use by bats of the Bone Chamber and related spaces as a hibernaculum. During rainy weather over 80% of the system is likely to be inaccessible. Several U-tube sections of the entrance crawls can sump and the Main Stream Passage fills to the roof. The prospect of being caught in the system in rising water would be dire and the hydrology is sufficiently obscure not to risk entry except in totally settled weather. The cave is also quite arduous, with several tight and awkward squeezes at the start and finish of the muddy and stony Entrance Series crawl.



Fig. 3 U-tube obstacle at start of entrance crawl



Fig. 4 Upward squeeze at far end of entrance crawl near Main Junction

Once reached, the Main Stream Passage consists of mostly stooping or walking-sized, beautifully shaped phreatic tubes, decorated with occasional grotesque formations. The tube walls are extensively scalloped, as typically formed by aggressive, relatively fast-moving water. When accessible, the passage is mostly dry, but terminated by static sumps at both ends, and with an intermittent static sump that dries away in drought conditions. This allows access to a further 500m of downstream passage that has a fine character, with some impressive sizes, shapes and speleothems. It feels like a gnarly version of Notts 2, but it currently lacks an accurate survey.

Our knowledge of the hydrology of the system is limited by the lack of access to much of the system when water is flowing. Dye testing (Baynton 1968-69) has proved confluent inflows from westerly and easterly sinks (Decoy and Willoxton respectively) before the Wellhead resurgence, but since the downstream reaches of Tooth Cave can only be explored during hard drought conditions, and there must be >500m of completely unknown passages beyond the farthest downstream sump (Fig. 2), the locations of the confluences are presently unknown.



Fig. 5 Intermittent downstream sump dry in August 2018



Fig. 6 Re-dissolving stalactites downstream of the intermittent sump

Were water to be observed flowing down the Main Stream Passage, the caver's future would not be hopeful. A blind refuge aven above a choke was identified early on, and emergency rations were placed there and still remain some 50 years later, now of dubious savour!

Except near the entrance, there is no perceptible draught in the system and after prolonged drought, as during this summer of 2018, a significant CO₂ hazard develops in lower reaches of the downstream main passage.

Not overselling this cave are we ?

Identifying the complexities and asking the questions

During the 2018 summer drought the cave became more accessible and some intriguing geological and geomorphological observations were made that add significantly to the earlier reports (Harvey et al. 1967, Baynton 1968-69, Ede and Bull 1989).

The cave is within the northern limb of the Gower anticline, with limestone beds dipping at angles of 15-50 degrees broadly northwards. There are no vadose passages in the entire cave, although these do exist in Llethrid swallet, which is up-stream and up-geological succession. Most passages beyond the Tooth entrance chamber and rifts are near horizontal, and they tend to follow the strike of the bedding somewhat south of east (at right angles to the dip). The entire system from top sink to bottom resurgence (Fig. 2) falls only 27m over a distance of 1.8km, a relatively gentle gradient of about 1 in 67. Passages only reach respectable heights where there has been some upwards solution of joints. One gains the impression that, whereas upstream passage walls are commonly stained brown or black, close to the downstream end staining is widely absent and limestone dissolution has been relatively aggressive. Here the grey limestone forms superb scallops, with bizarre blades and pillars which imply that increased dissolution from confluent inflows takes place here.

Given that the accessible main passage is a flood bypass to the deep phreatic flow that is continuous to the resurgence, there evidently exists a lower system of passages - proved by dye tests. These may not be simple phreatic loops but are more likely to involve flooded vadose passages from an originally more open system. We speculate that the continuous slow-flow (non-flood) deeper system was formed during periods of low sea level. This may now be restricted by sediment infill and we develop later in this article a tentative hypothesis for the cave's development through time.

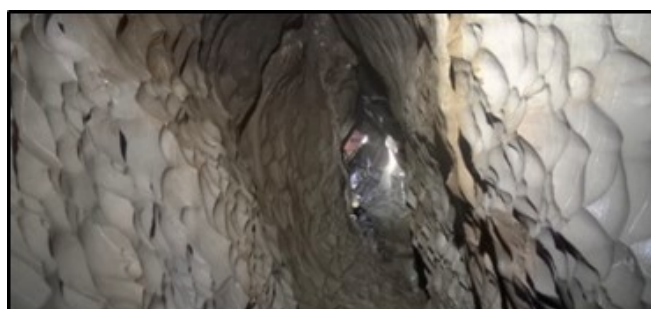


Fig.7 Scalloped rift walls near the downstream terminal sump

Loads of cobbles

Large sections of both the Entrance and Main Stream Passages contain banks of black rounded cobbles (64-256mm), generally without stratification, lacking imbricate (flow-aligned) fabrics and with sand and silt infill between them. Some passages are virtually half-filled with these deposits and the fine-grained matrix is continuous with a covering layer of silt and mud, especially within side passages and loops. These deposits predate flowstone and pillar speleothems.



Fig 8. Entrance Series crawl in channel between cobble banks



Fig 9. cobble banks and speleothems near Main Junction

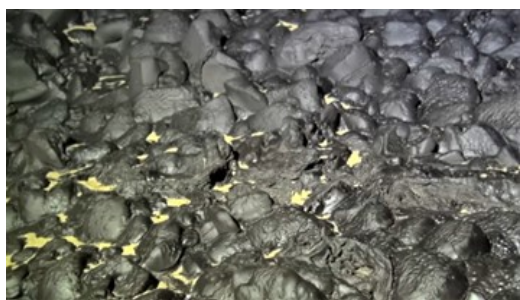


Fig 10. Black coated cobbles upstream of downstream sump



Fig 11. Main Stream Passage and pebble banks

Figures 8 & 9 on previous page and 10 and 11, above, show deposits of well rounded cobbles occur in mounds recording catastrophic short term violent flow and rapid deposition. They are non-stratified, were initially well sorted and formed clast-supported open frameworks, locally with clast-jamming fabrics (steeply upright – see red box). Fine sediment secondarily infiltrated into the frameworks, forming their matrix and covering the mounds. Speleothem growth post-dates the fine sediment infiltration. Steep banks show erosional reworking of the cobble-plus-fines deposits as well as their cohesion.

The cobbles are predominantly of tough sandstones and conglomerates, and include rock types absent on Gower but typical of the northern outcrops of the Devonian and Carboniferous (e.g. between the upper Loughor and Tawe valleys). The large size of the clasts and their good sorting (smaller pebbles and larger boulders are conspicuously uncommon) are problematic in that there is no presently active process that has the energy to transport them into the cave, and also no obvious point of entry for this size of material into the known passages. The general lack of stratification in the cobble banks, occasional upright jamming fabrics (Fig. 9), and mounded forms indicate rather catastrophic dumping. On the other hand, the fine sediment infilling matrix and cover of the cobble banks obviously record dramatically contrasting tranquil settling conditions, and, further, the steep banks eroded into these deposits clearly record subsequent stream erosion. To complicate things further, in one or two places the rapidly dumped cobbles overlies thinly bedded to laminated fine sands and silts, recording an earlier episode of water tranquillity (Fig. 12).

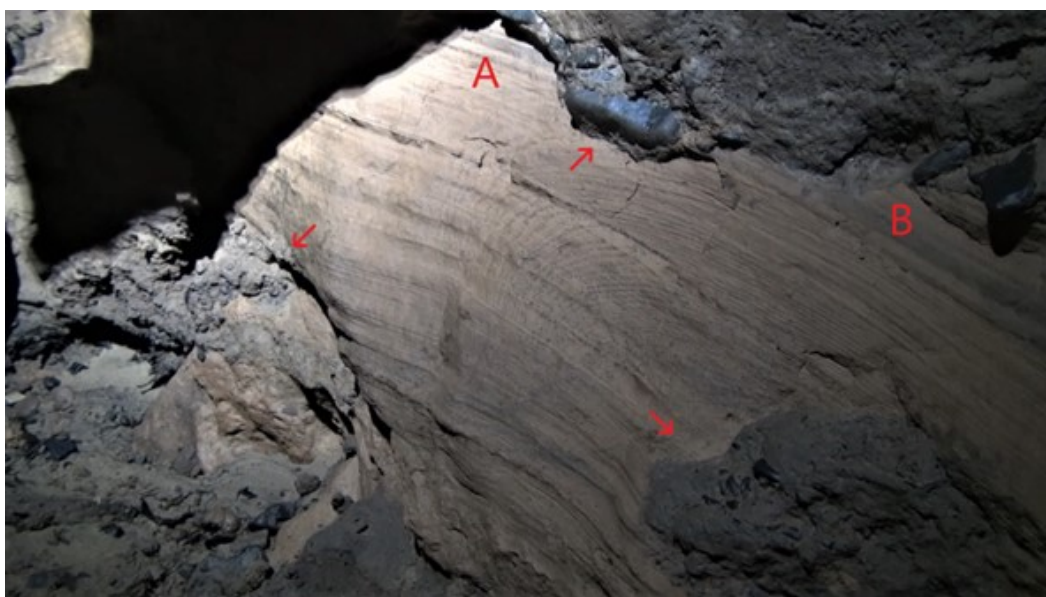


Fig. 12

Laminated sediments in the Main Stream Passage are older than the cobble deposits here, which lie over and against them (red arrows). The layering pattern continues from A to B, proving erosional incision in between and hence older age. Curved traces crossing laminations are probably concentric fronts of ferruginous precipitate formed during drying of the sediments.

So, the cave records a complicated sequence, arguably of 6 contrasting stages of development.

1. A long period of passage creation .
2. A period of sedimentation reflecting significantly lower energy levels.
3. The cobble infill then formed from some catastrophic processes.
4. Silt and mud infiltration and accumulation.
5. In relatively dry passage conditions speleothem development. The locally extensive flowstone, roof pendant and pillar speleothems record essentially uninterrupted growth after the cobble and fines sedimentation.
6. Currently active dissolution, particularly on up-stream sides in all but the few sites above the highest water levels (Fig 13. a,b,c), and erosion of the cobble-plus-fine-sediment banks relating to the modern flooding and some caving activities. The bank erosion would account for the storm-related turbidity seen at the Wellhead resurgence.

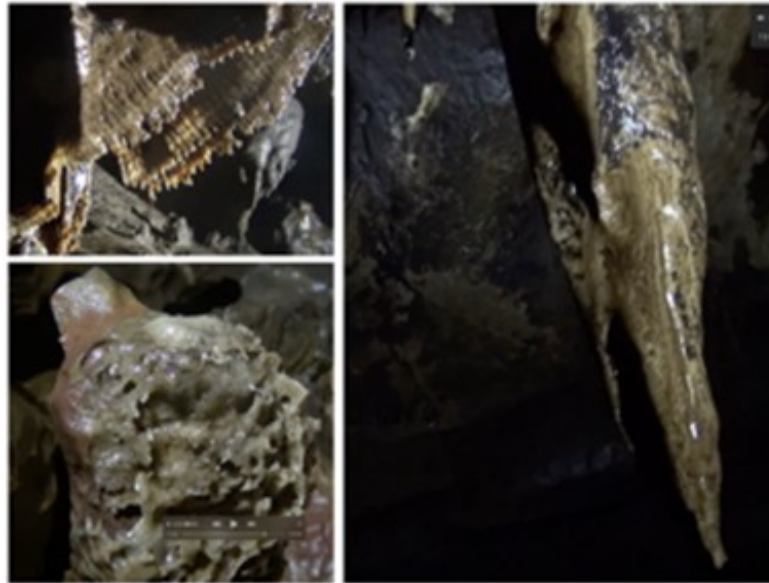


Fig. 13a.b.c. Active dissolution of speleothems

Black and brown veneers and evidence of ice movement

Most of the cobbles are coated with predominantly black, amorphous manganese and iron oxide/hydroxide veneers and these cover some cave walls and ceilings and some calcite formations (particularly on downstream faces) (Fig 10. and 11.). The walls near the top (inlet) sump have a ferruginous brown coating (Figs 15a.b.). The veneers are identical to those formed on cobbles in the bed of the stream that enters the cave, above Llethrid Swallet, and while they indicate oxidizing and basic (hydroxide forming) conditions typical of fast flowing waters, their influence on the timing and rates of limestone dissolution in the cave needs further consideration.

The stream water that arrives in Tooth Main Stream Passage during flood conditions has travelled through hundreds of metres of Llethrid Cave and the linking unexplored conduits. It arrives in Tooth Cave via a pressured ascent of 4m out of the upstream sump (Pot Sump). The steep passage walls above the upstream sump show numerous, variously orientated long scratches (tens of cms), some in parallel sets and crossing surface irregularities. Here the limestone wall has a distinct brown ferruginous coating. How could these marks have formed? They cannot have been produced by rock fragments suspended and driven through in any energetic, pressured phreatic upwelling here, which would form random-hit percussion marks, if anything. Rather, a suggested answer is that the parallelism of sets of scratches, their tracing over uneven surfaces and their multiple directions indicate long-term formation by hard-rock fragments embedded in slow-moving ice. In principle, they would be closely akin to glacial striae. This site is especially close beneath the existing valley floor of Green Cwm (Fig. 2) and conceivably it records a cryogenic phase in the cave's history. The locality warrants a revisit and very close inspection, not least to understand the relations of the scratches to the brown coating that seemingly predates them.

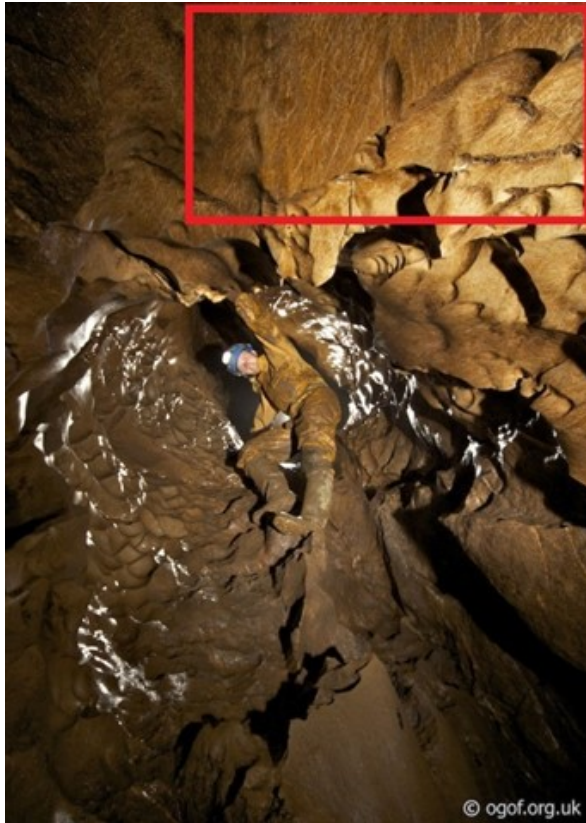


Fig. 15a

View from Pot Sump looking up a 4 m-deep irregular tube; near-horizontal Main Stream Passage lies behind the caver. Up and beyond this pot is the downstream direction where the passage contains cobble banks. This sump is like a u-bend with a vertical outflow reach. The 4m limestone vertical wall has scratches over variously orientated surfaces (photo courtesy of Brendan Marris, Ogof.org.uk)



Fig. 15b

Scratches cut the brown stain and occur in near-parallel sets; some are 10s of cm long (A) and in places clearly continuous over irregularities (B) and/or of variable 'depth'? (A and B). They suggest that the culprit stones locally moved together en masse but were able to adjust to some extent to the uneven wall surface. The scratches clearly record numerous 'scoring events' and are closely analogous to glacial striae.

Developing a hypothesis

Can we match described landforms and the sequence of events and conditions to the known history of glaciation of Gower?

We think we know that the Green Cwm cave system (Fig. 2) cannot have initiated before about 400,000 years ago. Prior to that, the vast Anglian ice sheet had extended over Gower as far south as the north coast of Devon (Gibbard et al. 2017) and the limestones that now form the 61m (200') marine abrasion platform across Gower only rose relative to sea level at about that time.

Let us *imagine* that all of the main passages mentioned above, vadose and phreatic, were substantially formed between 400,000 years ago and, say, 150,000 years ago. Gower remained ice free and sea level mostly remained more than 50m lower than today (Gibbard et al. 2017). Thus, the deepest possible base level of the developing caves would have been far below present sea level. During a particularly warm interval, 124,000–119,000 years ago (Ipswichian Interglacial), sea level rose to as much as 10 m above the present level. It formed Gower's 'Patella' raised-beach deposits (George 1932, Shakesby and Hiemstra 2015). You could have sailed through Parkmill in the flooded valley (ria) as far as Wellhead, where our cave system then discharged its water at the shoreline.

Stagnated deeper levels of the cave, below sea level, would have trapped sediments and become progressively blocked, forcing the resurgence upwards and through relatively undersized passage. We speculate that during floods in the cave-system water would have backed up the formerly open passages, where laminated fine sediments would settle in tranquil conditions. These are our thinly bedded and laminated sands and silts that locally underlie the cobble banks (Fig. 12).

Sea level then dropped again to previous low levels (Gibbard et al. 2017), perhaps allowing some vadose-stream partial clearance of cave blockages. The first prolonged cold period of the final (Devensian) glaciation began some 80,000 years ago, but Welsh Ice, mainly from the north and northeast, only extended over north and west Gower to reach its maximum extent at about 23,000 years ago, with deglaciation from approximately 17,000 years ago (Crowther 1989, Bowen et al. 2002, Shakesby et al. 2017). As the ice encroached Gower (Fig. 16), out-washing (fluvio-glacial) erratic debris picked up from the North Crop, and also more locally, flooded with meltwaters into Green Cwm.

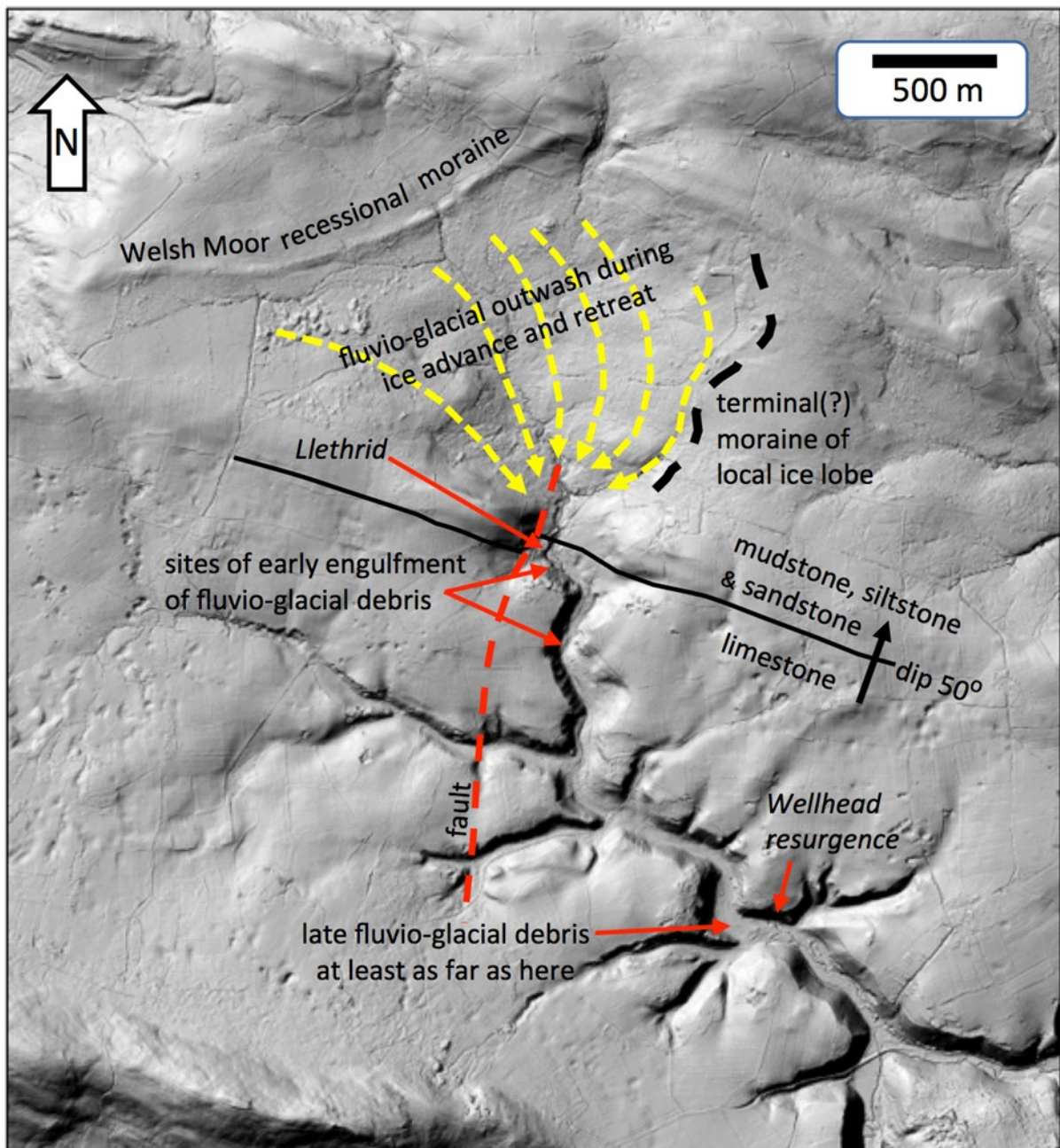


Fig.16

Green Cwm valley with suggested Devensian glacial conditions in central Gower shown on a digital elevation model (DEM) utilizing LIDAR imagery. © Natural Resources Wales and Database Right. All rights Reserved.

Again hypothetically, we suggest that the debris-laden meltwater floods catastrophically entered the cave system at the northern edge of the limestone, which at that time must have had open fissures and collapse pits to engulf the debris in the upper reach of the valley (much as exist in upper parts of Bishopston Valley today). This was the cobbles delivery, probably entering the caves just past the present entrance to Llethrid where there is now a line of choked sinks along the valley floor past Tooth Cave entrance. Seemingly the cave's boulder consumption and/or burial of entrances beneath fluvio-glacial outwash restricted subsequent entry of coarse sediment, so that the following events evolved from substantial ingress of silt and mud, which buried the cobbles, to relative drying and speleothem formation.

Logic would have that the drying was related to freezing during the glacial maximum, and the inference that the scratches at the upstream sump (Pot Sump) were formed by cobbles in ice would tie in here. During deglaciation further fluvio-glacial meltwater outwashes seemingly added little other than perhaps fine sediment to the cave, while the Green Cwm valley floor, at least as far as Well-head accumulated various mixed erratic, poorly sorted sand - to - boulder-grade flood deposits and local screes, as seen at the surface today, for example at and around Giants Grave.

As sea level rose again to reach its present level, some 8000-6000 years ago when humans occupied the valley and utilized the near-entrance parts of Tooth Cave, the open seaway to Parkmill would have filled with sediment so that any underlying lower reaches of the Green Cwm cave system, if they existed, would be choked again. The presently active flood bypass via the Main Stream Passage reflects the fact that the deeper, slow-flow phreatic passages cannot take storm waters, while the pressurized turbid-water fountain at the resurgence suggests an exit now that is undersized.

A red desert sandstone boulder choke and aven in a limestone cave, but no dinosaurs (maybe)

If the reader has grasped the half a million year-old complexities of what might have seemed a simple local cave, it may come as a bit of a further mind-bending shock to absorb the discovery of Triassic components to the present cave. That's from around 215 million years ago. Of course, caves may have formed further back in geological time, and not necessarily always by purely karstic processes. Here we conclude our presentation of Tooth Cave by reporting evidence of a remarkably ancient cavern in Green Cwm. It constitutes an exceptional twist in the tale, and, perhaps reassuringly, though more ancient in focus, is less speculative.

The main stream passage is interrupted by a short choke about 20m from the intermittent downstream sump. A 5m climb up through it leads to a comparatively large and tall chamber with an originally laddered climb into some small high-level crawls. This was known as the Iron Ore Series by the 1960s explorers, due to the red colour here of the cave walls, fallen boulders, and sticky clay. Fallen blocks in the choke and the walls of the chamber above show calcite vein mineralisation, indicating that the location is on a fault.



Fig. 17

Choke showing A fault plane, B calcite mineralisation, C red sandstone angular blocks and D fault brecciated blocks with calcite veining formed following initial fault movement.

The area has a fascinating complexity. Between the faulted and stained limestone walls of the chamber there is a succession of comparatively soft, near-horizontally bedded, red micaceous sandstones and siltstones.

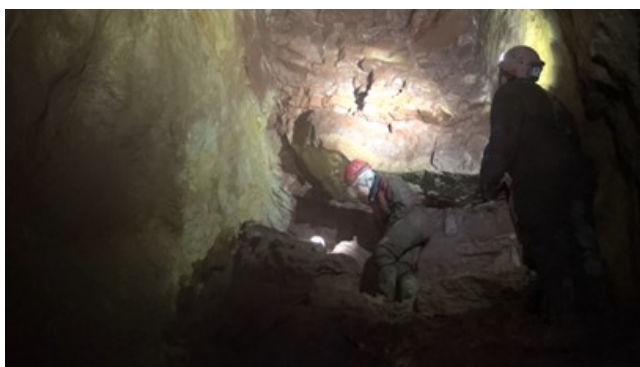


Fig. 18a

At the top of the choke – sandstone roofed chamber. The nearly flat-lying red sandstones and siltstones extend across between the fault walls of the chamber.



Fig. 18b

Ripple forms with mica on sandstone bedding planes record aqueous current activity



Fig. 19

Thin-bedded sandstones and siltstones with calcite infill of brittle fractures that record ongoing tectonism on the fault, and hence probably contemporaneous with the initial earthquake activity.

Nigel Woodcock and colleagues at Cambridge show that during Triassic times, when the Carboniferous rocks were under broadly east-west tension as the Pangaea supercontinent broke apart, pre-existing faults, trending approximately north-south across South Wales opened up to form deep fissures that connected to the surface. Triassic-age deserts with seasonal rainfall that formed wadis produced red sediments on the eroding uplifted land and in places, as on the fault now exposed within Tooth Cave, this sediment and water poured into the opening voids in the limestone. In Glamorgan and the Mendips this sediment even includes fossils of dinosaurs and other reptiles. There may be no dinosaurs in Tooth Cave, but this fascinating sediment occurrence that has been fortuitously intersected by the geologically recent (<400,000-year-old) Tooth Cave is still very special indeed!

So, one of our less-visited caves shows the potential to do so much more than provide physical exercise. Tooth Cave, for all its discomfort and difficulties, presents some unique intriguing geological, geomorphological, and hydrological phenomena, and important questions arise that should enthuse any enquiring speleologist. Further investigative trips down those uncomfortable entrance crawls clearly are necessary as soon as it stops raining and the bats wake up in the spring. Volunteer speleoscientists are warmly invited!

Acknowledgements

This article provides an opportunity to remember SWCC member Dick Baynton, whose tragically early demise in the 60s robbed us of a talented speleoscience and amusing friend. In his teens PK spent many muddy and abraded hours with Dick exploring Tooth Cave, and elsewhere on Gower, and Dick's enquiring and systematic approach to hydrological field studies substantially influenced the style of PK's subsequent academic career as a field geologist. We are immensely grateful to Adrian Luckman of Swansea University for creating the shaded relief Lidar image of Fig. 16, and to Nigel Woodcock of Cambridge University for help in interpreting the Triassic sediments occurrence. Thanks to Gareth Smith, Val Bednar, Claire Vivian, Duncan Hornby and Antonia Freem for assisting with filming, sampling and surveying. A film 'Tooth Cave' taken during the trips in the cave showing the discussed features in detail can be found on YouTube channel Catchpool 1.

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All photographs accompanying this article are the authors' with the exception of Fig. 16.

Königsberg revisited

Bob Hall

Over fifty years ago, soon after the opening of Ogof Nos Hir (or 'Top Entrance'), I was studying 'A' Level Mathematics, and most of my caving companions of the time had scientific or engineering backgrounds. Struck by the labyrinthine complexity of the new discoveries, I proposed the following theorem to the amusement of my fellows:

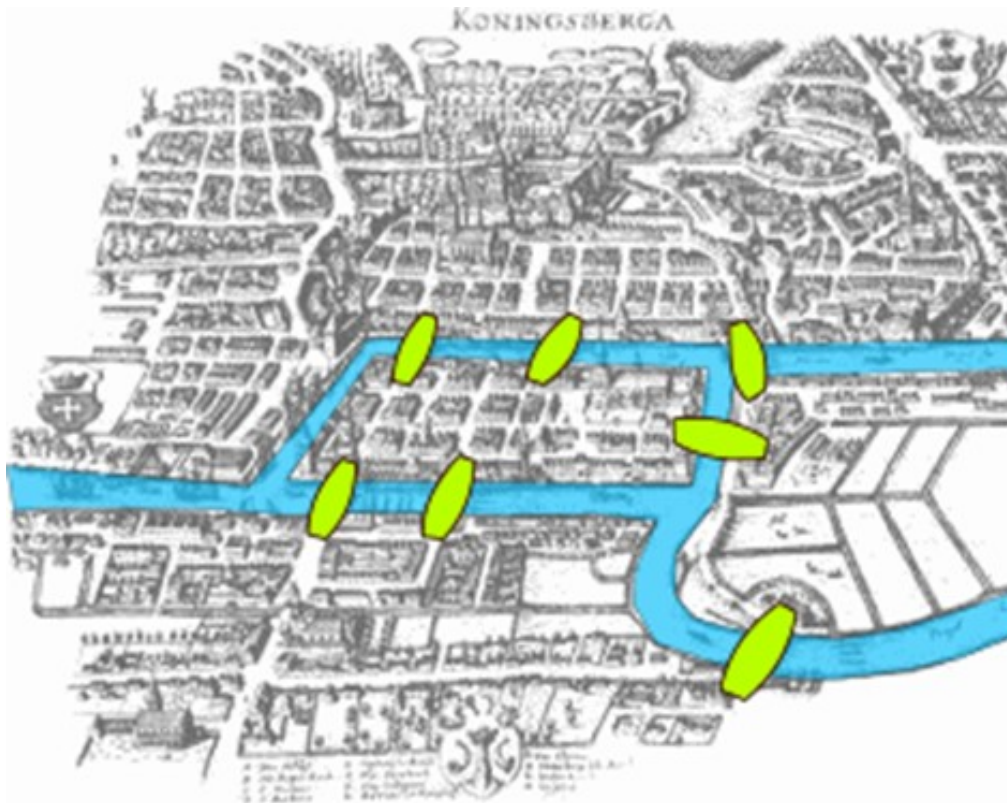
"There are at least $n+1$ routes from A to B where n has a value equal to the number of visits you have made to OFD".

Now, in 2018, with my personal value of 'n' hovering around the 500 mark I have been wondering about my theorem's validity.

I wasn't much of a mathematics student in 1968 and, although I got a great deal better over the years, my strengths were very much in analysis, calculus and applied mathematics, and more esoteric disciplines passed me by. Nevertheless, I was aware of some snippets of history and amongst these was the famous Königsberg Bridge problem. To quote Wikipedia:

"The Seven Bridges of Königsberg is a historically notable problem in mathematics. Its negative resolution by Leonhard Euler in 1736 laid the foundations of graph theory and prefigured the idea of topology. The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands which were connected to each other, or to the two mainland portions of the city, by seven bridges. The problem was to devise a walk through the city that would cross each of those bridges once and only once."

Wikipedia presents the historic layout of Königsberg's bridges thus:



Clearly there are some similarities between my theorem and the problem Euler faced – although Ogof Ffynnon Ddu is many times more complex than Königsberg.

In the terminology of modern graph theory Königsberg's bridges are 'edges' that connect 'nodes'. So in our cave, passages are 'edges', and passage junctions are 'nodes'. Thanks to the determined efforts of 'Team Clipjoint' we have a computer file containing details of all the surveyed nodes and how they interconnect. So, in principal it should be possible to conduct a sledgehammer attack on the data and count potential routes between any two nodes. However, we first need to refine my theorem somewhat and cast it in less ambiguous terms.

When first suggested, my whimsical proposition was very much set in the context of the area of the Nyth Bran series, the Labyrinth, and the area between the Nave and the Oxbow Traverses and I did not define my points 'A' and 'B'. There must however, be many parts of the cave where very few routes exist between certain nodes; for example, the node where the Paul Allan series joins the route to OFD III and the node where the Grit Chokes passage peels off are connected by just one, or at most two or three possible routes. Conversely the number of routes between the Trident and Moonlight Chamber is vast if you consider all the potential loops and convolutions you could choose to follow. So, to develop my proposition in more tightly defined terms I propose to turn it on its head:

Are there two passage junctions or nodes within OFD between which there are at least 500 possible routes? And to tighten this specification up in the spirit of Königsberg, let us say that no route may involve traversing the same passage twice.

I have suggested that a sledgehammer attack on the data might yield an answer, but a better mathematician than I will ever be might consider a theoretical approach. The data file should yield the 'order' of all the nodes, which is how many passages meet at each junction. With that information perhaps a more elegant solution is possible?



