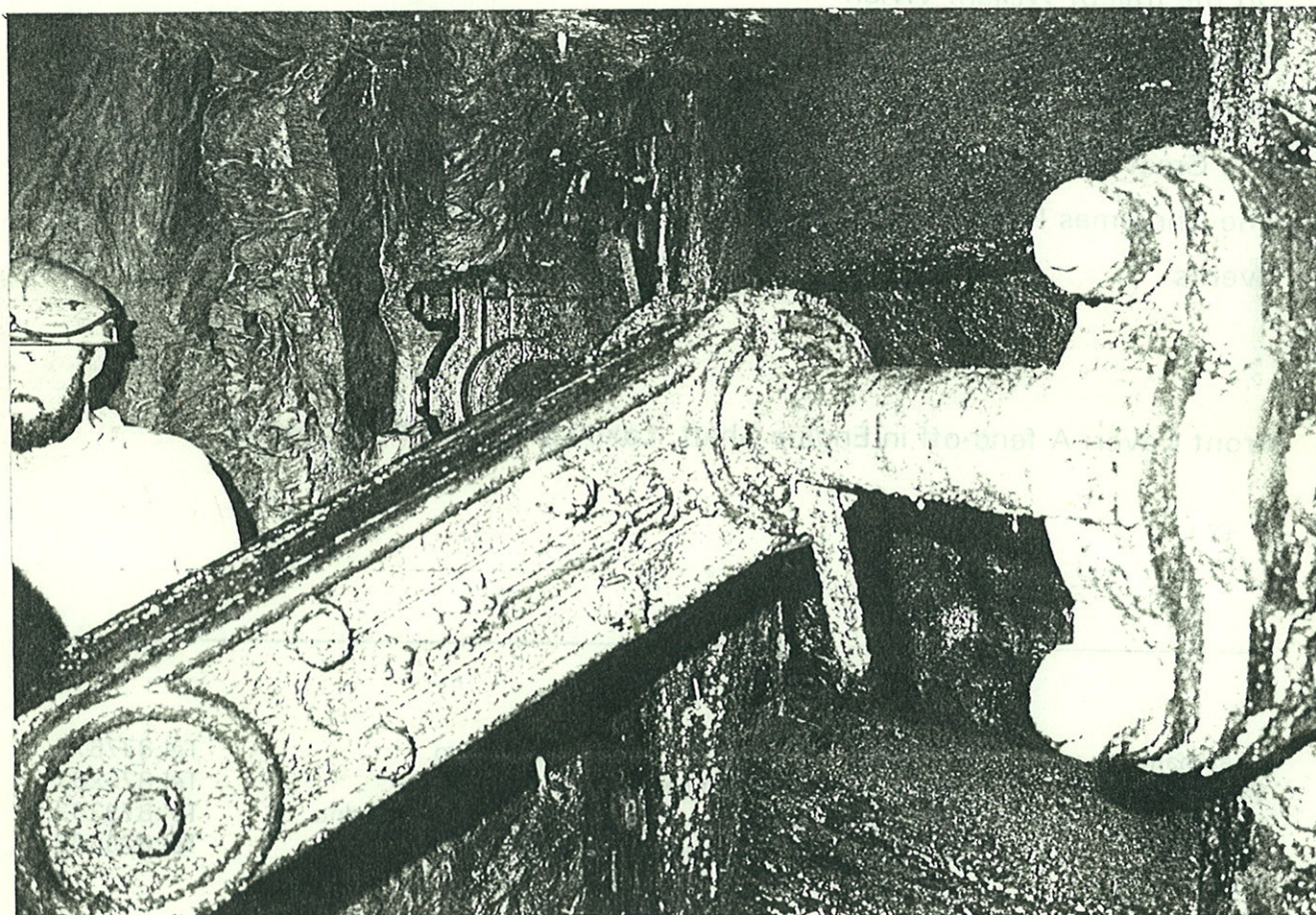


JOURNAL OF THE GREAT ORME EXPLORATION SOCIETY



1991 (2)

JOURNAL GOES UNDER NEW MANAGEMENT

Over the years a wide variety of material has been submitted to the Newsletter/Journal by members and associates, serious, comedy, verse and occasional prose. It will be my intention to provide a balance of material in the Journal and to include such things as, editorial comment, reports of club activities, forthcoming activities, training articles, findings from field and archive research, prose, verse and comedy.

I should like to produce an annual edition containing the best the Society has to offer as well as regular editions throughout the year. Of course, I cannot do it all myself, I shall need your help. So if any of you have an idea for a brief article or report please give it to me in one of the following formats:

- | | |
|---|------|
| 1 Typed/printed on A4 paper with 1 inch margins, photocopy ready . | **** |
| 2 5.25" or 3.5" IBM disk in Wordstar, Word Perfect or ASCII format. | **** |
| 3 Legible hand-written final draft. | ** |
| 4 Hand-written notes, audio-tape or verbal report. | * |

I am also interested in receiving suitable photographs, preferably B&W, cartoons and line diagrams.

Don Smith

NOTIFICATION OF THE ANNUAL GENERAL MEETING

The time and date for the AGM has been arranged, meeting at 7.30 for an 8 pm start, Thursday January 30th, 1992; the venue has yet to be confirmed. The agenda to date includes:

- 1 The minutes of the last meeting.
- 2 The treasurer's report.
- 3 The secretary's report.
- 4 Society business.
- 5 Nomination and election of Society officers.
- 6 Other business.

Proposers and seconders are asked to submit their nominations for elections to the secretary, together with an proxy votes, by January 23rd. Proposals of matters for inclusion on the agenda under 'Society business' should be supported by a seconder and submitted to the secretary by January 23rd.

WOT, NO PRISONERS!

In the last ten years members of the Great Orme Exploration Society have been in the van of an archaeological revolution centred in and on the Great Orme. From our early faltering steps we have advanced and with the help of some gifted society members, eg Andy Lewis, and academics, we have been able to make our contribution. With phase one of the mine project complete and its first season coming to a successful conclusion it is perhaps time to review our interests and strategy for the future.

Although the greatest advances in our knowledge and the best access to Bronze Age workings have been made in the area of Vivian's shaft, it would be wrong to conclude there is nothing left worthwhile to investigate. There are many more untold stories waiting to be discovered beneath Bryniau Poethion which may prove to be of equal importance to the Bronze Age material already discovered a little further south. Dare I say it, there might even be absolute proof of why Roman shaft is so named.

It would also be wrong to conclude that after crawling around the modern workings of the Old, New and Ty Gwyn Mines for some time we know all there is to know. Far from it. So much of these mines has yet to be re-discovered that it will take years of exploration to exhaust the system. Will we be able to traverse the mines from Bryniau Poethion to the Penmorfa? Will we find our way into any stopes in the Ty Gwyn Mine? Until we search we shall never know. There are, too, a great number of ghosts of local mining lore to be investigated and laid to rest.

Although our prime interest may still be the Great Orme there is also a great deal in the neighbourhood to stir our interest, caves such as Letter-box on the Little Orme and many mines, Parc, Aberllyn, Tre Castell and New Pandora up the Conwy Valley and Llansannan up the Clwyd coast to mention just a few. There are of course hundreds of mines in the Snowdonia mountain range and many more in Derbyshire and Cumbria. There is, therefore, no shortage of material to keep us interested and stimulated.

In short, our first engagement has been successful though sadly no prisoners, Bronze Age or Roman, were taken. However, the campaign is far from over.

TY GWYN TRAMMING ADIT

Work on the blockage at the ventilation shaft began some time ago. Steel rods were hammered through the rubble, supported at both ends, the rubble removed and intermediary support put into place over a number of weekends as work progressed. On Sunday morning, October 13th, steel sections were brought down and put into place by Tony Davies et al, and further work was done on October 20th. There remains the positioning of the final support work, be it brick or heavy timber, and then the project will be complete. This in itself is no mean task so your help will be appreciated.

Don Smith

PREHISTORIC COPPER MINES: AN UPDATE

Those members of **GOES** with ears to the archaeological ground will have already heard that the Great Orme is not the only place with a Bronze Age copper mine. Several other places in Wales, **Parys Mountain**, **Cwmystwyth** and **Nantyreira**, have produced evidence of Bronze Age opencast mining, with carbon-14 (C_{14}) dates in support. Parys Mountain indeed has produced the earliest date yet, around 2000 BC. Much the same has been found in Ireland; at **Mount Gabriel** (County Cork) consisting of no less than 31 shallow workings, with C_{14} dates ranging from about 1300 to about 1700 BC.

Other names may soon be added to this list, for example, **Alderley Edge** in Cheshire. Here stone mauls, those ungainly tools found in their hundreds in the Great Orme Mines, have been recorded over a number of years, and an exploratory dig is now being carried out by a team from the University of Bedford, in the hope of finding more definite evidence of a Bronze Age date. Stone mauls have also been found at **Bradda Head**, in the Isle of Man, and in a scatter of sites in Dyfed. They have also been reported from the **Tre Castell** lead mine in the Conwy valley and at two copper workings south-east of **Towyn** (Merioneth).

So it looks as if the hunt for Bronze Age mines is set to widen and by this time next year, or soon after, we may have quite a collection of likely sites scattered all over the 'highland' regions of the British Isles from Scotland to Cornwall. The same may be true of other parts of Western Europe; Austria has already produced a good example in the **Mitterberg** region south of Salzburg. Likewise Spain, especially in the **Rio Tinto** area in the south-west near Cadiz, and the area around **Los Millares** in the south east, north of **Almeria**. They have also been found, I am delighted to add, in my favourite foreign home-from-home, France, which used to be dismissed by archaeologists as having no domestic source of copper at all (they used to say the same about Wales).

I first became interested in the possibilities during the summer of 1988, when returning from my usual wine-sampling and sunbathing holiday in the Pyrenees. Pottering gently up the west side of the Massif Central, south-west of Poitiers, I happened to see a little sign by the roadside advertising visits to the 'Ancient Silver Mines' near the little town of **Melle**. Naturally, I made a bee-line for them, and very good they were too. However, the part that we were shown is only a tiny fraction of the whole system (60 kilometres of galleries). It was very well displayed with nice flowstone formations and good exposures of the main mineral, galena (lead sulphide) and also cerussite (lead carbonate). There was also some evidence of firesetting; the workings are certainly ancient, dating mainly from the 5th to the 10th century AD. They might indeed go further back still, to the Romans and even to the Celts or Gauls before them, although there is no actual evidence of that yet.

On the surface there is a little museum and while browsing around I met the curator. He knew of no local ancient copper mines but provided me with a reference of a detailed and illustrated report by one Monsieur Claude Dubois entitled 'Antique Mines of the Seronais' (Pyrenees of the Ariege). Unfortunately I

was unable to get a copy of this article at the time, but after my return home, I plucked up my courage to write to M Dubois at the University of Toulouse asking for a photocopy of his article, sending him, by way of encouragement, photocopies of articles by Andy, Danny and Duncan James on the Great Orme discoveries. In due course, M Dubois replied (in good English) enclosing a copy of his article but telling me that none of the Seronais mines were Bronze Age, alas. They were Gallo-Roman ie very late BC, roughly 200-0 and securely dated by the many bits of pottery found in the mines and spoil heaps. Most of these bits of pottery were from amphorae, giant wine jars imported from Italy, so some of the miners, at least, did not do all that badly for themselves.

However, this is not the end of the matter, because M Dubois did mention that he knew of two Bronze Age copper mines, both in the south of France, in the Cevennes, the hilly country north east of **Carcassonne**, and which happens to be one of my favourite spots (beautiful sunbathing and even more beautiful wine). He gave me brief details and advised me to get in touch with the excavator, a Madame Barges, in Marseilles. So I hastened to write, enclosing further photocopies of work by Andy et al, and in due course she 'came up trumps', with a whole sheaf of archaeological articles (in French) accompanied by a very friendly letter wishing us luck on the Great Orme.

From all this I learnt that the two mines were in fact within 30 miles of each other. One is at the bottom of a series of natural 'avens' (or swallow holes) called **Bouche-Payrol**, near the town of **Brusque** about 20 miles west of **Lodeve**. The other is just north of the village of **Cabrieres**, about 12 miles south of Lodeve. Bouche-Payrol, so Mme Barge told me is difficult of access requiring caving equipment but Cabrieres is easy. This was confirmed to me by David Gale, one of the archaeologists working for a while this summer on the stone mauls of the Great Orme. He had been there and gave me detailed instructions of how to find it so it looked as though Cabrieres at least was on the cards for my holiday in July.

Meanwhile, another article on the Cabrieres mine reached me, thanks to Dr. Craddock at the British Museum. This described in great detail several underground galleries (of unknown depth as the lower levels were flooded); some evidence of later Roman working (2 Latin graffiti) but enough bits of Bronze Age pottery in the galleries and mixed up with the spoil to establish its prehistoric date. There was also an obvious ore treatment site by the "**Roque Fenestre**", a prominent outcrop of rock about 400 m from the mine, once again proved by plentiful pottery finds to be Bronze Age in date, and supported by a C₁₄ date (charcoal) of 1950 BC.

Sadly, when I got to Cabrieres I found the mines closed, their entrances boarded up, 'Access Prohibited' signs outside and the archaeologists departed. Having sweated buckets getting there on a very hot day I wasn't going to leave empty handed so I took some photographs of the entrances. If GOES wishes to mount a French Copper Mines expedition at some stage in the future I can lead them straight to the spot, -provided it is spring or autumn, and not mid-summer!

G.C.David 1991

I, THE ORME

*Long years ago this mount bore trees,
And coppiced oak swayed in the breeze,
Bronze Age came and epochs passed,
Treed green no more, I'm green and grassed.*

*In peace I lay to heal my sores,
Till Romans came and dug my ores,
And then again I lay at rest,
Till later men my ores addressed.*

*Now, once again, my peace disturbed,
Inside old wounds great noise is heard,
These modern men with JCB,
Expose my soul for all to see.*

*Down inclines old, like ants they crawl,
To farm my ancient bone and maul,
Left to me long years ago,
By men that mined my cuppero.*

*It will not be like yesteryear,
No lust for ore, my side to spear,
And when this steward's term has passed,
I will remain, both green and grassed.*

Don Smith, Ontario, December 1990.

THE MINES AND COLLIERIES ACT, 1842

No owner or agent shall employ a female person to work in a mine or colliery: fine £5-10.

No owner or agent shall employ a boy under 10 to work in a mine or colliery: fine £5-10.

No apprenticeship shall begin before the age of 10 nor last longer than 8 years except masons, joiners, engine wrights and similar trades.

No parent or guardian shall misrepresent a boy's age to gain his employment: fine 40 shillings.

Any person may be employed above ground.

No male under 15 shall operate a steam or other engine, windlass or gin, however powered, nor take charge of rope, chain or tackle; however, he may operate a horse gin under supervision.

No wage shall be paid in a public house, tavern or place of entertainment: fine £5-10.

All wages so paid shall be paid again in full.

Her Majesty's Government shall appoint mine inspectors.

Summonses and warrants may be served to owners or their agents at the mine office 3 months before court; all fines shall be paid within 2 months of conviction.

August 10th, 1842

ON THE TRAIL OF WILLIAM VIVIAN

We know little of William Vivian save that he came to Llandudno circa 1853 when the Taylors took over the Old Mine. From where he came, and to where he went, we do not know. Nevertheless, his name has become inseparably bound with the mid 19th century lore of the Old Mine and 'Shafft Copr Ddu' which still bears his name.

It has certainly been convenient to relate him to the prominent Cornish and Glamorgan copper smelting family of Vivians. Though this may be the case, there is no evidence at all to substantiate this illusion. Vivian is a common surname in the Cornish community and a brief search of the family history records (FHR) for Cornwall lists no fewer than 87 Williams Vivian from the late 1700s to the mid 1800s. This figure does not include the Williams Henry, Williams James and so on. If our man is one of these, his father or his offspring, then the task of tracing him is formidable indeed.

In the FHRs for the Welsh counties, Glamorgan has the largest listing (N=12) which includes the 'Vivian' family of John Henry and Sarah Vivian and another family of Vivians, Frederick Edwin and Mary Margaret Vivian, both of St Mary (church?), Swansea.

This record is far from complete, from publications such as Burke's Peerage, Walford's County Families and Kelly's Handbook many more Vivian's come to light. In Burke's Peerage the Vivians are listed under 2 headings, as Baron Vivian and Baron Swansea. Richard Henry Vivian, brother to John Henry Vivian, was the first Baron Vivian and Henry Hussey Vivian, John Henry's son, became the first Baron Swansea.

While the Swansea family are of more immediate interest to us I have found no local connections. However, Baron Vivian's son, Charles Crespigny Vivian, took Mary Elizabeth Panton of Plas Gwyn, Anglesey, as his second wife. Their offspring had their seat in Plas Gwyn and another son, Walter Warwick Vivian, by a third wife, lived at Plas Dinorwic, Porth Dinorwic. This arm of the Vivian family remained closely linked with Plas Gwyn and many held prominent positions such as Deputy Lieutenant of Anglesey. Although these texts give us details of many distinguished Vivians they tell us nothing of the man we seek. However, they do provide an established family tree upon which details yet to be discovered may be placed.

Further west in Llanelly, Carmarthen, there was also a family of Vivians dating 1864-74. The man of the house was William Henry Vivian and his lady, Mary Matilda and between them they had 2 sons and 5 daughters. In Pembroke (Saint Mary) there was another William Vivian, married to Ann who in April 1836 had a daughter Elizabeth Ann. In Llancynfelin, Cardigan, a Jane and Mary Anne Vivian were born to John and Anne Vivian in September 1863.

Nearer to home, I thought there was a chance James Treweek might have had a

hand in Williams Vivian's appointment to Llandudno since he had, prior to coming to Mona Mine as agent in 1811, worked for the Vivians at their Penclawdd copper smelting works in Swansea. The Vivians also leased 'Mona Lodge' in the same year. Unfortunately there was no listing for Caernarfonshire or Anglesey, the nearest I can get is the birth of a Ralph Vivon in August 1779 in Eglwys Rhos.

There is another link between James Treweek and the Vivians. We know Michael Faraday was touring Wales trying to find a solution to the problem of copper smoke for the Vivians. He toured their Hafod works in Swansea and then proceeded to Mona Mine. There, Faraday studied the process and commented in his diary of Treweek's fairness in most dealings, except appointments where he was prone to nepotism which the locals miners resented.

A search of the FHRs for the other counties of Wales has not been fruitful though another William Vivian did turn up in Wentnor, Shropshire, born March 1795 to John and Ann Vivian. Searching further abroad, I came across a reference to a Vivian in the United States at about the time William would have left Llandudno. This Vivian was leading a strike of Cornish miners against Pennsylvania mine owners, but, after the strike at the Llandudno, this doesn't sound like our man. A search of the Pennsylvania FHRs showed no entry for a Vivian born or married during this period. There were no other details and no easily traced references.

Of the Vivians tracked down so far there are a couple of Williams Vivian who could possibly be excluded from the search fairly easily or identified as likely suspects, namely William Henry Vivian of Llanelly and William Vivian of Pembroke. The name Ralph Vivon is also sufficiently close geographically and corruption wise to be worthy of investigation as a possible father or grandfather. William Vivian of Wentnor I feel is not a likely bet since he would have been nearly 60 at the time of his appointment to the Old Mine.

Having eluded other investigators before me I feel sure that Captain William Vivian will not wish to be found so easily. Undaunted, there are many sources of information which so far have not been tapped, they include census records for Llandudno, Conwy, Pembroke, Llanelly and Swansea, Church and Parish records and so on. There are also many theses lingering on the shelves in the University library book stacks some of which must deal with our areas of interest. Many of these theses are also published in a shorter article form in 'Welsh History Reviews' which is probably available in the UCNW library, Bangor. Somewhere out there is the information I seek and when I find it you can be sure I will let you know.

Don Smith, September 1991

EDITORIAL

DRACONEM GOGARTHIENS

Draconem Gogarthiens (DG) is a hunter-gatherer requiring mineral and rock for the bulk of its diet. It is an illusive creature, but, like some mammals coming to a salt-lick, DG comes to the bitumen deposits beneath Bryniau Poethion on the Great Orme from where it may be tracked to feeding grounds and its lair deep within the Great Orme. Dolomite is its preference, particularly if rich in malachite and chalcopyrite. However, despite this preference it will consume limestone, chert and possibly galena, but appears not to relish sandstone and ores of manganese.

From the crushed mineral DG obtains a considerable energy yield, approximately 12.5 MegaCal.kg⁻¹, by a process to be reported elsewhere in the near future (research in progress). As previously reported, this results in several bi-products, such as the familiar smooth oval dolerite coprolite (maul) and copper. It is now all too clear why the archaeologists can find no trace of smelting-hearths or slag, the miners never needed to smelt the ore, they harvested the copper as it was cast aside.

Recent investigations prove conclusively that DG is not an obligate geovore as previously thought. Periodically DG has been observed venturing out to surface at night on feeding forays in search of organic calcium and nitrogen. The Old Mine, a giant ossuary, attests this fact and still contains the remains of many a feast by DG. Judging from the skeletal remains found in the mine DG has prayed upon goat, wild boar, deer, cattle, and also dog and cat.

For years local shop windows have displayed small advertisements such as:

MISSING: Cat answering to the name Tiddles.

It is now abundantly clear why Tiddles wont come home, so the local restaurants should be blamed no longer.

To many in the various fields of archaeology, much of the recently published material on DG will appear iconoclastic. In the near future one of the authors (TR) will be providing evidence which will silence any further protest and doubt regarding the authenticity of this rare and secretive species.

Thomas Rot and Huw G. Lyre.¹

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* British Mythology, BULL, 12 Waffling Way, London. Telex: Bull Sh1t.

OUTWARD BOUND, TOWARDS SWANSEA

During the night all was quiet, save the occasional rap of halyards on the mast and lapping of water along the ship's side. The sky was clear and the stars bright, even though the night as far from inky black. As usual, the gulls announced the dawn, long before the glow on the east horizon was detectable below decks; the ship began to stir.

Nature was up and at work. The shags were skimming, the terns bobbing and the seagulls lazily flapping their way across the water in search of their first meal. It was much the same as the day before, but, the night being cool, streams of mist had rolled slowly down the slopes of the Orme to form pools among the hollows and ditches. To seaward, thin banks of mist veiled the horizon and an oily swell rolled around the headland into the bay.

Huw, the skipper, checked the compass and went on to make other navigational checks as the crew prepared to get under way. He didn't have to watch what they were doing. With every muscular serge of the halyards the wooden blocks squeaked, quietly at first, but as the gaff rose up the mast and it grew louder.

In time he knew to look up from his task and glanced casually at the sail and called to the mate, "The throat's fine, belay it there and peak up," and returned to his task. In a few minutes the gaff, jib and jib staysail were set and the John was ready for sea.

She roved gently from tack to tack as the anchor cable was shortened up. As she roved to starboard they broke it out and she paid off onto a broad reach, the course set to clear Pen Trwyn.

Tom pulled out the gaff topsail from its stowage and began bending it onto the jackstay. When all was ready the skipper brought her up to wind for a moment and the topsail was hauled up the mast and set. Out of the lee of the Orme, and with the topsail drawing, the John ambled along at nearly 3 knots in a gentle southwesterly breeze.

To seaward of the Constable bank they could see the masts and sails of a fully rigged ship, homeward bound for Liverpool. She was hull-down, showing only her topgallants and topsails, shining like silver in the morning light.

She may have cleared Holyhead during the night but her passage had not gone unnoticed. The chain of semaphore stations from Anglesey to Birkenhead had begun reporting incoming shipping at first light. The stations on Puffin Island and the Great Orme could be seen wagging their arms, like demented windmills, relaying messages down the chain to the owners and merchants.

As they sailed on an Amlwch brig passed close to windward. All her canvas set for these light airs, her topsails and tween mast staysails billowed lazily as she romped along. Code flags were not necessary to identify her, she was 'Hero', well known

in these waters and owned by the Treweek family.

Huw had heard in the Miners Arms she was due in Llandudno to pick up ore for Mona and, no doubt, that is where she was bound now. He waved to their deck watch as they sailed on their way.

As the morning wore on the wind picked up and hastened their passage round the coast of Anglesey, clearing Holyhead during the afternoon from whence they steered to clear the LLeyn Peninsula and on into Cardigan Bay.

Aloft, the weather forecast was unfolding. They had seen the first signs appear during the morning as the high clouds gathered. In turn, they had been replaced by veils of cloud coming ever closer to earth and the wind had freshened. They were in for a blow during the night, and probably the next day too.

They stood out into the Irish Sea for sea room. The John was close hauled, leaning to starboard in the breeze and romping along, eager, like a dog straining on the leash. Astern the quarter waves rolled away athwartships, mingling with the waves in a confused melee of troughs and breaking peaks, and the wake course betrayed their leeway.

The sea state followed the wind and the bluff bows of the John met the waves, in confrontation, as they rose up before it. They still parted the waves but spray was beginning to come on deck. Thrown aloft, it was caught by the breeze and scattered to leeward before being cast down on the deck. Trickle of water ran into the scuppers, the splashes dried and were replaced by others up and down the deck.

At sunset they handed the gaff topsail and put a deep reef in the main to slow her down. Tom and Billy would steer watch-on, watch-off, from now on, Tom taking the first watch until midnight, Billy the middle watch until 4 am and Tom the morning watch until 8 am, and so on.

During the night, as the weather deteriorated, the motion became more lively and the wind increased to force 6 and then 7. The John began driving through the waves, pounding as she drove into banks of green sea. She buried her bows deep before rising, shaking, and driving on, pitching and rolling in the seaway. She continued to take the water white for a while, then she took it green and the scuppers ran deep with water. Below deck she creaked and groaned, but most of the sounds, so familiar to all seafarers, came from the elemental orchestra above deck.

The skipper took a look on deck as the watch changed at 4 am. All was well, the reef was adequate, the hatches and cargo secure, and the bilges dry. He puffed away on his pipe and passed the time chatting for a while with Tom. He turned to go, looked back at Tom briefly and said, "Call me when the wind shifts," and then he went below.

It was a dark night and raining steadily now. Tom couldn't see the navigation lamps but he knew they were burning. During a roll, green light reflected from the boiling sea to leeward as it rushed past, and spray glowed red as it whipped past to port. When dawn came the rain increased. Caught in the sail, it ran down and poured off the boom, dripped and poured off the leeward reefing points, the water falling away into the sea to leeward.

The wind stiffened for a while and then moderated and veered to the northwest with the passage of the front. The rain stopped and the clouds began to break up enough to see the sun climb into the sky. Having called the skipper, Tom bore away to starboard to keep the John moving until he could tack. In light airs he could have done it single handed, but not this morning.

Huw took the helm and Tom went forward, cast off all but the last turn of the sheets on the cleat and stood by for Huw's order. "Stand by to go about,...the helm's alee," Huw called out as he put the helm over. The bows came up to wind, the sails flapped and the shackles rattled as she came through the eye of the wind and slowed. When the jibs were well aback he cried, "Let draw." Tom cast off the sheets letting the jibs cross the deck and fill as he hauled in the port sheets, setting them for a broad reach. The mainsheet was eased and a guy shipped to secure the boom. "She's comfortable there Tom, steer east by south," said Huw as he handed the helm back to Tom.

The John picked up speed and was easier to steer now, and although she continued to roll, the pitching had eased. What spray there was failed to reach the deck, but they were not yet allowed to dry. Water continued to drip from the sails and rigging for a while, it was a brackish mixture, part fresh and part salt, but that too stopped.

Billy appeared on deck for the forenoon watch clutching two brimming mugs of steaming tea. Tom sipped his tea gratefully before he went about his duties, sounding the bilges, checking the rigging and so on. As they rose to the crest of a swell he surveyed all around before plunging into the next trough. He began to feel the warmth of the morning sun on his face and knew it would be a good fast passage.

They arrived in the Swansea roads the next day, and, being Sunday, the harbour and approaches were quiet. From the fairway, they saw the furnace stacks of the copper smelting works belching forth sulphurous copper smoke into the atmosphere. It hung like a heavy pall over the town, drifting inland, dumping its vitriolic cargo to bleach and wither wherever it landed.

They found a berth along the wharf, between a coastal smack like themselves and a barque just home from Australia and still deeply laden with a cargo of copper ore. Towering above the John, her yards and masts stretched skywards, supported and manipulated by webs of standing and running rigging. Her bowsprit projected forward high over the their stern and the buxom figurehead looked down upon the John from her commanding position.

Her sailors were going ashore as church bells tolled for evensong. They drifted along the wharf, past the John, the watchman at the gate and on into the town. Just home from foreign shores and with money in their pockets their return in the early hours of the morning would be less orderly.

The harbour master and sundry others appeared bright and early the following morning. After he had dealt with them, Huw went ashore to the agent's office and passed on Captain Vivian's order for supplies for the Old Mine to be procured for the return passage; 4 cwt of blasting powder; 50 tons of coal; 1 cwt of oakum and 2 cwt of grease for the engine; 150 fathoms 4 3/4" hemp hawser. Like the outward leg to Swansea, Huw would be charging 10/- a ton to bring the cargo home.

Unloading the cargo was Tom's part of ship. He peeled aside the tarpaulins and opened the hatches to inspect the cargo, 35 tons of chalcopryite, and 12 tons of malachite. Some water had come in through faulty deck caulking during the storm, soaking the hessian, but otherwise all was well.

They hauled the copper out of the hold and put it ashore where the stevedores carted it across the cobbled hard to the warehouse and stacked it in lots or parcels. There it would await the buyers from the smelters, such as Freeman's Co, Bath & son, the Hafod and Cheadle works at the next ticketing who would place their bids by secret tender, or ticket.

It would be a day or two before they had all their return cargo loaded, sale documents for the mine and were ready to sail. In the mean time the crew would be making the most of their time ashore.

Don Smith, Ontario, March 1990

This follow-on from 'The John' was published as a combined article by Window on Wales 1990;3(4):44-45.

THE GREAT ORME BRONZE AGE COPPER MINES

Excavation work over the past two years have been centred around, and to the north of, Vivian's shaft at the Great Orme copper mine site. They have exposed workings with associated sequences of spoil from surface and underground contexts, giving indications of large scale exploitation of copper ores from the early to late Bronze Age.

These early workings are now identified to depths of 70m below surface and extend for 240m into the hillside from the Pyllau valley to Bryniau Poethion in the north. An area of 24,000 m² shows evidence Bronze Age activity, and when combined with the known depth of these operations and percentage ore values, supports the view that volumes of ore bearing rock measurable in thousands of tonnes could have been easily extracted with minimum effort. The ore would have comprised of the copper carbonates malachite, and, to a lesser extent, azurite, containing respectively 57% and 55% copper, constituting an ore body of considerable size.

Several thousand complete and fragmented pieces of bone, many stained green through mineralisation have been recovered from this early spoil, some display wear consistent with having been used as tools. Identified species include predominantly swine (domestic and wild) and ox, with fewer bones from sheep, goat and deer. A few items of antler have been recorded.

Stone tools also exist, with 750 now identified. They are generally of an unmodified variety derived from beach or glacial deposits. They vary in size and weight ranging from 0.25 to 29.0 kg. a selection of specific tools type are recognised.

Evidence of firesetting in the form of charcoal from hardwoods is widespread over the site. The poor distribution and limited size of the charcoal differs noticeably when compared to similar deposits from other recognised Bronze Age mine sites, suggesting a more limited use of the technique.

The Bronze Age workings contrast markedly with those of the 18th to 19th century, as they tend to exploit only the part of the mineral deposit easiest to extract. As a result there is a great variability in the size and shape of the workings, some as narrow as 24.0 cm and others several metres wide. At least 30 north-south and 15 east-west trending mineralised joints and faults are known, giving rise on surface to trench and opencast workings and underground to a system inter-connecting tunnels (Figure 1).

Of the eight radio-carbon dates from the site, six are from underground contexts, while the remainder are from the surface. They span the period between 3370 $\pm$ 80 BP (CAR-1184) 1885-1465 cal BC and 2450 $\pm$ 60 BP (CAR-1281) 768-406 cal BC.

The scale of the workings at the Great Orme is largely a product of the rotted

nature of the ore bearing host dolomite and to a lesser extent the position of the mudstone and sandstone horizons that alternate with the dolomites and limestones. Such deposits would not have necessitated the major use of stone tools coupled with firesetting; instead, simpler tools of bone, antler and wood were all that were required for the earliest phases of mining at the site.

Quantities of ore as large as those described would require a well organised system for processing, smelting and distribution, as well as a considerable work force to be housed and fed. It is hoped that the projected study programme will be able to answer some of these questions, not only on a local level, but also in a wider context as a major technological centre in Bronze Age Britain.

Andrew Lewis, October 1991

This abstract was submitted by Andy for presentation at a meeting in Cardiff to celebrate Dr Savory's 80th birthday. Due to his injury Andy was unable to attend and Danny Dutton kindly stood in for him.

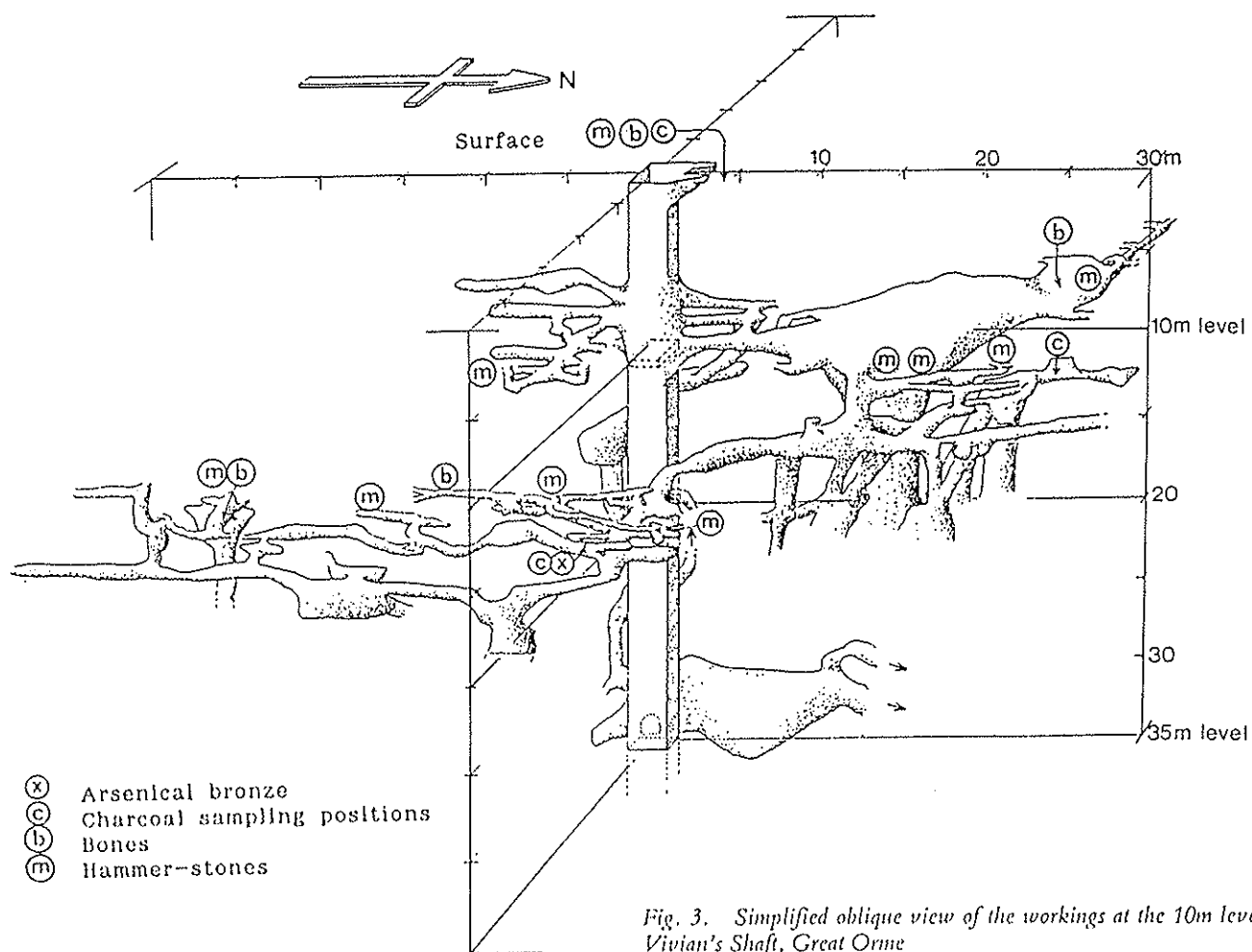


Fig. 3. Simplified oblique view of the workings at the 10m level, Vivian's Shaft, Great Orme

THE CHRISTMAS DINNER

The Christmas dinner has been arranged for Friday, November 29th; 7.30 for 8.00pm at the St. Kilda Hotel, Llandudno. Tickets are £ 10.00 each.

MENU

Prawn Cocktail: Norwegian prawns in a Marie Rose sauce, on a bed of shredded iceberg lettuce. Or

Leak, Onion and Potato Soup: Homemade, a seasonal speciality of the hotel. Or

Smoked Mackerel Pate with Melba Toast. Or

Fruit Juice: Grapefruit, Tomato, Apple or Orange

Roast Turkey Or

Roast Silverside Beef and Yorkshire Pudding Or

Poached Salmon in Hollandaise Sauce

Christmas Pudding and Brandy Flambee Or

Fresh Pavlova topped with Strawberries and Kiwi Fruit Or

Cheesecake with Glazed Grapes Or

Ice Cream Sundae

Cheese and Biscuits

Coffee and Mints

Wine will be served at the table.

EVENTS

Wedding: As all of you must now know, Tom and Eve were married on Tuesday October 1st at Conwy Registry Office. On behalf of the Society I would like to wish them every health and happiness in their life together.

Injury: Having fallen off his perch (mountain bike) on the Great Orme, Andy is nursing a broken fibula. Poetic Justice? All visitors to 'Gwynedd' are welcome, but you will have to make your own tea for the time being.

Lecture Series: A series of lectures is being held at the library in Lloyd Street, Llandudno, every Monday evening at 7.30.

'The Great Orme. Llandudno's Mountain'

Llandudno's Great Orme	Tom Parry	07.10.91
Coastal Artillery/Water supply	Phillip Evans	14.10.91
Geology of the Great Orme	David Jenkins Ph.D.	21.10.91
Prehistoric sites on the Orme	Frank Jowett	28.10.91
Flowers and Plants	Chris Jowett B.Ed.	04.11.91
Great Orme Country Park	Tom Gravitt B.Sc. M.Sc.	11.11.91
Shipwrecks	J. Povah	18.11.91
Recreation	Nic Jowett	25.11.91
Place names, Legends and Folklore	Tom Parry	02.12.91
Bronze Age Mining	Andrew Lewis B.Sc.	09.12.91
Industrial Archaeology	Lloyd Jenkins Ph.D.	16.12.91

For more information contact Tom Parry.

Coniston: A contingent from GOES visited Coniston on the weekend of October 25-27th. Any volunteers for an after-action report, Ian, Eric,?

NAMHO Meeting: A conference is being held at Gloucester in early November.

Boxing Day walkabout: Rendezvous and itinerary to be decided closer to the date.

VISITORS

Academic: Dr. Paul Craddock (BM & EMRG) and Dr. David Jenkins (UCNW & EMRG) visited the Bronze Age Opencast again recently.

Social: We have been visited again by the Crewe Caving Club who enjoyed a through trip from Treweek's shaft to Vivian's shaft on Saturday September 21st. The following day they were offered a choice of mud-wrestling in the Penmorfa adit or climbing on the Great Orme. On October 12th we were visited by 'The Moles', a group from the Midlands who went down the Ty Gwyn mine.