

JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY



1995(3)

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Early Days	Tom Stone	1-5
GOES 1985-1995	Don Smith	6
GOES, 1995	Nigel Bannerman	7-8
Biography in Local History	Don Smith	9-10
Letters to the Editor	Anon, and others	11
Have you found any gold there yet?	Geoff David	12-13
The Cwm Bychan Mines	Max Atkinson	14-15
Great Orme Mines, Llandudno	Andy Lewis	16-19
Mynydd Parys, Anglesey	David Jenkins	19-21
Copper mining at Bradda Head, IoM	Edric Roberts	22
Index J GOES	Don Smith	23-30
GOES Safety Underground	GOES	31

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Front Cover: Tea break at the Ty Gwyn Mine, 1985: Left to right, Tom Parry, Stephen Davies, Dave Lewis, Miss Healey, Duncan Scot, Rob Smith, Phil Smith, Huw Tudno Williams, JCB Driver, Andy Lewis, Tom Hannon and Don Smith.

EARLY DAYS

Arriving at Llandudno at the age of six it was as if someone had waved a magic wand over me. Having been born in Liverpool with its pea-soup fogs and the smell of industry always in the air, Llandudno was indeed heaven and I will always remember it.

The Great War had not long ended, the troops were coming home, and in Liverpool dock workers were busy turning troop ships back into civilian ships with all the repairs, alterations and refurbishing involved. Other industries also were picking up the pieces, but even so there were many people out of work. My father was one, so he and my mother decided to move to Llandudno where his sister lived.

In Liverpool I had attended Boaler Street School which then seemed to me a large building. I remember two of the teachers, a very large classroom and a basement gymnasium. The school yard was large and a long way for a small boy to run around. The yard was divided into two by a high iron fence which separated the boys from the girls! Woe betide any child who talked in class, a strip of sticking plaster was slapped across the offenders mouth, a painful indignity I suffered from many times but on moving, that was gone forever.

My first childlike impression of Llandudno was the smell of salt laden air and flowers, the summer heat reflecting off the rocks and enhancing the pleasant aroma. For a short while we lived on the Great Orme, close to Killen's Hill and it took me a long time to get accustomed to living on a mountain. Tall buildings I was used to but natural cliffs were very different.

As it was anticipated that eventually we would live in or closer to town I was sent to Lloyd Street School. What a difference from my last school. To start with there were no high buildings to hide the sky and from my classroom situated over the front door I had a view of the Great Orme as the windows looked out on to the wooded slopes of what was eventually to become 'Haulfre Gardens', but that was to be some time in the future. Certainly a more pleasant view than from a city school.

My first teacher in Lloyd Street School was a Miss Williams who lived on North Parade and who welcomed me into my new surroundings and made me feel at home. I also remember a Mr John Williams from Penmaenmawr, who was the first teacher to encourage my interest in art and who taught the last class I was in before moving on to the Secondary School. Mr Thomas the headmaster of Lloyd Street was a kindly man who obviously loved his work and lived in the school house next door. On the other side of the school was the Lifeboat house, always an attraction to us kids, and, if I remember rightly, the Lifeboat was named the 'Theodore Price'.

Opposite the school and across the road was the narrow lane called Breton Street running behind Clifton Road, a place of great importance playtime as one could obtain from Jones' bakehouse hot sticky buns or fancy cakes for one old penny

each. It was a nice place to go on a cold frosty morning and the smell of baking was enough to make us forget any worries at school.

Today one cannot imagine what the sea front was like then with dozens of rowing boats pulled up on to the promenade near to the jetty, all with their anchor ropes coiled neat and tidy over the bow with the anchor on the ground, oars tied together and placed under the seats, all perfectly safe, no one had heard of vandals then. With the onset of winter the boatmen who served the summer visitors returned to their various trades mostly in the building business. Those with no work or retired went fishing. Most evenings, if the weather had been fine, one could buy fresh fish on the promenade. The boatmen would have strings of fish on the bottom boards of their boat, six or seven nice fat whiting could be had for a shilling, about ten pence in today's money! Large cod, plaice, dabs etc. were in quantity also shellfish, crab, and lobsters. These are in short supply now probably over fished by the number of trawlers that drag their nets close inshore, a lot were scared away during WW2 by all the activity in the bay, the gunnery school on the Great Orme and Little Orme.

Whilst still on the promenade, one must not forget the invalid chairs that were a feature there in large numbers. As Llandudno was well known as a health resort in those days, with several convalescent homes in the vicinity, these chairs were in great demand. Some were made of wickerwork some coach built with half folding doors across the front to keep the wind off the occupant. Fitted with three wheels, they could be pushed with the occupant steering or pulled by an attendant. They were hired either by the hour or day, complete with the attendant if required. Close to the pier gates could be found Professor Codman's Punch and Judy. Always an attraction to children I can remember the one in Lime Street, Liverpool, who I believe was a relation to him.

Another attraction to visitors were Ferrari's birds. These tiny canaries and budgies were trained to pull tiny coaches complete with passengers, walk on tight ropes, fire small cannons and do little tricks on the trapeze. A fantastic feat of training. The Cenotaph, now dominating the Prince Edward Square, was not built then and the square in the summer was the place to hire a horsedrawn carriage or landau to drive around the Orme or take a trip along the promenade and back. Taxis were not to be found in great numbers in those days. Another place where these carriages could be hired was Upper Mostyn Street opposite the entrance to Vardre Lane. The centre of the road from the junction of Gloddaeth Street was cobbled with square granite sets from the quarries at Penmaenmawr to stop the horses slipping in wet or frosty weather.

The Pier Pavilion was always in great demand by the visitors, famous artistes from all over the world gave concerts there. Underneath the pavilion was a cinema, a Bioscope in fact. The picture on the screen was round, not rectangular as they are today and was the same as I had seen in the Casino on the corner of Holt road and Kensington in Liverpool. I believe that before becoming a cinema it was the swimming baths and part of the Baths Hotel, the forerunner of the Grand Hotel there now.

Gloddaeth Street looked a lot different to today too, no houses after Maelgwyn Road until Great Orme Road, allotments and fields all the way. The tram track ran down the centre which after strong winds was often covered in sand, at least that is how I remember it. Some large houses faced the model yacht pond, but the sea wall was very much smaller than today and was always getting damaged in rough weather.

The Post Office that served the top end of town was where the Marie-et-Cie (McIlroy's) is today. Hooson's the chemists, Conway's the ironmongers and Roby House a high class grocers shop also the Masonic Temple were on the left hand side of the road when facing the Great Orme. On the right were Bennet & Low, the saddlers and leather goods shop and Reading, the jewellers, a little lower down. This shop had glass show cases outside with all manner of silver articles on display inside them, something one could not do these days. The cases also had smaller cases on top of them containing barometers, thermometers etc which showed what the weather was doing and what was anticipated. Two hostelrys were also on that side of the road as they are today, the Gresham and the London. Next to the London was the local paper office and printing press of the Llandudno Advertiser.

I can't remember much of Mostyn Street or around the Palladium theatre area, at least not in 1919. Mostyn Street has been very much altered from those days. The Carlton public house was on the corner next to Thompson's the news agent also known as the "Postcard King". To us children the most important shop was the toy shop on the corner of Mostyn Street and Market Street, Holman's. It was packed from front to back with the most tantalizing array of toys a child could ever imagine. When it eventually closed down the site was re-opened as Kitts Restaurant, later still Martins Bank and now Barclay's.

Lower down the road the Harrington Hotel had a glass case outside holding a large scale model railway engine. Children were fascinated by this and for a penny in the slot, the wheels with all their bits and pieces would revolve. Happy Days. Moving down a little further Thompson the "Postcard King" had another shop, with a rather narrow frontage looking a bit squeezed in between its neighbours. Above the shop was the local telephone exchange, I am sure some people can still remember the large structure of four poles on the roof with wires going in all directions over the town, it looked very much like an overgrown birdcage. Next door was the shop called the D.C.B, this particular shop specialised in pottery, and china, everything a hotel or landlady in the then thriving holiday resort of Llandudno required. The shop window was full of plates, cups and saucers, tea sets, you name it, it was there. Then came St John's Church, followed by the then largest store in town, Bunney's. Apart from everyday items, this store also had a large toy department with a window to match. A great competitor to Holman's back up the top end of town.

The library was opposite the D.C.B, there is no change in its external appearance these days, but in the 1920s if you required a book you asked at a small window

in the foyer, the lady on the other side would ask for the author and title, if one was lucky one had it placed before them, stamped and a stern reminder to bring it back, or dire penalties would ensue! We kids were scared to death.

During the 1920s we stayed with my Aunt in Madoc Street and one night I had just gone to bed when I heard a bell being rung furiously coming down the street. It was the fire engine with the two horses at full gallop and the driver hanging on to the reins like "Ben Hur" in the film. All the crew in their brass hats hanging on for dear life. A photographer would have been made for life if he had captured a shot of those horses at full stretch. The Marine Hotel was ablaze, my Mum took me to see it. I can remember vividly the large ladder being placed in the middle of the road and watching a fireman climb to the top and hosing water into the top of the building. Great hero stuff for a youngster. The fire was the talk of the town for many days, the one good thing that came of the affair was the employment it created. Work was in short supply those days as it is now. I'm not sure of the date when the war memorial was erected but the hole that was excavated for the foundation was another attraction for kids. One must not forget the Great Orme of course, that was the biggest attraction of all. The 'Happy Valley' in the summer holidays where we could sit on the rocky slope watching the show for free. If I remember rightly, the stage, built of timber and painted green had two pointed towers.

A new stage was built sometime later but has now disappeared and the place is a ruin - pity. Playing on the Great Orme there were always the warnings at the back of our minds about going too close to the cliffs, brought home to us on many occasions when visitors, and also some of the local people, fell. Two favourite places were the quarry caves above the Valley and the old signal station on the high ground above the lighthouse. Built there to replace the original station previously on the summit, it sent messages by semaphore regarding shipping at Holyhead to Liverpool via a series of stations along the coast. With the advent of the electric telegraph it was now derelict and open to the elements. Two stories high, cement-faced, with a vertical wooden ladder leading to the floor above, it has seen many a weekend scout camp. The great attraction was that the signal mast was still there. No semaphore, but wire stays and halyards, great!

A few years later I came to know the Great Orme much better. I had a Friday evening and Saturday job, to assist the pocket money you understand. Delivering meat for a butcher in the market, this entailed every Saturday, summer and winter, walking up the tram track to the summit with a basket of meat calling at various addresses on the way. Very often something was forgotten and a repeat performance was called for! Winter winds and frost on the summit are not very good for lads in shorts as many youngsters of those days in rough serge trousers will remember.

Many children at the Central School came from Llandudno Junction and Conwy by train and even went home for lunch the same way. One day the midday train collided with another behind the school, just outside the station. I don't think anyone was badly hurt and I'm sure there must be someone who remembers the

excitement it caused?.

Another exciting event was the evening the shop in Augusta Street selling fireworks went on fire! That was a display that beat anything we had ever seen, rockets through the windows, pin wheels and squibs, fairy fountains etc made the biggest bangs ever heard and the fire brigade were really under fire. In 1927 one stormy night the maroons calling the lifeboat out went off and everybody dashed to the shore. A small coaster called the Delphore had dragged her anchor, gone under the pier losing the mast on the way and finished up on the Jumbo rock. I watched the launch, which in those days was impressive as the boat was propelled by sheer manpower on the oars. Running around to the other side of the pier we saw the lifeboat come round the pierhead under sail and make a pass along the wreck and saw the Delphore's crew jump into it. Considering the sea that was running the coxswain did a fantastic job as he had to do a 90° turn to port within a very short distance to avoid the pier and make for open water. Whilst on the subject of the sea, there were always ships to be seen crossing the bay on their way to or from Liverpool in those days. Today there are very few even the river Mersey is almost empty just the odd coaster going up to Garston docks or a tanker to Rock Ferry oil terminal.

Another event in our lives those days was the 5th of November and all the effort that went into collecting material for the bonfire. Not little bonfires, massive ones built on the bottom of the promenade steps by children from various parts of the town.

Spaced out along the front there must have been at least five or six and that led to rustling from one another. On the night the promenade was alive with people and explosions, you had to watch what was going on or rip-raps and squibs would be exploding between your feet.

Tom Stone, Llandudno, December 1995

This the first of a series of articles describing Tom's early days and his recollections of Llandudno.

THE GREAT ORME EXPLORATION SOCIETY, 1985-1995

When I, with others, first became interested in the mines of the Great Orme circa 1980, we were not the first, nor even the second group to take up such an interest. Many more preceded us, not least of whom being the late Huw Tudno Williams, who, in his earlier gladiatorial days, had been through most of the known systems of the Great Orme, and a few fabled ones too. Listed too among the great and good are Billy Davies, his fellow members of the Great Orme Mine and Cave Exploration Society, Duncan James who recognised what had for so long been missed, Chris Williams and his associates in the North Wales Caving Club.

So we were not the first to go there, nor even the first to recognise the significance of so much of the Great Orme, but we learnt fast, organised ourselves and the Society was formed. And once formed we broke into the lost workings of the Ty Gwyn Mine in 1985 much to the delight of Huw Tudno, though for historical reasons his presence in the Ty Gwyn Mine had to be most discrete. A little later, Society members were at the forefront surveying and exploring the recently reopened Vivian's shaft which was to become the focus of Great Orme Mines' Bronze Age mine.

The Society over the years has fostered a wide range of interests from the conventional mine exploration and occasional mine diving to beach surveying and firesetting. Despite the confined nature of our patch -Ynys Tudno- we range far and wide and continue to make new discoveries at home. With the departure of the badgers from Ogof Tudno the last year has seen its reappraisal which had been prevented for many years due to these sitting tenants. It was clear from Tom Stone's work in the 1970s there was much more to the system than the clearly Victorian working in the entrance but until free access was possible the system had been given an open verdict. The prospects for a detailed examination of the system leading to definitive dating are looking very good indeed with every prospect of confirming this site as an early mine, probably Bronze Age.

Must all our future discoveries fall into one of two categories, Bronze Age or Modern? I think not. While I welcome all discoveries and advances in our knowledge of the Bronze Age, I look forward to data emerging from the great void between ancient and modern -Roman, Viking, Medieval.

We have come a long way in ten years achieving a great deal as a Society and for the community. The prospects for the next ten years are excellent and I am confident our achievements will go from strength to strength. But, let's not lose sight of why we have a pass time which others might perceive as a daft and self destructive, we do it for fun.

Don Smith, Editor, J GOES
Chester, November, 1995

GOES, 1995

In this past year the Society has been rather active on and under ground. Members have attended various conferences and their comments make it very clear that international recognition of our ancient sites is growing. There is still lots of research as well as exploration to be done and who knows we might even find more recent mines, Roman, Dark Ages, or Medieval. In 1748, or thereabouts, Lewis Morris reported with regard to the Great Orme that a 'great mine of copper had been lost to the sea' this would point to an early 18th or possibly 17th century mine waiting to be found. That, however, is for the future, what's been happening in the past year?

Ongoing exploration in Ty Gwyn Mine and other sites continues and it's good to see that new members are being attracted by these activities which, after all, are what the Society is all about.

The moves towards closer ties and involvement with the North Wales Cave Rescue Organisation are a reassuring step forward. The comment that it's just because the Chairman is somewhat overweight and of advancing years that he expresses this sentiment is not appreciated!

Parys Mountain: the £100 contribution to costs and physical effort put in by GOES members to help regain entry into the workings has paid off. However, the lions share of the credit must go to Dave Jenkins for the huge amount of negotiation, and work, he put into gaining permission, and organising, for what in the end was just one days dig [all be it with the aid of a J.C.B. and a few fanatical diggers!]. I know that members are keen to assist Dave in the exploration and scientific work in any way they can.

The Ormesday project, which is essentially a compilation of knowledge and information supplied by members to be carefully sorted, listed and researched, in field and archive, by Diane, is proving its worth in more ways than one. It was on her suggestion I went along to look at Ogof Tudno as a possible prehistoric mine and subsequently with Dave Chapman we decided that this was a site worthy of very careful examination.

The realization that the 'cave' passages were in fact worked out pipe veins and 'flats' similar to ones I have seen elsewhere encouraged us to further efforts. We soon spotted areas of mineralization which seemed to have been pounded with stone hammers as well as what appeared to be backfilled areas covered with stalagmite flow. It was Dave though who identified what may prove to be a most important section close to the entrance and hence very close to the prehistoric surface - where he found what seems to be charcoal and wood ash in a matrix of clay and stalagmite!

Steve Lee and Dave have since made an excellent survey of the mine. This, along with drawings made by Tom Stone of finds he made in Ogof Tudno 20 years ago and a project design outline, were submitted to various authorities for approval

before we remove material for C₁₄ dating as well as moving post Victorian debris in an attempt to discover further workings. Fighting through the red tape has been a bit frustrating when what we want to do is get covered in mud and find new passages but this could prove to be a most important site.

The Ormesday project has also become the pilot scheme for the Bronze Age Coast (BAC) project. In this, along with attempting to draw the Bronze Age Coastline of North Wales and to understand the societies of those days, a database of information is being created with reference to mining and associated activities. The Great Orme is now seen as the focal point of a large amount of activity in prehistory and this rocky promontory so beloved by the 'Boys from the Orme' must be seen in context with the rest of the region. [Any way **we** already know that it's the most important place in North Wales, if not in the world, don't we!]

It's been good to see GOES involved with the Llandudno Historical Society, Orme Divers, North Wales Marine Study Group, University of Wales Bangor and others all working together this year on the BAC project. A momentum has been established, let's keep it rolling. Hopefully that by the time this is printed all members will have received a copy of the 1995 BAC report. Next year's programme of visits to Llys Helig is presently being compiled.

Discussions have taken place with Tom Gravitt and other AberConwy Borough Council (ABC) Officers over the possibility of the involvement by members as Great Orme wardens with special regard to underground and mine related matters. Co-operation generally with the Great Orme Country Park with improved lines of communication are of course a positive move which should be encouraged.

Pen Morfa adit is now in rather dodgy condition but it looks as though professional renovation to this important drainage level will go ahead before too long. The Pen Morfa adit report to ABC is just one example of how we in GOES contribute to looking after the environment, looking after the gates on various mines is another.

There is now the possibility that we will be able to have a 'Shop Window' of Society finds and activities in Llandudno Museum. A new room is to be available there in the near future and during the recent presentation of GOES work to Llandudno Town Council it was suggested by the Town Clerk that we should look into the practicalities of mounting an exhibition there. Preliminary talks are taking place and comments and suggestions from members are sort.

All in all I feel that 1995 has been a very successful year. Members have been involved in many Great Orme related activities, indeed it's a definitive case of the more you discover the more there is to learn. There has been a heartening amount of co-operation with other groups with similar interests as well as steady progress with the basic aims of the Society and that I feel says it all.

Nigel Bannerman, Llandudno, December 1995

STOP PRESS: C₁₄ dating at NERC Labs dates the North Shore tree stump samples at 7,000 BP $\pm$ 45 years. More to follow in the next edition of J GOES.

BIOGRAPHY IN LOCAL HISTORY

In the last few years I have made considerable advances in our knowledge of several of the prominent figures in the history of copper mining of the Great Orme during the 19th century, principally William Vivian¹. I cannot claim to have made any new, previously unrecognised, discoveries, but I have collated what available data there were in the archives and other sources. Since then several people have asked my for advice on where to start a search of their family tree or similar project. With that in mind I shall describe some of the ways I gathered my data which would be relevant to similar projects and hope it will be of help.

I started my search where C.J. Williams had left off. Scanty information had been available to him largely due to destruction of invaluable archive material by the Luftwaffe. There were three Old Mine reports lodged in the Welsh Library at UCNW, a mention in Crump's history of the introduction of English Methodism to North Wales and two Geological abstracts. I considered that someone of his standing would probably appear somewhere in the Cornish literature and took every opportunity to look for his name when in the libraries, here or in Canada. There were Vivians, but none of the right age or first name. I was making little progress though in my three years in Canada still managed to gather a great deal of general background information from the university library.

If you don't know the answer, try to find someone who does. So I did, I wrote a series of letters to the West Country, one directed me to a mining history bibliographer, who directed me to a family historian and in a short time I had an introduction to a living relative. From this point the venture gathered pace and the data rolled in. William had written a great deal, much of his material had been collated and published in the last century in the Cornish but not the Welsh literature. But, now knowing where he had previously published, a systematic trawl of the bound journals in various libraries and archives found additional uncited material. Further enquiries, e.g. of the Geological Society found some of William's drawings.

When I was unable to visit archives and libraries, but knowing for what I was looking, I was able to request copies by letter or telephone for a small fee which was much less than the petrol and other costs of travelling. 'Merciless' use of the interlibrary loan service through the local library also turned up copies of his work, again at only nominal cost. Other material was more difficult to retrieve from its lodgement e.g. in the British Library who felt it was in too poor condition to photocopy so a visit was necessary, and copy obtained! In the end, there was only one paper I couldn't find as there was no surviving copy, not even in the publishing society's archives.

Additional sources for data were census returns which were available from Glamorgan, again a written request to the local family history library and a small copying charge secured the data at minimal cost. Unfortunately the North Wales census returns in the National Library were unhelpful. From official sources I obtained at, greater cost, copies of three certificates which provided marriage and

death details not available from other sources. I did not pursue the registry of wills though this might have been worthwhile.

In view of his connection with the Methodist Church I accessed the archives at the John Rylands Library of Manchester University and secured a brief obituary. The Mining Journal contributed a further obituary and I was directed to a eulogy in the Cornish literature. I further corresponded with authors of papers covering mines where William worked and received generous replies which once included photocopies of all the author's research notes. Business directories were consulted with some success.

Without doubt the most rewarding step was a day trip from Manchester in 1992 to visit William's great grandson in Hertfordshire. From his research he had drawn a family tree to date but knew little of William and by that time I knew a great deal about him. We freely traded material, my data for the opportunity to copy photographs from a family album. This I consider to be the jackpot. The whole project had taken over five years and when the draft manuscript was submitted more data rolled in, from the editor and a society member. These new references were included in the manuscript, leading to conversations with other authors and still more data arrived from readers after publication.

At the conclusion of this and similar projects I had employed the following:

Trawling	books	business directories
	journals	manuscripts
OPCS	census data	marriage and death data
Parish registers		
Letters	authors	historians
	society journals	local history libraries
	societies	
Conversations	authors	relatives
	mining historians	
Libraries	local	specialist
	university	national
Archives	county	university
	society	

All of this will take time but need not cost a great deal. For instance, a trip to the National Library with four in a car is an economical exercise and my British Library search was deferred until I had cause to go to London on business. Be prepared for periods of low return and for tedious plods through lists and compilations. Compare notes with your peers from whom you may get direction or data which leads you forward. And, when all is done, commit your findings to paper and submit it to the most appropriate journal.

Don Smith, Chester, November 1995

- 1 Don Smith The life and essays of William Vivian, Cornish Mining Engineer, 1817-1879. **British Mining Memoirs** 1994;50:100-110. Northern Mines Research Society.

LETTERS TO THE EDITOR

Virtual Reality Caving Club

In the last edition of the Society Journal the Editor asked if the Society approved of their material being submitted to E-mail and the Internet. Since we are in the age of the computer might I suggest we go one step further, further even than the Really Rich Caving Club who pay others to go underground for them. Might I suggest the Virtual Reality Caving Club solution. From the comfort of your living room experience the thrill of crawling, wading and wriggling without breaking one's fingernails or even breaking into a sweat. Totally safe, but for those who want a more realism a little water, a spray on the face, a torrent down the back or total immersion in chilled water from the champagne bucket can be arranged. And, for a small fee, a lithesome lass/lad can daub thick clinging mud anywhere you desire. See you at NAMHO-96, in reality?

Anon, VRCC

If there is a reading membership out there, how about a few more letters to the Editor.

BIBLIOGRAPHY OF THE GREAT ORME

This edition of the Journal contains the collated indices from 1988 to 1995. I have also begun collating all the relevant references I have come across in my combing of the literature and the archives in an attempt to build up a bibliography. I would be grateful if any and all members of the Society were to put this form aside and as they come across an article, manuscript, book etc. jot down the details for me. I hope in due course to be able to publish the bibliography as either a stand-alone supplement or as part of the Journal. The more you give me the more likely it is to be a supplement.

ANNUAL GENERAL MEETING

14.30, MARCH 2ND, 1996
QUEEN ELIZABETH COURT,
JACKSON'S LANE,
LLANDUDNO

"HAVE YOU FOUND ANY GOLD DOWN THERE?"

One of the rare joys of digging on the surface of the 'Great Opencast', in our Great Orme Mines, is to listen to the comments and questions of the tourists as they saunter past on the official footpath high above us - and luckily separated from us by a stout wire of mesh fence.

The question in the title is very popular: usually it is (I hope) meant as a joke, and we enjoy ourselves concocting a suitable reply, but sometimes it is meant in all seriousness, and we have to explain - "Well, Er, no. You see, this type of rock is limestone, and for some geological reason, Gold is never found in limestone." A few questioners sometimes persist, and I usually play the coward and refer them to Uncle Frank (Jowett) "who knows much more about Geology than I do."

Another comment is - "Look MUM! There's a MAN down there!" to which Mum replies, "No, no, Johnny, that's not a man down there, it must be some sort of dummy: look - it's not moving at all." "Can I see if I can hit it with a stone, then?" asks Johnny - at which point I hastily abandon my vitally important archaeological recording, heave myself up to my feet, and beg Johnny not to use me as a target (which Johnny accepted with obvious disappointment).

But diversions such as these have been rare this season. It started hopefully enough - all we had to do was to excavate the loose spoil along the northern edge of the Opencast, to reveal (we thought) a clean line of south-facing cliff, decorated at intervals with the entrances of untouched Bronze Age mine-workings. Unfortunately it did not quite turn out like that. True, we found a line of what looked like solid rock, almost at once, but further digging showed that this was very far from solid. It was, in fact, fractured to a quite extraordinary degree, which made working underneath it a very chancy business indeed. The crunch finally came when I cleaned round the edges of a large limestone boulder protruding from the steep slope just above what looked like a possible Bronze Age entrance - to find that the said boulder was apparently resting on fresh air. So Tony and I had a conference, and agreed that we should try digging somewhere else.

So we tried again - a few metres further east, on the far side of a solid-looking slab, only to find that this slab, which dipped gently southwards, was seamed with cracks and joints, all of them lined with a veneer of clay - ideal as a lubricant to encourage large blocks to slide off into space immediately above anyone working underneath.

So we tried yet again, further east still, but found that the rock which looked so invitingly solid had - like the famous Idol - Feet of Clay, or, to be more exact, very friable shale, just waiting to collapse and bring the whole cliff down on top of us.

So we retreated a few metres further south, and started digging in a new area, alongside a big outcrop of absolutely definite solid rock which we had discovered during our 1993 excavations. And this again proved disappointing. True, the 1993 solid was good enough, but when we dug alongside it we failed to find anything

other than loose rubble, full of large angular boulders which looked suspiciously like 19th century spoil. At this point I retired, exhausted, and departed for the south of France in order to get my knees brown, and my place was taken by Emma, an excellent young lady lent to us from Sheffield University.

Emma continued digging where I had left off, until Tony (in the course of his own investigations) - discovered a shaft going down at a steep angle between the boulders, and followed this down to near the bottom he found himself in prehistoric workings which he recognised as familiar - he had entered them before, from underground. Fine, except that there was a thickness of at least 10 m of loose rubble above them, and some of this consisted of boulders the size of minibuses. So, once more, we were stymied. To remove all that loose material would take years, literally.

So this area had to be abandoned, too, and at Tony's suggestion Emma instead turned her attention to the foot of the little cliff which runs along the South side of the Opencast. And here at last the Fates relented: almost at once Emma and her helpers discovered the entrances to two little rock cut passages which from their small size and irregular cross-section must surely be Bronze Age workmanship. How far they go in is as yet unknown, as they are both filled almost to the roof with rubble, and this takes a deal of time to excavate properly.

When I got back from my holiday to take over from Emma, at the end of July, she and the others had valiantly removed several cubic metres of this rubble from each entrance, finding in the process several stone mauls - large smooth beach pebbles of hard igneous rock, often showing marks of battering at one or both ends, suggesting their use as hammers - and several tools made of cattle bones - mostly ribs or limb bones - with telltale smoothing or rounding at one end, suggesting the marks of wear when used as a gouge or chisel. Since then we have removed a lot more spoil from each passage, finding several more stone mauls and bone tools, and revealing in both passages a solid rock floor, sloping gently southwards. Also, in a crevice in the ceiling of one passage, a thin layer of rotted dolomite bearing what we think are the impressions of bone tools - easily recognisable because the imprint is rounded in cross-section, whereas the iron tools of a later age leave a square imprint.

So the future is very promising, but there is a long way to go yet before we reach the end of these passages. So the 1996 season is likely to be a busy one - but, we hope, full of excitement. Meanwhile, Johnny and his little friends will no longer be able to drop stones on our heads because we should be safely inside one of the passages - I hope.

Geoff David, Glan Conwy, December 1995

THE CWM BYCHAN MINES

This is intended as a guide for members who wish to expand their knowledge of mining outside the Great Orme and deals with mining in the last three centuries. It involves a walk of about 5.5 miles and a climb of 850 ft. The path is good and not too rough or boggy. A Ordnance Survey map (sheet 115 1:50,000) for the Beddgelert area would be useful. A shortened walk may be made by following the walk in reverse as far as the lower dressing floors (SH 598462) and then returning the same way, or it can be made still shorter by parking at the lower dressing floors.

Park at Beddgelert at the car park (SH 588481) and head past Llewelyn's Cottage onto the footbridge. Cross this and turn sharp left to follow a path beside the river, crossing a minor road and then pass along the riverbank to a stile onto another road. The derelict building just before stile is a mill, the leat for its undershot wheel can still be seen. Once on the road, turn right and follow it for 0.75 mile to Sygun mine (SH 604489) where you will see a small waterwheel and alongside it is a battery of four stamps used to crush the ore. The mine is open to the public and is a good example of 19th century mining. It was one of the mines owned by the Elmore family who were responsible for developing the floatation process to extract metal for ore which is still used in mining throughout the world.

Turn sharp left at Sygun and head towards the river where the dressing floors are situated. There are two waterwheels here to power ore-crushing stamps. The path continues right through a gate and along a track all the way to Llyn Dinas (SH 612 492). This track is along the leat that fed the wheels and is still obvious in places. Halfway between Sygun and Dinas there is a hill across the river which contains the Iron Age fort of Dinas Emrys. This is believed to be the fort that legend associates with Merlin and the red and white dragons.

At Llyn Dinas, cross the stile and head up the path to the right. The stone platform at the bottom of this path was for loading the ore onto carts. The ore would have been brought down here by packhorse. The carts would then ford the river and take the track along the far side.

The path climbs for about 0.75 mile giving excellent views of Snowdon, Moel Siabod, Cnicht and Yr Aran and eventually arrives at Llwyndu mine (SH 606483) Of particular note is the horse whim circle and axle stone which has been moved from the centre. The shaft has been capped recently with a grid. The associated dressing station is a classic feature of most small metal mines, where a waist high shelf was made as a work bench and on it was placed a mortar stone. This can be identified by a dip worn in its surface by the constant crushing of ore with a hammer. It would have been sorted on the shelf and the poor quality ore and rock can be seen dumped around. It was open to the elements as good light was needed. The calcining flue was used to roast the ore to reduce its sulphur content. A similar occurrence took place at Amlwch as their ore was high in sulphur and they would leave the ore roasting for weeks.

The dressing floor, made of cobbles, is one of the few remaining examples in North Wales. The paved floor meant that the good ore was not lost in the dirt underfoot. Traditionally this work was carried out by women or girls and the building nearby could well have housed a family or two; their menfolk worked underground.

Further exploration will reveal other features, including the double mortar stone where the first area became so worn that they moved it to one side. This is common, as was turning the stone over and using the underside. As a point of interest, there is a limestone mortar stone on the Great Orme at Bryniau Poethion which has several worn areas and some piles of stone around it.

The way continues following the signpost for Aberglaslyn, bearing right over a style after 50 yards. Various small trials are passed on both sides but the main point of interest is the head of the cableway and the large area of spoil at the Cwm Bychan mine (SH 604477). This mine was probably worked in the 17th century and continued intermittently until around 1928.

A climb up beside the spoil reveals the adit which probably dates from the later life of the mine. It is worth climbing up to the left on a faint path which brings you to more spoil and some small buildings. Just beyond are the upper workings which are likely to be the earliest. They consist of stopes open to the surface and descend to the level of the adit. The top of the stopes can be viewed but **GREAT CARE** must be taken as the ledge is narrow and parts of the hanging wall are loose. There are several workings continuing north from here but care must again be taken as there are unfenced holes and possibly some stopes covered with grass.

Returning to the upper terminus of the cableway, there are a couple of A-frames lying on the ground nearby. These carried the buckets of ore and the small wheels would have run on the curved steel bar around the back of the terminus. When full they would have been run onto the cable where they would have rested on the grooved channel. Following the pylons down there is another adit and associated dressing floor. This was probably worked in the last century as there is a good deal of crushed waste around and there is no obvious mortar stone on the site. The walk continues along a clear track down the valley for a mile to the trackbed of the Welsh Highland Railway with the Aberglaslyn tunnel to the right.

Turn the left about 30 yards before the railway and the lower dressing floors of the Cwm Bychan mine, dating from this century, can be viewed between the path and the stream. The tensioning device looks like a medieval torture instrument and the buddles are in very good condition with the water outlets still intact. The lack of dressing spoil suggests the floors have hardly been used.

Continue through the tunnel, a torch is useful though not essential as the track is fairly smooth. There is a lengthy detour to the left of the tunnel. Follow the railway track and cross the girder bridge and turn right along the river and pass Gelert's grave on the way back to Beddgelert.

Max Atkinson, Deganwy, December 1995

GREAT ORME MINES, LLANDUDNO¹

According to historical accounts, the main phase of exploitation in the mines of the Great Orme was in the 19th century, although it was appreciated at that time that there had been a more ancient phase of exploitation. Access for exploration was regained in the late 1960s, but it was only in the 1980s that the presence of prehistoric mining was recognised by Duncan James and a C¹⁴ date obtained which placed the mines in the Early-Middle Bronze Age. Since then there has been extensive exploration, surveying and excavation and it has been established that the labyrinthine Bronze Age workings extend down to a depth of 70m and well into the hillside where there are several kilometers of tight passages. The mine has now been established as a Visitor Centre with an underground tourist route displaying prehistoric features which receives some 40,000 visitors a year.

Notes on the underground visitors trip

The Entrances:

The entrances were first explored in the winter of 1990-91 when at least 14m of mainly 18/19th century spoil was removed revealing a prehistoric mined landscape of trench veins and entrances. The sandstone unit above the entrances has controlled the extent of mineralisation above and below it. At least 35 north-south and 15 east-west mineral veins are now recognised across the site with Bronze Age workings extending into the hillside for 240m and to depths of 70m, covering an area of 24,000m². To the left of the entrance are original constricted Bronze Age tunnels that are only the width of the rotted mineral vein. The principle tools were bone and stone supplemented by limited use of firesetting.

Entrance to the steps:

On the left is a worked out chamber bearing the dark staining of manganese. At the steps the contrast between the Bronze Age and 19th century mining can be seen:

Bronze Age: irregular shaped passages with smooth, rounded, rock surfaces containing spoil with bone, stone hammers and charcoal fragments from firesetting.

18/19th century: often square/rectangular shaped tunnels having angular rock surfaces with drill holes and iron pick marks.

Steps to the Zig-zags:

The passage follows the line of the vein, passing through a bed of mudstone at the level of the steps. Mudstones, like the sandstone, control the extent of mineralisation often, as here, forming a passage ceiling. On the right hand wall near the grill, traces of malachite can be seen. At the Zig-zags the route meets another vein to continue through a section of tunnel driven in the winter of 1991-92 and links to a wider vein known as East 3.

1) This article was prepared for the Ancient Mining Conference held in September 1995 during which the delegates visited the Great Orme and Parys Mountain.

East 3 Vein to the Large Stope:

An earlier passage following this vein north was enlarged in the 19th century, it continues for 30m where undisturbed prehistoric workings are located. The stope below the steel walkway is considered to be Bronze Age and similar workings extend to a depth of 30 below here. There are many connections into East 3 vein from the roof and west wall. The large stope or chamber was discovered in November 1987 and was considered to be largely 19th century mining. However, excavations revealed datable material (bone) which now indicates much of the chamber was mined between 1,200 and 1,600 BC. The volume of rock removed from here is estimated to be 1,400m³, which is equivalent to nearly 4,000 tonnes. This implies that reasonably large quantities of copper metal could have been produced here if a yield of only a few percent is considered. Numerous passages and workings radiate from the chamber, many of which are of an early age. On the far side a small square-shaped 19th century cross cut tunnel can be seen which links with further Bronze Age workings. The sandstone unit first seen at the entrances forms the ceiling of the chamber.

The return route:

At the foot of the steps a cross cut passage links with further extensive early workings dated at between 1,100 and 1,400 BC. Excavated material has also produced the only items of bronze metal found this century consisting of small fragments, thought to be from a damaged tool. The only other known bronze items were found during the last century, two small wedges, which are now in the British Museum. On returning to the surface the passage once more cuts through the bed of mudstone located at the steps. Along the inclined tunnel section it is possible, with the aid of a hand light, to see bone tools in the ceiling.

Shaftway:

This shaft was excavated in the summer of 1991 and revealed some of the finest bone tool marks and finger impressions from the site. These had been made in a particularly well rotted dolomite.

The Footbridge and Vivian Shaft:

This 18/19th century shaft is named after William Vivian, mine captain at the Old Mine in the mid 1850s². The shaft has been sunk along the line of an earlier trench working and originally connected with the Penmorfa drainage level at a depth of 134m. The surface workings here were excavated by Gwynedd Archaeological Trust between 1988 and 1993 and have produced a range of dates on wood charcoal from 400-1,750 BC. A human jawbone was also recovered here and is displayed in the visitor centre. From this location it is possible to get an impression of the amount of spoil removed from the site since 1990 when the existing ground level was 2.5m above the footbridge deck and extended to connect with the ground level at the fence line on the east side.

2) In fact, the first reference to 'Vivian's Shaft' in the literature pre-dates the arrival of William Vivian by 7 years. A connection with Swansea is more likely. Ed.

East Walkway and Steps:

This pathway marks a change in limestone lithology from the massively bedded varieties above the entrances to thinly bedded types with alternating mudstones. The entrance below the steps is a typical example of a 19th century tunnel. Below this area are further Bronze Age workings dated to 1,300-1,500 BC using C₁₄ and Uranium series on calcite flow.

Engine House:

The ruined foundations mark the position of the 1834 Engine House used for pumping and hauling in Vivians and Higher shafts.

The Opencast:

The opencast is considered to have been predominantly worked during the Bronze Age. The earliest phases of mining would have followed the trench workings north from near Vivians shaft. Eventually these workings extended underground near the thick mudstone unit seen on either side of the opencast. The volume of ore beneath the mudstone must have been immense and its removal from under this fractured and unstable unit would have been difficult. The only means to advance ore extraction was to completely remove the mudstone and then continue by trench workings to where mineralisation ceased, producing the opencast we see today. To the north of the opencast the early workings are known to extend beneath the tram tracks and as far as the cable car. These workings were first identified and excavated in the late 1970s. Looking south and to the left it is possible to see a burial chamber, or Cromlech, from the Neolithic period and it is possible this monument may have had a reuse when mining began here in the Early Bronze Age.

Geological Note:

The Great Orme is composed of Lower Carboniferous limestone of the Asbian Age. In the area of the mines the limestone have been dolomitised along a series of mainly north-south fractures. This arrangement provided a suitable host for copper mineralisation, principally chalcopyrite with oxidation to malachite and goethite and some azurite. A peculiar feature of the dolomite is an affinity to soften in the vicinity of copper ores. This rotting is probably the predominant factor in governing the extent of the Bronze Age workings, allowing removal of ore with bone tools and stone hammers or firesetting) when more resistant material was encountered.

Andy Lewis, Llandudno, September 1995

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MYNYDD PARYS, ANGLESEY³

Mynydd Parys is a small mountain rising to 170m above sea level a few kilometres inland from Amlwch on the north coast of Anglesey. It is the site of an abandoned mine that dominated the world of copper trade in the late 18th century. There was also evidence suggesting mining activity during the Roman period, and more recently it has been shown from surface deposits that such activity extends back to the Early Bronze Age. This summer access was regained to a section of the underground workings and evidence of prehistoric mining was identified at a depth of some 20m. Mynydd Parys has therefore been a site of mining for copper over a period of 4,000 years and offers great potential for future research into early mining.

The mineralisation at Mynydd Parys is associated with an ancient (late Ordovician - 480my BP) volcanic event involving the extrusion of silicic lavas (rhyolites-dacites) and ejection of ashes (pyroclastics). These grade laterally into the shallow water volcanic sediments which include siliceous sinters and cherts and there are also intrusions of rhyolites and later dolerites. This volcanic sequence overlies the Parys shales (Arenig-Llanvirn) and is in turn overlain by later shales (Llandoveryan-Silurian). These beds have been compressed into a steep trough-shaped structure (i.e. syncline; Caledonian), trending NE-SW and tilted over to the SE whose axis is exposed at both ends of the Great Opencast, although this structural interpretation is currently being reassessed. The region is also traversed by steep NW-SE cross faults and, to the north, overlain by older Precambrian schists carried south by the Carmel Head and Corwas thrust faults.

The primary mineralisation comprised **pyrite/quartz** ($\text{FeS}_2/\text{SiO}_2$) followed by a phase dominated by **chalcopyrite** (CuFeS_2) and then one dominated by an intimate mixture of **shalerite/galena** (ZnS/PbS); with minor chalcopyrite - i.e. Bluestone) and is believed to have been contemporaneous with the Ordovician volcanic activity. Evidence for this may be seen in the pyritic slumped structures in the centre of the Great Opencast. a secondary phase of remobilisation occurred during the late

3) This article was prepared for the Ancient Mining Conference held in September 1995 during which the delegates visited the Great Orme and Parys Mountain.

Caledonian metamorphism and has been dated (radiometrically by K/Ar) to 360my BP (the Devonian). Oxidation products are dominated by distinctive red/yellow Fe^{+++} oxides but include **anglesite** (PbSO_4 - the type locality for this mineral), **jarosites** and various other Cu, Zn and Fe sulphosalts. However, any extensive enrichment of copper in an oxidised weathered zone was probably removed by glaciation of the mountain. The present weathering is intense due to the acidity (pH 2 in some pools) generated by the weathering pyrite and other sulphides.

The ores were 'discovered' on March 2nd, 1768,. They were worked initially as two mines, Parys to the east and Mona to the west, to an ultimate depth of over 300m (i.e. 130m below sea level, the surface workings collapsing at an early stage to produce the present day opencasts: there were over 100 shafts (now sealed) and reputedly 20 km of underground passages. Drainage required wooden pumping systems (due to the acidity) powered by wind or steam (eg Cornish beam engine). The ores were roasted and some were smelted locally, others being shipped via Porth Amlwch to Swansea; sulphur, alum and vitriol were also reclaimed at various times on the mountain.

The two mines came under the common management of Thomas Williams, the Copper King, reaching their zenith in the late 18th century when they dominated the world copper market with a total output of 13,000 tons of copper, sheathing Nelson's men-of-war, and employing over 1,500 miners. Work underground effectively ceased in 1883 although copper continued to be reclaimed from solution by precipitation leaving ferric oxides in the extensive ochre pits that are such a feature of the mountain. New deposits are now being evaluated, mainly for Zn, in workings north of the road to a depth of 400m.

The underground workings became inaccessible when shafts and adits were sealed in 1970 and the surface remains of the earlier ore extraction and processing structures are sparse and vulnerable. For example, the cobbled working floor at Charlotte yard has been partially destroyed for roadstone and within recent years the chimney at Pearl shaft, serving one of the few remaining Cornish beam engines houses in North Wales, has collapsed. Nevertheless, industrial archaeology in the form of kilns, flues, powder and pumping houses, the two mine yards and other enigmatic features, as well as the cementation pits, still survive unrecorded to pose a management problem.

The Great Opencast and the Hillside Opencast, together with the ochre ponds at the eastern end, the windmill and the remains of a beam engine house at Pearl shaft are recognised as an important archaeological resource and are scheduled under the Ancient Monuments and Archaeological Areas Act of 1979. Geologically, five areas within the Great Opencast have been selected as a GCR (Geological Conservation Review) site and eight locations, including mineralised rocks, spoil heaps and the walls and mortar of the old mine buildings, have been proposed as an SSSI on the basis of their unusual lichen (*Lecidea* spp.) and other plant and mammal (bat) communities.

Archaeology

The past discovery of a number of inscribed copper cakes or ingots has suggested that these deposits were worked in Roman times, although no direct evidence has been found for this on the mountain itself. As at other sites in Wales, 'ancient' spoil at the Oxen Quarry on Parys Mountain was investigated by Oliver Davies on behalf of the British Association. In his excavation he recorded numerous stone mauls and abundant charcoal which he attributed to firsetting possibly of Roman or old Celtic period (Davies, 1939). In 1988 these ancient surface workings were relocated by the Early Mines Research Group (Timberlake, 1989), and the charcoal they contained has been dated (radiometrically by C_{14}) to 3,500 BP, indicating that copper was extracted at Parys Mountain in the Early-Middle Bronze Age.

In July 1995, permission was given to re-enter the underground workings sealed in the late 1970s and a new secure entrance has now been constructed. Surprisingly, evidence of prehistoric activity amongst the 18-19th century workings was obtained immediately in a large work chamber some 20m below the entrance. The roof of this chamber had been driven up into earlier cemented spoil containing numerous hammer stones and, in places, abundant charcoal and organic debris (acorns, grass, leaves) in stratified sediments. This material could be in situ or redeposited from workings near or at the surface which would now be buried under large deposits of recent spoil. It could involve unrecorded historic (pre-17th century) mining or Roman activity relating to the ingots, Bronze Age activity relating to the dated surface spoil. This chamber and its deposits await detailed investigation and the dating of the charcoal. Meanwhile, many more kilometres of workings remain to be investigated for more evidence of prehistoric mining.

David Jenkins, Bangor, September 1995

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COPPER MINING AT BRADDA HEAD, ISLE OF MAN

Ian Norman, Don Smith and myself visited the Isle of Man to attend to the NAMHO conference in April 1993. We arrived early and took the opportunity to tour the Island making use of Don's local knowledge gained while working there in the summer of 1987. Since stone mauls had been found at Bradda Head we headed south to the Foxdale mine in the morning and then after lunch to Bradda Head¹.

The mines, situated on the headland north of Port Erin, are described in the Geological Survey as²: *"The country rock consists of Manx Slate series with grits on the western side of the lode. The lode courses north and south (N5E) across the headland and is conspicuous in the cliff on both sides of it. On the south it occurs in a nearly vertical rib of white quartz and fault breccia 30-50 feet wide, with well defined walls. At its southern extremity the underlie of the vein is eastward at about 10 from the vertical but at its northern outcrop the fissure is less sharply defined and appears to have split into two branches, the western one being known as the Bulward Lode. The principle ores obtained have been those of copper and lead with silver. The workings on the vein are in three separate groups: the south Bradda mine, the north Bradda mine both at the foot of the cliffs; and a set of workings at a higher level, on top of the headland about halfway between the south and north mines. The workings consist of shafts sunk to meet them. The width of the lode in the upper part of the mine was in places 10-11 fathoms. The vein was very streaky and without continuous ore bodies. A little native coper (moss-copper) is reported to have occurred in parts of the mines highest above sea level. The following minerals from the lode are reported by Sir W.W. Smyth : malachite, cuprite (in minute octahedral crystals at the 40 fathom level) meloacnite, coper pyrites, copper sulphate, atacamite, argentiferous galena and cerussite. Sir W.W. Smyth stated that in 1859 at Bradda Head the adit had been cleared, the lode cross cut and a 20 fathom level driven some distance below the adit , but although copper pyrites, galena, iron pyrites and carbonate of iron are all there, they are all in too small quantities to be of any value. In 1871 the North Bradda shaft was driven down 9 feet below the 70 fathom and here the lode is a great quartzose mass of the hardest type, containing only small spots of copper ore. The returns of output of copper ores are as follows: 1850-1863, 146 tonnes; 1869-1874, 193 tonnes; 1881-1883, 478 tonnes.*

The surviving mine buildings are exposed to the elements and are only a few feet above the high water mark. Consequently they are at risk and are being undermined by the sea. In among the exposed foundations of the buildings we could see some very good mineral specimens and spoil which bore a striking resemblance to that from the Great Orme and Mount Gabriel, being highly fractured and well mineralised. Behind the engine house the massive opencast towered above us and was filled with spoil. This too has been and is being eroded by each and every storm. Shortly before we arrived in the Isle of Man this site was scheduled as an SSSI, or the Manx equivalent. Early data from this site is encouraging and suggests an ancient origin for mining though much more work is needed to confirm it as a Bronze Age mine and define its place pre-history.

Edric Roberts, Llandudno, May 1993

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INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1989-95

AUTHOR	TITLE	REFERENCE
Anon	Historic discoveries on the Orme	1989(1):14
Anon	GOES GO's to Rhosydd	1989(2):11-14
Anon	The ideal caver	1989(2):15
Anon	Cats	1989(2):20
Anon	Penmorfa drainage level	1989(2):20
Anon	Bronze Age ice and volcanoes	1989(3):10
Anon	Installation of a fixed ladder, Vivian's shaft	1990(1):17
Anon	Firesetting	1990(1):17
Anon	A history of the Ty Gwyn mine	1990(2):19-20
Anon	The North West Passage	1990(3):7
Anon	Echippus Minimus: the little workers	1990(3):7
Anon	Penmorfa	1991(1):9
Anon	Neatsfoot oil-The breaking of a myth	1991(1):10
Anon	Maen Y Mwynwyr	1991(1):13
Anon	An Ode to the Bannerman Premise	1993(1):12
Anon	Virtual Reality Caving Club	1995(3):11
Atkinson, Max	The Cwm Bychan Mines	1995(3):14-15
Bannerman, Nigel	Location of Bronze Age smelting sites	1992(S1):6-7
Bannerman, Nigel	Location of Bronze Age smelting sites	1992(2):5-6
Bannerman, Nigel	Bronze Age smelting in North Wales	1992(3):7-16
Bannerman, Nigel	GOES, 1995	1995(3):7-8
Barker, David	Great Orme Gardening	1993(1):1-3
Boon, George	An ancient anchor from Porth Felen Aberdaron	1989(2):21-24
Bowen, John	In praise of Llandudno	1991(1):3
Bradley, Arthur	Highways and Byways in North Wales (an extract)	1990(3):6
David, Geoff	Mumblings from the Mumbles	1989(2):7-9
David, Geoff	Underground oddities around Bryn Euryn	1989(3):21-22
David, Geoff	Little holes for little people:Corkscrew cave	1990(1):13-16
David, Geoff	Little holes for little people:Corkscrew cave	1990(2):5-8
David, Geoff	Little holes for little people:Letterbox and Mammoth caves	1990(3):8-11
David, Geoff	Little holes for little people:Brenda's, Elephants ..	1991(1):11-12
David, Geoff	Prehistoric copper mines: an update	1991(2):4-5
David, Geoff	Prehistoric copper mines: an update	1992(S1):4-5
David, Geoff	A little gentle winter's grovel	1992(2):15-18
David, Geoff	French Prehistoric copper mines: An update	1993(1):14-18
David, Geoff	Have you found any Gold down there?	1995(3):12-13
Davies, Tony	Ty Gwyn: first impressions	1990(3):3-5
Davies, Tony	Knots	1990(3):17-19
Davies, Tony	The Ty Gwyn tramming adit	1992(1):13-16
Davies, Tony	The Ty Gwyn tramming adit	1992(S1):9-10
Edwards, Dave	The Bronze Age and other North Wales Coastlines	1995(2):9-10
Hammond, Tony	Book launch	1989(2):3-4
Hammond, Tony	Pushing back the dawn	1990(2):9
Haynes, David	Radiocarbon dating: A layman's introduction	1995(2):7-8
Humphries, G.A.	Pen y Dinas, Great Orme's Head	1993(1):12
Jones, Helen	An epic voyage in the Gwylog	1990(3):10-11
Jones, Helen	First impressions of the through trip ...	1990(3):14-15
Jones, Helen	Roman's again	1991(1):4-5
Jones, Helen	Llansannan	1991(1):16
Jones, Helen	The round trip; an alternative version	1992(2):14-15
Jones, Owen	Ogof Llech	1990(1):7-8

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1989-95

AUTHOR	TITLE	REFERENCE
Lang, Ian	Tours under the Orme	1989(2):14
Lang, Ian	Mine of information	1989(2):19
Lea, Steve	Club Equipment	1995(2):15
Lewis, Andrew	Prehistoric copper mining at Llandudno, Gwynedd	1989(1):16
Lewis, Andrew	Firesetting	1989(3):5-6
Lewis, Andrew	An excursion into the Penmorfa	1989(3):7-8
Lewis, Andrew	Great Orme Copper Mines, Llandudno	1989(3):17-18
Lewis, Andrew	The Llandudno wells and springs:Fynnonn Galchog	1990(1):21
Lewis, Andrew	Great Orme Copper Mines, Llandudno	1990(2):17-18
Lewis, Andrew	Mysteries of the mine cats	1990(2):25-26
Lewis, Andrew	The old wells of the Great Orme:Ffynnon Powell	1990(3):16
Lewis, Andrew	The Great Orme Bronze Age Copper Mines	1991(2):15-17
Lewis, Andrew	see Wayman, Mike	1992(2):6-9
Lewus, Andrew	Great Orme Mines, Llandudno	1995(3):16-19
Jenkins, David	Mynydd Parys, Anglesey	1995(3):19-21
Jowett, Frank	The Cambrians in Llandudno	1989(3):9-10
Michaels, Suzy	Great Orme Attractions to get a new lease of life	1989(1):1
Morris, Lewis	.. Knockers (letter to Richard Morris)	1990(4):6
Parry, Tom	Rocking Stone Plate	1989(1):8-10
Parry, Tom	Recollections	1989(3):11
Parry, Tom	More subterranean animals	1989(3):12
Parry, Tom	The day GOES went to Alderley Edge	1990(1):5-6
Parry, Tom	The candle rat	1990(2):24
Parry, Tom	Gold in Mostyn Street	1990(3):14
Parry, Tom	A fair day's work	1991(1):17-18
Parry, Tom	The Penmorfa drainage level	1992(2):19
Parry, Tom	Cerrig cannon - Cannon stones	1992(3):19
Phillips, Judith	Orme find could mean a re-write of history	1989(1):15
Richards, Julie	A stone trial could be death	1989(1):10-11
Roberts, Edric	GOES over the hill to Rhosydd	1989(1):6-7
Roberts, Edric	Copper mining at Bradda Head, Isle of Man	1995(3):22
Sellors, Erik	Crossword	1993(1):13
Smith, Dave	Radon	1989(1):12-13
Smith, Dave	Great Orme Exploration Society (Ed)	1989(2):1-2
Smith, Dave	Carbon dating (Ed)	1990(1):1
Smith, Dave	Merioneth Gold	1992(1):8
Smith, Don	Y Ddraig Gogarth	1989(2):5
Smith, Don	Random Jottings	1989(2):6
Smith, Don	The Vivians	1989(3):13-15
Smith, Don	Down Below	1989(3):16
Smith, Don	More, Down Below	1990(1):4
Smith, Don	Steam power in the Llandudno mines	1989(3):19-20
Smith, Don	The John	1990
Smith, Don	Carausius, Emperor of Britain	1990(1):9-10
Smith, Don	The Penmorfa Patrol	1990(1):11
Smith, Don	Where seagulls dare	1990(1):12
Smith, Don	The GOES-busters are here	1990(1):18
Smith, Don	Are you qualified in the art of course grovelling	1990(1):19-20
Smith, Don	The four ages of mining in the Great Orme	1990(2):2-4
Smith, Don	Steam power in the Llandudno mines	1990(2):15-16
Smith, Don	The Ty Gwyn Eisteddfod	1990(3):8-9

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1989-95

AUTHOR	TITLE	REFERENCE
Smith, Don	Y Ddraig Gogarth from slumber awakes	1990(3):13
Smith, Don	Roman mine administration and labour	1990(3):20-23
Smith, Don	The Annual General Meeting	1991(1):14-15
Smith, Don	Wot, No prisoners (Ed)	1991(2):3
Smith, Don	Ty Gwyn tramming adit (Ed)	1991(2):3
Smith, Don	I, The Orme	1991(2):6
Smith, Don	Mines and collieries act, 1842 (summary)	1991(2):7
Smith, Don	On the trail of William Vivian	1991(2):8-9
Smith, Don	Outward bound, towards Swansea	1991(2):11-14
Smith, Don	Higher Shaft (Ed)	1992(1):1
Smith, Don	Coniston (Ed)	1992(1):1
Smith, Don	Old Mine engine house (Ed)	1992(1):2
Smith, Don	Cave rescue (Ed)	1992(1):2-3
Smith, Don	Captain William Vivian (Ed)	1992(1):3
Smith, Don	Subscribers to Mineralogia Cornubiensis	1992(1):7
Smith, Don	Woolf beam engines in Ontario	1992(1):9-12
Smith, Don	The four ages of mining in the Great Orme	1992(S1):1-3
Smith, Don	Viviana (Ed)	1992(2):1
Smith, Don	The Kendricks (Ed)	1992(2):1
Smith, Don	Mine exploration (Ed)	1992(2):1
Smith, Don	Archaeology and artifacts (Ed)	1992(2):1-2
Smith, Don	CIA meeting (Ed)	1992(2):3
Smith, Don	Victorian Extravaganza (Ed)	1992(2):3-4
Smith, Don	German technology in the early Swansea smelting industry	1993(1):9-11
Smith, Don	Edgar's tale	1992(2):12-13
Smith, Don	Has the smelting debate been beached?	1992(2):1-2
Smith, Don	Huw Tudno Williams (Obituary)	1992(3):2
Smith, Don	NAMHO (Ed)	1992(3):2-3
Smith, Don	CIA meeting (Ed)	1992(3):3
Smith, Don	Penmorfa (Ed)	1992(3):3
Smith, Don	Pen y Bryn (Ed)	1992(3):4
Smith, Don	Ty Gwyn beach adit (Ed)	1992(3):4
Smith, Don	Black damp (Ed)	1992(3):5
Smith, Don	Pen y Dinas (Ed)	1992(3):5
Smith, Don	Copper cultures in North America	1992(3):17-18
Smith, Don	Wet Earth Colliery (Ed)	1993(1):5
Smith, Don	First Aid, Penmorfa (Ed)	1993(1):5
Smith, Don	NAMHO, IoM, 1993 (Ed)	1993(1):5-6
Smith, Don	Copper Slag Analyses (Ed)	1993(1):7
Smith, Don	Llandudno Flood, June 11, 1993 (Ed)	1993(1):7
Smith, Don	Ty Gwyn Beach Adit (Ed)	1993(1):7
Smith, Don	A brief guide to copper mining in the Great Orme	1993(1):8-11
Smith, Don	William Vivian	1993(1):19
Smith, Don	Beach Slag (Ed)	1993(2):1
Smith, Don	William Vivian (Ed)	1993(2):1
Smith, Don	Aftermath of the Llandudno flood (Ed)	1993(2):1-3
Smith, Don	Miscellaneous journal reports (Ed)	1993(2):3-5
Smith, Don	Bronze Age Copper Smelting in North Wales	1993(2):5-7
Smith, Don	The Life and Essays of William Vivian, 1817-1879	1993(2):8-18
Smith, Don	William Vivian Biography (Ed)	1995(1):3
Smith, Don	GOES Military Vehicle Wing (Ed)	1995(1):4

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1989-95

AUTHOR	TITLE	REFERENCE
Smith, Don	The Great Orme Mines, C.J. Williams (Ed)	1995(2):1
Smith, Don	British Library, Skeleton Cave (Ed)	1995(2):1
Smith, Don	Ogofiau Tudno (Ed)	1995(2):2
Smith, Don	Ty Gwyn Beach Adit (Ed)	1995(2):2
Smith, Don	North Wales Cave Rescue Organisation (Ed)	1995(2):2-3
Smith, Don	Aerial Photographs (Ed)	1995(2):3
Smith, Don	Carn Brae Group (Ed)	1995(2):3
Smith, Don	Thomas Trevithick	1995(2):4
Smith, Don	Dawn Patrol	1995(2):5
Smith, Don	The Great Orme Exploration Society, 1985-1995	1995(3):6
Smith, Don	Biography in Local History	1995(3):9-10
Smith, Phil	Worth waiting for	1989(1):4-5
Smith, Phil	The three (not so wise men) of Tan Y Gopa	1990(4):2-4
Smith, Phil	A good food guide to Cornish mining	1990(3):11-13
Smith, Phil	A missionary's story	1991(1):6
Smith, Phil	Eureka, Higher Shaft!	1992(1):5-6
Smith, Phil	Eureka, Higher Shaft!	1992(S1):8
Stone, Tom	Early settlers on the Great Orme	1991(1):8
Stone, Tom	A Glimpse of Llandudno in Prehistory	1994(S2):1-28
Stone, Tom	In the beginning	1995(2):11-14
Stone, Tom	Early Days	1995(3):1-5
Vivian, William	A note on ancient copper	1993(1):19
Vivian, William	On arborescent native copper in the Llandudno Mine ...	1993(2):18-19
Walker, Simon	Several years painstaking research	1990(2):9-11
Watson, Peter	Bronze Age secrets uncovered by caver	1989(1):3
Wayman, Mike et al	The Great Orme Bronze Age Mining Centre	1992(2):6-9
Wheal, Kristian	The hole in the Promenade	1990(3):12
Williams, Huw Tudno	Past to present: Llandudno's hidden wonderland	1989(2):16-18
Williams, Huw Tudno	Unearthing Roman coins	1989(3):23-24
Williams, Huw Tudno	Unearthing Roman coins	1989(3):13-14
Williams, Huw Tudno	Thomas Kendrick	1990(2):21-23
Williams, Huw Tudno	North West Passage (letter)	1992(1):3
Williams, Huw Tudno	The Umpire Strikes Back	1992(1):3

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1991-1995

SUBJECT	AUTHOR	REFERENCE
Acts of Parliament	Smith, Don	1991(2):7
Artifacts	Smith, Don	1992(2):1-2
	Vivian, William	1993(1):19
Beach Slag	Bannerman, Nigel	1992(S1):6-7
	Smith, Don	1992(2):5-6
		1992(2):1-2
		1993(2):5-7
		1995(3):11
Bibliography, Great Orme	Smith, Don	
Beam engine	see Cornish engine	
Bishop of Bangor		
Black damp	Smith, Don	1992(3):5
Cannon stones	Parry, Tom	1992(3):19
Carausius, Emperor	Smith, Don	1990(1):9-10
Carbon dating	Haynes, David	1995(2):7-8
Carn Brae	Smith, Don	1995(2):3
Cave rescue	Smith, Don	1992(1):2-3
	Smith, Don	1995(2):2-3
Cave	see Ogof	
Charcoal		
Clearwell caves	Shepherd, Erika	1993(1):
Coastlines	Edwards, Dave	1995(2):9-10
Coniston	Smith, Don	1992(1):1
Copper, native	Vivian, William	1993(2):18-19
Copper, N America	Smith, Don	
Cornish engine	Smith, Don	1989(3):19-20
		1990(2):15-16
		1995(3):14-15
Cwm Bychan mines	Atkinson, Max	
Dates, C ₁₄	Smith, Don	1990(2):2-4
Dawn Patrol	Smith, Don	1995(2):5
Day's work	Parry, Tom	1991(1):17-18
Edgar	see Murder-Suicide	
Engine House	Smith, Don	1992(1):2
Equipment	Lea, Steve	1995(2):15
Firesetting	Anon	1989(3):5-6
	Lewis, Andy	1990(1):17
Flood	Smith, Don	1993(1):7
Geology	Barker, David	1993(1):1-3
	Smith, Don	1993(1):8-11
Gogarth		
Gold, Merioneth	Smith, Dave	1992(1):8
GOES	Smith, Don	1995(3):6
	Bannerman, Nigel	1995(3):7-8
Higher shaft	Smith, Phil	1992(1):5-6
		1992(S1):8
		1992(2):1
Kendrick	Smith, Don	
	see Ogof	
Llandudno early	Stone, Tom	1995(3):1-5
Museum	Bannerman, Nigel	1995(3):8
Military Vehicles	Smith, Don	1995(1):4
Mineralogia Cornubiensis	Smith, Don	1992(1):7
Mineralogy	Smith, Don	1993(1):8-11

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1991-1995

SUBJECT	AUTHOR	REFERENCE
	Vivian, William	1993(1):19 1993(2):18-19
Mineral and Battery Works	Smith, Don	1993(1):9-11
Mines Royal Society	Smith, Don	1993(1):9-11
Mining, Bronze Age	David, Geoff	1991(2):4-5 1992(S1):4-5 1992(2):15-18 1993(1):14-18 1995(3):12-13
	Lewis, Andrew	1989(1):16 1989(3):5-6 1989(3):17-18 1990(2):17-18 1991(2):15-17 1995(3):16-19
	Jenkins, David	1995(3):19-21
	Roberts, Edric	1995(3):22
	Smith, Don	1990(2):2-4 1992(S1):1-3
	Wayman, Mike and Lewis, Andrew cf Roman and modern mining	1992(2):6-9
Mining, Modern	Atkinson, Max	1995(3):14-15
	Smith, Don	1990(2):2-4 1992(S1):1-3 1993(1):8-11
Mining, Prehistoric	see Mining, Bronze Age	
Mining, Roman	Smith, Don	1990(1):9-10 1990(2):2-4 1990(3):20-23 1992(S1):1-3 1993(1):8-11
Mumbles	David, Geoff	1989(2):7-9
Murder-Suicide	Smith, Don	1992(3):12-13
New Mine	Smith, Don	1993(1):8-11
North West Passage	Anon	1990(3):7
	Williams, Huw Tudno	1992(1):3
Ogof		
Arth	Stone, Tom	1991(1):8
Brenda's	David, Geoff	1991(1):11-12
Bryn Euryn	David, Geoff	1989(3):21-22
Corkscrew	David, Geoff	1990(2):5-8
Elephants	David, Geoff	1991(1):11-12
Lower Kendrick's	Stone, Tom	1994(S2):1-28
	Stone, Tom	1995(2):11-14
Upper Kendrick's	Stone, Tom	1994(S2):1-28
	Stone, Tom	1995(2):11-14
Letterbox	David, Geoff	1990(3):8-11
Mammoth	David, Geoff	1990(3):8-11
Pant y Wennol	Stone, Tom	1994(S2):1-28
Skeleton	Smith, Don	1995(2):1
Tudno	Bannerman, Nigel	1995(3):7-8

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1991-1995

SUBJECT	AUTHOR	REFERENCE
	Stone, Tom	1994(S2):1-28
	Smith, Don	1995(2):2
		1995(3):6
Old Mine	Smith, Don	1990(2):2-4
		1992(S1):1-3
Orme's Day Project	Bannerman, Nigel	1995(3):7
Parys Mountain	Jenkins, David	1995(3):19-21
Penmorfa Adit	Anon	1989(2):20
	Lewis, Andrew	1989(3):7-8
	Parry, Tom	1992(2):19
	Smith, Don	1990(1):11
		1993(1):5
Pen y Bryn	Smith, Don	1992(3):4
Pen y Dinas	Smith, Don	1992(3):5
Poems and rhyming ditties	Anon	1993(1):12
	Bowen, John	1991(1):3
	Smith, Don	1989(3):16
		1990(1):4
		1990(3):8-9
		1991(1):14-15
		1991(2):6
	Williams, Huw Tudno	1992(1):3
Radon	Smith, Dave	1989(1):12-13
Rhosydd	Anon	1989(2):11-14
	Roberts, Edric	1989(1):6-7
Round Trip	Jones, Helen	1990(3):14-15
Shipping	Smith, Don	1990
Simdda Hir	Smith, Don	1990(2):2-4
		1992(S1):1-3
		1993(1):8-11
	Williams, Huw Tudno	1989(3):23-24
Smelting, Bronze Age	Bannerman, Nigel	1992(S1):6-7
	Bannerman, Nigel	1992(2):5-6
	Bannerman, Nigel	1992(3):7-16
	Smith, Don	1993(2):1
Smelting, German	Smith, Don	1989(3):13-15
		1993(1):9-11
Smelting, Swansea		1993(1):9-11
Societies,		
CIA	Smith, Don	1992(2):3
		1992(3):3
NAMHO	Smith, Don	1992(3):3
		1993(1):5-6
Swansea	see German smelting technology	
Tom and Jerry	Smith, Don	1993(1):5-6
Trevithick, Thomas	Smith, Don	1993(2):8
	Smith, Don	1995(2):4
Ty Gwyn Beach Adit	Smith, Don	1992(3):4
	Smith, Don	1995(2):2
Ty Gwyn, tramming adit	Bannerman, Nigel	1995(3):7
	Davies, Tony	1990(3):3-5

INDEX TO THE JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY 1991-1995

SUBJECT	AUTHOR	REFERENCE
		1992(1):13-16
		1992(S1):9-10
	Smith, Don	1991(2):3
		1995(3):6
	Wheal, Kristian	1990(3):12
Type site	Barker, Dave	1993(1):1-3
Virtual Reality Caving Club	Anon	1995(3):11
Vivian, Lord Swansea	Smith, Don	1989(3):13-15
		1991(2):8-9
Vivian, William	Smith, Don	1991(2):8-9
		1992(2):1
		1993(1):19
		1993(2):1
		1993(2):8-18
		1995(3):9-10
Water power	Smith, Don	1993(1):5-6
Wet Earth Colliery	Smith, Don	1993(1):5
Williams, Huw Tudno	Smith, Don	1992(3):2
		1995(3):6
Woolf beam engines	Smith, Don	1992(1):9-12
Worthington, Samuel	Smith, Don	1993(2):8-18
Wynn, of Gwydir	Smith, Don	1993(1):8-11

Abbreviations used in this index:

Anon	Anonymous or pseudonymous author
CIA	Council for Independent Archaeology
Ed	Editorial or News material
GOES	Great Orme Exploration Society
NAMHO	National Association of Mine History Organisations
NMRS	Northern Mines Research Society
PDMS	Peak District Mines Society
TS	Trevithick Society
WMS	Welsh Mines Society