

SOUTH WALES CAVING CLUB
CLWB OGOFYDD DEHEUDIR CYMRU



NEWSLETTER 128
2011-12

It may sound simple, you ask for articles and photographs from friends and members of SWCC; you await their receipt; do a bit of chasing and nagging if necessary (all part of the job description) and all that remains is to line them up, one after the other in a document, find a suitable front cover picture and there we have it – the next SWCC Annual Newsletter proof ready for printing. Job done!

If only! I think only those who have first-hand experience of the Editor's role can fully appreciate the effort, and more explicitly the time, it takes to pull together a newsletter in an orderly, interesting and stylish way. In editing this, my first offering of SWCC Newsletter, I have turned to previous issues for inspiration and ideas and in doing so have recognised the incredibly high standards and amazing professional results of Editors before me. With this insight I have no doubt the membership has very high expectations which I must aim to meet.

So here it is, it may not be perfect, and although I have proof read it many times there are probably still some annoying little errors that 'got away', my apologies in advance if that is the case. But with this aside, I trust that inside there is something for all members to enjoy, for the scientists and technologists amongst us, the historians, obviously the cavers, and even for those who have less of a penchant for reading 1000s of words – lots of really cool pictures to look at.

Huge thanks go to all those who contributed to this issue, these people are the keystone of this communication; obviously without their input the Newsletter would be meagre and I would have had nothing to fret about.

I should also like to add that one of the more pleasurable aspects of the Editor's role is having the opportunity to read the contents before anyone else (apart from the authors themselves) so I know exactly what you have in store. I think this year's contributors have excelled themselves so "Welcome to the SWCC Newsletter, 2011-12; read on, and I hope you enjoy it!"

Krysia Groves, Editor

Front cover: Bournillon by Tony Baker

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Opinions expressed in this newsletter are those of the contributors and not necessarily those of the Editor or South Wales Caving Club

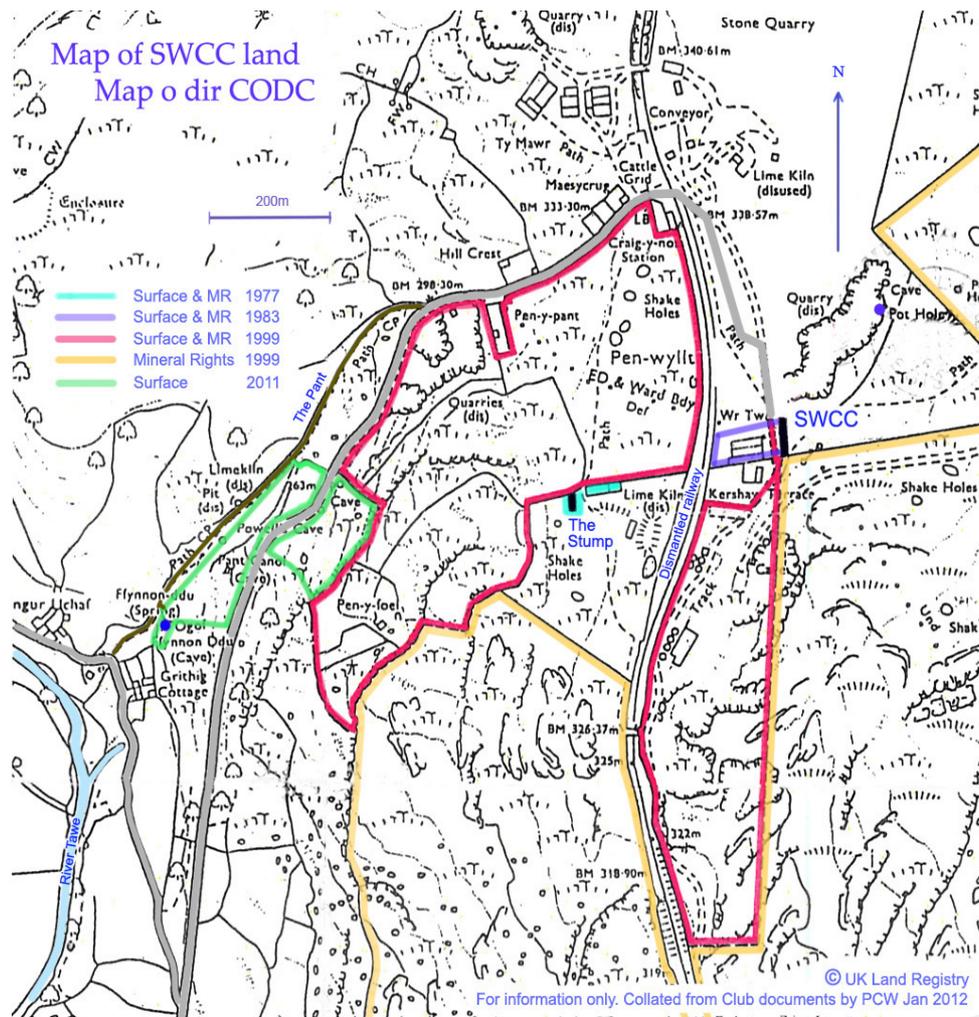
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SWCC LAND PURCHASE

By Tony Baker

In July 2011 SWCC completed the purchase of seven acres of land including the entrance to Ogor Ffynnon Ddu I, thereby securing the future access to, and conservation of, this important cave for members and other cavers. As the SWCC Chairman during the purchasing process, I thought it worth recording the story, for posterity, of how the club came to buy the land. What follows is a first-hand account, that has been verified by others involved, of what happened.

The issue of what might happen to access to Ogor Ffynnon Ddu I should the Barrows/Toye family decide to sell Y Grithig had long been on the collective mind of SWCC members. I can recall the matter coming up, in committee, during my stint as Newsletter Editor in the early 1990s, and a sort of 'watching brief' was being kept.

By 2010 it had come to the club's attention that Bill and Ruth Toye, then-residents of Y Grithig, had moved out of the property as it was in need of some renovation work. There had already been mutterings that they were unlikely to return to the cottage, but the only 'information' available was little more than hearsay. Nonetheless the committee took a proactive approach to securing at least a route to the

cave entrance, and we reached a verbal agreement with a neighbouring landowner that allowed cavers to cross the few metres of his land between the public footpath down the hill (known as 'The Pant') to reach the fence close to the cave entrance. This avoided the need to use the garden of Y Grithig to get to the cave.

Then, as the 2010 SWCC AGM was drawing to a close I was passed a note from Bill Toye, who was working in the office of the Abercrave Historical Society – the next room to our meeting – asking if he could speak with the club's Secretary and Chairman. Newly-appointed Hon. Secretary Lizzy das Neves, retiring Hon. Sec. Clark Friend and I went to see Bill immediately after the AGM. He explained that he wanted to make the family's position clear, so that we understood the situation with regard to access to the cave. Bill and Ruth had moved out and were unsure whether works to make the cottages habitable again would go ahead or not.

Bill explained that he had engaged the services of a chartered surveyor, to establish the extent of the necessary work and, crucially, the likely cost of this. At this point I spotted the opportunity to pose a cheeky question: would the family consider selling SWCC the cave entrance? Bill's reply was that they did not wish to do this at present but, in the event that the property was sold, they would look favourably on the club's request. The meeting was extremely amicable and we felt that we had laid down a 'marker' as to the club's likely intention in the event of the property being sold.

In November 2010 I took a call at home, one Sunday morning, from Conservation Officer Bernie Woodley. He told me that Christopher Toye (Bill and Ruth's son) had called at the club and had asked to be put in touch with a representative of SWCC. I immediately rang Chris and he explained that, with reluctance, the family had decided to sell Y Grithig and that they would like to meet with the club to discuss the possibility of our buying land to secure future access to the cave.

Chris and I agreed to meet on the Saturday morning of the forthcoming December SWCC committee meeting, at Y Grithig, and he would explain the family's position. As soon as I had put the 'phone down I rang both Fred Levett and Clark Friend and asked them to join me at the site meeting, and both readily agreed. Fred, then SWCC President, had been the driving force behind the club's previous land purchase during his time as Chairman, and I knew he could be relied upon for sensible advice. Clark, in addition to being a trustee of the club, has an unrivalled knowledge of the club's land and boundaries, acquired during long stints as Conservation Officer and as Hon. Secretary.

In the few days preceding the committee weekend snow fell in south Wales but fortunately all three of us managed to get to Penwyllt on the Friday night. We set off on foot for the meeting with the Toyes and as we walked down the hill I was acutely aware that the next hour would, one way or another, turn out to be a crucial one for SWCC and for caving access to OFDI. I felt it was important that only one of us spoke on behalf of SWCC in the negotiations and I asked Fred to take the lead role.

At Y Grithig we were greeted by Chris and Andrew Toye, their mother Ruth and Chris's wife Esther. We were invited into the cottage and Chris, using a map of the

property, explained the two possibilities the family had considered. One was that they would sell us a small 'parcel' of land that contained the OFD I entrance alone. Chris had made enquiries about the number of SWCC members and felt that £3000 (i.e. around £10 per member) was a fair price for this. The alternative was that the family would sell us two parcels of land, one either side of the road up the hill, totalling around seven acres and including not just the OFD I entrance but Powell's Cave and Pant Canol as well. Their suggested price for this land was £20,000 - equivalent to around £65 per member. We walked around the site and discussed likely boundaries.

We had already given some thought (and been guided by some members) as to what might be on offer and how cave access might be affected, and our first question was whether the Toyes' might consider creating and selling an additional 'corridor' of land that would provide access between the cave entrance and the public highway (either the road past the cottage or the one up the hill). The family had already thought of this and were not prepared to create such a corridor, for two reasons. First, a route to the lower road would have to run alongside the cottage's back garden, and their view was that any potential purchaser of the property would be put off by the idea of cavers walking to and fro, in full view of the garden. Second, a route up the hill to the road was not really practicable, as the terrain was difficult and would involve negotiating at least one cliff face. After examining this during the site meeting we could see that this was a fair assessment.

As the meeting ended Fred, Clark and I made it clear that we were only representatives of SWCC and that any decision on buying land would have to be made by the wider membership. We also explained that, although a big club, SWCC had limited financial reserves and we hoped they might consider reducing the asking price for the larger land area. At the same time the family made it clear that they wanted to get the cottage and remaining land onto the open market as soon as possible, and needed a quick answer from SWCC so that any potential purchaser of the cottage would be aware of exactly what was being offered for sale. Through negotiation we agreed what would be included in the two packages now on offer.

Attendance at that evening's committee meeting was wrecked by the snow, and the meeting was barely quorate. All were agreed, though, that it was important for the club to purchase one or other of the two options available; doing nothing would almost certainly leave us with no access to the cave. All of those present were convinced that we should pursue the larger parcel of land, but recognized that the wider membership might not agree. We considered convening an EGM but I was concerned about this for two reasons: first, with Christmas looming an EGM couldn't realistically be held before late January or early February, and this was a long time to keep the Toyes waiting for an answer. Second, in the previous January heavy snowfall and freezing temperatures had rendered the club inaccessible for a considerable period of time, leading to the postponement of a committee meeting. There was already snow on the ground and an EGM scheduled in the following couple of months could easily end up an expensive and irrelevant waste of time if the weather made attendance impossible for all but a few locals.

It was decided that I would write immediately to every member, outlining the situa-

tion and explaining the two options on offer, and invite a response. If the membership were divided we could then convene an EGM to settle the matter. Within a few days the letter was sent out by e-mail, accompanied by a map, with hard copies sent by post to those members not on the e-mail distribution list. It didn't take long to realize that the membership were overwhelmingly in favour of the larger purchase. Better still, many members offered donations towards the purchase price. One member made it clear that, if necessary to secure the deal, he would write a personal cheque to cover the full purchase price and the repayment could be sorted out subsequently.

By early January it was clear that there was no sustained objection to the club going ahead with the 'Option 2' purchase, and at our next meeting the committee voted unanimously to buy the seven acres of land. I rang Chris Toyne and told him, the contact details for each party's lawyers were exchanged and the process began.

Both SWCC and the Toyes had hoped for a swift conclusion to the deal, but progress was painfully slow. Both sides had to chase their lawyers more than once. At one point a minor hiccup interrupted matters, when it emerged that the family did not in fact own the mineral rights to the land offered, despite their earlier offer to include these rights in the purchase. I quickly sought expert advice on this and was reassured that the lack of mineral rights should not interfere with the decision to purchase. Sadly I was also advised that we would be unlikely to negotiate a discount on the price because of this.

In the meantime Fred Levett had been in touch with the CCW to enquire about the possibility of grant aid for the purchase, and had been assured that an application would be looked on favourably. He obtained the necessary application forms and undertook a lot of work on this; the outcome was a grant of £5000, one-quarter of the purchase price.

At the same time more offers of donation had been made and in the end members contributed more than £12,000 to the purchase price. I had promised that all offers of donation would be treated in strict confidence and to this day I am the only person who knows any names or amounts given (although two members chose to make open declarations of their contributions).

By now the family had agreed the sale of the cottage, and I used the various caving media outlets to spread the word that cavers should no longer use the traditional route through the garden of Y Grithig to reach the cave. Inevitably the dissemination of this information was a slow process and even after the Toyes had fulfilled their obligation to fence off 'our' land cavers were still using the cottage route.

Finally we were advised of a completion date, the 28th July 2011. This was right in the middle of SWCC's summer trip to the Vercors and I asked Fred to keep me informed. On the day in question I was out on a solo bike ride, and as I pedalled breathlessly up a steep incline on my way back to the campsite I heard the familiar bleep from my backpack as my 'phone received a text message. Glad of the opportunity for a break, I stopped and read the five-word message: 'The land is ours!'

Fred.' I punched the air, fortunately unseen, knowing that a successful outcome to months of effort had been achieved and SWCC had secured, for cavers, permanent access to one of the UK's most important caves. At that evening's campsite get-together I broke the news to the assembled throng, and we raised a glass in memory of Peter Harvey. I ventured, to unanimous agreement, that Peter would have been delighted to see the club he co-founded taking ownership of the cave he and others had discovered and that meant so much to him. It's a shame that Peter didn't live long enough to see this happen.

On my return to the UK I announced the news of the land purchase via the UK Caving forum, and cavers from across the country voiced their congratulations in response. News items later appeared in *Descent* and other media. At the same time the new committee had been hard at work in addressing the shortfall between the total raised through grants and donations and the purchase price, and had set about organizing the Ogof Fest for a weekend in October 2011. Gary Vaughan, newly appointed Hon. Sec., had

come up with the idea of a massive fund-raising event and a small but enthusiastic sub-committee had been working hard to put it together. It turned out to be one of the best-ever SWCC parties, attended by more than 150 cavers and friends who were entertained by a live band, fed by a massive hog roast, drank the barrels dry and spent their money. Sterling work by Claire Vivian had secured some fantastic items for auction and Pete Francis, in his usual role



Ogof Fest Auction

as auctioneer, set about parting those present from their hard-earned. In all the weekend raised almost four thousand pounds, thereby ensuring that the land was bought without recourse to the club's reserves.

At this point I would like to clear up a few points that were made about the purchase. First, why did the club pay a premium price for seven acres of hillside that had minimal value as agricultural land? The answer is that the Toye family only created the 'parcel' of land to enable SWCC to buy the cave entrance and associated sites of speleological interest. In doing so they incurred fencing and legal costs that they would not have had had they sold the entire property in one deal, and they can hardly be blamed for seeking to gain the best possible price for their property. One member told me that SWCC should have 'offered them £500 and told them to take it or leave it' but I can assure him that if we had done so there would have been no land to buy. While the price we paid was undoubtedly more than the land would have fetched as agricultural land, once the fencing and legal costs are considered no-one has made a fortune here.

Why did we not just buy the cave entrance, for the offer price of £3000, and formalize the arrangement we have with the neighbouring landowner to cross the fence?

Two parts to this answer: when the matter was originally negotiated (by Elsie Little, whose efforts on this should be recorded) the landowner concerned made it clear that he did not want anything more than a verbal agreement. In order to persuade him to change his mind we would no doubt have had to offer some form of financial 'sweetener' and we would have had to cover any legal costs. Add these figures to the purchase price and the deal starts to look less attractive. It was also clear that CCW were unlikely to grant-aid this lesser purchase, and in buying the smaller option we would not have secured the ownership of Powell's Cave and of Pant Canol, both sensitive sites from a conservation point-of-view.

Why did we not 'let the CCW buy the land'? The short answer to this is that the Toyes had offered it to us and it seemed rude to just send them off elsewhere. The longer answer is that many members made it clear that long-term access to the cave would only be secured and guaranteed by SWCC's ownership of the land and the committee agreed.

Finally I must record thanks to all of those who made the land purchase happen. Fred Levett and Clark Friend gave invaluable help and advice throughout the entire process. In addition Fred secured the CCW grant and dealt with the solicitor (James Anderson of Jeffries Powell in Brecon), while Clark worked hard to make sure that



Ogof Fest Hog Roast

the trustees received and signed the contracts quickly and efficiently. The other trustees (John Lister, Alison Maddocks and Les Hawes) supported the committee's decisions throughout. Andy Freem was Hon. Treasurer during the entire process and made sure that the funds were in the right place at the right time. Elsie Little, David Judson, John Harvey and Linda Wilson gave useful advice on some important aspects of the purchase. Both the 2010/11 and 2011/12 SWCC committees worked hard on this and were immensely supportive, and special mention must

go to all those who worked so hard (and spent their money) to make Ogof Fest such a success. The CCW's grant of £5000 was an enormous help and I must again record our thanks for this. Many members made individual donations and, although I am bound by my promise of confidentiality not to go into details, thanks are due to everyone who contributed.

From the outset it was my view that this purchase would come to be seen as a major landmark in the history of SWCC. The club now owns the entrance to one of the most important caves in the UK and this means that future generations of cavers will continue to enjoy Ogof Ffynnon Ddu.



Peter Harvey taking photographs in Ogof Ffynnon Ddu in 1977. Photograph by Jem Rowland

MUD, SWEAT AND TEARS: **A DIGGING TRIP TO TAL-DRAENAN**

By Tony Baker

Back in 1992, the cave at Ogof Twyn Tal-Draenan was first entered on a solo trip by Paul Quill. The next day he was back with Clive Jones, Nig Rogers, Mark Withers and Dai Hopkins, and they managed to follow the streamway to a sump. (The sump was pushed, on two occasions in the summer of 1992, by divers Gareth Hardman and Andy Ward, without success.) While Martin Hoff and I, along with numerous others, have in the intervening years explored more than 200 metres of passage elsewhere in the cave the streamway has never been regained.

During a dry spell sometime around the early 2000s, Martin and I took a closer look at the sump pool and found a vertical tube, reached by traversing across the pool, which could be climbed for about 4m before narrowing. The roof of what appeared to be a horizontal continuation could be seen a further 2m higher. We drew the conclusion that a suitably thin person might be able to push through the constriction and so, some months later, Annie Peskett was persuaded to assist. However, with water levels back to 'normal', access to the area above the sump pool was impossible and the trip was a wasted effort.

By the time of the SWCC Digging Week in 2008 progress in the cave had stalled. Martin and I had been involved, for a few years, with another promising digging project on the Black Mountain, but decided that the time was right to revisit Tal-Draenan and seek a fresh lead. A draught close to the sump was detected and pursued, for the next two years, into a new 'upper series', a project that ultimately ended in frustration. However,

during another dry spell the sump pool was revisited, I climbed the vertical tube again and decided that the constriction might yield to an assault with a drill. Dry and settled weather during Digging Week 2010 provided an ideal opportunity to do this, and what follows is an account of that trip...

Incredibly for Penwyllt in August, the weather had been dry and sunny all week and Martin and I, with others, had taken full advantage, pushing a surface dig near to Twyn Tal-Draenan and other fair-weather projects. By Friday I'd been up onto the Black Mountain six times in six days (including, on one occasion, carrying two long scaffold bars) and my legs were not so much complaining as screaming their discontent. When Friday dawned clear and warm I asked Martin what he wanted to do, and we both admitted that it was inevitable where we'd end up: we knew that the prolonged rain-free spell was an opportunity to revisit the sump pool unlikely to be repeated at least until the following summer. We packed rucsacs with all the necessary paraphernalia, parked at Dan-yr-Ogof and trudged once again up the unremittingly steep slope onto the Black Mountain.

The plan was simple: as the sump is only ten or fifteen minutes' caving from the entrance we'd go in, drill the holes, fire the charge, laze in the sun for a suitable interval and then go back in, unencumbered by drills and batteries, to see if we could then climb up into the virgin passage I'd glimpsed previously, that might just provide a by-pass to the accursed sump. With a heavy tackle bag apiece progress in the cave was slow but when we'd descended the rope

climb that led to the sump pool we were still on schedule and the plan was still intact. There was only room for one of us in the vertical tube, and getting to it involved a soaking almost to the waist, so Martin intended to retrieve and re-rig a bang cable from a nearby passage while I did the drilling.

I planned to traverse across the sump pool and shimmy up the vertical tube before setting up the drill, as I knew that forcing myself up the tight shaft while holding a drill in one hand and an ammo-box battery pack in the other would be awkward. I clipped the tackle bag to one side of my belt and the battery box to the other, waded across the first few feet of the deep, muddy pool and then clambered out and used what little friction I could muster from the mud-covered walls to make my way to the bottom of the tube.

When I'd been here before I'd not been carrying anything and it had been relatively easy to climb and wriggle up to the constriction at the top. Now it required a major effort and by the time I was in position I was breathing hard, sweating and liberally coated in sticky mud. And now I had to unpack the drill, plug it in and install the bit, very carefully, as anything dropped would disappear into the murky depths of the sump pool some three metres below me. Although I was just below the narrowest part of the tube there was barely room to move and it was a struggle to unpack everything from the now-muddy bag. Matters were further complicated by the lack of a decent foothold; my position in the shaft was only maintained by bracing my legs against the walls, a stance that was both tiring and uncomfortable. By the time I was ready to drill the drill itself was coated in mud, I'd dropped a glove and I was struggling to stay in the shaft. Worse, I had to drill vertically upwards, at arms' length – I

simply couldn't thrutch any higher up the tube and still move my arms. After a sustained attempt, for as long as I could bear, the drill had achieved no more than a couple of millimetres of progress and yet somehow I could tell this wasn't just due to the compromised circumstances: the bit just wasn't cutting. I paused to regain my breath and examined the cutting edge of the bit. It looked alright but I always carry spares, so another few minutes of frantic and mud-covered effort ensued as I wrestled with the tackle bag, extracted another bit and swapped them over. I inhaled deeply, forced myself as far up the tube as I could and started again. The difference was immediately obvious and I could feel the drill making much better progress, but then the next problem manifested itself: when drilling vertically upwards in a constricted shaft there's nowhere for the dust and debris to go but onto your face and into your eyes. Cursing the fact that I no longer have an old pair of safety specs that used to live in my plastic container of digging bits and pieces, I alternated between closing my eyes, looking downwards and squinting through one tearful eye to check on the drill's progress.

After what seemed ages I slumped back down to a more comfortable position, with my eyes streaming and the hole no more than half the depth of the bit, and thought: I can't do this. I prepared to slither back down to the sump and break the news to Martin, but even as the thought went through my mind I realized what this meant: we'd both made an extraordinary effort, after a hard week's digging, to come and do this today, and the chances of there being another opportunity like this, before next summer at the very earliest, were slim. This miserable, constricted tube remained the current best hope of further progress in a cave we'd been working at for most of the last two decades, and even if I aban-

done today nothing was going to change before our next visit, other than that I'd be a bit better prepared for the difficulties. Once I'd got my breath back and the stinging in my eyes abated I decided I had to try and achieve at least a bit more.

It would help to have more space to work in, so a Plan B emerged: from my now-more comfortable position I'd drill a couple of holes that would enlarge the working space, in readiness for a future return. I managed to get two good holes, in prime positions, just above me, and started to feel more positive. The battery was still going strong so I resolved to make one more supreme effort to attack the original constriction. Just as I was preparing to force myself up the tube again, I realized that a disaster had been narrowly averted: although the ammo box was attached to my belt, the hinge had come apart and the main body of the box was resting on my thigh, held only by the tension of the drill plug in the socket – one abrupt or ill-considered move and the battery would be in the sump pool. I wedged the drill between my shoulder and the wall and reassembled the hinge with some difficulty, all too aware that this was only a temporary fix to the problem and I'd have to keep an eye on it.

Everything was now thick with mud and I was worried about the long-term consequences of this finding its way into the workings of the drill, but it still sprang into life when I pulled the trigger so I forced myself back up the tube and attacked the original hole once more. Once it had reached almost the full depth of the bit I retreated, recovered a bit and then prepared to launch myself upwards again, by now determined to finish the job. At this point I realized that the combined weight of the tackle bag and the ammo box on my belt,

coupled with my repeated wriggling, had made the buckle come undone, so both bag and box were only held in place at the top of the tube by the friction between my back and the wall, trapping the belt. Once more I had to wedge the drill while I struggled to solve the problem, mindful of the fact that if I slipped the whole lot would drop straight down into the sump pool. All this was pushing my physical limits still further

Eventually I had another full-depth hole, but it was all I could do to maintain my position in the tube. By now both of the individual 12v batteries in the ammo box had slid out of it and were held only by their wire connections. If I'd even attempted to dismantle the drill either something would have dropped into the sump, or I would. I slithered down, holding the drill by its bit and using the other arm to keep the batteries on my thigh. Once down at the level of the sump I soon realized that traversing back across the pool like this wasn't possible, and I was in imminent danger of slipping or dropping something, so I called for help.

"Martin, I need a hand here!"

"OK, give me a minute and I'll be with you"

"No good! I need a hand now"

Martin sensed the urgency in my voice and came down to the pool, sliding through the muddy slot at its head in an instant. Gratefully I passed him the drill and was then able to compose myself and find a more reliable foothold. I traversed across and then stood knee-deep in the sump pool, attempting to stuff the muddy batteries back into the box and close the lid.

Although the four holes were now drilled I had yet to place the charge. I was sure this would be easier than the drilling but nonetheless I was determined to mini-

mise the potential for struggle so, using a convenient ledge at the edge of the pool, I carefully assembled the charges, shivering as I did so. Martin somehow managed to pack the drill and the battery into the tackle bags, and get both bags back up the rope climb.

By now I was suffering from both cold and exhaustion, so it required a major effort to get back up the tube and place the charges. I checked and double-checked everything, desperate to avoid the inevitable wait and struggle to return that would accompany a misfire. Once back down at the pool I took a break and composed myself before thrutching out of the muddy slot and back into the main cave, grateful that Martin had managed to rig a rope that made this easier and even more grateful that he'd taken the bags up the climb – it was all I could do to haul myself up.

Martin was waiting at the end of the wire. I untwisted the ends, crossed my fingers and shoved the bare wires into the battery socket. There was a huge sigh of relief when the dull 'thud' emanated from below – the charge had fired and we could head out.

My guess is we'd been underground no more than a couple of hours but I don't think I've ever emerged from a British cave feeling more whacked. Any idea of going back in had long been abandoned, so we cleaned up as best we could in the drought-deprived stream in the shakehole and trudged off the hill in glorious afternoon sunshine.

It took another trip of awkward, mud-covered drilling to enlarge the constriction enough to get through it. Finally, on the 2nd May 2011 I managed to squeeze up into a miserable passage that closed down in both directions. Back to the drawing board...again.

The 2012 SWCC Digging Week is scheduled for August 27th -31st.



LANZAROTE LAVA TUBE CAVES II

By John Gillett

Lanzarote was formed by volcanic action about three thousand years ago with the last eruptions about two hundred years ago.

There are many extinct volcanoes on Lanzarote and several miles of lava tube caves that were formed during the early volcanic period. Carmen Smith of The Wessex Cave Club has written a very good guide to the caves of Lanzarote as a PDF from www.cavesoflanzarote.co.uk Knowing that several SWCC members may be going to Lanzarote this year, I have added details to locate the entrances.

In 2011, I caved with Javier Trujillo Gutierrez and Alexandre Perez Perdoma, of the 'Grupo de Espeleologia de Canarias'. We explored *Jameo de la*

Puerto Falsa, one of the entrances into the extensive *Montana Corona* system and *La Cueva de Las Naturalistas*, called *Las Palomas* by the locals due to the pigeons that nest in the entrances.

This year I again caved with Javier, Alexandre and Brahim, another club member, to complete the rest of the *Montana Corona* system. We also re-visited *Las Naturalistas* with Carmen, Chris, Aubrey and Noel from the Wessex Cave Club, who came out for a week's caving. They went caving every day and suggested several future trips that I would enjoy. We were particularly grateful to Chris for driving us back to recover my hire car, parked by the *Jameo de La Gente* entrance some kilometres away, after we



Jameo de la Gente crater, looking back to the exit from the Puerto Falsa traverse. See circled onlooker for scale.

had completed the traverse and emerged from *Jameo de Prendes*. A brief record of this year's trips follows:

The *Puerta Falsa* to *Jameo de la Gente* traverse takes about an hour and is in large passages with lots of boulder hopping and a single constriction in a boulder choke. For the first time ever, I successfully used a walking pole underground to assist my arthritic knees! The final exit is into *Jameo de la Gente*, a large crater that is most impressive. There is an easy climb up to the surface just before the up-flow entrance to the rest of the system that leads to *Jameo de Prendes*. The best way back to the car is to take the road. We took a 'short cut' over the 'badlands', but it was awfully rugged, hard going and not recommended!

The *Puerta Falsa* entrance is reached along a small footpath that is to the left of the road (LZ204) past the tourist cave *Cueva de los Verdes*, near a bend where the car can be parked. *Cueva de los Verdes* is well signposted from Arrieta. There is a right turn on to LZ1 signed 'Orzola/Jameo del Agua' after the roundabout. Go past Manrique's 'Lobster Island' and turn left at the crossroads near *Jameos del Agua*. Go past the turn to *Cuevas de los Verdes* on the right. Follow the straight road as far as a left-hand bend. Park on the bend, in a passing place on the left. Then cross the road to find the tiny footpath that leads to the large cave entrance.

The *Jameo de la Gente* entrance is reached by keeping left on to the LZ201 avoiding the turn to Orzola after the Arrieta roundabout. Keep going for about a mile and pass a right turn that is the road to *Cuevas*

Fade los Verdes (The best way back to the car after the traverse from *Puerta Ilsa*). Keep along a short, obvious footpath going uphill until there is a wall with high

gates in it on the right. A rough track runs right along this wall and there is a car park by the second high gate. The *Jameo de la Gente* entrance is the wall from the car park. There is an easy climb down into the crater. (*If you get to the left turn to Maguez then you have gone too far and must turn round!*)

The traverse from *Jameo de la Gente* to *Jameo de Prendes* takes about three hours and is the best part of the Montana Corona system in my opinion. The climb down into the up-flow passages of *Jameo de la Gente* is easy. A scramble over greenish rocks leads to a wooden ladder that has a rung missing at the bottom. From here on up-flow, the passages are very large and impressive, with lots of gypsum powder and decorations on the walls, ceilings and floors. The going is quite strenuous, with lots of boulder piles to go over, several traverses along walls and balconies, and a short crawl that leads to tubes on two levels. My walking pole was really useful! Eventually the route leads via an upwards scramble over boulders to a short 7m pitch, with hangers to attach a pull-through rope. The descent is over a bulge and then it is free-hanging to the floor. Knee-pads are helpful if the two hidden footholds below the bulge cannot be located. The way on is then upwards over boulders. The passage continues to a 25m climb. Javier climbed this and fixed a rope for the rest of us to climb using our hand-jammers. At the top, there is a small hole to get through. I had packed my collapsed walking pole into my rucksack with the point sticking up behind me. Needless to say, this jammed in the hole and I had to back out and take the rucksack off before I could get through! At the top, it is only a short distance to the entrance. The route passes across a large hole by a traverse on the right-hand wall using cracks and a good handhold. Then

daylight beckons and the exit is into another large crater with a climb up to a metal gate on the surface. If no-one wishes to free climb the 25m pitch it is best to go to *Jameo de Prendes* first and put a rope in place, then return downhill and enter via *Jameo de la Gente*.

The *Jameo de Prendes* entrance is reached by continuing uphill past the track to *Jameo de la Gente*, past the left turn to Maguez and a right-hand bend to a sharp left-hand bend where there is a track on the right that leads to the *Jameo de Prendes* car park.

There are still several caves for me to visit next year. I particularly want to visit *Cueva de los Lagos* and *Cueva del Paso/Eskeleto* and to repeat the *Jameo de La Gente/Jameo de Prendes* traverse.

TRESVISO 2011



Brian Baru's Place, Cueva del Nacimiento (Phil Walker)

INTRODUCTION

Following on from the 2009 and the 2010 trips (see *SWCC newsletter 127*) a further summer 2011 expedition was planned to the Eastern Massif region of the Picos de Europa, Northern Spain. This time round, more interest had led to a group of 15 cavers, including 5 from the SWCC, once more braving the perils of cerveza, chorizo and blue cheese, with a little bit of caving thrown in.

This year the expedition relocated back to the sleepy village of Tresviso, the scene of the original 1970's and 1980's exploration by LUSS and later SWCC.

Larger and cheaper facilities (under the bar) were available this year and the village was a prime location for a new objective.



Tresviso (Phil Walker)

500m below Tresviso, in the Urdon Gorge, lays Cueva del Nacimiento (previously known as Cueva del Agua), the main resurgence cave for the whole of the Eastern Massif. The main plan this year was to revisit a series of climbs at the back end of the cave last visited by the SWCC in 1987. The climbs had risen steeply 200m above the furthest known reaches of the cave and were possibly the key to finding a route further into the mountain. The old reports provided some worrying reading, with various talk of crumbling handholds, rotten rock and ramps veering from 45 to 90 degrees(!). The usual caver hyperbole, in regards naming conventions, was also in evidence across the surveys; "Teeth of Satan", "Death Race" and the "Beast's Ramp" adding an extra layer of concern.

However, the added talk of howling draughts and various unexplored ramps was enough to convince me that some alcohol and the promise of further ridiculous naming rights would be enough to persuade Al Braybrooke that all he needed was a drill and some bolts and he could re-climb the ramps, with minimal fuss, and etch his name in SWCC history.

PRACTICE

After the initial enthusiasm had worn off, the more serious matter of working out how we would actually pull this off needed some thought. No problem, drill borrowed, some dodgy Screwfix bolts purchased and some homemade etriers constructed. All we needed now was some dodgy rock to climb that substituted for the crumbling death trap that we wanted to scale in Spain. Luckily a perfect spot was found at an old abandoned quarry. The rock was terrible and old prams and polystyrene blocks substituted for falling rock. A good 5 hours was spent fettling kit and trying out various options before reaching a grand height of 5m. The ramps in Nacimiento were only supposed to be 200m high so we were a good 2.5% closer to the target.



Alan practicing bolt placement

It was obvious we needed to speed up the training plan and as luck would have it a consignment of new shiny equipment arrived, courtesy of Lyon Equipment, buoying confidence. A second day out was planned, this time in the middle of a

blizzard at Penwyllt, and with better equipment, better bolts and the need to keep moving to avoid frostbite, a massive 15m progress was gained, only stopped by the drained battery on the SWCC drill. So, it seemed like an adequate training regime completed, so now we just needed volunteers to carry all the kit to Spain.

THE TEAM

As with previous years, interest was sparse, the August dates being rather inconvenient for most people and the need to repeat a lot of exploration and climbing, before reaching the previous limits, was discouraging for those seeking quick results. However, the trip slowly filled up, including a good SWCC contingent and a student representation from Nottingham University (NUCC). Additionally, the inclusion of Phil (madPhil) Rowsell, fresh from the 300m+ 'Darkstar' bolt climb out in Austria, meant I could quietly exclude myself from having to follow Alan up the climbs and leave them to it.

SATAN'S TWENTY MARLBOROS

Out in Spain madPhil and I spent the first week rigging Nacimiento in anticipation of the arrival of everyone else. Being the first time I had been back to

Nacimiento since a 1996 trip with ex-SWCC caver Jim Thomson, I was rather worried about route finding, so a trip down to visit Jim in Arenas was the first port of call. Jim's advice was turn left at the rocking slab and look out for a packet of Marlboros he dropped in 1987 near the Death Race 2000 aven. Slightly better recall than myself, but I was pretty sure the cigarettes would have long since crumbled away and not help much with route finding.

In the end route finding proved a lot easier than expected, the main problem being finding a way out of the streamway into the upper passages. From there the cave pretty much follows a steep line up through the mountain, toward the deep systems in the Andara region. However, the rigging trips took far longer than anticipated. The precarious state of a lot of the in-situ rope, called for some safety to take over, and the majority of pitches and climbs were re-bolted and re-rigged. The cave was finally rigged with a day to spare before the arrival of the troops.

Alan arrived on the Sunday, fresh from his honeymoon and was instantly sent to work down Nacimiento, only having time for one cup of tea before a 4 day stint at the underground camp.



Entrance, Cueva del Nacimiento (Simon Woolhead)



Big Country (Phil Walker)

Initial progress was good, scaling the previous climbs following an impressive draft and edging closer to the previous limit of exploration. However, the climbs started to get more and more sketchy and the route becoming less obvious. Alan takes up the story:

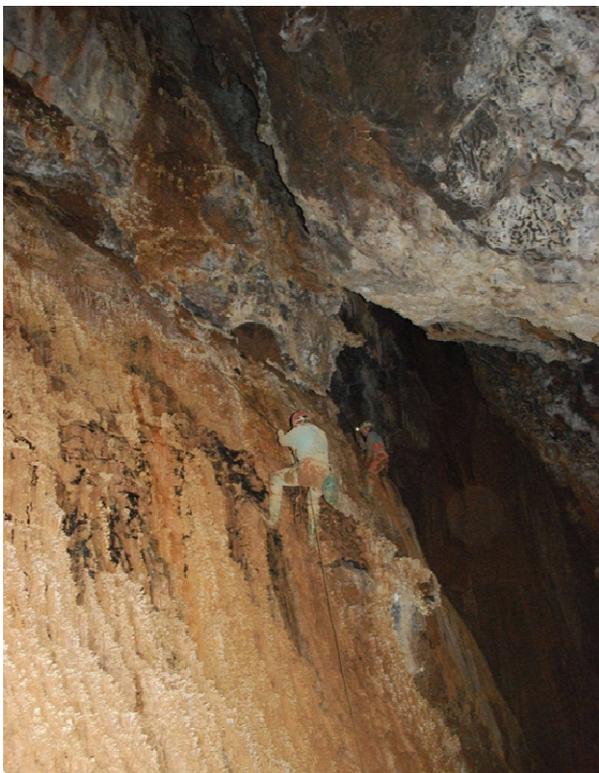
Now feeling a long way away from the entrance, quite a few hours on from the camp, felt like we climbed efficiently but the slurry, scabby slabs and crumbly rock made everything feel very precarious. With the extra noise and cold of the water I was getting a bit strung out! We were out of rope but had traversed crumbly spires to the base of the aven, another climb was managed with combined tactics, even more necessary as the key holds fell off. Made some good progress at the top, possible bat bones and several possible ways on. Unfortunately I couldn't enjoy this as I was preoccupied with how we we're going to get back down the last climb, I must have been good because from nowhere we came upon a stash of 86 kit, this 25+ year old rope was immediately pressed into service allowing a far safer return. Back to the camp for a cup of tea, then we decided to get out of the cave rather than spend another night. Though I regretted it on the endless climb out of the valley with legs of lead. Too much food and drink too quickly, but we still managed a beer before collapse.

In the meantime, the others members of the expedition undertook various work on the hill, and continued work in and around Nacimiento, including completing a new line survey and getting better GPS fixes at the entrance. Duncan, Derek and Maxine had some great success finding approximately 100m of new passage near the Entrance series, including a well decorated chamber, dubbed the "Dragons Lair".



*Formation in the Dragons Lair
(Duncan Hornby)*

Only 1 day off was allowed before the second underground trip commenced. Once more madPhil and Al tackled the climbs, progressing ever closer to the Death Race aven. Martin and I joined them on the second day, ferrying equipment to the camp and to undertake



*The Beasts Ramp
(Phil Walker)*

some photography for the sponsors over the next couple of days.

The underground camp setup for the duration of the trip, proved remarkably comfortable. Located at the traditional Consort Hall, it boasts nice flat sand for sleeping on, a fountain for water supply and a toilet with authentic 1987 trowel and toilet roll accessories.

The Teeth of Satan and associated ramps were very impressive but hard work, being very steep with either crumbling rocks or slippery mud waiting to catch the unwary, coupled with the psychological issue of being quite far from the safety of the taverna.



*The Teeth of Satan, Cueva del Nacimiento
(Phil Walker)*

The old SWCC surveys made difficult reading, suggesting we should have been well past the previous limits and seeing huge unclimbed ramps leading off into the dark. It was becoming clear that some of the surveys were well off the mark with a lot of artistic license and we still hadn't made it to the Death Race avens. With time running short it was decided to resurvey as much as possible in order to try and understand the old descriptions and where the 'real' leads actually were!

Feeling good as it was the last day, and at some point we must be able to pass the previous team's exploration. Completed survey, spotting some avens up high, exciting Phil more than me. After a long day we eventually started exploring again, bolting across the traverse then dropping a short pitch, every obstacle passed I was expecting to find Death Race, but it was never there, lots not mentioned in description or survey. After the drop we were faced by another climb, I was all for sacking the mission off at that point, it was after 6, we were out of metalwork and had limited rope. We did what was right, stripping some hangers off the traverse and trimming the rope got us moving again. Four bolts got us up it, then finally a black space! It was huge, a balcony of boulders arcing round the LHS with a massive cliff plunging down the RHS the sound of water rising up from the hole. Ecstatic at reaching the Promised Land. We explored around the balcony, following a couple of leads but nothing going, time to go home. Misery as the bags got heavier and heavier, thought I'd never get back to camp, wishing we'd filled the water container before leaving, no tea until that was done. Ate too much too quickly so spent night feeling ill.

The following day the entire expedition was press ganged into de-rigging the cave and with amazing speed and efficiency the equipment and people emptied the cave and had some celebratory drinks. (see Duncan Hornby's de-rigging write up in SWCC newssheet 3/2011).

Despite not getting to the main lead until the final day, the trip was quite a success, leaving the cave rigged right to the previous limit of exploration, ready for the next trip. Other leads on the mountain are still waiting, and as for 2012 further promises of naming rights has convinced Martin Groves that a short swim

in the upstream sump of Nacimiento should be enough to pass the sump, with minimal fuss, and etch his name in SWCC history.



*The Twilight Zone, Cueva del Nacimiento
(Phil Walker)*

The full report on the 2011 expedition is detailed in the official "Tresviso 2011" report, available from the SWCC library.

Expedition Members:

Phil Walker, Alan Braybrooke Duncan Hornby, Maxine Bateman, James Collings (SWCC)

Alex Slater, Phil Stringfellow, Martin Trerise, Simon Woolhead (NUCC)

Dickon Morris, Phil Rowsell (BEC)

Colin Boothroyd, Derek Cousins (SLUGS)

Peter Lewis, Adam Tomlinson (Harper Adams)

IN THE FOOTSTEPS OF NOT MANY **SISTEMA LA GANDARA**

By Martin Hoff (words and pictures)

Caving in places unfamiliar can be a tricky experience, sometimes because the information about what there is to do and where to go isn't readily available, sometimes because there's stuff going on that local people don't necessarily want other people sticking their noses into. But sometimes it works out great, when people give you just enough information to get the idea, and then leave you sufficient room to get on with it in your time and at your own pace. This is the summary of the excitement so far resulting from a fine example of the latter.

In March 2005, we were in the MTDE shop in Ramales and benefiting from local knowledge about a newish system that had recently become the current big thing. With a description of where to find the entrance, some of the party went off to investigate while I opted to catch up on a bit of sleep, still exhausted as I was from the trip out to Spain. I knew they weren't going to get very far as we had an arrangement to go somewhere with another local contact a couple of hours later.

With some of the party having already wound their way up the hairpin bends at the head of the Ason valley to look for this new site and all the way back down again, we went off to collect our man in Ramales, who would take us all to somewhere new and exciting, as promised. And indeed somewhere straight back up the hairpin bends at the head of the Ason valley, and in fact back to the same spot where a number of us had been not that many hours before. Well slept, I thought.

A short walk from the vehicles led al-

most straight up to a small platform of rocks on the side of the hill, with a great view out over the valley to the southern side of El Hornijo. A small black space in the rocks looked nothing special, that is until close enough to see the blades of grass blowing backwards and forwards in the breeze coming out of the hole. With some small delay, we dropped into the slot and found ourselves at the top of a long chamber, not unlike dropping in through a larger scale version of Top Entrance if the passage inside were on rather more of a downwards sloping gradient.

Cowstails at the ready, we crossed a suspended traverse round the corner on ropes of uncertain vintage and over a drop of certain depth, found our way along a passage now showing a roof forty or more metres above our heads before encountering a small lake, a slippery muddy slope eventually leading to a small grotto where an inlet comes in from the roof. The way on was down a large flowstone slope to skirt the edge of another lake, a lake that it is now clear is not always there, and through some more old formations to a short drop down between some rocks.

Crossing international borders for extended bouts of crawling isn't everyone's idea of fun, and it was here or shortly after that our party thinned out a little. Less the Long Crawl, more like ten minutes of zigzagging hands and knees and stand up and bend down variety, this section only contains one brief stretch of lying down for the purpose of gently passing through between some formations, so even this bit is pretty comfortable caving.



Brendan Sloan admiring formations

Emerging into more formations including a number of columns and plenty of room for manoeuvre, we moved on into a succession of small sandy breakdown chambers and crystal areas, following our man with the knowledge. Knowledge which rapidly turned out to be a little on the sketchy side. Nevertheless, we located what was then a vertical squeeze, already of some little local notoriety, which gave access to the pitch into the next section of the system. The thing that made the squeeze a little on the tricky side was less the amount of room it offered and more the gear management required to avoid dropping the tackle sack into the wrong place between the perched boulders we were climbing down between, although standing underneath and seeing how securely the boulders were located also gave pause for thought!

A couple more minutes of crawling and climbing saw us at the top end of the sloping chamber floored with loose rock which leads to the 40m pitch. It's sufficiently comfortably sized that it can be double-rigged, but the loose rock on the approach and at a couple of points on the walls in the upper part of the pitch offer enough hints that stringing up sev-

eral people there at once perhaps isn't the best plan. Changing over at the re-belay on the comfortable ledge halfway down, the nature of onward progress along and down a rift passage becomes much more obvious, and three more short pitches along the base of this brings the requirement for full SRT to an end for some time.

That final rope drops into the top corner of the Salle Angel, a mighty impressive chamber, approached across a gently sloping balcony to a handline down some steep, shiny rocks. The best way to appreciate the place is to be at the top of the handline, looking out across the chamber while other cavers are at the other side of the ledge that leads to the next part of the system. A waterfall emerges from a bedding plane high up the northern wall of the chamber, and even with barely thirty metres to drop it is always something of a spectacle.

Back when we made that first trip into there, still unfamiliar with what stood between us and getting out again and really without any appreciation of just what the (w)hole has to offer, we were incredibly fortunate. Seeing that mighty black void for the first time coincided with the thaw at the end of a long winter, and to say the waterfall was in spate is a drastic under-statement.



Richard Sore: Roof and Stal

At a point halfway between the end of the handline and the fabulous stalactite

grotto that sits on the end of the ledge next to the waterfall, it was impossible to see anything clearly due to the amount of spray droplets in the air.

Having heard the noise of the waterfall as far back as the rift passage into the chamber, from such proximity it was a thunderous roar such that it was hard to tell if it was the air vibrating on its own or the impact of the exceptional volume of water on the rocks below that made the floor tremble slightly as we stood with all our lamps turned up as high as possible and still failing to take it all in.

For a first trip that was plenty, and in the years since we have become very familiar with what follows for several hours beyond that point in a couple of different directions. The squeeze above the pitch has been substantially modified since then, and the volume of people going to Salle Angel and not much further has had significant effects from a conservation point of view – a number of distinctive helictites that were there on my first couple of visits now only exist in photos.



Paul Meredith alongside an interesting formation that sadly is no longer there.

On its own and going no further, this is an impressive piece of cave. Sistema La Gandara is highly accessible from the

road and with only one pitch of any note to get down, it's understandable that lots of people would want to go there. This applies rather less to the further reaches of the system, and while its French discoverers have put in many, many hours of camping underground surveying the place, it seems clear that some areas in the cave have seen very few other visitors. And as long as the survey remains a work in progress, it's unlikely that a full copy will be coming our way any time soon, so that lack of traffic in the inner reaches may persist for some time.

This is one of the things that has made trips into the place both satisfying and challenging over the years since that very first one, and while we are not discovering anything brand new, we are discovering it as new for us, section by section, and gradually building up our own picture of how it all fits. On the Easter 2010 trip we started exploring from another entrance at the other end of the system, and the through trip can't be that far beyond our capabilities now. With over 600m of vertical range and around 10km to cover, according to its discoverers, it will be quite some undertaking but then in a system with the last published surveyed length at over 106km, that should be no great surprise.

Over the period since that first trip, I've done three times as many trips into the Gandara as I have into Dan Yr Ogof, and if that doesn't tell you something about the place then there's really nothing I can do for you. I've accumulated many photos in the place and while there are still parts of this cave to be looked at before we can be confident of getting from one end to the other, our repeated excursions into the further reaches have also shown us that the six caving days of an Easter trip isn't a lot of time for the caver who wants an easy day before going at the through trip and who may also want something of a rest day afterwards.

With 2012 set to be one of those summers without a Vaughan Continental Caving Extravaganza, there's more than a whisper that the summer of 2013 might be time for a return to the Cueto-Coventosa through-trip – see Newsletter 120 for more information and some stories from last time – and a few of the other great local trips we've become familiar with in the meantime. And if you can't find a place on the Easter trips due to their being highly popular and understandably quickly over-subscribed, you might do well to save a place on your summer holiday calendar for late July and early August 2013.



GOUFRE BERGER, VERCORS, AUGUST 2010

*By Phil Walker, Al Braybrook (SWCC)
Bob Clay, Mike Broad, Arwel Roberts (SBSS)
Photos by Arwel Roberts*

It all started in Belize, while out on the expedition; Russ had mentioned that his club, the Bradford Pothole Club (BPC), had a permit to descend the Berger in August. Feeling rather jolly on the local Belikin Beer it seemed a good idea, Alan was up for it and I was sure I could probably get a few more interested people.

Back in the UK the idea still seemed sound. A whole week in France was out of the question, but my foolish plan of suggesting that we help de-rig for the BPC towards the end of the expedition was snapped up first by the BPC organisers and then by Mike, Bob and Arwel. We had a team, a deposit was paid, a ferry booked and the offer of a t-shirt for attending meant no more excuses.

Of course all plans are subject to change and journey arrangements are quickly altered. Mike is already in France at the time of the trip, Arwel will cycle down and the rest will go in Bob's car. The night before the journey starts I ring round just to make sure things are still on track. Bob is sorted, just picking up the ropes. I get Alan on the phone

and after a few minutes conversation where he seems far too relaxed about his packing he asks the question:

*"It is next week we are going isn't it?"
"No, the ferry is tomorrow"
"Oh..."*

I leave him a broken man at the other end of the phone, some confusion on work holidays and mis-read emails and we are one down. However, the next morning I receive a text, he's on his way, a hasty pack, work cover sorted and a sprint down the motorway on his motor-bike. There is a good chance he might just turn up in a pair of pants and a Petzl zoom!

Bob arrives shortly after Alan and we set off with a full car. The journey to Dover is uneventful, and we get aboard the 23:59 ferry. A fried breakfast some 30 minutes later probably marks the start of where our body clocks start to go wrong.

The ferry is full of bodies sleeping in random places, Bob catches a few minutes sleep by simply lying down in the middle of a family of Dutch holidaymakers, they

seem fairly relaxed about it and just ignore him.

We arrive in Dunkirk and promptly drive towards the Belgian border, probably my fault as I'm half asleep. We finally get back on track and drive for a few hours before pulling over near Rhiems for a few hours sleep. A 10am start sees us back on the road and barring a short nap stop for Bob we keep going all the way down to Grenoble. Alan sleeps most of the way, getting me back for a trip to Spain many years ago, where I slept for around 36 hours all the way down.

Grenoble and the Vercors areas are as impressive as ever as we make our way up the hill towards Autrans and the campsite. We arrive at the campsite and meet up with the BPC, who seem far too glad to see us. Mike and Arwel turn up about an hour later.

It appears that the BPC have had a rather bad preceding week with poor weather and consequently the cave is not yet fully rigged. However, the plan is for a team to enter the following morning, rig the last few pitches and bottom, a second team to follow and bottom, a third team entering as far as Camp 1 and then our group to enter and de-rig. It sounds a great plan to us, as we had feared that they may have started the de-rigging already or we would have to wait in line for a bottoming trip. The word is that there are only 4 bags below Camp 1 to be brought out, ideally as far as the bottom of the entrance pitches. Sounds easy, a few beers are handed out, they do seem rather too pleased to see us.....

It means a 1pm start for us the following day, so we have a leisurely morning eating and streamlining our own personal kit. We team up in twos for tackle, Bob and Arwel with a bag between them and me and Alan with a bag. Mike opts for a large suitcase sized tackle bag, probably

filled with sandwiches and lucky gonks.

After a pleasant drive and walk to the cave we arrive at the surface camp at 3pm. Last minute toilet stops are taken and we set off. The pitches are fairly straightforward, easy rigging and nothing too technical. They are broken up by a section referred to as the "Meanders", a monotonous piece of passage necessitating some traversing across drops, but nothing worse than anything in the UK.

The pitches continue with a few big drops, including the final big Puits Aldo., which places us at about -330m. A short stooping section brings us all out into the start of the big stuff and, firstly, the 'Starless River' passage. It's an impressively large piece of passage with a river running along one side of it. We continue through the Grand Gallery before arriving at Lake Cadoux. As the weather has been bad, the lake is up and a dinghy is in place. It was actually a lot shorter than I expected. All the tales of the danger of not leaving a boat in place had left me with visions of huge canals



on a par with the canals in Coventosa. The reality was a rather dark and dismal looking pool, but despite the small size I was pretty sure I didn't want to swim in it. Bob and Arwel take a few photos, so the rest of us press on.

The cave continues steeply down, including a few smaller pitches before a

traverse around the side of a waterfall brings us to the start of the “Grand Rubble Heap”. This section of the cave is very impressive, best viewed from the bottom when there are others above you, to give a good idea of the scale. At the bottom of the slope is Camp 1, at approx -500m. The camp consists of some silver space blankets draped over camping



mats and a good choice of fibre pile sleeping bags. There is plenty of food available but we are not hungry yet. It has taken us about 2.5 hours to get to camp 1, not too bad. Bob and I take the opportunity to dump our entire carbide headsets, which have been playing up for both of us on the way down. We use the radio to make contact with the surface and then press on.

Shortly after camp 1 the “Hall of the Thirteen” is reached. This is possibly the most impressive part of the cave. Large missile silo shaped stalagmites are interspersed with equally as large gour pools.



A few piccies are taken before the cave continues sloping down until the start of the canals. This is one of the main sections to avoid in bad weather and the various pieces of tat and traverses left in site give an indication of some of the problems people have encountered in the area. The dilemma is whether to try and stay totally dry and expend a lot of effort keeping high out of the water or accept getting wet as given. I opt for somewhere in between, keeping out the water when minimal effort required and a few dunks (butt and testicle deep) where otherwise. The water is deceptively cold and at one point I’m pretty sure my right knee has gone numb.

The whole section of canals and a few pitches takes a lot longer than anticipated, progress up until now had been good (going by the survey) but this section seems to drag on for hours and is increasingly cold. Eventually, we reach Camp 2, a rather pathetic looking camp with just a first aid kit in place. We are now at -920m; we are getting close to the magic number. We are all still feeling quite fit and active. Pretty soon we encountered the second bottoming group returning, they inform us of some changes to the rigging they have made and suggest it is still quite awkward and they are not wrong. The rigging below Camp 2 was quite a concern, in many places old tat had been used and some traverses were far too tight. The majority of us struggle with a reelay at the “Grand Cascade”. A rather unpleasant water splashed place that saps strength as we attempt various means of changing over without the comfort of an adequately rigged traverse.

Eventually we are down to “Little Monkey” and then the (in)famous “Hurricane” pitch. It’s a big one, but not as bad as I expected. We are already now passed the -1000m, we could just de-rig from here, but we are so close to the end we

have to finish it. The bottom of "Hurricane" is a wet, cold and inhospitable place. Apparently there is a camp somewhere in the boulders, used in emergencies; I imagine a rather poor night's sleep! We all get down past the impressive "1000m inlet" and reach the Pseudo Siphon. This is -1155m, enough for all of us and it's already 9pm.

It's time for a toilet stop and a moment of near disaster. After relieving myself I'm just doing up my central maillon, but something does not look right? My cows tails are missing! A number of expletives are let out and a bit of panic sets in, I can't face prussiking out with a couple of pieces of tat as my only safety! There is only one thing for it, I have to jump in the pool of freezing water and my own piss. As I'm standing in it, thinking this was not how I envisioned this trip, (or my life), ending, I see something blue pop-up out of the water. Like a bear catching a salmon I grab for it and breath a huge sigh of relief and some nervous laughter as I return my cows tails to their rightful place.

So that was it, now we just had to get out, and the small matter of de-rigging. Mike volunteers to de-rig initially, so we all start on the way back to Camp 2. It's a slow and laborious task, we are all slowly tiring and we had noticed on the way down that there seemed to be far more than 4 bags worth of equipment needing removal.

Back at the "Grand Cascade" I have a minor epic; the same re-belay is even more difficult on the return. There is just no slack to pull myself up to change onto the next rope. I thrash about for a good 20 minutes, slowly getting more and more exhausted. In the end I have to change back over to my descender and abseil down, straight onto my long cow's tails. Another expletive let out, but I can luckily reach up and unclip. Back at the bottom I shelter away from the water and rethink

my strategy. I can't stay here for too long, I'm already pretty cold. Luckily, Alan is at the bottom and I ask him to go up and try and get past and rig a better traverse line for me with some spare rope. It seems the quickest and safest option rather than more potential thrashing around before ending up unconscious on the rope. *(Afterwards, Alan points out he had been watching, debating the etiquette of retrieving his Mars bars from my pocket if I passed out, I think he was joking....)*

Alan struggles for a bit on the same rigging, but gets past and drops a new rope round. I get up and round without too much issue now the rigging is better. We all meet up at Camp 2, Bob and Arwel have been there for a while, wrapped in their survival blankets. Alan gets the stove on and we have a few bits of food, and I crack open some more wine gums.

By now we all have a bag each and there are still at least another 3 or 4 between here and camp 1, 2 bags each is going to prove impossible to manage, but we are still in high spirits, just a bit cold and tired. Alan and Arwel take over the de-rig and we head for the canals. Mike and his suitcase disappear into the distance and Bob and I start a slow plod up the pitches leading to the start of the canals. Ideas of dumping bags have been held off by the thought that if we can get to the canals we can float a lot of them through. The pair of us begin the traverses through the canal and can hear Alan and Arwel some distance behind. I'm concerned that by now they may have 3 bags between them and so when we catch up with Mike he is sent back to give a hand, while I carry on with his suitcase attached to my belt. It floats surprisingly well, but is also unbelievably heavy when it needs to be lifted up, obviously the sandwiches have become water logged.

Mike catches up soon after and I swap his suitcase for a bag of rope. As I'm still in the water I'm quite comfortable with the extra bag. The canals seem to be quicker on the way out and once we climb out we know we are getting close to Camp 1. The last few hundred metres seem the worst, I seem to be falling asleep every time I stop, waking up with a panic that I am falling down the precarious boulder I'm sat on.

It's 11am when we get to Camp 1. It's taken nearly 12 hours to get from the bottom to Camp 1. Under any other circumstances that's a trip in its own right. Food is opened up and eaten and Bob and I decide on a sleep in the bivouac, we don't have long, we know the rest of the BPC de-rigging team intend to be at camp 1 by 1pm and we can already hear voices in the distance! It's a rather cold unpleasant sleep for about an hour. Contact is made with the surface and we sheepishly advise that a bag is still down by the canals and needs to be retrieved.

Alan, Mike and Arwel head out with the thoughts of catching the last rays of sun. We have another half hour of sleep before some reluctant movement. I need a toilet stop anyway, so Bob elects to stay under the bivvy while I attempt to master the instructions for the wag bag.

At 1:30pm we both set off at a rather leisurely pace up the "Great Rubble Heap" which seems far steeper than I remember. The rest of the trip passes in a blur; I'm still half asleep and fairly cold. "Lake Cadoux" is now fairly dry and can be bypassed along the side. We reach the bottom of "Puits Aldo", it's just 300m or so of prussiking now! It's slow work, I can't seem to get a good rhythm together but we knock the pitches off one by one, passing various BPC members helping with bag hauls following behind us. The Meanders are a bit more difficult on the return and

prove a grind. Bob christens his bag with various unrepeatable names. The final few pitches are reached and we are out at 8pm, with some daylight still available. Cups of tea all round and some dry fruit.

I'm surprisingly indifferent on reaching the surface, I think my body had generally shut down and was refusing to do any more work until it had pizza and beer. I needed some time to digest the trip.

Back at the campsite we were all depressed to find out the restaurant had closed so no pizza! A few beers and some more MOD ration packs were enough to send me off to bed. The night was spent turning and groaning, every part of me aching and bruised.

Well, we did it, taking between 26 and 29 hours, not bad seeing as we were de-rigging and had really been under-sold on the amount of equipment that needed removing! Not sure I would ever volunteer for a sole de-rigging trip again, I don't think we probably got to fully appreciate the cave as we rushed down knowing we had the de-rig to start. However, it was in the end, a great trip, a fantastic cave, good weather while down and a few personal achievements gained.



“MENDIP MEETS VERCORS”: THE TROU QUI SOUFFLE TO LES SAINTS DE GLACE THROUGH-TRIP

By Tony Baker

One of the principle objectives of the summer 2011 trip to the Vercors was the through-trip from the Trou Qui Souffle to Les Saints de Glace. Here's my account of several trips leading up to, and including, the through-trip.

With the entrance to Trou Qui Souffle just a few minutes' walk from our camp-site at Les Eymes in Meaudre, rigging the cave in advance of likely through-trips seemed a perfect objective for our first day in the Vercors. Four of us set off up the road laden with tackle sacks and soon found the entrance, immediately beside the road and with a helpful barrier that not only protects unwary tourists from falling in but also serves as a belay. I rigged the rope for the drop of just a couple of metres to a metal platform, from where a short traverse and clamber down leads to a walking-size passage in attractive beige limestone. I stomped on ahead with the bag of rope and soon came to the next pitch, a fine 30m drop split into three sections by re-belays.



While the Finnish contingent (Miri and Velma) received some coaching – until now their SRT experience was a little, ahem, limited – I set off down the streamway, a narrow meander that presents few difficulties. A succession of short, straightforward pitches follows, intersected by a traverse along the right-hand wall, but by the time I'd rigged two 12m drops the others had caught up and the route-finding became more tricky.

The Trou Qui Souffle system has almost 50km of passage – as much as Ogof Ffynnon Ddu – and just as in OFD there are 'trade routes'. The description in *Vercors Caves* said that the two 12m drops would put us in the Galerie des Condensations (the route for the through-trip), but a few metres further down the passage an unexpected, and awkward, 6m drop took a few minutes to rig. Not convinced that we were heading in the right direction, one member of the party set off along an awkward meander that turned out, with the benefit of hindsight, to be the route to the Siphon Verna. By now I'd re-read the description and suspected we'd missed something at the bottom of the 12m drops. I helped Miri and Velma negotiate the 6m pitch, the rigging being somewhat compromised, and discovered that the Galerie des Condensations was no more than an insignificant side passage, all the more easily missed because the piece of tape that served as a marker had dropped off into a puddle. By now we were all back together, and we were pretty much out of time, so after de-rigging the 6m pitch to prevent future trips making our mistake, we headed out.

While all this had been going on Gary, along with Josh and Ben, had rigged the other end of the through-trip, Les Saints de Glace, although there were two other sets of rope already in place. A couple of days later three of us opted for a familiarisation trip into the cave and the chance to photograph the reportedly impressive Salle Hydrokarst, the largest chamber in the system. The cave descends steeply but with only a few short pitches (Note: it's considerably more awkward on the way back up, if you have a big bag of camera stuff) and after a minor route-finding blip - caused by my mistaking a small pool on a hairpin bend for the Siphon [sump] Hydrokarst - we dropped the 10m pitch into the massive chamber.

Worth more than a passing visit on a through-trip, the Salle Hydrokarst lived up to its billing and an hour or so was spent taking photos before we explored the Salle Suparlie and the route towards Trou Qui Souffle. Once we'd established that we were on the right route we retraced our steps and exited via the Saints de Glace. The 'toboggans'-smooth, steep slopes that one can slide down - that we'd so effortlessly slithered down on the way in turned out to require considerably more effort on the way out, but nonetheless we made good time

With both ends of the cave rigged through-trips were there for the taking, and on Saturday morning Gary, [French caver] Michel and I headed out of the campsite. We were soon at the uninspiring Galerie des Condensations, a grotty crawl-cum-stoop through a series of low passages. An awkward, wet bedding plane (Laminoir de Bassin) soaked furry suits and Gary remarked that the cave was 'Mendip meets the Vercors'. It certainly didn't feel as though this was a French classic and soon afterwards I came to a halt as Michel, in front, struggled with a squeeze. After a minute or two of struggling he retreated, declaring

'Pas possible!'

Michel is a slender individual, certainly slimmer than Gary or me, and this didn't bode well. There was an additional problem now, too; anyone who's caved with Gary knows he's not a fan of tight spaces and Michel's struggles had alerted Gary's tight-spaces radar. I could tell he wasn't happy and, to be honest, neither was I. If Michel was struggling I doubted I'd get through. This had to be the right way - the calcite floor was polished smooth - but none of the cave descriptions mentioned anything this tricky. The prospect of retreating and heading out the way we'd come in didn't appeal.

Michel removed some kit and had another go, and managed to get through. By now I'd taken off my SRT kit and, aware of Gary's discomfort, tried to sound calm. I slid carefully up to the squeeze and eased my way gently in. Although it was tight against my chest and back, by taking it steady I popped through. Relieved, I reassured Gary and he passed the bags before making his way carefully through. After this the passage dimensions soon enlarged and we emerged into the Réseau Francois, where there is what seems like miles of tatty fixed traverse lines. It was clear that this was in the process of being comprehensively re-rigged, with freshly installed but as-yet unroped P-hangers throughout. Drilling dust liberally coated the walls and I suspect that, by the time you read this, the tat will have been removed and the P-hangers rigged to provide smooth, efficient progress. Route finding is simple; you just follow the fixed lines but it has to be said that, although the passage is roomy and progress straightforward, this is not the most inspiring of places.

Eventually a 15m pitch drops into a larger, more impressive passage, the Conciergerie. The nature of the trip changes

and the caving is better. Michel was in front most of the way and the route-finding seemed straightforward. Michel and I recognized a passage we'd been in on our earlier trip and realized we would soon be in the Salle Hydrokarst, leaving only the uphill trip out of the Saints de Glace ahead of us.

The three of us popped out of the Saints de Glace entrance, into a damp afternoon, less than five hours after entering the Trou Qui Souffle, with the inescapable feeling that, although a reasonable through-trip, this one lacks the sparkle of some of the other caves on offer in the Vercors. The Salle Hydrokarst is definitely worth a visit, however, and this can easily be done by going in and out via Les Saints de Glace.



VERCORS: GROTTTE FAVOT

By Tony Baker

If you're in the Vercors and fancy an easy day visiting a fine cave, head for Grotte Favot. Minimal caving effort – the walk to the cave, the hardest bit – is rewarded with some impressive passages and massive stal. An ideal trip for cave photographers, novices, kids or usually non-caving partners.

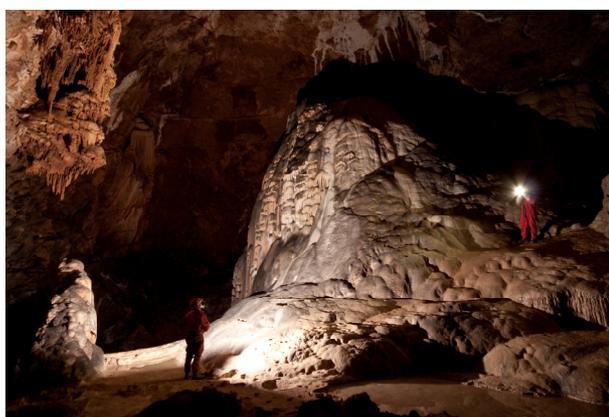
To find the cave: from the Pont de Goule Noire in the Bourne Gorge, take the road towards Pont-en-Royan and the Choranche show cave. Approximately 500m from the Pont there is a lay-by on the right-hand side, marked at the time of writing by a large boulder. Park here. The footpath leads from the top end of the lay-by but a slightly less steep start can be had by going a few metres down the road and taking the obvious path on the right.

The path weaves up through the trees and is hard work on a hot day. In places towards the top a bit of scrambling is required over some small rock faces. Allow 20-30mins for the walk. The cave is at the top of the tree line and the large entrance porch allows plenty of room for changing and leaving clothes; you won't want to walk up the hill in caving gear.



From the entrance, a low stooping passage emerges at another daylight porch, and from here the magnificent

Grand Tunnel, a spectacular phreatic passage, is followed down a steep slope. (There are spits towards the bottom end of this and a handline might be useful for kids or novices on the way back up.) From here the passage continues and after an arch with a pretty pool you emerge into a fine chamber. A huge stal dome (Le Grand Dome) has had steps cut into it (care required when coming back down), which lead to a continuation of the same chamber, with attractive views of the dome and more superb stal.



From here, if you're keen, two pitches of 14m and 35m lead to a 'final mud chamber' but we didn't bother with this. Thanks to the patient efforts of Harvey Lomas and Michel Bernard I was able to spend an hour taking photographs on the way out. Cave photographers take note: choose your time of day carefully (late afternoon probably best) and you'll be rewarded with some spectacular lighting effects as the sun's rays backlight the Grand Tunnel.



VERCORS: SCIALET DU TOBOGGAN

By Tony Baker

The Scialet du Toboggan is part of the RESEAU Christian Gatherer system, which can also be accessed via the nearby Scialet du Brudour. Both entrances are at the downstream end of a popular through-trip from the Trou des Anciens, which was connected in 2001. While in the Vercors in the summer Paul Tarrant and I decided to visit the Toboggan, and I hope the information here might prove useful to anyone attempting the through-trip or just wishing to explore the 'bottom end'.

The first problem we encountered was in finding the cave. The directions in Des Marshall's book *Vercors Caves* are now out-of-date – I suspect the road has been resurfaced since the book was written and the lay-bys are no longer in the same places. So here, with the benefit of first-hand experience, is how to find the cave:

From La Chappelle en Vercors Take the D76 towards Vassieux. Just before the village the D76 turns right towards the Col de Chau. Take this, go past the car park for the Resistance memorial and across the top of the col, past the ski resort of Font D'Urle. As you descend the hill you will pass the Teleski [ski-lift] de la Foret on your left, followed by the Teleski de la Combe. The latter has a large parking area on the right-hand side of the road.

Continue down to the hill to the next lay-by on the right and park here. (If you get to the next left-hand bend, or ultimately to the sign for the Grotte du Brudour, you have gone too far.)

The path to the cave is on the opposite (left-hand, looking downhill) side of the road, a few metres further downhill, and

is not easy to spot. It's less than a metre wide and overgrown in summer. Follow the path downhill for less than a hundred metres and the small cave entrance can be seen at the base of a cliff. It draughts well in summer.

(Note: Des Marshall describes the lay-by as being between the Carrefour du Broudour Sud and the Carrefour du Brudour Nord. These 'carrefours' are just junctions with forest tracks and are not labelled.)

With regard to the cave itself, again some clarification of the description in *Vercors Caves* is necessary. The book says that the entrance pitch can be free-climbed but I would strongly advise against this – the bottom few metres would be extremely difficult, especially when coming out. A big obvious tree at the entrance serves as a belay, there is a thread belay a few metres down and spits a bit further down still. Des Marshall describes the pitch as including some 'easy' squeezes, but one in particular is tight even for anyone of average build and is not a place for those who are spooked by small spaces! I had a major struggle to get a tackle sack back up through this squeeze.

The pitch drops into a walking-sized passage with some stooping. A short length of rope takes one up to a short pitch down, avoiding a small sump at floor level. There follows a 7m pitch into a fine dry passage, the Premier Metro. (All of the pitches in this section of cave, bar the entrance, are usually rigged because of the popularity of the through-trip from the Trou des Anciens.) We'd made the mistake of bringing ropes for these pitches but left the bag here.) There follows a section of fossil passage with a lot of stal. At one point



we reached an obvious junction (Salle de Plongee) where arrows point down into a boulder ruckle but somehow we by-passed this on the return.

Eventually a 10m pitch (again, rigged) drops into a superb section of streamway, the Riviere de Bournette, for me the finest bit of the cave. There are some lovely cascades and more stal. After a couple of hundred metres a deep pool is rigged with a traverse line and immediately after this you follow a series of lower passages up into the huge, and very impressive, Salle des Tenebres. This is a superb chamber, well worth a visit.

We turned back at the far end of this chamber but from the description and the survey we were not far from the Galerie Geant, another large fossil chamber. From there, there is an 'up' pitch of 22m which is not rigged, being most usually done as a 'pull-down' from the Trou des Anciens, . (The Trou des Anciens –

Scialet du Toboggan (or Scialet du Brudour) through-trip is something of a classic, with the Rivière de Montué streamway getting rave reviews from those that have done it. It seems the Trou des Anciens entrance can be tricky to find but otherwise this sounds like the best way to experience the Reseau Christian Gathier. You will need to rig your chosen exit beforehand.) A Google search for 'Trou des Anciens' will reveal all. The *Spéleo* article referenced below, complete with survey, can be found online by searching for 'traversee anciens pdf'

(Note: *Vercors Caves* describes Scialet du Toboggan as the 'usual' entrance to the Reseau Christian Gathier but most of the descriptions of the through-trip refer to exiting via the Scialet du Brudour. As we didn't visit the latter I can't comment on whether or not it is preferable to the Scialet du Toboggan but, given the awkward squeeze on the Toboggan entrance pitch, the Scialet du Brudour might be worth investigating.)



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GÖRNER GLACIER AUGUST 2011: A PERSONAL PERSPECTIVE.

By Martin Groves



Panoramic view of Gôrner Glacier by Martin Groves

Six a.m. in the morning and I've never been so happy to run out of rope. We had already outstayed our welcome. The icy water crashed around us, water levels too high for comfort. In the distance we heard a shout, "Time to go, it's starting to rain!" Gareth and I looked at each other, there was no need to say anything, we both realised the seriousness of the situation. We had to get out and fast, if a flood pulse comes through we would be dead for sure. The race was on.

We were not in a limestone cave but an ice cave descending into the heart of the Gôrner Glacier, near Zermatt in Switzerland. Ever since seeing shafts descending into the Franz Joseph Glacier in New Zealand I have been keen to pervade this icy world. Quite fortuitously in 2009 I came across the work of the La Venta organisation and particularly their work on the Gôrner Glacier. Although there is huge potential for exploration of ice shafts, known as moulins, around the World it seemed sensible to break our teeth on a relatively accessible glacier that was logistically easy to get to. It did not take much to convince Gareth Davies that it was a good idea, as I was so busy I was delighted when he was happy to take on much of the organisation. Krysia joined the team as it was the

best out of a bad bunch of options for a romantic break. It proved easy to twist Jules' arm as he was guaranteed some misery and discomfort. We were also joined by Sam Harrison, Chris Jones and Ian Peachy. The Welsh Sports Association provided invaluable financial support for which we are hugely grateful.

Glacial Speleology is still in its infancy and there is certainly no manual. So we spent much time thinking about what I would describe as defensive rigging techniques as the thought of hanging off ice-screws instead of bolts in solid rock was a bit intimidating to say the least.

Departure day soon arrived. At the campsite in Tasch we were a source of bemusement for Alpine climbers, each with a tiny rucksack, whilst we had up to three large bags each. They were even more confused when we told them that we would not be climbing but walking on the glacier, the language barrier made it too much like hard work to explain our exact intentions. Our taxi turned up to transport us to the train station, he glanced at us briefly then turned away; he returned ten minutes later with a trailer. We were deposited on the outskirts of Zermatt, where only electric vehicles can operate, and we started hauling our gear through the town. All of the locals and tourists alike would turn and

stare as they saw these human mules struggling under the weight of their burden.

Luckily much of the altitude gain can be made on the Görnegrat mountain railway, we were just a little worried that they may turn us away or charge more when they see the amount of luggage we had. Fortunately the only thing the guard had to do was open the side gate so that we could actually fit through onto the platform. On a beautiful summer's day the train creaked its way up the mountain side and soon we got a stunning view of the Matterhorn. Upon leaving the train we had to do two shuttle runs with the bags gradually losing height, but it was still hard work as our bodies were not yet accustomed to the altitude.

The stunning view of the Görnér Glacier below helped us forget the aching shoulders. Soon a long rigid ladder led down to a stream and after climbing a small mound we were soon donning crampons as we arrived at the glacier. One team scouted ahead to find a suitable camp spot on the lateral moraine. Quite some time was spent moving rocks around before it was possible to pitch tents. The tents were just erected when the heavens opened - good timing! Fortunately that was the only rain we saw during the first week of the trip.

Throughout the first week we gradually built up our experience of descending moulins, as time moved the moulins gradually got larger and deeper. A number of potentially sobering lessons were learnt as the week progressed. I always find one of the fascinations of caving is mastering new techniques to allow one to pass whatever obstacles the subterranean world throws at you, this new environment was great and the brain was working overtime thinking of ways to get down these things safely. The lessons

which stand out the most are: -

- Forget going down these places in day time during the summer, not only is the incoming water flow too fast but the surface anchor soon melts out, not good.....
- Don't chip on the ice too much when underground, due to the pressure it is under when glacial ice fractures it can literally be ejected from the wall in an explosive manner, as we discovered in the later, aptly christened Ice Cube Mine.
- The water level in the moulins can vary by as much as seventy metres between early afternoon and the early hours of the morning.
- If in doubt rope up, as even with crampons a simple down climb can be difficult to reverse, plus these places have a tendency to just drop away.

With these points in mind the decision was soon made that we must cave at night. I was nominated as expedition alarm clock and got less and less popular as the trip went on waking the gang up at midnight. It was too warm to sleep by the mid afternoon and so that time would be spent surface prospecting. Our typical day consisted of four parts and a couple of weeks out there certainly felt like a month. I'm not sure that people were convinced by the argument they were getting a 2 for 1 deal so the trip was good value for money.

By the end of the first week the most noticeable finds were a moulin we named Mega Moulin which we had dropped only to a depth of 40m or so but at the bottom there was a Maypole Inlet type streamway meandering off which we had followed for some distance; a moulin we had named Canyon Land which had been dropped for about 60m to where it became too tight; and a short almost horizontal moulin which ended in a sump. One of the long term objectives of the project is potentially to dive within

the moulins because I think it is fair to say that between the sinks (moulins) and resurgences little is known for certain about the nature of englacial conduits. To quote the La Venta team, "we are still far from being able to follow the course of submerged tunnels for long stretches. Who knows if we will ever be able to do so?" Well there's a carrot for the donkey.

Most importantly during the first week we had refined our rigging to suit the environment. As surface anchors we used a 20mm auger to drill a hole into which a steel tube was hammered. Fortunately



*Gareth using the auger.
Photo by Martin Groves*

Gareth had enough time and resources at work to refine this technique and it was certainly funny trying it out on buckets of ice prior to leaving. These anchors were coupled with whatever natural features were around, large rocks, snow bollards, ice-screws.... Needless to say

the underlying principle was that this system had to be one hundred percent bomb proof and generally at least four anchors were used paired off and equalised with the overall system then being equalised. A number of surface rigs were described by one member of the team as "over engineered" but that was the intention. One tricky problem was that many of the moulins have a conical funnel shaped approach, which means that it is impossible to avoid rope rub. In such cases we generally used an electron ladder which ran down the slope with the dual purpose of acting as a rope protector and also giving the person hand holds to pull up on. Much 'gardening' was often needed to get the initial hang because in the freeze thaw zone the ice is pretty poor in quality. There is little option but to use the ice screws and to add a back up into the system another thinner rope was rigged in parallel to the main rope, this being kept under tension so the failure of an anchor would not shock load the ones above. Thankfully we did not have any anchor failures throughout the trip, but we were prepared for the possibility.

Once into solid glacial ice the screws form extremely strong placements, however we still always used a minimum of two anchors on each rebelay. Ice screw are however pretty expensive and although a number of people were very generous in lending us more screws it is amazing how quickly they are used up, so we often drilled a thread through the ice and tied a chord through it, an abalakov thread, which forms an extremely strong anchor in glacial ice.

Jules joined us on the second week and was thrown in at the deep end, straight down the Mega Moulin, which was pushed following an aid traverse to a tight sumpy conclusion. The team split off to other parts of the glacier that afternoon. Krysia and I were pretty pleased

with the half a dozen large moulins we had found but were blown away by the photographs and tales that Jules, Gareth and the others came back with. The one hole put Mega Moulin in its place and Monster Moulin was the only appropriate name, even if it is not very imaginative. Quite some time was spent staring at the photographs and as sad as it sounds I could hardly sleep that night, the brain running through rigging options. (I really need to get out more.)

Rising at midnight and then trogging an hour across the glacier to our destination was a delight, especially given the Perseid meteor show was lighting up the sky above. The hole was huge,

over twenty meters in diameter, with a stream thundering in from one side. The best option was fairly clear and people were soon busy drilling two auger holes for the main anchors. The ladder was thrown over the edge and then the real hard work began. Some two square meters of rotten fern ice, about six inches thick, had to be hacked away before a couple of ice screws could be placed for the main hang; hands frozen, but arm muscles about to explode, as blow after blow with the ice axe caused more ice to crash down into the depths below. Once done the rest of the rig was pretty straightforward and at a depth of only forty metres or so a descending streamway was met. Peachy soon joined me, the others had started to drop another



*Krysia adding scale, looking down Monster Moulin:
Photo by Martin Groves*



*Martin Rigging Monster Moulin
Photo by Jules Carter*

neighbouring moulin, and we made steady progress down another couple of pitches, rigging mostly off abalakovs because we were running out of ice screws. An ominously tight water fall appeared ahead with the water crashing down into what appeared to be a deep lake below. Chris had turned up at this point; "You'll have to go down there, you have a PVC suit," was his comment. Traversing out to avoid the tight spot and the direct force of the water a Y-hang was soon rigged using the last couple of screws and the descent began. A channel had to be kicked through a perched level of pop corn like ice, what we believe is the equivalent of foam which has frozen. No sooner had I recovered from being almost buried in the ice then I landed in a lake which nicely went up to the *crown jewels*, "ouch!!!" Quickly getting out of the lake around the next bend the river plunged down another drop, more gear required....

Sadly we had to bail the next night due to a thunder storm. The weather generally seemed to be taking a turn for the

worse, but we had been lucky as the summer as a whole had been a wash out in the Alps. Things did not look good the next evening as more rain fell, the alarm went off at midnight and poking the head out of the tent confirmed the rain had stopped but the sky was still cloudy. I think all were relieved; the alarm was reset to 1.30am. It took a lot of will power to even move to turn the alarm off; never mind, look outside the tent. The sky was clear and the temperature had plummeted, more importantly the surface streams near the tent had stopped running. Shouts of "Wakey wakey campers, last chance for glory" went down well!

Having left most of the kit there two days earlier we made rapid progress and the rigging was soon underway; it is not sensible to leave these places rigged as the ropes will get iced up and be unusable. The team split into various group, Gareth and I would push on, Peachy and Chris would survey and Jules and Sam would take photographs, Krysia the only sensible one on the trip made the wise move of staying in bed.

The water levels were noticeably higher than two days ago and I was getting more than a little jittery about the time, especially given we had started a couple of hours later. Rigging the main streamway was pretty easy because we had left the abalakovs in place. We were soon at the waterfall leading to the lake. To avoid submersion a new approach was employed, to traverse along at roof level and drop down beyond the lake. Several ice screws were used for the traverse a Y-hang set and the descent began. It was tight, with my stop on a cowstail yet it was still a squeeze. Gareth came down, "Bloody hell I'm going to struggle getting back up that," is all I could think of saying. Another couple of pitches were dropped, but the tension was rising, "We better get going soon, time is getting on, I'll just have a look around the next cor-



*Sam Harrison hanging from an abalakov thread:
Photo by Jules Carter*

ner.” Descending down the chute, through a plunge pool, and just as another short drop appeared, the knot on the end of the rope appeared from the tackle bag; rope ends, cave continues... Relieved we could head out now, but relief was short lived when from the distance a cry echoed “Time to go, it’s starting to rain!” For the last hour I had felt we had overstayed our welcome in the underworld on this occasion and now felt completely at the mercy of the ‘cave gods’. Little was said but we both knew the potential gravity of the situation.

We almost considered leaving all of the ropes and ice screws in place and just bolting for the surface. If any easy decision was to be made it was to let the old SWCC rope meet a fitting end and I let it go, to be washed into the heart of the glacier, one bag of gear less to haul out.

At the bottom of the tight pitch it was evident I was going to have major problems getting up it; the water was too high to go the previous route. “Right Gareth, I’m going to struggle up this,” I said in a matter of fact manner. How to help was not clear, then Gareth offered his head as a foot hold; his helmet now has some nice crampon scratches on it! It provided enough of an aid to get me through the tightest part of the slot; thank God that obstacle was passed.

The rest of the pitch was still pretty snug, but we soon regrouped at the top. We made quick progress up the next couple of pitches waiting for the each other at the top and then working together to derig as fast and efficiently as possible, dreading at any minute the onset of a flood pulse.

Once into the larger stream passage and not far from the main pitch Gareth was given a pretty hefty tackle bag and we split - it would make

progress on the entrance pitch much more efficient. It was only at this point that we felt as if we were home, although not yet dry! Due to the nature of the ice shafts throughout the trip we had only had one person on a pitch at any time, when I saw the water thundering down the pitch this rule was thrown out of the window. Bits of ice tinkled down on my helmet but now it was just time to get the hell out of here. The dawn broke beautifully silhouetting the contorted outline of the shaft, a most amazing vista, and a mesmerizing prussic. Clambering over the lip, crampons clawing into the icy crust, aching arms pulling on the ladder and disorganised array of equipment randomly hanging off my harness, I was battered. Upon seeing the others I just let my shoulders and head slump and breathed a huge sigh of relief. What a place...

Coming Soon

CASTLEGUARD 2012

THE PREVIEW

By M & K Groves

The team is still out in the field making final preparations for the return to the UK as this article is being printed but here is an exclusive sneaky insight into the Castleguard 2012 expedition...and it didn't all go according to plan. The preview is via text messages exchanged between Exped. Leader (M) and his mis-sus (K):

- M [At London Heathrow] *All checked in. Gareth being hassled by security!*
- K *Is he through yet? How much did it cost to sort out his [bulky & heavy looking] "hand luggage?"*
- M *All sorted now and boardin :-)*
- M *Arrived, slept, few hic ups in dive shop but getting there. Off to pick up Donovan*
- K *Excellent! Glad they were only minor hic ups.*
- M *U got a shadow? [i.e. is the dog getting clingy to you while I'm away?]*
- K *My shadow stares out the door, sulks in her basket a bit then reappears to resume her role of shadow. Don't think she can work out why yr van here but u not xx*
- M *F**k!!!! Trip may be off. Ice crawl blocked :-)*
- K *What??!! U gotta b jokin! There must be something can b done about it, surely???*
- M *No, will let u know when decision been made. Got another option so not game over.*
- K *Sorry to hear that but guess u can't overcome nature. Hope alternative option turns into adventure you want.*
- M *Waitin game, decision will b made 2nite, if 1st team get thro ice! Got truck prob too. Doesn't rain but pours!*
- K *Oh no! Keepin fingers crossed 4 u. If it any consolation there is crisis at home too – kettle broke n no shops open til 2moro ;-)*
- M *Divin in Castleguard f****d. We need 2 go 2 cave on Tuesday 2 get gear back :-)*
- K *S**t!! What a bummer!!*
- M *Good job I not one to cry!!*
- K *Guess I'd b blubbing uncontrollably if it were me!! U off to sightsee or something then? Really, really sorry it's not happnin, after a year of all that preparation n everything. U said there's another option? So trip not totally screwed hopefully??*
- M *Will email l8r wi plan*
- K *Phew!! Got yr email – exhausted just readin it!! Dunno what to say...How was Castleguard Chainsaw Ice Massacre*
- M *Nice trip to Castleguard, ride on skidoo, ice chippin..weather not good .[extract from*



email: ...got a lift half way in a sledge towed by a skidoo which was a right laugh...icecrawl was well blocked, spent a good few hours trying to smash a way through but it was not really going to happen...Gareth checkin out another dive site...]

- K Divin for the others?
M Divin 4 others cancelled due to avalanche risk!
Off to drown sorrows with Guinness!
K Hope u not sufferin too much...in all respects.
M Off to tackle big boulder!
K Not sure what to make of tha :s U goin climbin? Pickin a fight with a big Canadian or u gonna vent yr anger on a dig site?
K Who won – u or the boulder??
M I beat 5 of em but 1 monster 2 get out 2moro. My arms are knackered. Off diggin again 2day.
K Hope it's a way on to endless caverns...
M Lot more potential...
Is the dog happy?
M Excellent diggin session, open passage 2 dive into
M We pulled a 1 ton boulder out, even Donovan has blisters on his hands!
Off 2 c if we through, get 2 use regs at last
M Through!! Laid some line, big shaft heading to centre of earth!
Did u get photos?
K Yeah! Why was tha man skiing in his pants? Were u snow-shoeing in yrs ha ha
M It was bakin on ski in...but I didn't find it tha hot!
Off 2 try n find caverns measureless to man
K Go Kubla...
M Caverns measureless 2 mice :- (but still goin
Off to look for cave in bear country 2moro then dive day after
K R bears still sleepin?
M Bears sleepin...met 2 mooses 2day...want to meet wolf
K That's no way to speak of Canadian women...good luck wi meeting wolf
M Back from mad rush 2 visit cave in avalanche zone. Area only been open 1 day since we been here.
One last dive 2moro
M Pushed sump 2 38m deep. Well tired, ready to come home. Hoped to return on a high – mission accomplished!!



**Look out for the official
Castleguard 2012 Expedition re-
ports and pictures in all the usual
places such as Hidden Earth**

ALTERNATIVE LOW COST HIGH INTENSITY LIGHTING

By Gary Vaughan

OVERVIEW

In the past ten years light bulbs and batteries have improved dramatically. Gone are the days when heavy waist mounted lead acid batteries powered low wattage incandescent bulbs. The outdoor pursuits market has been quick to adopt LED units as an energy efficient means of producing light and today virtually all commercially available caving lamps offer LED as the main source of light.

Batteries have also moved at a pace. Nickel Cadmium quickly gave way to Nickel Metal Hydride and in turn we see now the emergence of Lithium Ion as the 'new kids on the block' providing 2400 milliamp hours at 3.7v in a unit the size of a modest tube of lipstick. With so much available to the budding cave lamp constructor it would seem that lamps of considerable brightness and low weight should be commercially available at low cost. As ever though, the minority appeal of caving has led to a small number of constructors and many of these focusing on high quality robust units but at a price.

So what is potentially available to the DIY cave enthusiast who is prepared to sacrifice a modicum of indestructibility for the saving of a euro or two? This article introduces high lumen output hand held torches produced for the mountain biking market and offers a view as to their suitability for caving. It also offers an impartial evaluation of the output of these and several other commercially available cave lighting sources available today.

BACKGROUND

My introduction to caving was perhaps unusual and in turn my approach to lighting has always been slightly 'innovative' perhaps bordering on eccentric! There have been two occasions when a lighting source has made me re-think my approach to cave lighting. The first of these was on a trip into Lost John's Cavern back in the mid 1980's. In those days I caved with an ex NCB Oldhams lead acid battery connected to a standard Oldhams headset in which burned a very modest incandescent bulb. The carbide lighting used by many 'northern' cavers at that time was truly an 'illuminating' experience for me and I promptly purchased a Fisma generator to power a standard Petzl expedition headset. This was to be my lighting of preference for over twenty years much to the disapproval of my stalwart electric lighting companions and much ribbing ensued down through the years with every wiff of acetylene and every familiar click of the piezo electric ignite switch. Very few forms of illumination light a cave passage the way that a group of cavers using carbide light a huge chamber or passage. The large European systems such as the Berger and the Pierre St Martin literally warmed to the light from those carbide lamps and even today I would choose carbide for certain types of trip into caves with larger than average sized passage.

My second epiphany occurred in a cave in Spain two years ago, April 2010. Towards the end of a traverse through one of Cantabria's finest systems I found myself in very large passage at less than ten minutes from the point of exit. My carbide was tired and so was I. With only ten minutes to go there seemed little point in re-charging the generator. This of course is one of the major draw

backs of using carbide. With only ten minutes to go, would I stop and spend five minutes 'fettling' or would I simply tail light others in the party using the diminished flickering flame as sufficient light so as to be able to exit the cave but not necessarily to navigate or more to the point enjoy the sheer magnitude and grandeur of some of the finest caving in the world. In the dwindling light I missed the exit passage and amidst the jumble of boulders and blocks we found ourselves heading back east, directly away from the known exit.

It was at this point that a certain Mr Hyland reached into his tackle sack and retrieved his latest 'toy'. It was a Bressner Photon Torpedo. A very stylish and well-made piece of lighting capable of emitting no less than 900 Lumens. I had secretly been eying this hand torch of Dominic's for some time and had wondered how it might fair as a 'main caving lamp' as opposed to an auxiliary hand held torch for shining up huge avens or lighting up huge chambers. As I stood in the dim light trying to coax carbide to meet water somewhere deep inside the generator Dominic handed me the Bressner.

I switched it on and the world lit up before me. Not just the immediate floor, not just the walls twenty metres or so off to each side but the whole bolder strewn passage stretching off 100's of metres into the distance. Suddenly all could be seen like never before. I knew instantly that my carbide lamp would never throw light to the distance that this tiny hand torch was now doing and doing without the fuss of finding water or the fuss of carrying around car inner tubes stuffed with spent carbide. My mind was set. This style of lighting needed some serious looking into.

THE SOURCE OF THE LIGHT

My starting point of course was the impressive little Bressner. A fine piece of craftsmanship, small enough and light enough to helmet mount and with a build quality that would seemingly stand up to the rigours of modern caving. As luck would have it the Bressner factory turned out to be located about five miles from where I live. The downside however was the price. Although undoubtedly worth every penny, the £110 price tag was going to start to mount up by the time I'd strapped two of those little beauties on either side of my caving helmet let alone to either side of the caving helmets of my two boys Josh and Ben. I delved deeper into the world of mountain biking and by chance came across a link to a website called 'Lumen Junkies'.

Lumen Junkies is the webshop retail outlet run by Ryan Thornley. It's a pretty straight forward and simple to use website and exactly as the name suggests, the site is dedicated to the pursuit of torches which emit large amounts of light. The site includes a wide variety of hand torches of all shapes and sizes most of which emit in excess of 300 lumens. I settled on the MTE SF-23 SSC P7-D-SXO 5-Mode Memory (900 Lumens) hand torch. This at face value had a very similar output to the Bressner but of course, does 900 Lumens from one manufacturer equate to 900 Lumens from another. The price was a very respectable £53.98..... for two of them! Admittedly I could have bettered this price by a pound or two by importing from a well know extreme deals website in Hong Kong but I valued dealing with somebody a little closer to home and Ryan's website seemed to be just the ticket.

The service from Lumen Junkies was first rate and the torches arrived well packaged and in a prompt delivery time-scale. I also sourced four pairs of UI-

traFire Protected 18650 3.7V 2400mAh Lithium Batteries for the sum of £27.16. Again I could match the price abroad but knowing that I could speak to somebody on the other end of a UK national telephone call was comforting. I have to say that I have found Lumen Junkies to be a very reliable source of batteries, chargers and torches and I would have no hesitation in recommending the site to anyone looking for these sorts of torches. Currently the website boasts the latest offering from MTE, the veritable UltraFire 18WG-T60 5-Mode 1200 Lumen hand torch. This in fact is the current successor to the SF-23 and the SF-23 is no longer available through Lumen Junkies. However, if the 900 Lumen SF-23 is anything to go by, this new beast must be truly impressive.

A BRIEF DESCRIPTION OF THE MTE SF-23

The torch is around 155mm in length with a main body diameter of about 25mm, The tail cap holds the 'clicky switch' and measures up at around 28mm diameter. The lamp housing itself measures 42mm in diameter. The SF-23 is fitted with a Seoul Semiconductors SSC P7-D LED unit. It is powered by one 18650 Li battery and runs between 2.7 and 5.0 volts. From a slightly annoying point of view for cavers the torch has five settings, each activated in sequence by quickly turning on and off with the clicky switch. There are a high beam, medium beam, low beam, strobe and SOS settings.

The strobe is useful when cycling but not really any use for caving except for producing a rather intriguing effect at waterfalls.

The chassis of the SF-23 is aluminium. Overall I have found the SF-23 to be quite a robust torch. The front glass is protected by an aluminium bezel which projects about 3-4mm forward of the glass face and with the exception of the

front glass all other openings are well sealed. With up to two years of caving the glass on all six units sampled are clear of scratches and chips. The cast aluminium body gives the impression of being robust and sturdy but the overall crushing resistance has not yet been put to the test that is to say, we've not dropped one of these down a pitch yet! The scratches and wear marks that are visible give a good indication of the general wear and tear that they have been subjected to over the last two years.

The tail cap is well sealed. A neat rubber 'O' ring seals the battery compartment to the tail cap and the screw thread which connects the one to the other is well machined and smooth to operate. The 'clicky switch' is waterproofed by a robust rubber gasket completing the SF-23's water resistant measures. I would not buy one of these if I were intending to go free diving sumps. On well watered trips we have noticed condensation behind the front glass and on the surface of the reflector. This has occurred after particularly 'splashy' trips with close proximity to water falls. The condensation was easily removed by unscrewing the lamp holder and placing the assembly on a warm radiator.

The light itself is very caver friendly. The beam has quite a good wide spread and could not be described as a spot beam. The light is very much a flood of light with higher intensity in the central third of the beam but a good level of peripheral wash to ensure that the passage is illuminated very effectively. Duration on high beam with a fully charged battery is about two hours to two and a half hours but the torch exhibits a very user friendly fade out of light given off as the battery output declines. Starting with full beam at the start of a trip I often find myself three or three and a half hours into the trip before I notice that the light is not quite as bright as when I started. The

reduction in output is not noticeable at first. Two of the best attributes of the torch in my opinion is the spread of the beam and the gentle fade away of the light as the battery fades. These facets make the SF-23 a very usable lamp from a cavers perspective.

The Lumen Junkies website advises that the manufacturer claimed 900 lumens maximum brightness is probably closer to 400-500 lumens which is very honest of Ryan. Mr Hyland and myself have indulged in a 'boy's toy's' style torch showdown where both the SF-23 and the Bressner were compared side by side in open farmland against a stand of trees at a range of about thirty metres. I think it's fair to say that the Bressner may have just pipped the SF-23 by a fraction but that in truth the difference in cost between the two lamps cannot be justified by the lumens produced. There really is next to nothing between the two torches on output. Both produce exceedingly bright beams of light with perhaps the SF-23 producing a marginally better flood or spread than the Bressner.

Most of my shorter trips now, say about five or six hours caving, are completed on one SF-23 burning one fully charged 18650 Li battery. The second SF-23 becomes a backup or if occasionally we come into 'large' passage towards the end of a trip I may turn on the second SF-23 and remind myself of the full out-

put potential of these outstanding torches but even at near exhausted battery levels the SF-23 produces a very usable caving light.

SO WHAT'S THE CATCH?

The largest problem with the SF-23 has been the unreliability of the electrical connectivity within the unit itself. This has until recently proved to be a bit of a thorn in the side of the SF-23 but at last I think I have found the source of the problem and currently all six 'modified' units are producing perfect flicker free lighting. The problem experienced manifests itself at first as an inability to hold a particular switched setting. From within the first few months of use it would be a regular thing for the lamp to self-adjust from high intensity to medium or even low. This I interpreted initially as problems with battery charging and the lamp automatically adjusting power output to suit supply. As the fault continued however the problem progressively worsened to the point where the slightest tap or knock would produce a reduction in light output or worse still, no light at all. The matter came to a head whilst de-rigging Battle Axe traverse (back to Lost John's again) when a knock caused the SF-23 to go out completely and to compound matters the backup SF-23 would not switch on. This was the first time that both units had completely failed seemingly with plenty of life in both batteries.

The components of the SF-23 tail cap disassembled. From left to right the tail cap aluminium chassis, the blue plastic diaphragm seal, the clicky switch assembly with coil spring negative feed and rough solder ring positive return, far right the aluminium bulkhead which secures the assembly within the chassis and acts as part of the positive return circuit.



I have to thank Bob Hall for taking the time to look at the SF-23 later that weekend. As those of you who know Bob will be aware, Bob was extolling the virtues of electric lighting back on the 1993 Berger Expedition. At the time I believed Bob's experimentation with electric lighting in such large European systems was futile but it would seem that he was ahead of his time. Bob's expert eye soon located a serious flaw in the design of the SF-23, the electrical contacts between the clicky switch and the aluminium housing. Whilst the negative feed to the clicky switch is via a compressed spring contact directly soldered into the switch circuit board, the positive feed relies simply upon the aluminium casing pressing against a blob of hardened solder.

The clicky switch assembly with the modifying Copper spacer placed over the rough solder ring Ready to be reassembled into the chassis.



I have no scientific evidence to back up the following proposition but the budding electronic enthusiasts amongst us will be aware that when lead molecules in lead solder combine with oxygen molecules in the air the result is a dull grey to black tarnish that covers the surface of soldering. In many situations this isn't a large concern, the electrical current passes within the solder and not into and out of the solder. It is possibly the case that the tarnishing of the solder surface brings with it a reduction in electrical conductivity which in turn leads to a breakdown in connection.

Another possibility is Electromigration a phenomenon that scientists have been aware of for over a hundred years. 'EM' results from an exchange of momentum between charge carrier free electrons and the ions of a conductor. When a metal is subject to a high current density, the so-called electron wind transfers part of the momentum to the atoms or ions of a metal or alloy, which make the atoms or ions move in the direction of the free electrons. EM causes atomic accumulation and hillock formation in the anode side and vacancy condensation and void formation in the cathode side. Both hillocks and voids will cause degradation of a solder joint.

Another possibility is that with wear and tear the aluminium casing simply loses contact with the solder ring and a break in connection occurs.

The clicky switch assembly with the modifying copper spacer set back into the tail cap chassis.



To get over the problem I have introduced a copper washer or packer to squash into the gap between the solder and the aluminium casing. These packers are simply made by slicing a 0.5mm thick ring of Copper from a length of 22mm copper tubing. By cutting a segment from the ring the radius can be diminished to around 18mm so as to fit neatly inside the tail cap against the clicky switch assembly. This modification appears to have solved all of the problems and symptoms experienced and all six units are again producing brilliant flicker free lighting.

PHOTO COMPARISON SETTINGS

It's hard to gauge one light against another. Some are very beamy or intense, some are very yellow and some are very white. With the assistance of Tony Baker a selection of caving lights were used to light different types of cave passage. For the photographers amongst you the camera used was a Canon EOS 500D fitted with a Sigma 10.2mm lens. ISO was set at 1600. Two exposures were used, the first was 5 seconds at f5.6 for all front-lit photos. The final selection of back-lit photos were shot using a 2 second exposure at f5.6.

LAMPS COMPARED

The following is brief description of each light used in the comparison.

1.0 PETZL TACTIKKA HEADTORCH

Standard Petzl Tactikka headtorch with elasticated head straps and good condition battery.



2.0 CIRCULAR ARRAY 14 LED / HALOGEN MAIN BEAM

This was a commercially purchased reflector with an array of 14 LED bulbs in a circular arrangement fitted into a standard Oldhams headset and powered by a helmet mounted 4.5v Duracell battery in good condition. Photos labelled 2.1 show the illumination from the LED array. Photos labelled 2.2 show the illumination from the central halogen bulb.



3.0 BISUN S3 ON BEAM / FLOOD

Bisun is a small British enterprise designing and making LED lighting products for cavers. The light tested is a commercially available LED caving light fitted into a standard Oldhams headset and set to either 'BEAM' setting, see photos labelled 3.1 or 'FLOOD' setting see photos labelled 3.2.



4.0 VIPER

Custom Idea are a well-known manufacturer of lights for use in mountain biking. The Viper uses technology tried and tested in Custom Ideas highly acclaimed Tiger Lights. The units are professionally put together specifically to deal with the rigors of caving. There are four power settings on the Viper that we tested. Photos labelled 4.1 show the unit on its minimum power setting. Photos labelled 4.2 show the unit on its second power setting so on and so on.



5.0 MTE SF-23

There are three power settings available from the SF-23 and photos labelled 5.1, 5.2 and 5.3 reflect the three power settings from one torch. Photos labelled 5.4 show both helmet mounted units on full beam.



LOCATION ONE – GNOME PASSAGE JUNCTION WITH EDWARDS SHORT-CUT LOOKING WEST TOWARDS CHASM PASSAGE.



1.1



2.1



2.2



3.1



3.2



4.1



4.2



4.3



4.4



5.1



5.2



5.3



5.4

The Gnome Passage photographs each have a set of white reference markers set at intervals down the passage. The Tictikka picks up on all three with it's narrowish beam. The third post is not reached by the 14 LED array or the halogen beam. The Bisun on beam easily reaches all three posts and the addition of flood setting fills out the passage. The Viper on it's lowest power setting provides a very usable cave light. It reaches all three posts but also provides a wide spread of light from the central point. The Viper's higher power settings clearly set it a class apart from the older style LED and halogen lights. The white marker posts are there in all of the shots it's just that the light is so bright that the photo is burnt out around the nearest marker posts! Turning now to the SF-23, the lowest power setting is perhaps comparable with the Tactikka or the 14 LED array. It picks up all three marker posts and perhaps is a little less beamy than the Bisun beam setting. The medium

powered setting of the SF-23 clearly surpasses the older technology lamps and falls somewhere just below the Viper second level setting. Photo 5.2 clearly has a more focused centre beam than the Viper at 4.2 but note how the Viper picks up the further passage beyond the third marker post. The Viper's third level setting is very comparable to the SF-23 on high setting, photo 4.3 versus 5.3. The SF-23 casts a near shadow ring at the outer periphery of the beam which is absent in the Viper's beam. As to reach and intensity however there is I would suggest very little between the two.

**LOCATION TWO – SELENITE TUNNEL TOWARDS PRESIDENTS LEAP END
LOOKING TOWARDS SHATTER PILLAR .**



1.1



2.1



2.2



3.1



3.2



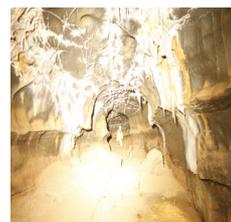
4.1



4.2



4.3



4.4



5.1



5.2



5.3



5.4

As with the Gnome Passage photos, the first set of Selenite photos also has a trio of white marker posts in each frame. Perhaps the most marked observation is that the light from the Viper is a little warmer in spectral range than the SF-23.

**LOCATION THREE – SELENITE TUNNEL TOWARDS SHATTER PILLAR END
LOOKING TOWARDS PRESIDENTS LEAP.**



1.1



2.1



2.2



3.1



3.2



4.1



4.2



4.3



4.4



5.1



5.2



5.3



5.4

The final set of Selenite photographs are backlit with the lamp shining towards the camera. The exposure for these photographs is reduced to two seconds and in turn the older style lamps struggle to register. Again there is a marked difference between the Viper's lowest power setting and the SF-23's lowest power setting. The sand floor in photo 4.2 is clearly brighter than the sand floor in photo 5.2 as are the respective ceilings. Again, at the highest level settings there is very little between the two.

CONCLUSIONS

Clearly the Bisun, the Viper and the SF-23 represent a newer breed of light source to the other lamps considered here. It should also be remembered that the Bisun S3 is an entry level (and perhaps older) model and in effect we are not necessarily comparing like with like. My point however is not that the Viper is a brighter light than the Bisun or come to that the SF-23. My point is that at about £30 a pop for the SF-23 or it's current day counterpart, there exists commercially available torches which are small enough and robust enough to be used as a main caving lamp for most types of caving trips. If you are of the disposition to put up with having to carry spare re-chargeable batteries and you can accept that these lights will not be the best choice for free diving sumps then possibly it would be worth your while visiting the website of Lumen Junkies and experimenting with one of the modern generation of high intensity LED hand torches.



INCLINOMETER VER 2.0

By Ian Todd (2007)



This document is basically a copy of a section of my website. A visit to the website (<http://www.ietodd.co.uk/clino/index.htm>) will provide all the other documents referred to in the following article.

The article describes the development of an electronic inclinometer ("clino"), a surveying device designed to be used in the instrumentally hostile environment of cave exploration. There should be enough information to enable an electronics hobbyist to build a unit.

HISTORY

Back in about the year 2000, integrated circuit accelerometers, magnetometers and laser pointers had become available, and were affordable for the amateur experimenter. I conceived of the idea of building a solid state surveying tool, the InCompass, having a built in compass, an inclinometer and a laser pointer for sighting on the target survey station. Using an accelerometer gives not only the tilt angle to the next survey station, but knowing the tilt angle, the compass can be "electronically

gimballed" to give an accurate reading when tilted, unlike a conventional compass which must be held level. The In-Compass project is still not finished but a prototype has been in use at South Wales Caving Club (SWCC) for a couple of years. This article isn't about the In-Compass project, but about a spin off that the surveyors at (SWCC) have found very useful: the electronic clinometer.

Dave Edwards and I worked together at a London University, and I talked him into joining me on the compass project. Neither of us had any experience with microcontrollers at this stage. Initially we concentrated on just getting the accelerometer to be a sensor attached to a PIC microcontroller (Microchip PIC16F84), with an LCD display to show the output. We used a lookup table stored in some non-volatile external memory, to give us an output in degrees. This was in essence our first electronic clinometer. Working independently, Dave then changed the display for an LED display, and boxed the instrument in a Perspex case to make it as rugged as possible. He offered this to the SWCC surveyors for trial, and never got it back! They found it both easier to use than a traditional clino, and more accurate, they continued to use it until Version 2 became available.



Larger picture: <http://ietodd.co.uk/clino/snaps/dbecolino2.jpg>

Just before Christmas 2006, an approach was made by someone who had heard that SWCC had an electronic clino, and wanted to build one for himself. Unfortunately the one we had was really just a prototype, and the documentation we had was mostly in our heads, and fading with time. So at that time we couldn't really help him. Subsequently two other people at SWCC also expressed an interest. This gave me a kick start to get back into the project, which I hadn't touched for a while.

RECENT DEVELOPMENTS

The first new units built were basically tidied up versions of Dave's unit. A fresh PCB was laid out and three boards were made commercially. These boards worked out at about 17 GBP each. Of the three units, the two for our club surveyors worked well, but the third unit built for my further experimentation was unstable and inaccurate. After a lot of head scratching, it turned out that the accelerometers (Analog Devices ADXL202) had quite variable characteristics, unit to unit, and my unit had little change of T2 (see below) with temperature.

Dave had developed a clever method of using changes in the ADXL202 output pulsewidth (T2) (see <http://www.ietodd.co.uk/clino/ADXLtemperature.pdf>)(34KB) to detect the current temperature and used a lookup table to apply corrections. By chance the third unit had little change of T2 with temperature, and so the corrections were very coarse.

This third board was then modified. The original PIC16F84 was swapped, for a newer, pin compatible microcontroller, the PIC16F87.

This has much more internal memory, so that the look up table didn't require the external memory anymore. At the same time the resolution of the lookup table was improved to one tenth of a degree. The 16F87 had an internal module which could more accurately measure the dura-

tion of the accelerometer output pulses (capture and compare module). The resistor which determines the accelerometer total output period (T2) was replaced with a couple of components that made T2 more sensitive to temperature changes. This improved the accuracy of the calibration corrections and the original instability in readings disappeared.

At this point the design was considered to be fully working.

(I subsequently upgraded all three units to use the PIC16F88, which while functionally like the PIC16F87, has an A/D (Analogue to Digital) convertor as well, which meant we could monitor the supply battery voltage).

Out of interest I decided then to do a complete redesign around the PIC16F876 microcontroller which, like the PICF87 and 88, has more internal memory than the PIC16F84.

It also has more control lines available than the PIC16F87/88, which made it possible to dispense with the LED driver integrated circuit, and drive the four digit display directly from the PIC. As well as the Capture and Compare module this PIC has an A to D (Analogue to Digital) module. This is used to continuously monitor the battery supply, warn when it is getting low, and prevent further use once the voltage has dropped to the point at which the voltage regulator can no longer supply a steady voltage to the accelerometer. Circuitry was added to isolate the battery from the whole circuit except during a measurement. The PIC turns the power off when a reading is finished. This extends battery life considerably.

Considerable changes were also made to the software, putting functions like keyboard debouncing, capture and compare, the A to D, and display multiplexing into the interrupt routine.

The original clino had to have a set of calibration values programmed into the external memory during manufacture.

This was less than ideal. The new version has the calibration routines built in, and can be calibrated at each of two different temperatures by the end user. These values are stored in the PIC internal memory, and calibration values are then automatically calculated for other temperatures while the unit is in use.

The file <http://www.ietodd.co.uk/clino/ADXLtemperature.pdf> (34k) describes the temperature calibration method in more detail

This final version of the clino is referred to as InclinomETer Version 2.0

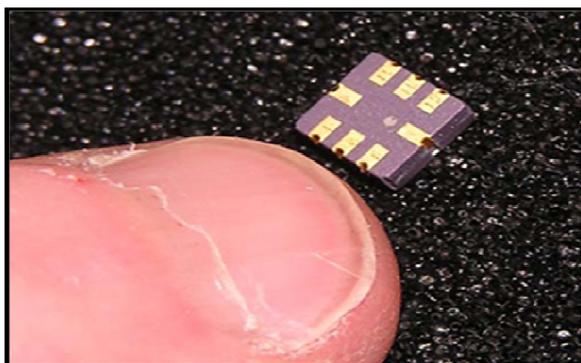
BUILDING AN INCLINOMETER VER 2.0

As far as possible all the component parts were sourced from retail outlets so that anyone else should be able to acquire them easily. Farnell (<http://uk.farnell.com>) are a good source of parts and will accept an order over the internet paid by credit card (minimum order value 20 GBP +vat).

The cost of parts is about 95 GBP plus board manufacture, but you could save 12 GBP if you do without the red filter for the LED display, and don't have to buy the mounting screws.

The circuit board is designed to accommodate the 14 lead Cerpak ADXL202, but Analog Devices no longer produce it in this package, and Farnell's stock eventually ran out.

The new ADXL202 is packaged in an 8 pin ceramic leadless chip carrier (LCC). . You can order it directly from Analog Devices with a credit card from on their website. <http://www.analog.com/commerce/index.html> , but they demand a VAT registration number. This means you have to order through a friendly VAT registered company. Prices are much cheaper like this, but you may be liable for additional taxes.



*The tiny LCC package
larger view <http://www.ietodd.co.uk/clino/snaps/CLCC.jpg>*

WARNING: THE ADXL202 IS NO LONGER AVAILABLE FROM FARNELL IN EITHER PACKAGE (17/11/2007)

The ADXL213 will work in this project without changing any other components. It is mounted in an LCC case (see below) and is available from ROnline <http://rswwww.com> for 21GBP +vat. If you want to buy more than one, it's cheaper to use Digikey UK (<http://dkc1.digikey.com/uk/digihome.html>) who charge 7.80 GBP each but with a supplement of 17GBP per order. Vat is on top of this.

An alternative PCB layout is provided for the LCC version of the accelerometer (see at bottom of this webpage). I believe it to be correct, but it has never been built.

The PIC processor will need to be programmed, which requires some simple hardware, but unless you really want to get involved, it's easier for me to do it for you. Just send the PIC to me, with stamp and addressed packaging for the return. This offer applies to covers only. For anyone interested I enclose the assembler file of the program, the generated hex file and some necessary include files.

You are free to do as you wish with the software and circuit, but you may NOT use it for commercial gain without first obtaining my permission.

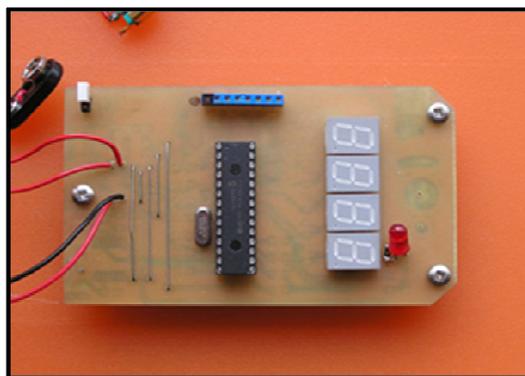
Microchip, the manufacturer of the PIC, supply an assembler/development envi-

ronment which is free of charge and is very useful if you wish to further develop the assembler code. Look for MPLAB-IDE at <http://www.microchip.com>

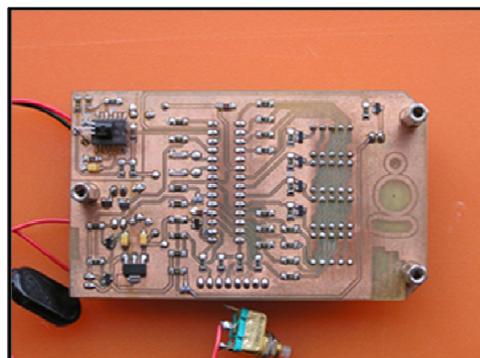
The clino is contained in a plastic instrument case with battery compartment, and all components are mounted on a single sided Printed Circuit Board. It is quite possible to make this board yourself, and I include the 1x scale artwork (<http://www.ietodd.co.uk/clino/artwork.pdf>) (984KB) for those who wish to make their own. (The layouts can be magnified onscreen to show more detail). It can be printed out with an inkjet onto transparent overhead projection film, and this used to make a "contact print" onto some emulsion coated PCB board.

(Please check when you print out the artwork that it is **exactly 100mm x 60mm** as some printers may introduce their own scaling. Also, ensure scaling is set to none in the acrobat print menu).

A couple of pictures of a home built board.

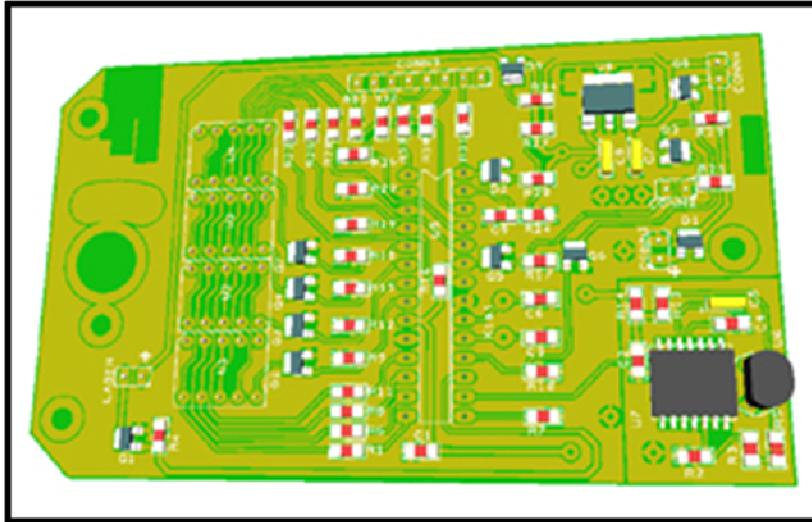


Larger version: <http://www.ietodd.co.uk/clino/snaps/hbtop.jpg>



Larger version <http://www.ietodd.co.uk/clino/snaps/hbcopper.jpg>

A 3D computer simulation of the bottom side of the board showing the component numbering and positions



Larger version at: <http://www.ietodd.co.uk/clino/3D.pdf>

The mounting holes for the laser will need filing out on a home made board to enable alignment of the mounting block, but would be routed out during commercial manufacture.

If you would prefer a professionally manufactured board, a company called PCB-POOL make a very good job at a reasonable price.

http://www.pcb-pool.com/uk_index.htm

I paid about 17 GBP per single sided board with solder mask and routing for three off, although one off you should expect to pay more. You can send them a copy of my layout file <http://www.ietodd.co.uk/clino/clino876.zip> (43KB) directly to their website. The file has been zipped to prevent Windows incorrectly identifying the file type. In the zip file you will find `clino876.pcb` which is the file to send.

You can enter all the necessary information into their web form. You will need to tell them it is an Easy-PC file, that you want a solder mask and that you want it routed. Specify postal delivery, not courier to save money.

Many of the components are surface mount, but can be quite easily soldered by hand, providing you are experienced in soldering and are using a fine tipped iron (and, in my case, a magnifying glass).

The LM335 is mounted on the copper side of the board and its body is bent over to rest on the the ADXL202 so they should remain at the same temperature. (Apply a little thermally conductive paste if you have some).

The PIC should be mounted in a DIL socket, so it can be removed if necessary for re-programming if a change of program becomes necessary.

(For those of you who know more about PICs, the PIC can be programmed in situ using "In Circuit Serial Programming" (ICSP); a connector is provided)

There is a picture of the component placing at <http://www.ietodd.co.uk/clino/components.pdf> (689KB)

The circuit diagram is stored as <http://www.ietodd.co.uk/clino/schematic.pdf> (753KB) and the list of parts, with Farnell order codes and prices, as <http://www.ietodd.co.uk/clino/parts.xls> (21KB)

Some components like the resistors and some of the chip capacitors are common

1206 sized parts, which I had in stock, so their order codes are not included. I would advise powering the completed board by fitting the jumper link, before installing the ADXL202 and the PIC, and checking that the power and ground supplies are all as required, without any short circuits.

Manufacture of the mounting block for the laser is a bit of a problem as it needs someone with machining facilities to make a neat job. I include a drawing of the block I used <http://www.ietodd.co.uk/clino/block.pdf> (269KB). This hangs beneath the PCB, and the laser is held in place by the grub screw. The type of cheap laser used here has a beam that may come out at quite an angle relative to the body of the laser. So the idea is to rotate the laser in the mounting block until the off axis beam is as near horizontal as possible, and then tighten the grub screw. Then swing the block left or right on its mountings until the beam is straight ahead. Minor errors in getting the beam horizontal can be corrected in software (see calibration instructions). Probably the most accurate way to set the beam level, is to use a water level. This is just a length of transparent hose-pipe, the longer the better, filled with water. One end is held near the laser exit port and the water level adjusted to be level with the laser beam. The angle of the laser beam is then adjusted until it is also level with the water in the distant end of the hose. The laser beam is then exactly horizontal.

The trigger switch is the other mechanical problem. The unit only has the one switch for both turning the unit on, and for use as a trigger to take a measurement. To avoid disturbing the clino as the trigger is pushed, the trigger should only need a very gentle push. The switch should not be mounted on the top of the unit, as pushing the button will tend to lower the beam slightly. Maybe the switch should be very sensitive but have some mechanical protection to

avoid turning the unit and the laser on accidentally during transport. This might also help prevent the ingress of water and cave dirt. I don't have a good solution to this problem so far, so please let me know if you think of something ingenious.

CIRCUIT DESCRIPTION

see <http://www.ietodd.co.uk/clino/schematic.pdf> (753KB) for the circuit diagram.

The battery supply to the circuit is via a protection diode to a P channel CMOS switch (Q8). When this switch is off (its normal state), the current flowing from the battery is only about a microamp. When the trigger button on the unit (CONN2) is pushed, the PMOS switch turns on, and the 78L05 voltage regulator supplies the PIC with current, which starts it executing its program. The PIC then holds the PMOS switch on by applying volts to the gate of Q6. After a measurement is made the PIC turns off the PMOS switch, effectively isolating the circuit from the battery again. In use this should extend battery life considerably.

The jumper link CONN4, when fitted, supplies the circuit continuously with power. This is used for programming and to put the clino into calibration mode.

When the circuit is powered the switch at CONN2 is used as a trigger by pulling a port line on the PIC low via Q5. R24 and R27 form a potential divider which supplies half the unregulated battery voltage to the A to D converter in the PIC. Using the regulated supply as a reference the PIC triggers a warning when the battery volts are getting low. C9 is fitted to reduce high frequency noise reaching the A-D.

Q9 is wired as an emitter follower. Its base is connected to regulated 5 volts which fixes the emitter at about 0.6 of a volt less. This is used to feed the laser. The laser supply current is thus taken

from the non-regulated supply.

Q1, an NMOS switch grounds the other side of the laser, turning it on, when the PIC sets its gate high.

The ADXL202 accelerometer is fed with regulated 5 volts via R14, which with C2, helps reduce any high frequency noise generated by the PIC. Only the X channel is used. The terminal voltage of the LM335 is strictly proportional to the absolute temperature. This causes the current flowing from the T2 pin, and thus the frequency of the output waveform, to change markedly with temperature.

Measuring the T2 period is thus a good indicator of temperature for applying temperature corrections. The high value of C5 reduces noise in the output signal, but at the expense of slowing down response time.

The X channel output of the accelerometer is fed to the Capture and Compare pin of the PIC where the duty cycle is accurately measured. This data, averaged over 64 cycles, to reduce noise, is then used to calculate the tilt angle of the accelerometer (acceleration due to gravity).

Each segment of the 7 segment LED display is connected in parallel with the other 7 segment displays, and connected to an output port line from the PIC. Which display is actually lit at any time is determined by whether its cathode is grounded by the PIC via Q2, Q3, Q4 and Q7. The PIC illuminates the individual digits in quick succession (multiplexing) so the whole display appears to be on continuously to the human eye.

The connections \bar{MCLR} , PGC, PGD and GND on CONN3 are provided to enable the PIC to be programmed in situ (ICSP).

OPERATING INSTRUCTIONS

The accelerometer chip in the Clino (ADXL202) is sensitive to temperature, and so must be calibrated to give accurate results. This involves taking a pair

of measurements at a high temperature, and a pair at a lower temperature. (in the airing cupboard and in the fridge maybe). The actual temperature does not need to be known, but the unit should be given plenty of time to temperature stabilize.

My early software contained a bug which only showed when the unit was operated at a lower temperature than the low calibration point.

I have now fixed the problem (10/3/2008).

For the first measurement, at each temperature, the unit is pointed vertically up. This subjects it to a -1g acceleration (gravity). For the second measurement it is pointed vertically down and experiences a +1g acceleration. The difference between the obtained readings is therefore caused by a known 2g change in acceleration. These values are then stored in the Clino and used to calculate the correct calibration values for any other temperature (this could be outside the two calibration temperatures).

PERFORMING A CALIBRATION

Before a calibration can be performed, a jumper is used to short out the 2 pin connector on the bottom left corner of the circuit board (CONN4). This also applies power continuously to the circuit. Having fitted the jumper, put the lid back on the instrument case (just hold it with a rubber band, to save putting the screws back in). The lid will keep the internal temperature more stable during the actual calibration. Hot and cold calibrations are performed independently, and either can be done first.

- On fitting the battery the device will power up, and the display will read "CAL" until the key is pushed.
- The display will now sequentially show "Cold", "Hot", "Corr" and "End?", each for about 2 seconds and then start again.
- Selection of "End?" will exit the cali-

bration routine.

- If the key is pushed during the display of "Cold", the unit is ready to perform a calibration at the lower temperature. It will now display "UP".
- Press the key again and the display will show a 4 digit number. This is the output reading (T1) of the accelerometer in microseconds.
- Point the unit vertically up and make small adjustments to the angle until the displayed number is at a **maximum**, then without shaking it, carefully press the key again.
- The unit will now display "dn" (the nearest to down the display can manage).
- Press the key again and point the unit vertically down and make small angle adjustments until the displayed number is at a **minimum**, and carefully press the key again. (As the unit is upside down when doing the down measurement, the display is inverted for ease of reading)
- The unit will now display "donE" and can be turned off.

Calibrating the unit at the higher temperature is a similar procedure.

- With the unit powered up the display will read "CAL".
- Push the button once. As above the display will cycle through showing "Cold", "Hot", "Corr" and "End?"
- Push the key again during the display of "Hot", and then proceed as above.

Because of the difficulty of mechanically ensuring the laser and the accelerometer are exactly coplanar, the menu option "Corr" when selected will give you a choice of adding, or subtracting, a small offset from the clino reading.

- Firstly, ensure the laser beam is level.
- Following the selection of "Corr", you get the choice of
 - "nil" (zero any previously stored offset)

- "Add" (add to whatever is already stored in the offset)
- "Sub" (subtract from whatever is already stored in the offset)

- If you select "Add" or "Sub" each push of the button will then add (or subtract) one tenth of a degree from the stored offset, (if any).
- When you have entered the correction, just don't touch the button for a couple of seconds, and the unit will store the new value and display "donE".
- It can now be turned off.

When calibrations are complete, the jumper link on the circuit board should be removed, and parked on just one pin. The unit now cannot enter calibration accidentally.

The Clino is now ready to use and shouldn't require frequent calibrations. Periodic checks of the unit accuracy is advised.

IN USE

When in normal use, with the jumper link removed, the battery is effectively disconnected from the circuitry, until the button is pressed.

The laser will now be turned on, and the display will show the continuously updating angle from horizontal. When the laser beam is pointing at the target survey station, hold the unit as steady as possible, count to 3 (to allow for settling), and push the button gently.

The laser will turn off, and the angle when the button was pressed, will be held on the display, which will flicker gently to indicate a held reading. After recording the value in the log book, another press of the button will disconnect the battery again.

In this way battery life should be maximised.

In use, the output voltage of the 9 volt battery (MN1604 , 6LR61, or as it used to be called, a PP3) will slowly decrease. A 5 volt regulator ensures that the volt-

age supply for the accelerometer remains constant.

When the battery voltage drops to 7.5 volts, the bottom left hand segment of the display will flash. The unit is still useable, but this is a warning that the battery will soon run out.

When the battery voltage drops to about 7 volts, it is close to the point at which the regulator can no longer keep a steady 5 volt output. This is sensed by the PIC, and the display will read "FLAt". The unit cannot then be used until a replacement battery is fitted.

**The following files are available for download from my website
All files except P16F876.inc and clinotemp.pdf are Copyright Ian Todd 2007.
They may be freely used for non-commercial purposes**

The PCB

For the ADXL202 in the 14 pin CERPAK (ADXL202 JQC or AQC)

Easy-PC pcb file <http://www.ietodd.co.uk/clino/clino876.zip> (43KB)

The file has been zipped to prevent Windows incorrectly identifying the file type. In the zip file you will find clino876.pcb

Circuit diagram <http://www.ietodd.co.uk/clino/schematic.pdf> (753KB)

1:1 artwork <http://www.ietodd.co.uk/clino/artwork.pdf> (984KB)

Component placing on PCB <http://www.ietodd.co.uk/clino/components.pdf> (689KB)

Parts List <http://www.ietodd.co.uk/clino/parts.xls> (21KB)

For the ADXL202 in the 8 connector LCC package (ADXL202JE or AE)

Easy-PC pcb file <http://www.ietodd.co.uk/clino/LCCclino876.zip> (44KB)

The file has been zipped to prevent Windows incorrectly identifying the file type. In the zip file you will find LCCclino876.pcb

1:1 artwork <http://www.ietodd.co.uk/clino/LCCcopper.pdf> (984KB)

Software

Main assembler file <http://www.ietodd.co.uk/clino/Clino876.asm> (69KB)

Assembled Hex file (the file that is actually loaded into the PIC) <http://www.ietodd.co.uk/clino/Clino876.HEX> (18KB)

Include files (all small files)

<http://www.ietodd.co.uk/clino/arcsin10.inc>

<http://www.ietodd.co.uk/clino/ccp1.inc>

<http://www.ietodd.co.uk/clino/P16F876.inc>

<http://www.ietodd.co.uk/clino/options.inc>

<http://www.ietodd.co.uk/clino/seg876.inc>

<http://www.ietodd.co.uk/clino/intcon.inc>

My thanks go to my friends who have helped me with this project, particularly Frank Vine for the use of his amazing homemade CNC PCB drilling machine.



A LITTLE BIT OF CLUB HISTORY

By Dave Edwards

Back in the mists of time, when the Club and the HQ were very different from today, winters could be particularly trying. The reason for this was that the water supply, although coming from the same source as today, travelled to the HQ via a very old, rusty, iron pipe. In cold weather, the pipe would frequently burst; often more than once in a weekend.

The route of the pipe was not very well defined so the solution was to walk the route generally and look for soggy areas of ground. These were usually of a fairly small area and it was not difficult to dig, expose the pipe, wrap it in sack-cloth soaked in araldite and rebury it. Then it was back to the HQ to see if the problem was solved. Often the process had to be repeated more than once to regain a water supply.

On one particular weekend we had completed several repairs but still had no water. A further search was undertaken and a very large area of boggy ground was found. There was no indication of where the pipe actually was and it seemed that a lot of digging would be required. At this point, one of the party (I wish I could remember who it was!) broke a twig from a tree, walked across the boggy ground, the twig stood up and he said "the pipe is here". It was!

I was gobsmacked. I had been an engineer for most of my adult life and had never even entertained such a possibility. The story of a ring swung over the stomach of a pregnant woman to determine the sex of the unborn child I had heard of but never really thought about. Divining had not even crossed my radar.

"How did you do that", I asked. "Easy",

was the response, "anyone can do it". "Show me", says I. I was given a demonstration and promptly started traversing the boggy ground, looking for the pipe with a marked lack of success. Not a flicker. "Well there you are", I said, "it doesn't work". "What were you thinking of", I was asked. "To be honest I'm thinking that this is not going to work".

I was then told that I should carry a mental picture of the thing that I was looking for. Another traverse of the boggy ground was undertaken. The twig stood up and smacked me on the nose! Honestly!

I was even more gobsmacked. In subsequent conversations I discovered that it was possible to divine almost anything, just by getting the mental picture. I spent the rest of that weekend divining for caves, especially in the cutting by the quarry weighbridge where legend has it that a large hole was bridged to carry the railway when the cutting was first manufactured. I got reactions everywhere there and also by the railway station.

When I got home after that weekend, I made several trips to the library. (There was no internet and I don't think computers had reared their ugly heads by then.) I searched for books on dowsing; there were very few. All the dowsing books mentioned pendulums. Searching for pendulums bought up the subject of spiritualism: books on spiritualism mentioned voodoo. Soon, and without too much effort, I had a list of 26 occult subjects. But that is a whole other story.

I found that the pendulum worked for me too, finding missing objects around

the home.

On my return to the HQ, I discovered that part of OFD ran under the cottage. By this time, bent coathangers swinging in empty Biro casings was another way of obtaining a reaction. This could be demonstrated very well in the front corridor of the cottage where it crossed the cave. To prove to people that anyone could dowse, they were sent along the corridor equipped with coathanger rods. I recall most vividly the reaction of one doubting young lady when the rods crossed in the right spot. She screamed loudly, threw the rods in the air and ran out of the cottage. I'm not sure I ever saw her again!

A couple of apocryphal stories of the time; shortly after the Cwm Dwr connection to OFD 2 was discovered, it transpired that the Smithy area had been dowsed and marked above ground before the breakthrough. The underground survey of the Smithy disagreed positionally with the dowsed survey by some margin. When the underground survey was checked it was found to be out by the same margin.

The second story involved a Ouija Board session in the Long Common Room. OFD2 had not yet been discovered and the question was asked "what is the way on?". The Ouija board came up with a random series of letters and numbers which seemed to mean nothing. When the breakthrough came, it transpired that the letters and numbers referred to the grid reference of Dip Sump on the original high grade survey of OFD1!

There may be someone out there who can verify this; I hope so.

Dowsing is now a much used tool by many Members of SWCC, if anyone is interested, ask around; you'll soon find out who they are.

Anyone can do it. As to how it works, don't ask me. Strange things happen at a molecular level.



EARLY CAVE HUNTING

By Peter Francis

It's long been noted in the Long Common room how younger club members think they're the first cave explorers to find anything of significance in the history of Cave Exploration. The older, wiser members shrug a condescending shrug and wink a knowing wink because they know how wrong these youngsters are. After all it was they, in their youth, who achieved the significant penetrations, the important breakthroughs, they who trod the first, the significant footstep on virgin ground.

Read on sad explorers, it's all been done, all been seen before. There is nothing new under the sun (Book of Job – Old Testament), or rather, nothing new under the earth, someone has probably been there before!

The Carmarthenshire Diary of Thomas Jenkins of Llandeilo – fawr. A.D. 1826 – 1855.*

1837

May 18th

Saw a tapeworm with Mr. Williams, Druggist, Llandeilo. It measured 27 feet.

June 11th

Went to Carreg Cenen Castle, got a candle and lantern from the farm to see the cave which is under the castle and is about 159 feet long and has a fine spring of clear water near the further extremity. Returned to Llandeilo by Mr. Lawford's house, went to see his collection of stuffed birds.

1841

April 4th

Peter and self went to Kilrychen cave, which was discovered the 13th Dec 1823.

April 24th. Went at 6 p.m. together with Dd. Davies, Peter Jenkins and John, the mason, to Kilrychen cave. I took a pistol, and Peter brought his clarionet. Spent three and a half hours inside; the total length, including all the branches, is 301 yards. We retired at 12 at night.

May 1

Went at 6p.m. together with Dd. Davies, Peter Jackson, Phillip Griffiths and Wm. Williams, of the Rose and Crown to see Llygad Llwhwr cave. The entrance is about 10 foot above where the river leaves the rock. We entered at 8p.m.; the entrance is narrow, and rather dangerous. After proceeding 51ft. Tied the end of a ball of twine to a stalactite pillar, there being so many winding and passages. We then proceeded onwards to a stalactite pillar 5ft. long from the floor to the roof, and 3ft in circumference. Each of us having a candle we passed through several narrow passages till we came to the river. The cave is about 30 ft from the water to the roof; the river is about 15ft wide. Not being able to proceed further we returned, after having gone through all the different passages I could find. We came out at 1a.m. (Is this the first 7 hour caving trip?) The distance from the entrance to the water is 567ft. Arrived home at 3a.m.

Oct 2.

Made a gun case for Mr. Thomas, late of Llwynberlan, to take to Australia.

1843

July 9th

A detachment of the Light Dragoons arrived at Llandeilo, having been sent for owing to the people breaking down the Turnpike gates in the neighbourhood under the name of Rebeccaites.

Aug 9

The Walk Gate and house was taken down to the ground last night by the Rebeccaites, with the soldiers billeted in the White Heart and "Walk" on both sides – so much for the soldiers' vigilance!

Aug 19

Went to Carreg Cenen cave, from thence to the cave at Penebnyne (Pal y Cwrt ?) on the hillside about half a mile higher than Llygad Llwchwr. Went in about 300 ft. together with B. Morgan and E. J. Griffiths. Found it very low and dirty, excepting one place where it is spacious. From there to Llygad Llwchwr cave; borrowed kettle and cups at Cwrt Bryn Beirdd, made a fire and took tea before going in; spent about four hours inside. Having taken a pistol with me, the report it made rivalled the loudest thunder. (Is this the first use of explosives in a cave – did he have a licence?) Got home by dark.

Aug 29

Went with B. Morgan, E.J. Griffiths, Wm. Griffiths, Dd. Davies and Phillip Griffiths to Kilrychen cave; from there to the cave at Pant y Llyn, where, thirty years ago, from 14 to 20 human skeletons were found in quarrying fore lime stone. It now extends only 30ft; having been quarried off.

(See Arch. Camb. 1893 p. 163 for paper on this bone cave by Vice – President Alan Stepeny – Guiston).

Sept 12

Went into Llygad Llwchwr cave together with B Morgan, E J and W Griffiths, Wm. Jones and Wm. Davies. Having taken a rope ladder with us, we entered at 9 am and having crossed the river inside with the aid of the rope ladder, we discovered two branches, where no human had been before. In one there is a plank of stalactite extending from the roof to the floor, which when struck with a hammer emits as fine and loud a sound as one of the largest bells in the Llandeilo steeple. From which we christened it the "Bell Cavern". Came out at 3pm and took tea near the entrance. Arrived home at 7pm highly gratified with our day's discovery.

Dec 25

Went to Carreg Cenen Castle with Peter Jenkins and Dd. The Cooper. Found three Roman coins in the earth beneath the rock on the S. Side of the Cstle. Peter found two, and David one; presented two coins to the Institute.

1844

Sept 9

Made a coracle that may be taken to pieces and made again, for Llygad Llwchwr, cost 10s 9d. (Was he the first "Clockwork Caver"?)

Sept 10

Went with B Morgen, Dd. Lewis, John Thomas, Walter Jones. Puddycombe, and Owen Jones to Llygad Llwchwr. Entered the cavern at 8 and a half am; and after turning to the left at right angles to the main branch, and getting down over the rock by rope ladder over the stream we made up the coracle and proceeded down the stream over very deep pools, and through several magnificent caverns where man never dared before. Came out to day-

light at 1 and a half pm.

1845

March 21

Went with the Rev. David Griffiths to Carreg Cenen Castle; found one Roman copper coin.

Sept 2

Left, together with T T Williams and B Morgan to Rhiw Wen to see a newly discovered cavern at the lime quarries; found it to be of small extent, and containing five and a half foot of water. Proceeded over the mountain to Brynamman and went to see Mr Perkin's coal works.

March 15

Went with B Morgan to see Tregib house and gardens; thence to hear the Rev. David Griffiths at the Unitarian Chapel, Onen – fawr; from thence to Llygad Llchwyr, and from there to Glynhir, and saw a snake in the wood near the waterfall.

1848

July 14

Went to Llygad Llchwyr Cave, together with Rev. John Lewis, Messrs. D Lewis, R W Lewis, H Bundy and J Roberts. Left coracle inside. Entered at 10 am. Out at 4 pm. Thermometer in the shade outside 68 degs. Water 49 degs. Quantity of water dis-charged per minute 450= 28.325b lbs=12tons 11 cwts. 12lbs = 2.8121and a half gallons=45hogsheads. Holywell discharges 84 hogsheads per minute.

(He's even started the new field of Cave Science!),

Jan 3rd

Went to Dalcothy to the old Roman mines at Ogof Cayo and then to Aberdauddwr.

1850

May 2

Accompanied Mr R J Lewis to Cennen tower, where Mr T T Williams joined us. Went to the Black Mountain range to LLwchwr Lakes, to the lately discovered Cavern near the lime quarries. Found fine specimens of various coloured ochoris in the junction of the lime and millstone grit.

1853

Aug 15

Sent box of fossils to the Rev. Dd. Griffith.

1885

Aug 23

Ed. Price, Thos. James and self went to Llygad Llchwyr at 6pm to see if the coracle I left there some years ago was in a fit state to make use of it. Found it to be completely decayed. Returned home at 1am.

And so we see that someone has been there before us and that someone has vandalised the gear we'd safely stashed for future exploration – probably one of those “know it all” youngsters. It wasn't like it in our days - was it?

*(Taken from The Carmarthenshire Antiquarian. Vol. 8 parts 23 and 24 1912 – 1913)

THE NEATH AND BRECON RAILWAY, INDUSTRY AT PEN- WYLLT, AND ADELINA PATTI

By John Wilcock

The Neath and Brecon Railway (N&B) was a standard gauge railway built across the western Brecon Beacons and Fforest Fawr in the 1860s to replace the horse-drawn Brecon Forest Tramroad. It linked the Vale of Neath Railway at Neath with the Brecon and Neath Railway (B&N) at Brecon, and also linked with the Swansea Vale Railway (SVR) at Ynisgeinon Junction via a connection from Coelbren Junction. At Cadoxton (Neath) it connected with the broad (7 ft) gauge Vale of Neath Railway, from where a third rail (4 ft 8 ½ inch gauge) was laid to gain access to Neath and the Swansea Docks. The original purpose was to serve several collieries, and the southern section from Onllwyn to Neath was retained until the coal industry wound down, although passenger services ceased from October 1962 and the northern section was lifted under the Beeching Axe.

The railway was authorized by an Act of Parliament dated 29th July 1862 as the Dulais Valley Mineral Railway Company (Figure 1), to transport coal from the Dulais Valley to Neath.



Figure 1. The original company seal of the Dulais Valley Mineral Railway Company

It was promoted and constructed by the contractor John Dickson. After it was authorized to extend the railway to Brecon, it changed its name in 1863 to the Neath and Brecon Railway (N&B). Then by promoting itself as the “Swansea Vale and Neath and Brecon Junction Railway” the railway also linked to the Swansea Vale Railway. The line experienced some delays in construction because of Dickson’s bankruptcy, but eventually when it was opened it gave the Neath and Brecon Railway running rights to Swansea, and it began a passenger service between Swansea and Brecon. In return, the Swansea Vale Railway was given running rights to Brecon.

When the railway reached Crynant in 1863 the improved transport allowed several collieries to be opened (Crynant Colliery, Brynteg Colliery in 1904, Llwynon colliery in 1905, Dillwyn colliery, and Cefn Coed Colliery in 1930) and coal mining quickly expanded. In July 1864 the metals of the Swansea Vale Railway and the Neath and Brecon Junction Railway were joined up, Ynisygeinon Junction on the Swansea Vale Railway being connected to Coelbren Junction on the Neath and Brecon Railway. By this agreement the Swansea Vale Railway was granted access over all the lines to Brecon. On 02.10.1864 the Neath to Onllwyn section opened. However, the railway was expensive to operate, and aspirations to expand and develop were effectively ended by the collapse of the bankers Overend and Gurney in 1866.

From January 1867 the Swansea Vale and Neath and Brecon Junction Railway was leased by the Neath and Brecon Railway for 999 years. Finally in June 1867 the extension from Onllwyn to Brecon opened. It is said that during construction of the cutting north of Penwyllt Station a large cavity appeared which swallowed a wagon. When the railway reached Brecon in 1867 it provided access to three other railways: the Brecon and Merthyr, the Mid Wales, and the Hereford, Hay and Brecon Railways, which were all completed at about the same time. On 26.07.1869 the Swansea Vale Railway, Swansea Vale and Neath and Brecon Junction Railway, and the Neath and Brecon Railway formally merged. The several companies providing services to Brecon consolidated their stations at the newly-rebuilt Free Street Joint Station from 1871. These railways linked onward to Hereford, Worcester and the West Midlands. Finally in 1873 the Swansea to Coelbren Junction track opened.

The railway ran new Fairlie locomotives, which were strange locomotives with a boiler and funnel at both ends (Figure 2). They were designed to run on twisting mountain railways, but were not particularly successful. Examples can still be seen in preservation on the Ffestiniog Railway.

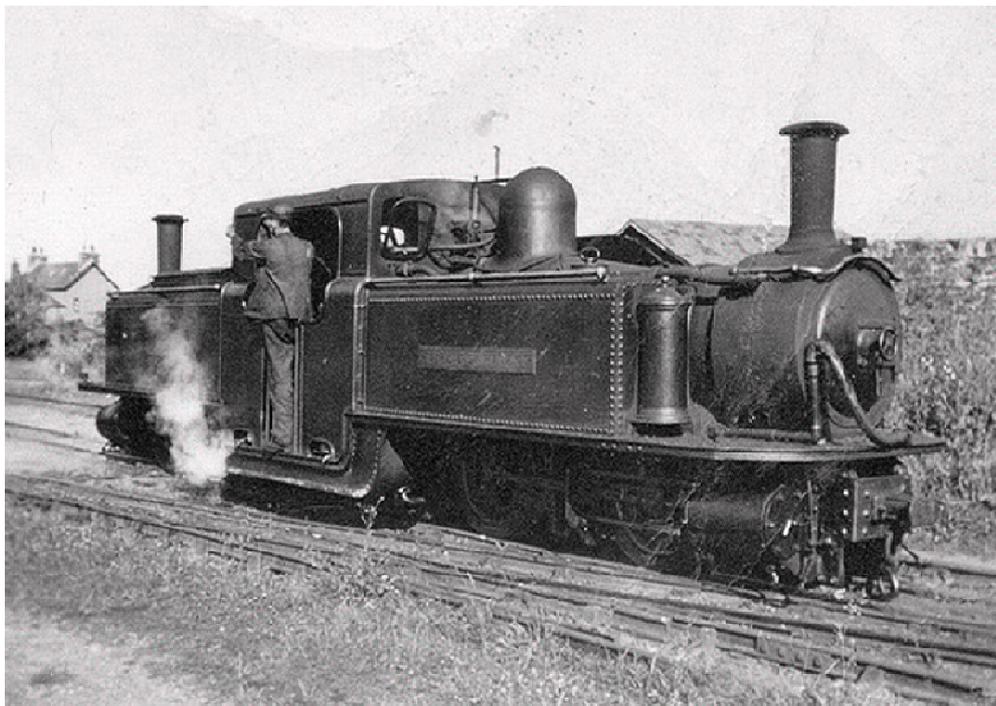


Figure 2. A Fairlie double-ender

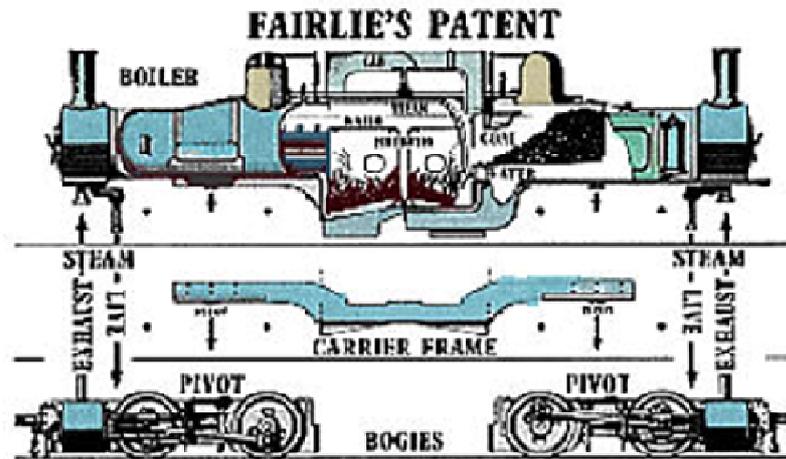


Figure 3. Fairlie's Patent 1864

Robert Francis Fairlie, born 1831, was a Scotsman who trained at the railway works of Crewe and Swindon. He joined first the Londonderry & Coleraine Railway, and then the Bombay, Baroda & Central India Railway. In the early 1860s he set himself up in London as a consultant, and then in 1864 he filed his patent for what would later be known as the Fairlie Locomotive (Figure 3). This was an articulated locomotive intended mainly for hauling heavy loads on twisting narrow-gauge mountain railways. The first unit was built in 1865 for the Neath & Brecon Railway; it had two pivoting power bogies and two boilers back-to-back (with smoke box and chimney at each end of the locomotive, and a single firebox at the centre, around which was built the cab). This was the typical Fairlie 'double-ender', although single-boiler and other variants later appeared. While the system provided a flexible coupled wheel-base, and the freedom to include a large well-ventilated firebox, the flexible joints of the steam pipes tended to leak, and the locomotives could only be safely used at low speeds because of overhang and other stability problems.

Figure 4 shows another type of double locomotive that was used, manufactured by J. Cross of St Helens.

The Neath and Brecon Railway had 56 miles of track with three branch lines, eventually connecting Swansea with Brecon, and serving many collieries and quarries (see the route map in Figure 5).

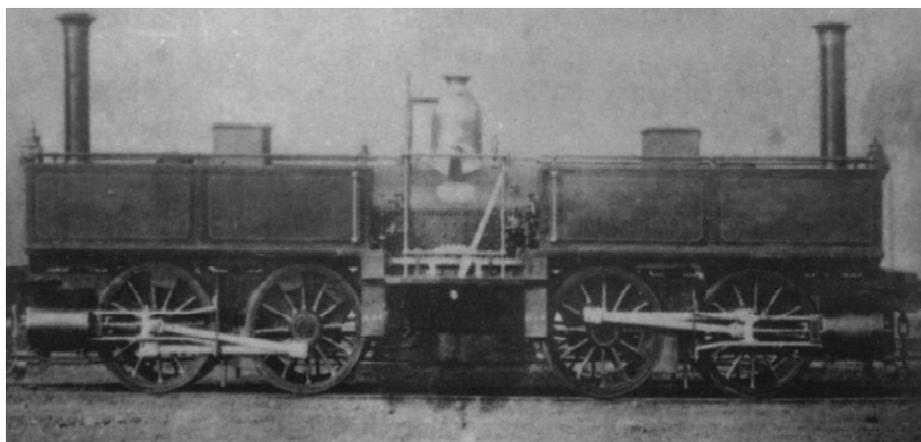


Figure 4. Another type of double locomotive on the Neath & Brecon Railway was the Mountaineer, built in 1866 by J. Cross of St Helens

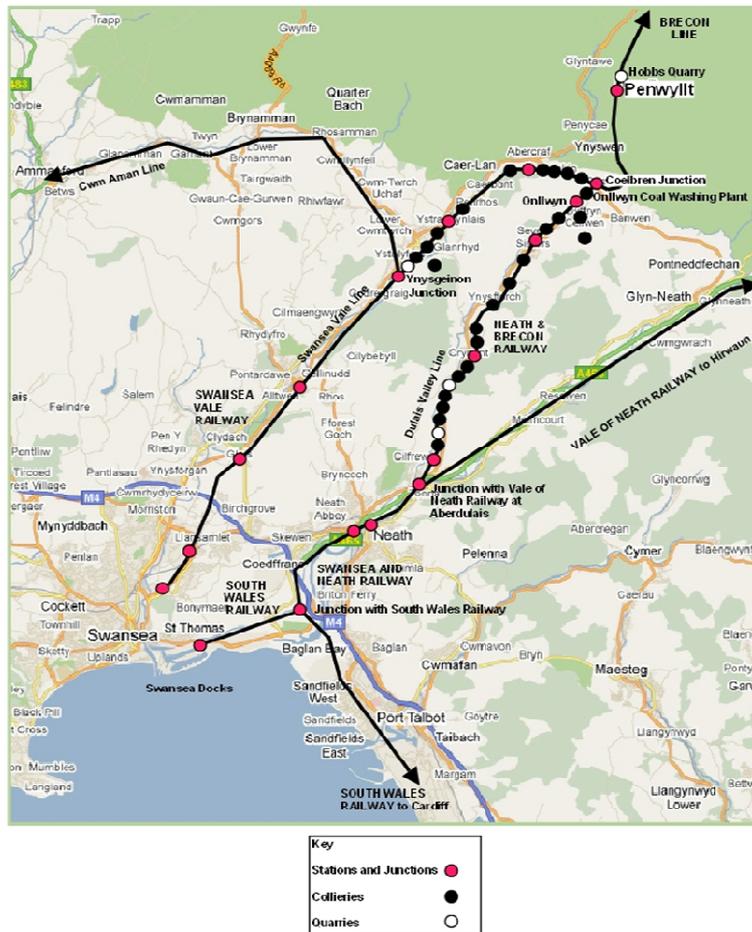


Figure 5. Map showing the relationship of the Neath & Brecon Railway and the Swansea Vale Railway to Swansea and Penwyllt.

Operation of the line was not profitable, and by the early 1870s the financial situation was serious. Next on the scene was the Midland Railway (MR, the ambitious railway which began as a triangular junction near the River Trent serving the important Midlands manufacturing towns of Leicester, Nottingham and Derby, and later expanded to serve Leeds, Sheffield, London (St Pancras), and finally Scotland via the Settle-Carlisle Line). Having already reached Brecon from Hereford via the Hereford, Hay & Brecon Railway, on 01.09.1874 the MR leased the Swansea Valley Railway, and intimated that they intended to run trains over the N&B using the running powers of the Swansea Valley Railway. The N&B was in no position to contest the issue and reluctantly agreed to the Midland working mainline services between Brecon, Coelbren and Ynysgeinion, the N&B being left with one third of the profits.

In 1877 the N&B abandoned its Brecon - Swansea service and decided to lease its main line north of Coelbren to the MR in return for an annual fee. Thus the MR took

over the rest of the network, enabling the MR to have direct access to Swansea Docks and to start running trains from Brecon to Swansea. There were even grandiose plans to export South Wales coal to the Midlands via this route. At the turn of the 20th century there were eight steam trains a day passing through Penwyllt Station: one each from Brecon and Neath, crossing at 0920, and two more crossing at 1215pm. At 1700 there was a train to Brecon and at 1900 one to Neath. There were also two freight trains each day.

As part of the re-grouping on 24.07.1922 the N&B was absorbed by the GWR. However, the MR was absorbed by the LMS, which continued to run through Hereford-Brecon-Swansea services. It was not until the LMS withdrew its through Hereford-Swansea trains on 31.12.1930 that the GWR assumed control of the network and introduced Brecon to Neath trains. The N&B line under the GWR then reverted from a through route to a quiet backwater.

On 01.01.1948 the railways were nationalised, British Railways assuming control of the LMS, GWR, LNER and SR groups. In December 1962 the Beeching Axe withdrew all passenger services from Neath to Brecon, leaving only freight services. The line north of Craig-y-Nos/Penwyllt Station was lifted to Brecon on the closure of Brecon Station, but south of Penwyllt the line remained open until 1977 to serve Hobbs Quarry. By the end of the 1960s the population at Penwyllt had fallen to 20. The line also remained open to Onllwyn, to continue to serve the coal-washing plant used by Celtic Energy, with haulage by the English, Welsh and Scottish Railway Company. Some of the old Celtic Energy wagons were then preserved by the Foxfield Light Railway (a preserved colliery railway) to the east of Stoke-on-Trent in Staffordshire.

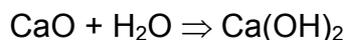
INDUSTRY AT PENWYLLT

The industrial site of Penwyllt had been developed mainly because of the need for quicklime in the industrial processes of the lower Swansea Valley. Limestone and calcareous clay was taken from the quarries and some of it was burnt for lime on site in lime kilns, of which there were fifteen: two at Craig-y-Nos dated 1878; four constructed by the Brecon Coal & Lime Company at Pen-y-Foel, dated 1863-1867, with a loading quay for railway wagons; seven at Twyn Disgwylfa built by Joseph Claypon, dated 1836-1842; and two at Twyn-y-Ffald built by Joseph Claypon, dated 1825 and 1827.

First of all the calcareous material is burnt, producing calcium oxide and carbon dioxide:



Quick lime (calcium oxide CaO) is, however, very corrosive, rapidly attracting water and turning to slaked lime (calcium hydroxide Ca(OH)₂ with an exothermic reaction of 300°C:



This temperature and corrosive action is high enough to cause spontaneous combustion of any container, such as a basket, wooden box or railway wagon, so in-

stead the calcareous materials are often exported and then burnt in a kiln near to the site of final use, such as on a farm or building site.

The owners during the period 1841 - 1843 were the Powell family, notably Captain Rice Davies Powell, who became a county magistrate and a High Sheriff of Brecknock. Constructions included Powell Street, a group of terraced quarrymen's houses, now owned by the SWCC. It was said that the Powell family was cursed thanks to their bloodline relationship with the Dutch Overbeek family of Calcutta and Capetown: cholera killed Captain Powell's younger son in 1851, and he himself died in 1862. His wife and younger daughter also died. In 1864 his eldest son was killed in a hunting accident on the Isle of Wight. This resulted in his eldest daughter Sarah inheriting the estate, and she moved to Penwyllt with her husband Captain Allaway. After Allaway died in 1875, Sarah moved to Tenby and the property was sold in 1876.

The next owners were the Morgan Family: Morgan Morgan of Abercrave bought the estate for £6000. Morgan and his son, also called Morgan Morgan, were in control for many years.

Later another industry at Penwyllt was the Penwyllt Dinas Silica Brick Company, which quarried silica sand at Pwll Byfre, from which it manufactured refractory bricks at the Penwyllt Brick Works (closed by 1939). The bricks were primarily used to line industrial furnaces. A narrow gauge railway, with a rope-worked incline (referred to in modern times as the "tram road") transported silica sand to the brickworks, which was adjacent to the Neath & Brecon Railway.

MADAME ADELINA PATTI

This history would not be complete without some discussion of Madame Adelina Patti and her beloved Craig-y-Nos Castle. Adela Juana Maria Patti (Adelina Patti, 19.02.1843 – 27.09.1919) was a highly-acclaimed 19th Century operatic diva, who earned huge fees at the height of her career in the music capitals of Europe and America. She first sang in public in 1851 and gave her last performance before an audience in 1914. Patti remains one of the most famous sopranos in history due to the purity and beauty of her lyrical voice.

She was the last child of the Italian tenor Salvatore Patti (1800–1869) and his wife the soprano Caterina Barilli (died 1870). Her parents were working in Madrid, Spain, at the time of her birth. Because her father came from Sicily, Patti was born a citizen of the Kingdom of the Two Sicilies, a small 19th Century country which later became part of Italy. She later had a French passport, since her first two husbands were French.

In her childhood, the family moved to New York City. She sang professionally from childhood, and made her operatic debut at age 16 on 24.11.1859 in the title role of *Lucia di Lammermoor* (Donizetti) at the Academy of Music, New York. In 1861, at the age of 18, she was invited to Covent Garden for the role of Amina in *La Sonnambula* (Bellini). She had such remarkable success at Covent Garden that season that she bought a house in Clapham and, using London as a base, went on to conquer the European continent, performing as Amina in Paris and Vienna in subsequent years with equal success.

Then, in 1862 (Figure 6), during an American tour, she sang *Home Sweet Home* (John Howard Payne) at the White House for the President of the United States, Abraham Lincoln and his wife. The Lincolns were in mourning for their son Willie, who had died of typhoid. Moved to tears, the Lincolns requested an encore, and after that the song became associated with Adelina Patti, and she performed it many times as an encore at the end of recitals and concerts.



Figure 6. Portrait of Adelina Patti by Franz Winterhalter (1862)

In her prime, Patti demanded \$5000 a night, in gold, before the performance. Her contracts stipulated that her name be top-billed and printed larger than any other name in the cast. Her contracts also insisted that while she was "free to attend all rehearsals, she was not obligated to attend any".

However, Patti's personal life was not as successful as her professional career. She is thought to have had an affair with the tenor Mario, who is said to have bragged at Patti's first wedding that he had already "made love to her many times". She was engaged as a minor to Henri de Lossy, Baron of Ville. She married three times: in 1868 to the French nobleman Henri de Roger de Cahusac, Marquess of Caux (1826–1889), divorced with bitterness in 1885 after infidelity on both sides, costing half her fortune; in 1886 to the French tenor Ernesto Nicolini (1834–1898) after living with him for many years—it was a happy

marriage until his death, but Nicolini cut Patti out of his will, suggesting some tension in the last years; and in 1899 to Baron Rolf Cederström (1870–1947), a Swedish aristocrat many years her junior.

Adelina Patti purchased the Craig-y-Nos Castle (Figure 7) and surrounding park land for £3,500 in 1878, to develop it as her own private estate. After her second marriage in 1886, to Ernesto Nicolini, she embarked on a major building program at the castle, adding the North and South wings, the clock tower, the conservatory, the Winter Garden and the theatre. After Patti's very successful international singing career she undertook one final singing tour of the United States; but it turned out to be a financial failure due to the deterioration of her voice through age, and wear and tear. From then on she restricted herself to the occasional concert here or there, or to private performances mounted at her own private theatre in the castle, and she also undertook gramophone recordings at the castle. She last sang in public in October 1914 at a Red Cross concert at the Royal Albert Hall, in aid of victims

of the First World War. She spent the rest of her life at Craig-y-Nos with her third husband Baron Rolf Cederström. The Baron severely curtailed Patti's social life, cutting down her domestic staff from 40 to 18, but he gave her the devotion and flat-tery that she needed, becoming her sole legatee. She lived long enough to see the war end, and died at Craig-y-Nos in September 1919. Eight months later she was buried near her father at the Père Lachaise Cemetery in Paris, where many famous singers, authors and artists are buried. Patti had no children, but she was close to her nieces and nephews. After her death the Baron married a much younger woman, and their daughter, Brita Yvonne Cederström (born 1924), became Patti's sole heir.



Figure 7. Craig-y-Nos Castle

THE ADELINA PATTI THEATRE

The private theatre (Figure 8) is a Grade I listed opera house. Built as Patti's own private auditorium with space for an audience of 150, it was designed by Swansea architects Bucknall and Jennings, with input from the famous Sir Henry Irving. Conceived by Patti to be her miniature version of La Scala, Milan, it incorporates features from Wagner's Bayreuth Festspielhaus and from the Theatre Royal, Drury Lane. With dimensions 12m long x 8m wide x 7m high, it was originally decorated in pale blue, cream and gold. The ceiling is supported by ten Corinthian columns and in between these are the names of composers including Mozart, Verdi and Rossini, surmounted by Madame Patti's monogram. The stage area was originally fronted by blue silk curtains, with a back drop that illustrates Madame Patti riding on a chariot in the role of *Semiramide* from the opera of the same name by Rossini. The design incorporates a mechanical auditorium floor which can be raised to form a ballroom, or inclined towards the stage for performances. The theatre also incorporated an organ, given to Patti in the United States after one of her tours. The back of the theatre houses a gallery where the domestic staff sat, enabling them to enjoy the performances. The orchestra pit is separated from the seating area by a balustrade, and is able to hold up to 24 musicians:

The theatre was opened on 12.07.1891 with invitations for the house guests (who included the Spanish Ambassador; Baron Julius De Reuter (founder of the Reuters News Agency), Baron Henry Hussey, and journalists from the *Daily Telegraph*, *Le Figaro* and the *Boston Herald*) and the performance guests. Final rehearsals occurred in the afternoon with the Swansea Opera Company, and a specially chartered train arrived at Penwyllt with the performance guests. Patti's performance in

the first half was the prelude to Act One of *La Traviata*, and in the second half the Garden Scene from *Faust*. The refreshments included 450 bottles of champagne. Today the theatre remains a time capsule, and the stage is probably the only surviving example of original 19th Century backstage equipment. The Opera House is licensed for weddings, and is still occasionally used for public performances.

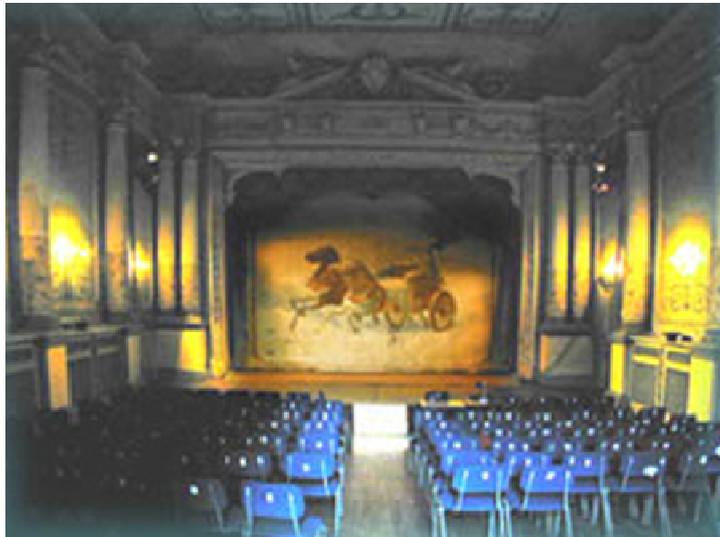


Figure 8. Adelina Patti's private theatre at Craig-y-Nos, a miniature version of the one at Bayreuth

THE WINTER GARDEN

The Winter Garden was a spacious building with a soaring roof, constructed mainly from glass. Here Patti promenaded with her guests among tropical plants, while exotic birds flew around. A pair of wrought iron water fountains in the shape of birds (cranes) was made in the local ironworks by a Mr Crane, who made decorative ironware featuring his namesake bird - their multi-coloured plumage shed rainbows of light from the falling waters, and were said to have captivated all who saw them. As a memorial of the First World War, Patti presented her Winter Garden to the people of Swansea in 1918. It was renamed the *Patti Pavilion*, and it has since been restored on several occasions (Figure 9). One of the crane fountains stands in the forecourt of Craig-y-Nos Castle, and the other stands in the grounds of Swansea University.



Figure 9. The Patti Pavilion in Swansea after its refurbishment in 2009

ELECTRICITY

Craig-y-Nos Castle was probably the first private building in Wales to be wired for electricity, the first building in the UK having been Cragside in Northumberland (1880), a year after the invention of the incandescent electric light bulb by Thomas Edison. The changes from candle-light via gas lighting to electric lighting were elsewhere rather slow. Large estates had their own generating stations, and at Craig-y-Nos an Otto Engine was installed, generating 110V DC, with electric wiring of two bare copper wires placed in two parallel grooves in a wooden plank, with a second plank placed over the top. The need for insulation seems not to have been well understood, nor the risk of electric shocks – these methods of installation had to be radically changed when high voltage AC electricity arrived. The DC power lit Swan lamps throughout the castle, and an electrically-powered organ which was controlled by a punched paper roll, in the Billiard Room. This organ, and the other one in the theatre used for opera performances, was dismantled in the 1920s when the buildings became a hospital.

TRANSPORT

In 1878 the N&B rebuilt Penwyllt station in stone, with a lavishly-furnished private waiting room for Madame Patti, and both the GWR and MR provided private saloon carriages for her use, which she could request be attached to any train to take her whenever, and wherever she wanted to travel within the United Kingdom to attend singing engagements. A private road was constructed from the castle to the station.

Early in the 20th Century Patti had one of the first motor cars in Wales, she is reported to have raced a local doctor from Swansea to Abercrave for a small bet.

HOSPITAL

After Adelina Patti's death in 1919 the castle and the grounds were sold in March 1921 to the Welsh National Memorial Trust for £11,000. This was an organisation founded to combat tuberculosis in Wales. The castle was reconstructed as a sanatorium: called the Adelina Patti Hospital, it admitted its first patients in August 1922. In 1947 the children of Craig-y-Nos were among the first in the UK to receive the newly developed TB medicine, the antibiotic streptomycin, at the hospital. In 1959 it became a hospital for the elderly. The castle closed as a hospital on 31.03.1986, the remaining patients being transferred to the new community hospital at Ystradgynlais. The castle is now an hotel. In 2005 the castle featured in the BBC *Dr Who* episode *Tooth and Claw*, with David Tennant as the Doctor and Billie Piper as Rose Tyler. The *Torchwood* crew later stayed at the hotel to film the episode *Countrycide* at the Penwyllt cottages.

HAUNTING

The castle is said to be subject to strong paranormal phenomena, and to be haunted by the ghosts of Patti, her second husband, French tenor Nicolini, and her favourite composer Rossini, who coached Patti and arranged scores specifically for her. The sound of Patti singing is said to be a common experience in the theatre. On one occasion a film crew was recording an interview in the theatre, and while eating in the kitchen was discussing the fact that Adelina Patti had never mastered the role of *Carmen*, when suddenly a heavy saucepan which had been placed a long way from the edge of a large cooker flew onto the floor. Unexplained "presences" have been experienced by visitors all over the castle in

many different forms. Nurses who worked at Craig-Y-Nos while it was a hospital reported many such presences, including frequent reports of "having walked past somebody on the stairs or corridor, but nobody being there", unexplained noises and sounds of footsteps. Visitors have also said that they have experienced breathing difficulties in the castle and a feeling of the lingering presence of old patients suffering from tuberculosis.

Finally, the Top Children's Ward is said to be the most active ghostly room in the castle. The recovery rate from TB was very low; so many children entered the castle at an extremely young age and died there. Many apparitions have been seen in this room, together with the sounds of children's footsteps, bouncing balls and giggles.



*Without the possibility of death, adventure is not possible.
~ Reinhold Messner*

Back cover: Görner Glacier Moulin by Henry Patton

