

Journal of the



Spring & Summer 2005

£2.50 to Non Members

GOES JOURNAL SPRING 2005

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From the Editor.....

Welcome to the Journal once again! Our apologies that there was no last Journal for late Autumn & Winter, but as you will know from the newsletter that we sent out in its place, there were just not enough articles for a full journals. Please remember that this is a members journal and relies on articles from within our membership. Please keep them coming in.

Once again, our very grateful thanks to those who have supplied articles for this issue!

Thanks to those who renewed their membership so promptly. We currently have 37 members renewed at the time of going to press which is slightly down on last year. Of the 37 members 15 have the full £30 fee

covering them for underground visits. If you know of someone who has not yet renewed perhaps you could jog their memories!

Our programme of Summer Walks has been organised this year by Dave Broomhead our Public Relations Officer. Thanks to Dave for all his hard work. Details are given elsewhere in this journal.

Our website, which you will remember was set up by Tony Davies, now has a new webmaster, Dave Flowers. Dave has worked hard to update the site which still gets an amazing number of hits. Thanks to Dave for taking this on-going task in hand. Why not pay the site a visit

www.goes.org.uk

Lastly, this rather fetching photo of Steve Lea at the GOES christmas meal landed on the editors desk. Any offers for captions?

Phil Barratt : editor@goes.org.uk



Caption Competition

"I think I've just figured out why these skateboards are so cheap!"
(Duncan Nield)

Tony is saying ..
"I've had three GOES and still cannot tap dance in these wellies!"
(Dennis Oliver)

Impressed by Brian's rendition of Irish dancing, Tony says "look Brian it's not the dancing I mind, but I will NOT wear one those short skirts They clash with my wellies!" "Ooh" replies Brian, "some people are just too fussy!"
(Phil Barratt)



Visit to First Paleolithic Cave Art Found in Britain Nicky Campbell

Many members have probably seen in the national press, articles about the discovery of Palaeolithic rock art in Creswell Crags near Worksop in Derbyshire. When myself and my partner Gary heard that Creswell Crags were opening the rock art to the public for a limited time, we jumped at the chance and I thought an account of my visit would be of interest to other members.

Creswell Crags are composed of a magnesium rich Permian Limestone carved in to a gorge by a stream. The gorge is riddled with caves and fissures and there is evidence of Palaeolithic and Mesolithic human activity at the site. When the rock art was discovered eighteen months ago, there was great excitement as no other Palaeolithic rock art has been discovered in Britain. So for two weeks only, Creswell Crags decided to let a few small groups of visitors in to the cave to monitor the effect upon the delicate art, to see whether they could open the cave on a more permanent basis.

So on a beautiful August Sunday afternoon, Eleanor, our guide lead myself, Gary and nine others to Church Hole cavern to see the rock art. Luckily, our ancestors had no desire to live deep inside damp dark caves so access to the site was easy. An excavation/destruction during the Victorian period had left the ground level around 2 meters lower than in the Palaeolithic so to view the art, Creswell Crags had installed a platform at the original level of the Palaeolithic floor. Once the group had donned hard hats and scrambled on to the platform, we started to look for the rock art. At first no one could see anything but

then Eleanor began to point to the outline of a reindeer near the roof. The lines were faint at first but as you looked more carefully you could see the anatomically correct outline of a reindeer around 45cm in length. As soon as we had spotted the first image, we began to spot others all over the ceiling and walls of the cave. The question everyone wanted to know was, "How do you know that picture was created in the Ice Age?"

Our guide pointed to some modern graffiti that could be dated to 1948. The modern graffiti read 'PM 1948'. PM had also drawn a beard onto the reindeer indicating that this individual had also discovered the rock art but was probably unaware of its age or significance. The lines of this modern graffiti were sharp compared to the ancient art. To more accurately date the art, some flowstone deposited over part of one image had been sent for Uranium dating and showed the image to be older than 12,000ya. An age of 12,500ya is likely as the style of art matches that present in Europe at the same time and corresponds to an explosion of cave art in Europe.

96 images have now been discovered in the cave, mainly of horses, birds, bison, deer and bear. A pair of women's legs was found away from the other images, right at the back of the cave, near the original floor level. (Possibly Ice Age porn?) Also some symbolic drawings were found, such as notches and triangles (possibly representing a vulva). These Palaeolithic people were nomadic hunters and used the caves seasonally as a hunting base. It is easy to see why they would draw pictures of the animals they were hunting but it is harder to understand the purpose of the more symbolic images as we know so little of these peoples culture and society and such images remain enigmatic.

We did not see all the images as they are best viewed in the morning light and many are very faint. Though most of the images were simple engraved outlines, some were more three dimensional, called bas-relief sculpture and carved specifically to catch the morning light. There are only six examples of this type of art work in Europe and makes the site even more special. And, as they are finding new images every time the cave is examined, who knows how many images will eventually be



Picture shows Nicky and Gary outside the caves

discovered.

Paul Pettitt, Dr Paul Bahn, and Dr Francisco Muñoz, decided to explore four British caves which they considered most likely to contain Palaeolithic art based on finds that have already been made. These were Creswell Crags (Derbyshire), Paviland (Wales), Kent's Cavern (Cornwall) and Gough's Cave (Cheddar), Creswell Crags being top of the list due to the presence of mobile art of the correct age and style. The horse carved on a rib bone found at Creswell Crags may not have originated from there but does show that these people were at least in contact with people who were creating art at this time.

The only other piece of unequivocal Palaeolithic art found in Britain was in Kendrick's Cave on the Orme, where a decorated Horse Mandible was discovered in 1977. All other possible Palaeolithic art found in Britain is open to interpretation as to whether it served some practical purpose such as handle grips or was purely an artistic creation. I think this makes the Orme an obvious place to start looking for cave art and as the Derbyshire art was found in a cave in which no previous Palaeolithic finds had been made, there are quite a few candidates that we would be wise to inspect in detail. It is probably safe to say that the Great Orme is the second most obvious place to

look for Palaeolithic rock in Britain and now it has been discovered at the most obvious British location, I think the likelihood of such a discovery on the Orme is quite high.

I hope the art work at Creswell Crags will soon be open to the public on a more permanent basis so more people can see this magical artwork and who knows what we might find on the Orme if we keep our eyes open!

For more information on Creswell Crags and the Rock Art: <http://www.creswell-crag.org.uk> and click on 'News and Views' and don't forget to look at the ceiling and walls next time you're in a cave on the Orme, particularly on a sunny morning and maybe we can find some cave art of our own.

Nicky Campbell
October 2004

The picture below shows Reindeer from Creswell Crags with engraved outline highlighted.



August in Cheddar 2004 Steve Lea

The summer holidays had been planned for camping in the Cheddar area of Somerset, with visits planned to Longleat Safari Park and House as seen on the BBC programme Animal Park. Any planned trip in the Mendip's must include at least one visit to a cave, I had explained to my wife as she booked the site.

The journey from North Wales was down the border area finishing with a run down the Wye valley passing a cave complex on the way, not planning a break in the journey at that location was my mistake, but towing three quarters of tonne was not the easiest to just pop into a small car park (still cannot reverse it!). The Severn Bridge then leading us into the Mendip's which are small compared to the Welsh Mountains we are normally use to seeing.

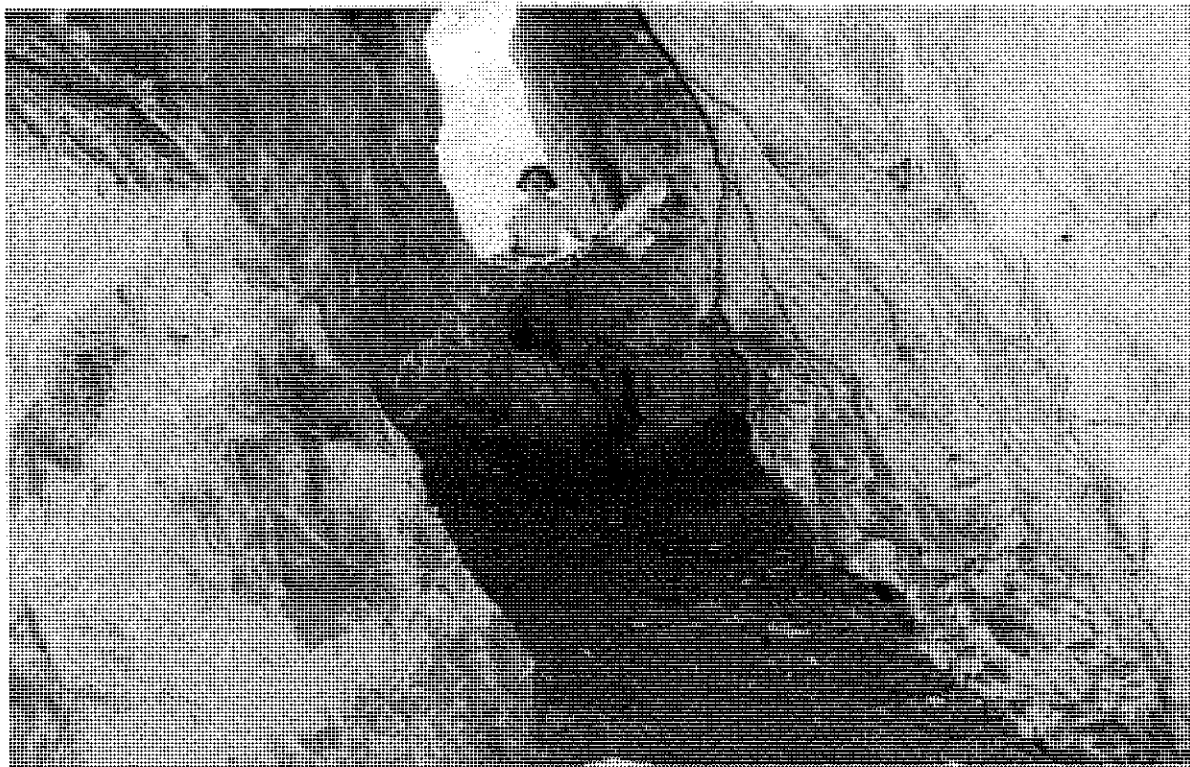
The first week turn out to be very hot with afternoon temperatures as high as 35 degrees, so a visit to the Cheddar Cave Complex gave pleasurable relief from the heat for everyone. The main cave is toured by self-guiding with use of a multi European language speaker unit. This also included a kid's

version of story of the discoveries and geological processes involved in their formation.

After some of the usual family days out the need to be underground again had begun to call. The next afternoon had nothing planned so my eldest daughter Abigail and myself set off for Burrington Combe area which lies a few miles north of Cheddar in a small valley. This area has numerous caves which generally have uncontrolled access and are used by various groups.

The first cave to be visited was Goatchurch Cavern (ST4758,5822) Length 750 M Depth 55 M, this is graded as a moderate cave with no rope work. The advice for locals was to park down by the pub and walk to the caves because of car thieves had been actively targeting cavers-car knowing they would not be back quickly. The entrance is located up the West Twin Brook valley in the southern flank of Burrington Combe by following a rough track from the road for about 250 M this takes you pass Sidcot Swallet and Pierre's Pot, then a short climb up the left side takes you up to the entrances first Tradesman's Entrance then just round the corner to the Main Entrance archway of Goatchurch Cavern.

The cave had been used at one time as a show



cave in 1901 by a previous owner. the simple entrance of worn smooth stone steps you into the main cavern which gentle slopes down to short climb down Giant's Stairs which leads round to the tradesman entrance which makes a good round trip. Sitting outside the tradesman's entrance taking light refreshment and contemplating how much cooler it was inside we could now hear voices coming from the hole behind us. This turn out to be a group of school girls on an adventure day out who soon disappeared down to the stream below to clean up. At the same time another party arrive at the cavern made up of all ages from 5 to 75 it would appear, I asked the last of the guides about Foxes Hole (ST4830,5821) Length 40 M Depth 10 M, across the valley which has a digital padlock for which I had not got the number, it transpired that he had not either, but did recommend a small mine just up the valley which was not list in the guide book.

The area was now getting crowded so we moved onto the mine entrance, which was easily found as described beside a small stream with a six foot square door. Entrance to this was barred by an earth embankment holding the door closed, after about 45 minutes of hand digging, this was given up as a bad idea, so we headed back to the car.

Just before reaching the car park we pass the entrance to Aveline's Hole (ST4761,5868) Length 68 M Depth 16 M, so with nothing to loss we cross the road and enter the roomy cave entrance some 15 feet across and somewhat higher, this listed as an easy cave as it just descends as one chamber much enlarged by excavations between 1860 and 1927. The cave was first discovered in January 1797, when two men pursued a rabbit into a small hole (at the top of the present entrance) and discovered a burial chamber. Many human and animal bones were discovered. The mud filled shaft at the end of the cave was dug by William Boyd Dawkins in the 1860's, but only revealed bones of modern animals. The terminal shaft has been excavated on a number of occasions, but no extension has been found here.

The almost daily visit to the supermarket lead to the bargain of the holiday, a £2.50 garden spade, much to my wife's surprise as a spur of the moment purchase. only Abigail could see the need for such an odd holiday extra. So needless to say that afternoon saw us again in Burrington Combe, to excavate the mine entrance. The help of a spade soon enabled a trench to be dug across the door entrance to en-

able us to swing it ajar and get in. The lead mine name unknown was driven on a fault twisting and turning but generally heading in the same direction. A concrete and brick water channel is constructed in the floor, which feeds a stone water tank externally. This caused some swapping of sides ending with Abigail being in front, by this time we are about 80 M into the tunnel, when Abigail says that she could see an animal eyes in the light of her helmet, being sure nothing would be in the tunnel, I took over the lead and strode on to face this creature of the darkness, after another 50 M the eyes had neither moved or loss any of the reflected light, another 50 M saw us on top of this creature. Which turned out to be a cleverly engineered trick with road cat's eyes, fixed in metal mounting brackets and glued to a large concrete block. The tunnel continued some little way further before ending blind, in total over 400 M long.

Having completed the mine and returned to the surface we noted that another entrance a few yards away had been blocked with concrete blocks but no sign of a connection had



been seen inside so this must have been another system.

The afternoon was still early so another cave was calling, this being Read's Cavern (ST4682,5844) Length 690 M Depth 70 M, the guide book gave good description of directions, so we head back down to the car park and below the café, until an unmade road lead up hill towards to the left heading for the

University of Bristol Speleological Society HQ (UBSS), passing an open gate a small deer was stood motionless watching us passing but then ran back into the woods. We have to pass several other caves on the way being Bath Swallow; Rod's Pot; Drunkard's Hole and Bos Swallow, these are all large basin depressions over ground with ferns grouped closely together. The map in the guide book indicated Read's Cavern was by the corner of a wood named Rowberrow Warren just off the path, but the path was located on top of a cliff so further walking was necessary down the path to enable us to return at the base this soon lead us to a small stream which we could follow to the swallow hole itself. The time had now slipped away being 5:30pm we had said we would be back by 7:00pm so a quick look around was in order. Leading the way in we descended a small boulder area at the entrance dropping into a large sloping chamber dipping away from the entrance. We looked around the chamber and at the several large boulder climbs leading down to lower sections which time did not allow to be fully explored. Formally known as Keltic Cavern the cave was open in 1919 by UBSS. Archaeological excavations by UBSS in the early 1920's indicated a period of human occupation in the Early Iron Age.

No visit to the area would be complete without a visit to Wells with its cathedral and historic city sights not to mention Wookey Hole another public cave attraction not to be missed

Stephen J Lea
October 2004
Glan Conwy

Acknowledgments and Recommendation

Mendip Underground *A Caver's Guide* by D. J. Irwin & A. R. Jarratt - Published by Bat Products, Tucker Street, Wells, Somerset BA5 2DZ. Phone & Fax 01749 676771 - opposite Tesco supermarket

Galleries Inn, Cheddar Cliffs, Cheddar. Phone 01934 744796

A NEW FRONTIER Dave Wrennall

An observation...

So far as we know this 1850's section through the Old Mine is the only underground plan of any of the Great Orme mines to have survived. As such it has been mulled over by all the experts and many an interested individual over the years. I was no exception. Although clearly simplistic the section showed one particular detail which plagued me. Above that much frequented connection from Romans to Treweeks Shaft, namely, 'Wagongate' (at 125m Above Ordnance Datum) a tunnel was depicted running between Treweeks and Higher Shaft. Surely this must represent a lost section of the mine?

Voicing my 'discovery' I was told that the plan was inaccurate in many respects and that a high level link between Treweeks and Higher Shaft was out of the question. The tunnel depicted was simply artistic licence. Certainly there did not seem much scope for the connection, the two upper levels leading off Treweeks having been well explored and surveyed in the past. However the 135m AOD level at least showed some development and so might offer the possibility of more. It also lay directly above Wagongate as the 1850 plan indicated, so it was the obvious place to look for the mysterious tunnel.

Dream chaser...

On the 20th of June 04, whilst preparatory work was being done for the proposed Treweeks ladderway, I got the opportunity to check the level out for myself. It was a location that I had abseiled or jumared past on more than half a dozen occasions. We were paying a visit in the hope of diverting water cascading into the shaft, an obvious damper on the scaffolding scheme lower down. Perhaps with some old sacking it could be induced to flow down the shaft wall? In anticipation of doing some digging I took along my trusty shovel.

I was the first to abseil and had to keep a sharp look out, dropping and spinning into the darkness. I travelled past the first level, a bit of a crawl and no water. Down still further, much further, perhaps too far, had I missed it? Another level arrived well proportioned with a grab handle and some water. It looked

much like Wagongate. Damn I had gone too far! Thankfully I was wrong, I realised there was no security rope in place and that this was the rarely frequented 135m level. I swung in and detached from the rope. In a few minutes Gaz joined me.

Before the others arrived we had a quick exploration. After 5m the level running eastwards reached a junction. To the left (northwards) was a passage-way full of spoil climbable for a considerable height. Ahead the main tunnel ran for another 10m to where it was blocked by backfill, a tight crawl over the top suggested it was a probably a dead end. Back at the junction, water emanated from a high alcove in the roof. I bridged up to it with great difficulty reaching an impasse where there was seepage from solid rock. Not relishing the return climb I was pleased to see Gaz's light in a tiny side passage. This led out half way up the climbable spoil. Slightly higher, just below the roof, another circuit led us back down to the main tunnel at a point where we found another roomy area of extraction at a slightly lower level. By now the others had joined us and for a while we discussed our findings and pondered over a skeleton we had found.

Andy Lewis in his 1980 dissertation described our area thus.

Location 6. *A limited sized 19th century working exploiting three minor veins within dolomite and limestone with chert nodules. The continuations of blocked veins to the north appear to connect with workings above, some of which, because of their constricted dimensions may indicate the possibility of early activity. The unusual occurrence of a sheep skeleton located towards the eastern end of the main cross cut suggests the animal does not appear to have fallen into this working and is more likely to have been deliberately placed here.*

Whilst the others started channelling water and positioning the sacking at the shaft I went back up to the top of the spoil tip. I had noticed a small hole in the roof containing wood holding back debris. There had to be higher workings that we hadn't yet reached. The large spoil tip must have come from this unknown area. I started to shovel material down the slope. It needed little encouragement and I was soon looking at an area of more consolidated material containing large rocks that hung precariously above me. Fortunately I was able to position myself to one side of the rift and continue with my work, undercutting and levering.

A huge amount of material was sent thundering down. A downward fang of solid rock that appeared provided a safe niche behind which to climb higher. From my new position I was able to thrust my shovel ever higher, creating more avalanches and a considerable cavity.

A collection of large rocks I had unearthed on the far wall began to attract my attention. They were very tightly packed and proving impossible to shift, surviving several intensive onslaughts. It was only when I got up close looking for a weakness that I felt the cold air on my face coming through the gaps. Eureka, these rocks had to go!

Ben Atkinson arrived with news that the others had finished and were abseiling. We were expected to follow. I immediately introduced him to my discovery and the rock puzzle. He was keen to help, the pick on his rock hammer better able to fit in the gaps and exert some leverage. Eventually one rock was prized out to hurtle down the spoil promptly followed by the others. In front of us was a square window into blackness. After cleaning up the edges and satisfying ourselves that the shutters weren't going to come down unexpectedly we decided to have a look at what we had found. I was first onto the threshold. Ahead of me stretched the rift, wider and continuing to run northwards into the far distance, an awesome place. It was a truly magical moment. In front of us lay unknown ground, a prize we so often searched for, talked about and even dreamed of. It was ours for the taking.

A glimpse of the past...

To gain access we needed to drop down rubble to reach a firm walkway. At this point the remains of wooden supports running back under the spoil indicated there had once been a tunnel at a lower level. Ahead led quickly into a blind damp area where intriguingly water seemed to be soaking away. Above the walkway we clambered onto a comfortable dry ledge, the perfect place to use as a base. Clearly we were not the first to think so judging from the rusting remnants of various containers, candle stubs on the wall and the carefully positioned clay pipe subsequently found on a wall of rocks. The way on was to step off the ledge up into a narrow cleft. This led to the base of an impressive rift which continued up-

wards beyond our beams. This would need to be explored on another occasion, no time for heroics. Continuing north a slope downwards reached the remains of an old ladder probably the one needed to scale the rift! A tunnel ran on for 15m ending in a blockage caused by infill from above.

After looking at what could be safely and quickly explored, it was time to get back to Treweeks, follow the others to surface and report our findings. These workings had been lost for over a hundred years and if our window had shut we may well have had to wait a considerable time for our predicament to be appreciated. Thankfully our excavation was sound and we eventually made the surface and found a place at the bar without any difficulty. Needless to say we had much to discuss. Bearing in mind the day we named the large stope D-Day Rift, the comfy basecamp becoming our own D-Day Landing.

Higher secrets...

Two weeks later a team returned to D-Day Rift eager to find out what mysteries lay out of sight in the darkness above. Only the first section proved difficult and Dave Flowers was soon at the top drilling bolt holes. Gaz, Crusoe and I followed thankful for the rope. Slightly higher at some stemples Crusoe and I mistakenly took the passageway continuing north into a chamber with a circuit to another beyond. In the first chamber we observed the small slanting window that led through to a crawl strangely at right angles to the rest of the system. But more of this later. We decided we had better look for the others.

Back at the stemples we clambered up into a tunnel leading south. We soon found them in a network of low workings. Here I was abruptly chastised by Dave for almost standing on an impressive array of clog prints, and then for nearly crawling over the skeleton of a small mammal (Rat?). 'Slow down and open your eyes man!' He was right of course, things were so easily missed or even destroyed. I resolved to be more cautious in my exploration. There were some neat walls that had been constructed to help support the roof and at various vantage points candles had been positioned. In one spot there was an old bucket and in another, two rectangular slates lying against a rock looking very out of place. Perhaps they were tallyboards though no writing was discernible.

Down a tunnel heading south we came to The

Void, an abrupt 3m chasm surrounded by tottering undercut rocks. We estimated that we were now above the breakthrough point and that the chasm was caused by the same collapse that had blocked the section below (later verified by a survey). With care it was possible to reach the far side to where the tunnel continued. But it wasn't a route for the squeamish. Here it became obvious why the miners had built the walls- the whole area was badly fractured. A long section of the roof had become totally detached and other blocks were threatening to fall. Being of optimistic outlook and using the utmost of caution we entered the lowering passageway. We were rewarded with an abundance of clog prints, more candle stubs and a squeeze through into a splendid 3m high trial shaft.

It looked for a minute that this might be the end of our endeavours until Dave Flowers realised that the debris at the base of the shaft, which had hindered our entrance, was also blocking access to a tunnel beyond. One very large rounded boulder in particular required a Herculean effort on his part before it was safely out of the way and we were able to continue. Very quickly we arrived at the edge of a 3.5m drop in another series of workings. Ahead at the far side of the drop and still running south was a passageway stacked full of backfill. A big effort would be required to check if the tunnel led anywhere. After clambering down to the base of the workings I was fortunate when a rock dislodged from above, whizzed past my ear and struck the ground next to my foot, a reminder of our vulnerability in this environment. We found a hole leading through into a parallel working from where it was possible to climb back up to reappear at the backfilled passage. We could go no further without digging.

There was however, one place we hadn't been, through that odd slanting window we had visited earlier. On the way back I kept a rough account of the distance we had covered to help me construct a map later. Beyond the window a narrow crawl did indeed run westwards for about 10m. It felt very different to the previous sections of the mine. The strata here dipped from north to south at approximately 25 degrees. The miners had clearly worked with the grain of the rock resulting in a

sloping roof with tiny side passages that ran up and down at right angles from our crawl. All of these were blocked apart from one, which lured us upwards. After 7m of squirming we reached a cross-roads where we were intrigued to find an old kettle and two Spangle wrappers! The side passages were again blocked but ahead the tunnel continued to gain height for another 7m to where it was finally choked by fine infill.

Spangles are fairly modern phenomena, a popular sweet of the 60's and 70's. Surely these were proof that we weren't far from surface. They must have been washed in or perhaps, remembering the skeleton, carried there by vermin. Not that this explains the kettle. With much to report we made our way back out well satisfied with the day's discoveries.

A degree of accuracy...

It had been an exceptionally good two weeks for GOES our first major discovery in quite some time. But naturally enough the actual heights involved and the exact location of the passageways caused much conjecture within the club. An accurate survey had to be done and on July 18th somewhat by default Erik, Brian and I found ourselves as the nominated team.

Before we abseiled Steve Lea gave us some lessons on how to use a sighting compass. Unfortunately I've only got good vision in one eye. Realising I was a lost cause the technical job was given to Erik. I was in charge of the white stick, quite apt perhaps. The idea being that it would be easier to sight on in the dark. I was also to be chief scribe with Brian there to help with the organisation and checking of details.

It was a methodical and slow process but well worthwhile. We were able to cover all the new areas and build up a reliable set of data with which to map and understand the mine. One tip: don't sight onto the base of your white stick. Erik seemed unable or unwilling to place his head on the floor at exactly the same spot to take the subsequent reading.

Hard facts and supposition...

- Our calculations showed the top of the 'Spangle Series' to reach 155m. The top of Treweeks Shaft is 166m so our high spot was just 10m short of surface, although in the area where we might anticipate the Spangle tunnel to break surface there are numerous pits so it might be

slightly less. This area is known as 'Bryniau Poethion' and these bell pits date from the Welsh California period of 1849 when copper was discovered close to the surface. It is possible that the Spangle Series date from this time and that the connection to the Old Mine was fortuitous

- Floodwaters from the great summer storm of 1993 caused the fill in some of these bell pits to settle and the council became rather concerned about hidden shafts. Great Orme Mines, who had an excavator on site, volunteered to do checks and fill them in. During this time Tom Parry and others helped excavate several of the pits down to the original rock surface, at a depth of 10 to 15ft. Were any of them sucking Spangles at the time or had floodwater already washed old wrappers into the system?
- According to the Internet, Spangles, which were made by Mars, were brought out in 1948. For the nostalgic amongst us they were a fruit flavoured square boiled sweet in a tube. You could suck them thinner and thinner until you felt you could cut your tongue on them, but upon trying they would always snap in your mouth. They were taken off the market in the early 80's but re-introduced in the 90's due to popular demand. However, it seems the buying public then remembered why they had not bought them in larger quantities first time around and they were withdrawn again.
- As anticipated were able to confirm The Void as being above the collapse at the breakthrough point.
- It was interesting to find that the trial shaft and the two parallel workings lie some 10m above and to the south of the West to East passageway leading off Treweeks' 135m level. In a small roof cavity on this passage I have discovered wet calcited spoil clearly run in from above. It is my theory that this could represent a short cut to the higher 'parallel workings', being the route by which ore was fed down into trucks. (cf *New Dig update*)

- Little is known about the levels off Higher Shaft. Sadly the shaft was filled in and even its location at surface lost under spoil and landscaping. However its position can be deduced as lying in the loop between the Summit road and the Great Orme Mines road by using the several points at which it has been observed underground: (1) Towards the end of the right fork in Penmorfa; (2) On Owens' 106m level (*Location 24*) where there is a large, part blocked shaft; (3) On Treweeks 92m level (*Location 25*) where it is the source of a huge scree fan.
- The reality is that Higher Shaft still remains over 80m from the tunnels we recently discovered, but a rarely visited area known as 'Duncan James' presently accessed from between Roman Shaft and Wagongate does lie very close. This complex system of interconnecting early and 19th century workings might become a stepping stone in the right direction. Tunnel orientation, water flow and the pattern of backfill all suggest it was worked from entrances to the south towards Higher Shaft.

Although mine maps are usually regarded as legal documents and required to have a high degree of integrity, the mysterious tunnel drawn from Treweeks to Higher Shaft may turn out to be nothing more than a cartographer's whim to add detail and perhaps impress shareholders. If this is the case, we were very fortunate that a fictitious line led us to look for and find our 'New Frontier' but maybe, just maybe, there are still more hidden passages waiting to lead us on towards Higher Shaft.

New Dig Update...

It wasn't until the 30th of January 05, whilst the majority of the team were busy below constructing the landing stage at Wagongate that I found myself in position to attack this dig.

A secret weapon was on hand for the task, my old 'Snowdon Curver' ice axe. A revolutionary tool when it was purchased in the late 70's, magnificent for going into ice but extremely difficult to remove. The constant struggle to extricate the pick rendered the climber's arm exhausted after just a few moves! Unfortunately too short for a good walking axe it had remained hidden in the garage, unused for some ten years. With some heart searching about misusing my once prized possession in such a way, I set to work.

Gradually the smaller calcited rocks were broken off

and scraped away to undermine the larger boulders. The axe proved superb for both digging and levering. Increasingly the water dribbling in from above mixed with the dislodged grit to form sludge. By squatting across the cavity with one knee on a dry ledge I managed to avoid lying in the mixture and from time to time kicked it together with the larger rubble out of the cavity into the level below. Eventually the more stubborn boulders had gone and upward progress was made quite quickly. All the rocks above were a handy size and loose. It was simply a matter of prodding them and keeping out of the way of the ensuing avalanche.

I was joined by an inquisitive John Carpenter who helped me to throw rocks. The nature of my excavation was becoming increasingly apparent. Above within a narrow rift, rocks to each side that hadn't tumbled were in fact 'deads' carefully stacked to leave a vertical space between them. This gap must have become blocked at a later date. Very soon we reached a point where my axe wasn't long enough to touch the suspended rocks without leaving the safety of a solid roof. The game became one of stab at a rock and dodge in quickly, but eventually even my neck wasn't long enough for any more heroics.

The dig is exciting, with a long pole progress should be swift. I anticipate breaking into the 'parallel workings' (Our survey placed them at 140.5m AOD, I estimate the dig to have reached 138m.), but there may be further surprises waiting to be unearthed along the way.

Dave Wrennel
March 2005

SUMMER WALKS 2005

All walks start at 7pm and are usually gentle strolls which last approximately 2 hours. Sturdy footwear is recommended. Following is a list of the proposed walks, but all are subject to confirmation. **Please check the community news section of the North Wales Weekly News which will provide full details of the walk taking place and the arranged meeting place.** If the weather is poor, it is very likely that the walk will be postponed until a later date. If you have any queries please contact Ali Davies on 01492 864165

DATE	WALK DETAILS	MEET AT
May 19 th	Ffynnon Gogarth, the Tom & Jerry.	Summit car park
May 26 th	Traeth Melyn [yellow sands]	West shore car park
June 2 nd	Site of old Whimsey	Waterboard building
June 9 th	Pigeons Cave & Porth yr Helig	North Shore toll gate.
June 16 th	Caerhun Church & Fort	To be arranged.
June 23 rd	Old Well at Pant Y Ffridd	Waterboard Building.
June 30 th	Deer Leap Area, Medieval Hall & Hafnant.	Park nr St Tudno.
July 7 th	Mynydd Marian [Llisfaen]	To be arranged.
July 14 th	Eglwysbach Unseen Burial Chamber	To be arranged.
July 21 st	Cadair Ifan Goch [Tony]	Maenan Abbey hotel.
July 28 th	Graig Llwyd [Dave Chapman]	To be arranged.
August 4 th	Fairy Glen, Dwygyfylhi.	Car park at SH 75057702.
August 11 th	Little Orme Memorial	Little Orme end of Prom.
August 18 th	Pen Y Dinas	Ski Slope car park.
August 25 th	Gun Sites and hopefully a good sunset.	Gun Sites

MINES IN THE CONWY VALLEY

R. J. Fletcher

Lead - zinc and copper mineralisation in the Conwy Valley extends discontinuously from Betws-y-Coed to the Great Orme on the coast to some 20 km to the north. There appears to have been two main geological controls over the location and extent of this mineralisation :-

1) Stratigraphic Control

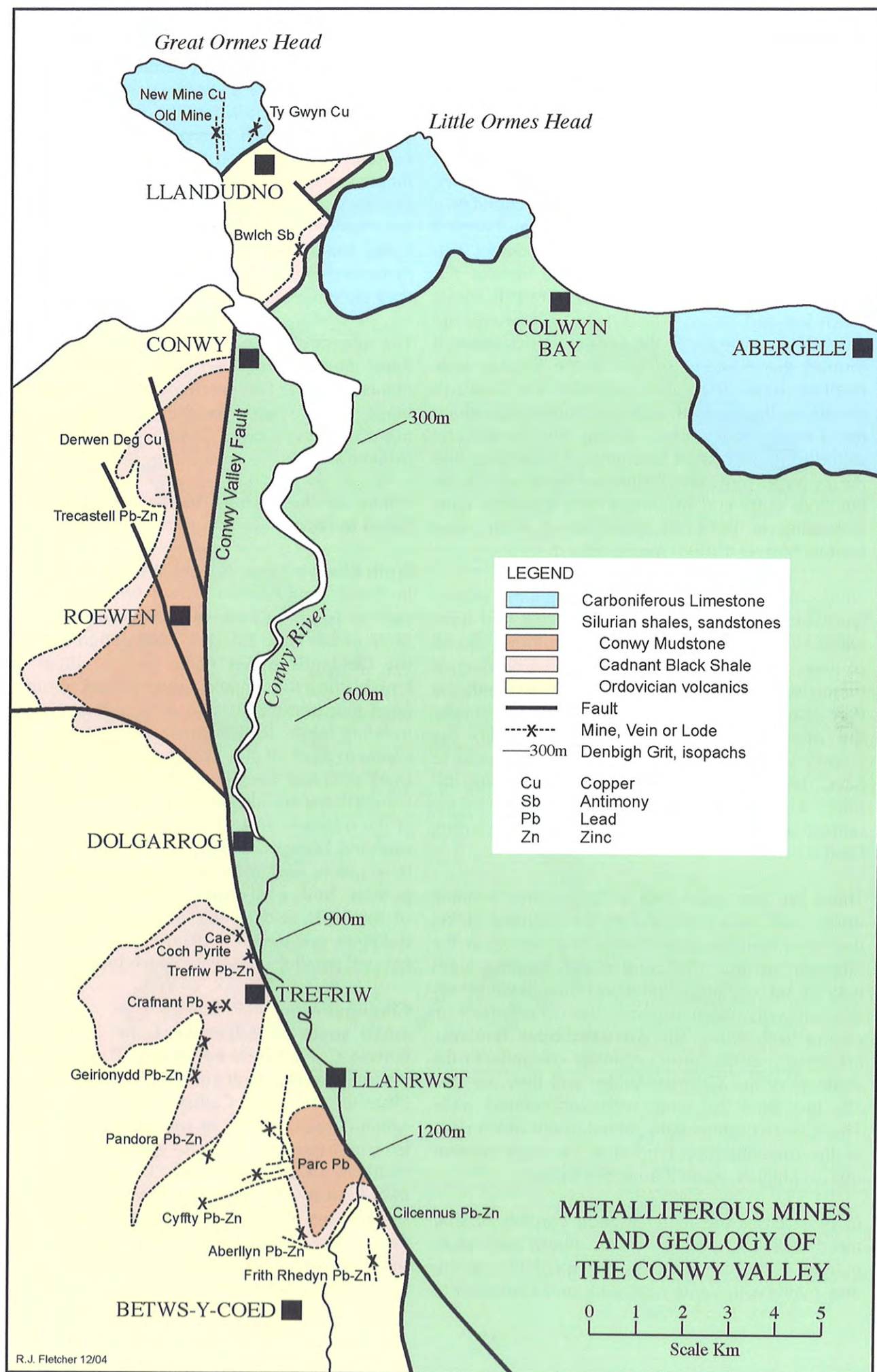
The Ordovician volcanic activity that formed most of Snowdonia, was followed by a long period (about 18 My) of deep-water conditions that lasted into the early Silurian Period. During this time the 360m thick sequence of fine-grained shales and mudstones, that now underlie the Conwy valley, were deposited. These were followed by a period of renewed tectonic activity, during which the 300 - 1200m thick Denbigh Grits were deposited in a rapidly subsiding basin to the east of the Conwy valley. The end of the Silurian Period was followed by a long interval of uplift and erosion during the Caledonian Orogeny, before the return of marine conditions in the Carboniferous. **The lithological sequence in the Conwy valley is as follows :**

AGE m.y.			FORMATION	THICKNESS metres	LITHOLOGY
CARBONIFEROUS 354 Tournasian			Lower Limestone Basal Beds	300	Brown sandy dolomites overlain by pale grey to white limestones
~~~~~ 66 m.y. unconformity during the Caledonian Orogeny ~~~~~					
SILURIAN	420	Wenlock	Denbigh Grits	300 (Conwy) increasing to 1200 (Llanrwst)	Sandstones and siltstones with many slumped or "disturbed" beds that thicken rapidly to the south
	425	Llandovery	Pale Slates	100	Pale grey mudstones
	434		Bryndowski Mudstone		Dark grey mudstones
	434		Ashgill	Conwy Mudstone	180
ORDOVICIAN	443	Caradoc	Cadnant Shales	80	Black shales with pyrite along the bedding planes
	443		Dolgarrog / Tal-y-fan Volcanics	1000	Submarine pillow basalts and basaltic tuffs. Dolerite intrusions at the base of the formation may be feeders.
	My		Crafnant / Snowdon Volcanics		Sub-aerial and submarine rhyolitic lavas and tuffs.

The Great Orme copper mines occur in the dolomitic basal sequence of the Carboniferous Limestone, just above the unconformable contact with the underlying Ordovician rocks.

Most of the Pb-Zn-Fe mineralisation in the Conwy valley (e.g. Aberllyn, Parc, Cae-Coch, Trecastell) appears to be located in, or adjacent to the Upper Ordovician **Cadnant Black Shales** that forms the lowest unit of the 360m thick sequence of shales and mudstones that separate the Ordovician Volcanics to the west from the massive Silurian sandstones to the east. The Cadnant Shales consist of black pyritic shales up to 80m thick with pyrite occurring as laminations along the bedding planes. They are well exposed on Cefn Cyfarwydd on the north side of the Crafnant Valley where they overlie basalt of the Dolgarrog Volcanic Formation.

The Conwy valley was formed by erosion of this belt of soft shales along the line of the Conwy Valley Fault.



## 1) Structural Control

The most obvious structural control is the N-S trending Conwy Valley Fault that gives rise to the prominent escarpments between Dolgarrog and Gwydyr Park. This is not a single fracture but a broad tectonic zone up to 2km wide composed of numerous parallel fracture planes. Near Trefriw, these appear to be normal faults with a cumulative downthrow to the east of at least 500m, bringing Ordovician volcanics to the west into contact with Silurian sediments to the east. The vertical displacement appears to decrease northwards and is much less at Conwy. This Fracture Zone was apparently in existence in the Silurian Period when it formed the western margin of the Silurian sedimentary basin that now underlies the Denbigh Moors to the east. Continued subsidence along the Conwy Valley Fault during the Silurian, resulted in the repeated slumping of sediments into the basin to form the "Disturbed Beds" within the Denbigh Grits and resulted in the Denbigh Grits increasing in thickness from about 300m near Conwy to over 1200m near Llanrwst.

Numerous second-order tension faults extend westward from the Conwy Valley Fault and have either WNW-ESE or WSW-ESE orientations. Some of these are mineralised and the most productive mines, such as the Trecastell Pb-Zn mine and the Parc-Aberllyn Pb-Zn mines, were located at or near the intersection of these E-W faults with the Conwy Valley Fault. The mineralisation appears to have diminished in intensity with increasing distance westward as most of the mining activity occurred within 1 - 2km west of the Conwy Valley Fault.

There are two main sets of lodes, one trending north-south nearly parallel to the regional strike; the other trending approximately east-west in the direction of dip. The north-south trending lodes may be up to 25m in width and often have poorly defined walls that merge into the country-rock on one or both sides. The east-west lodes, however, are mostly in the stronger brittle volcanics in the footwall of the Cadnant Shales and they are usually less than 2m wide with well-defined walls. These were preferentially mined in the olden days, as the mineralisation tended to be more continuous and higher grade than in the shales.

In most cases the mineralisation consists of shattered wall-rock cemented with quartz and calcite gangue. The ore minerals are sphalerite, galena and pyrite with some marcasite and chalcopyrite.

Evidence of more than one period of movement is seen in many of the lodes, resulting in further brecciation followed by a second period of mineralisation. At the Hafna Mine, the first-formed breccia was cemented with quartz and zinc blende; this cement was then itself brecciated and further cemented with calcite. At the Cae-Coch Mine, the breccia was cemented with pyrite, re-broken, and re-cemented with pyrite, calcite and quartz. At Cyffty Mine, the lode consists of a slate breccia cemented with galena that was re-brecciated and then re-cemented with galena.

The mineralisation was probably emplaced along these faults during extensional tectonic movements from late Devonian to Upper Carboniferous times, as K-Ar ages for the mineralisation range from 339 m.y. (Lower Carboniferous) to 240 m.y. (Middle Triass).

## Mines in the Conwy Valley - described from South to North

### Ffrith Rhedyn Mine [G.R. 806 573]

In Coed Bron-Rhedyn above Rhyd-y-creua, 1km east of Betws-y-Coed, old workings known variously as the Ffrith Rhedyn, Gallt-y-Ffrith Rhedyn or **the Oaklands mines** occur over a 400m strike length along two parallel vertical lodes about 10m apart that trend 170°, and on a vertical cross-lode trending 084°. In the Rhyd-y-Creau Gorge at the southern end of the workings there are several small adits and trenches on the NNW-SSE trending lode. There are also shallow stopes and trenches at the northern end. The lodes consist of mineralised and brecciated dark-grey to black mudstone. Brecciation and mineralisation occurred at two periods, both post-cleavage. The minerals consist of sphalerite and galena, in a quartz, calcite and dolomite gangue and occur as multiple, closely spaced, parallel veins within each lode.

### Cilcennus Mine [G.R. 809 582]

100m south of Cilcennus Farm, 2.5km NE of Betws-y-Coed, a lode trending 172° occurs along a 1m wide vertical fault zone cutting grey tuffaceous siltstones and black Cadnant Shale. The mineralisation consists mainly of sphalerite with a little galena, in a quartz and calcite gangue that forms the matrix in a siltstone breccia. The workings consist of at least two levels entered by adits and in 1967 several tons of ore were visible in the lower dump. Two minor surface trials [G.R. 808 580] form a similar line of workings about 200m to the south-west in Coed Cilcennus.

### Gwydyr Park

The Llanrwst lead-zinc field consists of 27 lead-zinc mines scattered over an area of almost 20 km² between the Llugwy and Conwy valleys. The most productive were the Aberllyn, Parc, Llanrwst, Cyffty, Hafna, Gorlan and Pandora mines. Between 1848 - 1938, these 27 mines had a recorded production of 13,000 tonnes of lead ore and 14,200 tonnes of zinc ore, but their total historical production may have been much larger. The Parc mine was reopened in 1953 by Johannesburg Consolidated Investments and finally closed in 1962.

The lodes were mineralised fault fissures penetrating a series of inter-bedded tuffs, rhyolite lavas and the overlying Cadnant Black Shales. These steeply dipping lodes form 3 main sets, trending N-S, E-W and NW-SE. The important workings were all close to the intersections of the lodes and the most productive were :-

N-S Lodes	Aberllyn - Parc - Ty'n-twill line of lode.
E-W Lodes	Principal Lode extending from Parc - Llanrwst - Cyffty.
NW-SE lodes	Hafna and Pen-yr-allt lodes

The north-south veins are up to 25m wide with poorly defined margins. The east-west veins are much thinner (<2m) with well defined margins and were generally more productive. The dominant minerals are sphalerite, galena, pyrite and minor chalcopyrite, in a quartz gangue. The mineralisation decreased at depth and few workings extend below the Parc No.3 adit level.

### Aberllyn - Parc - Ty'n-twill Lode

The Aberllyn mine (G.R. 796577) is located 1.5 km north of Betws-y-Coed, at the southern end of Llyn-y-Parc. Initially it was worked for lead, but by 1900 it was the largest zinc producer in the area, with lead comprising only a very small part of the output. Between 1869-1904 the mine produced 2548 tons of zinc ore (sphalerite) containing 29-44 % Zn, but only 25 tons of lead ore (galena) containing 78-80 % Pb, although the large size of the stopes suggests the total production may have been much greater.

The Parc Mine (G.R. 788601) 2km north of Aberllyn was the largest mine in the Llanrwst area. Mining started before 1850 and was carried on by many different companies until 1958. Recorded production between 1860-1913 was 1175 tons lead ore

containing approximately 80% Pb, and 984 tons zinc ore containing 32-47 % Zn.

The country-rock consists of dark siliceous volcanoclastics which merge upwards into the overlying black pyritic Cadnant Shale. Strong volcanic rocks adjacent to the lode formed a good host rock for mineralisation, whilst the weaker shales generally hosted an impoverished lode.

The most important lodes were the Hard (Gors) Lode, the Soft (Shale) Lode, and the less important Intermediate Lode. These trend roughly NNW-SSE and dip steeply (70°) to the east. The footwalls of these lodes are well defined, whereas the hanging-walls merge into the sheared and brecciated country rock.

The Soft (or Shale) Lode is the most easterly of the district and marks the eastern boundary of the mineral field. It is a mineralised fault that cuts off all the E-W trending lodes, such as the Principal lode at the Parc Mine. The Soft (or Shale) Lode ranges from 5 - 25 metres in width and dips steeply to the east at an angle of 72 degrees. It is not a clean-cut fissure, but a zone of brecciated rock, cemented and mineralized during two periods of movement and mineralisation. This fault has a large down-throw to the east and brings the older sequence of volcanic rocks to the west into contact with the younger Cadnant Shales to the east.

The Shale Lode has been followed from the Aberllyn Mine for a distance of nearly 5km northward through the Park Mine to Ty'n-twill (west of Llanrwst), as a string of sheared lenses of zinc blende in brecciated country-rock. The gangue is mostly comminuted black shale, with occasional patches of calcite and quartz, and with bunches of zinc blende here and there. These bunches appear to be shear-lenses or "augen" of blende in slickensided black carbonaceous shale with hardly any quartz present and may represent the dismembered fragments of a once continuous lode. The tectonic origin of the Shale lode is demonstrated by the presence of sheared and slickensided strata.

The Hard Lode lies about 50 - 100m west of, and parallel to, the Soft Lode and similarly trends north-south and dips east at 70°. The Hard lode is about 2m wide at the southern end near the Aberllyn shaft, but increases up to

10m in width north of Llyn-y-parc, where it is continuous with the Gors Lode of the Parc mine. There is no true hanging-wall but there is a distinct footwall. In the workable parts, the lode consisted of brecciated black slate and tuffs cemented by a quartz gangue, with thin veins of galena and blende as well as vughs lined with crystals of blende. However, at the Aberllyn mine in the south, it contained blende almost to the exclusion of galena. The lode suffered a second period of brecciation, after which it was re-cemented with pyrite as seen in the western section of the Aberllyn mine where sphalerite gives way to large masses of pyrite below the No.4 level.

The country rock lying between the Soft (Shale) Lode and the Hard (Gors) Lode consists of a brecciated mass of country rock cemented with quartz with localised enrichments of zinc blende that have been worked in places. It therefore appears that these two lodes define a wide zone of mineralized fault-breccia.

To the west of the Hard Lode, the Fuchclas Lode also trends north-south (020° Mag), but dips 80° west. In the upper workings it averages less than 1m in width, but widens to 1.5m at depth. It carries galena with subordinate quantities of blende.

There are also several lodes that trend approximately east-west and the most important of these are :-

#### **Hafna Lode (G.R. 780602)**

The Hafna mine was one of the earliest lead workings dating back to at least 1620 and possibly to roman times. The mine worked the WNW-ESE trending Hafna lode that was up to 2.5m wide in places, over a 300m strike length to a depth of 125m. The Hafna lode dips northwards at 60-70° in dark shales and volcanic ash intruded by a dolerite sill. The ore consisted of galena, sphalerite and pyrite. Some of the lead ore contained up to 7 oz Ag / tonne although the average was only 4oz/ton. Total recorded production between 1860-1913 was 803 tons of lead ore containing 80-82 % Pb and 2555 tons of zinc ore containing 33-44 % Zn. Production ceased in 1915.

#### **Principal Lode (Parc / Llanrwst / Cyffty mines) (G.R. 779598 - 772589)**

This dips steeply north and varies in width from

0.5m near the surface to as much as 4m at depth. It consists of brecciated black mudstone in a matrix of calcite and saccharoidal quartz with galena, sphalerite and occasional stringers of pyrite and more rarely of chalcopryite. The crystals of calcite are up to an inch across and occasionally occur as star-calcite or schiefer-spar. In 1952, the Llanrwst Lead Mines Company Limited (a subsidiary of JCI Co.Ltd.) investigated the Principal Lode by means of 6 drillholes over a strike length of 1.75 km and outlined a recoverable resource of 709,620 tonnes at an average grade of 5.8 % Pb and 2.0 % Zn. The best mineralisation occurred at the eastern end, where it terminates against the Shale Lode, and the Pb-Zn content gradually declined and the marcassite / pyrite content increased as the Principal lode was followed westwards towards the Cyffty mine.

#### **Pen-yr-Allt - Griffin - Cwmlanerch Lode (G.R. 797575)**

This is a complex series of workings on two NW-SE trending lodes which lie approximately 50m south of the Aberllyn Mine mill-site and extend over a strike length of approximately 450m from the Conwy River in the east to Pen-yr-allt Isaf cottage in the west. The eastern workings were known as the **Cwmlanerch** mine and are close to river level and very wet. The portal of the old Cwmlanerch No.1 level lies between the main road and the railway line. The western workings consist of 5 levels on the 1m wide east-west trending **Pen-yr-allt lode** which dips north at 60°. Prior to 1895 these were worked for silver-lead as the **Griffin mine**, and then between 1896-1905 were worked for zinc by the Brunner Mond Company. The ore consists of galena and sphalerite in equal proportions.

#### **Pandora Mine (G.R. 767602)**

The Pandora mine worked four lodes, Goddard, New, Champion and Francis to a maximum depth of 100m. Shafts and adit workings extend over 1km length of a NE-SW trending, steeply dipping, quartz stringer lode up to 1m wide, in black, pyritic Cadnant Shale. The pyrite is very fine grained and laminated but also shows occasional large "blebs" of framboidal type pyrite. The lodes consist of brecciated country rock cemented by calcite, galena and sphalerite. The recorded production between 1877-1911 was 2822 tons lead ore and 1839 tons zinc ore. The galena contained 80% Pb and the sphalerite 44% Zn. In 1907, a 1.3 km long adit, the Pontifax Level, was driven

from the side of Llyn Geirionydd to drain water from the 33 fathom level.

Many minor old workings occur in the Crafnant and Geirionydd valleys. These were brought together in the 1890's as the **Klondyke Mine**.

### **Llyn Geirionydd**

Between Pen-y-Drum and Llyn Geirionydd, the **North Willoughby** workings (G.R. 765598) consist of trial adits and shafts. Northwest of the lake a line of open stopes, shafts and adits mark the NNE-SSW trending lode of the **Gilvin Ddu** mine (G.R. 762611) on a lode up to 1.5m wide. A short distance further north the two trial adits of the **Glan-geirionydd** workings have been driven on a similar trending lode to that of the Gilvin Ddu mine.

### **Bryn Cenhadon mine** (G.R. 766618)

Located on the western side of the Afon Geirionydd gorge, north of the lake. At the top of the gorge are shafts and open stopes on a NNW-SSE trending lode and an east-west lode cuts the main lode on the hillside above the gorge. Northwards, the gorge appears to follow a belt of mineralised ground with numerous minor adits driven on at least two more NNW-SSE lodes and another east-west cross lode. Lead ore was the main objective, though abundant ochre in the northern levels suggests pyrite was present in some quantity. At the bottom of the gorge in comminuted black shales, two adits with large stopes were driven on a 0.2m thick lode that trends east-west and dips north at 20 degrees from the horizontal. On the hillside north and east of the gorge a number of trials have been made but with no evidence of success.

### **Crafnant Valley**

These lodes are mostly brecciated fractures that trend either N-S or E-W in black shales and felsic tuffs. They consist of quartz gangue with pyrite, galena and minor sphalerite. Most are less than 0.5m wide and dip at angles of 20-50°. Workings occur on six farms on the northwest side of the Crafnant valley of which

**Cae'r Hegle** (G.R. 765633) was the most extensive with minor workings on an east-west trending lode over a distance of approx. 100m.

**Cae'r Gwair** to the north and north-east was exploited from a shaft and an adit:

**Gelli-lydan** - at the **Gelli mine** located south-east of Cae'r Hegle, an opencut and two levels exploited calcite-galena ore along a 1.5m wide fault zone which dips north at 45°.

**Gelli-newydd, Bron-felen and Bron-fadog** - there were at least five levels driven on a pyritic lode in the triangle formed by these 3 locations.

**Trefriw Lead Mine** (G.R. 779644) also known as **Coed Gwydyr** or **Bryn-y-Pyll**, is located on the road 1km north of Trefriw, at the southern end of the Cae-coch pyrite deposit and approximately 100m NW of Bryn-Pyll homestead. These are minor workings whose only reported production was 1.5 tons of galena in 1861. The workings consist of shallow shafts and adits that extend along a NE-SW trend over a distance of approximately 200m. The main adit (cross-cut ?) was 120m in length and cut 5 narrow lodes up to 0.2m wide trending E-W and carrying galena, sphalerite and minor pyrite. The mine was promoted between 1915-20 as the Conway Lead & Silver Mine.

### **Cae-Coch Pyrite Mine** (G.R. 775 654) 2km north of Trefriw.

The Cae-Coch deposit occurs at the contact between the basaltic Dolgarrog Volcanic Formation and the overlying black pyritic Cadnant Shale. The NW trending zone of pyrite mineralisation extends from just north of Trefriw over a strike length of approximately 2km around the hillside into the Afon Ddu valley. Cae-coch mined the central 1-2m thick part of this zone over a strike length of approximately 1km. The mine worked two separate lenses, the smaller northern one to the east of Blaen-y-wern (ruin) while the larger lies to the east of Rhibbo farmhouse. Both terminate to the east against a NW-SE trending fault, whilst to the south and west the mineralisation thins to less than 30cm. The southern lens dips SSW at 30° with minor open folds and minor fault displacements. The northern lens dips south at approximately 10°.

The workings extend over an area of approximately 200m x 200m and consist of room and pillar stopes accessed by 4 adits. The ore is a 2m thick bed consisting of a fine-grained aggregate of pyrite and quartz with a little calcite and contains up to 30% S (pure pyrite contains 46.6% Fe and 53.4% S). Nodules of pyrite up to 25mm diameter are common in the adjacent mudstones. The roof of the workings consist of a friable pyritic mudstone up to 1m thick (known locally as "zebra stone"). The dolerite immediately below the ore is also enriched in pyrite. The mine produced 91,400 tonnes of pyrite ore between 1860 and

1875. A further 16,250 tonnes was produced in 1917-18. Some exploratory development work on the No.2 and 3 levels was carried out in 1941-42 to test for southern and western extensions, but no ore was mined. The sulphur springs at Trefriw occur directly below the mine and were apparently known to the Romans.

**Trecastell Pb-Zn Mine** (G.R. 760746) formerly known as **Pwll-y-Cochion** (Red Pits).

The Trecastell mine, which may have been worked by the Romans, is located on the Henryd-Llangelynin road 5km SW of Conwy, with the upper adit workings west of the road, and the lower shaft workings east of the road. The mine occurs at the contact between Ordovician Tal-y-fan basaltic volcanics and the overlying Cadnant Shales, which contain interbedded siliceous tuffs that resemble chert.

The workings exploited five steeply dipping lodes over a 300m strike-length to depths of at least 175m. These were :- the **Aberllyn Lode** which trends NW-SE and dips at 70°NE parallel to the bedding of the Cadnant Shale host rock where exploratory drilling in the 1950's located several fine-grained pyrite bodies. The **Main** (or Principal) **Lode** trends E-W, is almost vertical and ranges from 0.2 - 1.8m (average 1.2m) in thickness. The Main lode is transgressive to the bedding and cuts across the contact between volcanics, tuffs and a 10-15m thick bed of black chert. Where the lode cuts the chert it is impoverished although the lead-zinc content of the lode is similar above and below the chert indicating that the character of the wall rocks has a strong influence on the mineralisation. The Main lode appears to be faulted out against the Aberllyn lode. The **No.2** and **No.3 lodes** are branches of the Main Lode, and also trend E-W, are almost vertical and also appear to terminate against the footwall of the Aberllyn Lode.

The lodes have been described as wide, sparsely mineralised shear zones containing an intimate mixture of fine grained sphalerite and galena in a calcite gangue, usually in the proportion of 60% sphalerite to 40% galena, but with occasional large "bunches or seams" of sphalerite and/or galena. In 1928, the northern end of the lode was described as six feet wide carrying 2 feet of galena and 4 feet of sphalerite ore. Recorded production between 1892-1913 was 6,449 tons lead ore containing 64-81% Pb, and 12,514 tons zinc ore containing 44-56 % Zn, and 88,225 oz silver.

It closed in 1920, but was reopened in 1948 as Trecastell Lead Mines Limited when a flotation plant was erected and drilling and development work were carried out. The mine was finally closed in 1956. In the 1950's, 22,720 tons of production averaged 3.2% Pb and 3.6% Zn. The lead concentrate was reported to contain approximately 15 oz Ag / ton.

**Derwen-Deg Copper Mine** (G.R. 762756) 2 miles south-west of Conwy.

In 1860-65, approximately 30 tons of copper oxides and carbonates of copper were produced from a lode trending N-S that was stoped over a length of 60 feet to a depth of 18 fathoms (15m). In 1877 it was described as "a N-S bearing lode 400 feet in length that had been worked over a length of 160 feet to a depth of 18 fathoms. Recorded production in 1878-1881 was 58 tons at 10% Cu, plus 20 tons at 7%Cu.

The host rock is Cadnant Shale.

**Bwlch Antimony Mine** (G.R. 787794)

A little known occurrence of antimony-lead-zinc mineralisation at Bwlch Farm near Deganwy, consists of an E-W lode with patches, veins and stringers of sulphides in highly altered Ordovician volcanics close to the contact with the overlying Cadnant Shale. The vein consisted of quartz with polymetallic sulphide minerals including stibnite (Sb sulphide), semseyite (Pb-Sb sulphide), galena, sphalerite and marcassite. It was worked, prior to 1837, from adits and a shaft said to be 120 feet deep. Unfortunately nothing is known of its history.

**Great Orme Copper Mines**

The Great Orme consists of a sequence of limestones that are separated by beds of shale varying from a few inches to several metres in thickness. These rocks were deposited in warm, shallow seas that covered the area in Lower Carboniferous times, about 350 million years ago. In the vicinity of the mine, the limestone has a brown porous appearance that is partly due to the replacement of the calcite by dolomite. The copper mineralisation is developed along fractures and open cavities where steeply inclined faults cut these dolomitised limestones. The faults, which trend in a north-south direction, are all mineralised, but the most intense mineralisation was found along 4 parallel copper lodes approximately 50m apart that trend roughly from Penmorfa in the south,

to St Tudno's church. The ore typically consists of dolomite with chalcopyrite crystals up to 5mm in size. Other minerals, including galena, sphalerite, pyrite, and marcasite also occur, but only rarely. In the upper levels, the chalcopyrite is altered to malachite (copper carbonate) which formerly occurred in sufficient quantities to be mined as copper ore in its own right. Blue copper carbonate (azurite) also occurs in the distinctive "Azurite-Bearing Shale" and Native copper metal has also been reported.

The workings are complex, with three separate Victorian mines: the **Old Mine** (G.R. 771831) and **New Mine** (adjacent to Old mine) located on the upper slopes of the Great Orme; and the **Ty-Gwyn Mine** (G.R. 778828) in Happy Valley on the east side of Great Orme. The earliest record of mining was in 1692, but large-scale mining did not occur until 1830-1850 when 300 men were employed. Ty-Gwyn mine closed in 1853, New mine closed in 1864 and Old mine closed in 1881. As the deposit was apparently first mined 3500 years ago, the total production is unknown, but between 1804-1913 the Great Orme copper mines produced over 28,500 tons of ore, most of which came from the Old Mine.

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## Where is Amy?

The photo at the bottom of the page showing two girls overlooking Happy Valley and the bay arrived on the editors computer following a request for help via the GOES website.

I was contacted by a lady who was helping American friends with some family history. The family had thought that the location was New Brighton but the lady in question thought it might be Llandudno. Could we help?

Obviously the location was easily defined and then came the request to date the photo. They thought (judging from the age of the girls—one of whom is called Amy) that it might be around 1920. A good search through history books enabled me to date the photo somewhere between 1913 and 1929 when the last twin towered stage in Happy Valley was burned down. They hope to visit in the summer, and we will hopefully meet and take them to the very spot where the photo was taken from.

There is one puzzle which I wonder if members could help with. What are the structures/buildings at the top of the amphitheatre in Happy Valley on the picture? Please let me know if can help

Phil Barratt : March 2005  
[editor@goes.org.uk](mailto:editor@goes.org.uk)

