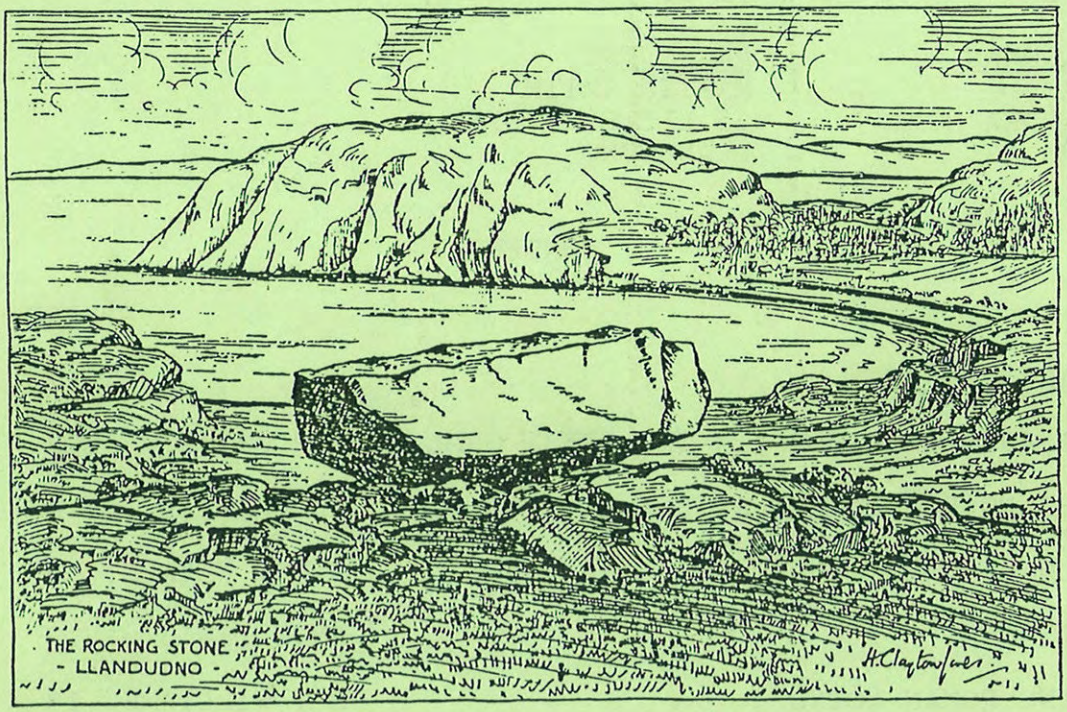
GREAT ORME EXPLORATION SOCIETY
FOUNDED 1985
LLANDUDNO

THE CREUDDYN JOURNAL



VICTORIAN EXTRAVAGANZA
SPECIAL ISSUE

The Journal of the Great Orme Exploration Society

Spring 1990 Volume 2

EDITORIAL

Thank you for purchasing a copy of the CREUDDYN JOURNAL produced specially for the 1990 Victorian Extravaganza.

The word Crueddyn is the old Welsh name for the Orme, an apt Journal title given the societies objectives of exploring and researching the history of the Gt. Orme copper mines.

Few industrial sites in the world can lay claim to a history of use stretching back 3600 years which is the case with the Orme mines and Society members have played an important role in the exciting discoveries that have elevated the Orme to site of national archeological importance. Founded in 1985 in its present form the society brought together a small group of mine history enthusiasts some of whom already had a life long experience of researching the Orme mines. There had long been a tradition of Roman working but in the 1970s pioneering work by Duncan James showed that these mines were worked in pre Roman times. Recent work has confirmed this in more detail and shows the ancient working to have been on a previously unsuspected scale.

There are three mines on the Orme, the Old and New mines where the ancient workings are located and the Ty Gwyn a wholly Victorian venture lasting from 1835 to 1856. The rediscovery of the entrance to this mine was an early objective of the society and was accomplished in 1986 when the main adit was relocated and entered for the first time in over 120 years. Although the deep workings are flooded part of the societies work is to preserve the workings ,a task that would not be possible with out the assistance given by Mostyn Estates and Aberconwy Council. As recorded in the various articles in this Journal the discoveries in the Old and New mines are now the focus of attention and new discoveries are expected as the excavations continue . It should be mentioned that parts of the Old mine are to be opened as a visitor attraction both for the serious mine history student and the interested tourist.Although this is a commercial venture the society has a detailed involement with the operating company and it is intended that the continuing archeological excavations will form an important feature of the show mine.

The Four Ages of Mining in the Great Orme

The Great Orme has seen several periods of mining activity. Perhaps the best known are from 1692 to 1881[1,2] and during the Roman occupation. In recent years a growing body of evidence has been accumulating to indicate a much more ancient origin to mining here than the Romans, in fact, it dates to at least 1600 BC in the early middle Bronze Age[3].

The Old Mine is the common element throughout these periods and it is here that many artifacts, such as bronze fragments, bone and stone tools[4], were discovered by the miners during the last century. They were attributed to the 'Ancients' or 'Romans' and remained undated until very recently.

We now know Bronze Age man began mining here around 1600 BC, or earlier, probably around the area of Vivian's Shaft where three closely related copper veins in weathered dolomite were exposed. The tools they left behind tell us how they worked. For picking they used chisels made from bone or stag horn and round igneous rocks were used as hammers (mauls) to batter the rock or separate ore from waste.

They dug out trenches following the veins north and used a process called firesetting when the going was more difficult. A fire was set underground as close to the work face as possible and allowed to heat the rock, cracking it and making it easier to work. The Great Orme Exploration Society recently showed this method to be surprisingly effective in a small surface working.

Underground, the area around Vivian's Shaft is honeycombed with tight sinuous passages, rifts filled with surface spoil and ancient stopes within paces of typical 19th century workings. Here, lying as they were left, 60 or more feet below the surface, you can find bone chisels, stone hammers as well as the characteristic tooling marks they leave on the rock. Charcoal has been dated from here and in 1989 another bronze fragment was discovered which provided valuable metallurgical information.

This area appears to have been mined extensively for 500 years or more, long before the Romans arrived. However, we have found no evidence yet to suggest the ore was smelted here, perhaps this and other evidence will come to light soon.

BRONZE AGE DATES

Location	Year	Depth	Material	Date
Roman Shaft	1987	90 ft	Charcoal	c 1165 BC
Vivian's Shaft	1988	6 ft	Charcoal	c 1690 BC
Vivian's Shaft	1989	70 ft	Charcoal	c 1240 BC
Vivian's Shaft	1989	Surface	Bone	c 1590 BC
Vivian's Shaft	1989	70 ft	Bronze	c 1300 BC

The Romans were certainly in this area and had an auxiliary fort

at Connovium (Caerhun) garrisoned by a cohors quingenaria equitata, a composite unit of around 480 infantry and cavalry. Not long after their occupation of North Wales they were mining Lead from the Clwyd mines (AD 64)[5] using the Deceangli tribe as their labour force. They also mined copper at Parys Mountain where a number of bun ingots have been found, and, closer to home, a copper bun ingot bearing Roman markings was found near Caerhun.

Two large hoards of coins were found in the immediate area of Llandudno and several small collections have been found on the Great Orme. During the last century miners are said to have found coins in the Old Mine, unfortunately, no example or objective account survives. To date no Roman tools or engineering has been discovered relating to the mines and no trace has yet been found of a Villa Urbana or a less sophisticated Villa Rustica.

Although we lack objective evidence, the circumstantial evidence for Roman mining by either themselves or contractors cannot be ignored. It is hoped that in the course of continuing investigations new data may confirm mining activity during the Roman period.

Following the withdrawal of Roman forces the mines probably closed, or at best were worked intermittently and it was not until Elizabeth I[6,7] that serious thought was given to mining. German mining engineers were brought across from Augsburg in the Tyrol and licensed to prospect in England and North Wales c 1564. In 1568 the Mines Royal Company was incorporated and given sole right to mine copper in eight counties of England and all of Wales. Copper mining and smelting began in Keswick and a little later smelting began at Neath. As yet, I have found no indication that anyone from the Mines Royal Society prospected or mined the Great Orme. The Mineral and Battery Works Society was incorporated in the same period and held the sole rights on zinc mining, brass manufacture, battery and wire production and rights on copper mining in the un-named counties. Between them they worked a cooperative duopoly.

The activity of the Mines Royal Society waned over the years and was never quite the same after the civil war as the Keswick works had been destroyed by Parliamentary forces and many of the shareholders were Royalists. In 1688 legislation was passed which allowed others to mine copper, zinc and other non-precious metals, and in 1692 the first mining lease for the Great Orme was granted to Sir Thomas Mostyn.

For part of the mid eighteenth century the mines lay abandoned once more, possibly because of the price of copper, but were reopened once again. By the early nineteenth century they had became organised into the Old Mine leased from the Bishop of Bangor and the New Mine leased from the Mostyns. The Tyn y Coed Mine was leased separately from local owners but was effectively part of the New Mine. Later, the Ty Gwyn Mine opened near the Happy Valley, and, although very productive for a few years, it was dogged by engineering problems and was forced to close in 1853. The New Mine

was the next to close in 1864 and finally, after being run down for some years, the Old Mine closed in 1881.

Mining techniques had advanced a great deal from those of the Bronze Age. The Romans had introduced iron edged tools and iron picks and hammers were common in mining when the Great Orme mines opened in 1692. Blasting became common place but was still labour intensive and time consuming as all the shot holes were drilled by hand.

The mines became more organised and the levels a more generous size. As they went deeper it became necessary to pump water from the workings; this problem was addressed in a number of ways. Water could be bailed out, pumped out with a horse powered pump, steam engine or water powered engine, or drained from below with an adit. All were tried, singly and in combination.

Due to many factors the fortunes of the mines changed, and, in turn, they closed. Cheap copper ore was being imported to Swansea from abroad and later, as foreign plants became established, they sent cake copper to Swansea for finishing. When smelters in the New World adopted the Bessemer process Swansea[8] clung to the Welsh method of repeated roasts and smelts, becoming less and less competitive. The demand for copper had fallen as iron ships did not need copper sheathing to protect them from shipworm in tropical waters and the miners could find better work in Llandudno, which was by 1850 a rapidly growing town.

It is fitting that the Old Mine, which plays the leading role in this saga through the ages, should have been the last to close in 1881. In 1990, 109 years after its closure, the Old Mine is once again in operation and playing the leading role as the story of Bronze Age mining unfolds.

References:

1: The Great Orme Copper Mines, Don Smith, 1988
2: The Llandudno Copper Mines, C J Williams, 1978
3: Prehistoric Mining for Copper in the Great Orme Llandudno, D A Jenkins, C A Lewis, Early Mines Research Group, in press 1990
4: W.O. Stanley. Archaeological Journal, 1850:p68-69
5: British Mining, Robert Hunt, 1887
6: Elizabethan Copper, M B Donald, 1955
7: Smelting of Copper in Swansea, G Grant Francis, 1881
8: The Lower Swansea Valley Project, K J Hilton, 1967

Don Smith, London, Ontario, April 1990

LITTLE HOLES FOR LITTLE PEOPLE

PART I - CORKSCREW CAVE, GREAT ORME.

One of the great delights of our area is that it is full of little holes. In no way so dramatic, of course, as the enormous underground workings on the Great Orme that have hit the headlines recently, but nonetheless intriguing, and in some cases productive of nice surprises. And therefore worth recording before they are forgotten - or filled in by some conscientious Clerk of Works in the name of Progress.

So, in the next few Newsletters/Journals, I propose to try and describe some of the more dramatic, or hilarious, or disgusting, of these "little holes" - discovered in most cases by the Trogs of St. David's College (hence the "Little People" in the title of this article) who usually led the way, with shrill cries of triumph and much wallowing in deep mud, while I panted and perspired in their wake.

First in my list comes "Corkscrew Cave" - a small natural cave with two entrances about 17 metres apart, on the South-facing slope of the Great Orme about 100 metres South East of the corner between Anglesey Road and Tyn-y-Coed Road (See Map 1) - Map Ref. SH 773824, - and not to be confused with "Bedding-Plane Cave", slightly higher up and 100 metres or so further West.

Both entrances of "Corkscrew" are just below the crest of the steep slope above Invalid's Walk, and tucked away at the foot of a little cliff, so they cannot be seen from above. Nor can they be seen from below, as both are at the back of little natural platforms. So it was by pure chance that we found them in November, 1977. I say "found them", but of course they must have been "found" many times before, judging by the rubbish (some of it modern) in both entrances.

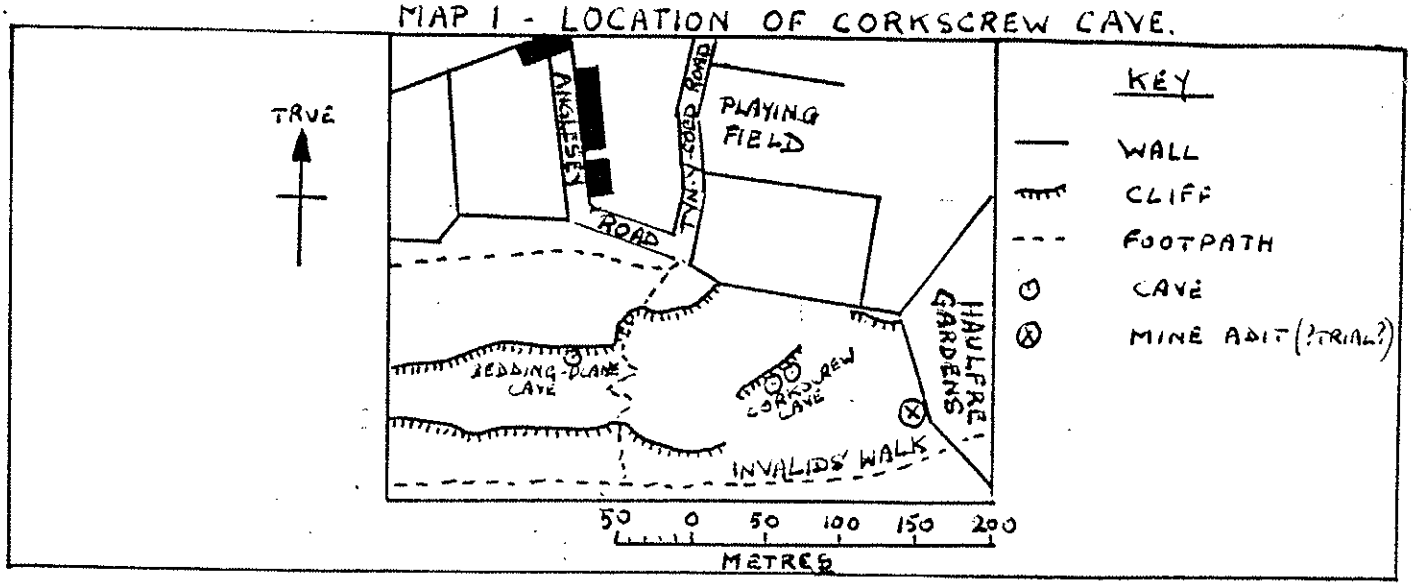
Map 2 shows the main features of the cave. I think there can be no doubt that it is a cave rather than a mine: there is no sign of mineralisation (that I could identify) throughout its length, nor any drill holes or pick marks. Also, apart from the 5-metre long chamber at the Western entrance, the passage when we first entered it was too narrow for wielding anything bigger than a trowel. However, as we dug slowly down into the floor - which consisted of packed earth, not clay, - we found the rock walls tended to slope away from the centre of the passage, which thus increased in width from less than 50 cms. to as much as 1.5 metres. On the other hand, the rock surfaces within the cave are surprisingly rough, with none of the smoothing or fluting by water action that one expects to find in a natural cave - but I suppose such features could have been destroyed by frost action long ago, particularly in view of the cave's height above sea level (about 100 metres).

Of much greater interest are the finds of human bone, as shown on Map 2. All of these were seen and identified by Mel Davies on various dates between 1977 and 1985, and then taken by me with some misgivings to Llandudno Police Station. I got some funny looks there when I told the Duty Constable - "Er, excuse me, but I've found some human bones", but about a fortnight later a cheerful Detective Sergeant brought them back to me at St. David's College, saying "You don't need to worry, Sir, - our Laboratory at Menai tells us that they are all at least a thousand years old." So they are probably prehistoric, as burials in caves were apparently common then (ask Tom Stone for details - he has excavated several), and to be on the safe side I also reported the details to the Council for British Archaeology, who published a brief summary in "Archaeology in Wales", No.19 (1979).

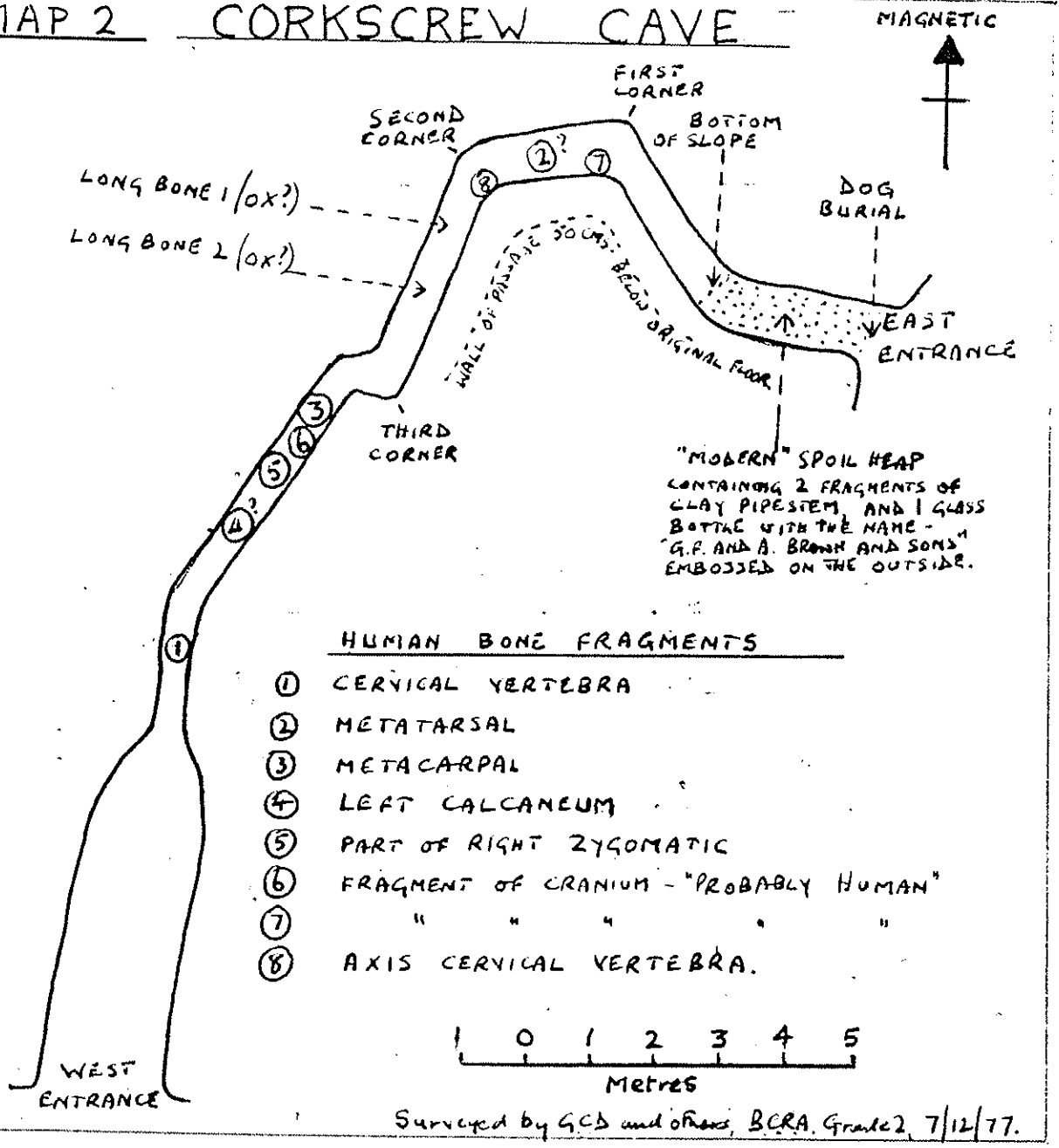
Much to our disappointment, we found absolutely no trace of

prehistoric artefacts../OVER

MAP 1 - LOCATION OF CORKSCREW CAVE.



MAP 2 CORKSCREW CAVE



HUMAN BONE FRAGMENTS

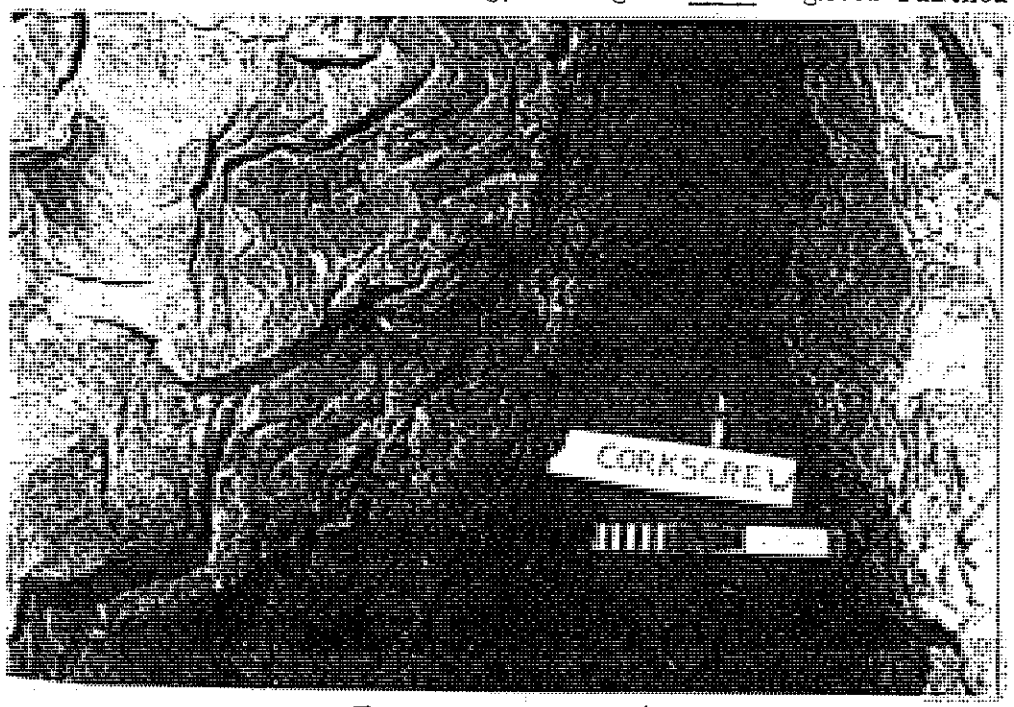
1. CERVICAL VERTEBRA
2. METATARSAL
3. METACARPAL
4. LEFT CALCANEUM
5. PART OF RIGHT ZYGOMATIC
6. FRAGMENT OF CRANIUM - "PROBABLY HUMAN"
7. " " " " "
8. AXIS CERVICAL VERTEBRA.

Surveyed by GCD and others, BCRA. Grade 2, 7/12/77.

prehistoric artefacts, though we carefully sieved every bucketful of earth as it was brought out - no pottery, no flint implements (but two small flakes of Chert, though these showed no sign of secondary flaking and could have been natural), no Bronze, and - sadly - no Gold. From Map 2 it is easy to see that most of the human bones were found in quite a small area in the Western half of the cave - but scattered haphazardly through the soil, in company with many bones of small animals such as rabbits and rodents. Another oddity is that the bones that we have found come from widely separated parts of the skeleton - for example, the Metatarsal and the Calcaneum are both from the foot, while the Metacarpal is from the hand and the Zygomatic is part of the front of the skull. All this makes me believe that there was a prehistoric human burial, probably just North of the wide chamber at the Western entrance but a good deal deeper than we have dug so far; and that the bone fragments that we have found to date have been detached from the skeleton and brought to the surface by the burrowings of small animals. It is significant that all the time that we were digging, it was through the same sort of dark brown cave earth, and there was no sign of a stalagmite floor - such as the one that Tom Stone and Mel Davies found at the Pant-y-Wenol Cave between the Little Orme and Nant-y-Gamar. There the stalagmite floor was over 20 cms. thick, and all the Neolithic finds were beneath it. So it seems as though we would need to dig a good deal deeper in Corkscrew Cave to get to the Neolithic levels, - though not so deep for the Bronze or Iron Age ones.

I still think it is worth digging further: it is an ideal place for an early occupation site - even earlier than Neolithic, maybe - as it faces South and would be nicely warmed by the morning sun. Also it is a splendid - and quite well concealed - vantage point for spotting herds of wild game - "meat on the hoof" - browsing on the flat plains now occupied by Llandudno. This would surely have been dry land at certain times after the last Ice Age, when the rising sea level (caused by the worldwide melting of the glaciers) had not caught up with the rise of the land once it was relieved of the weight of the ice.

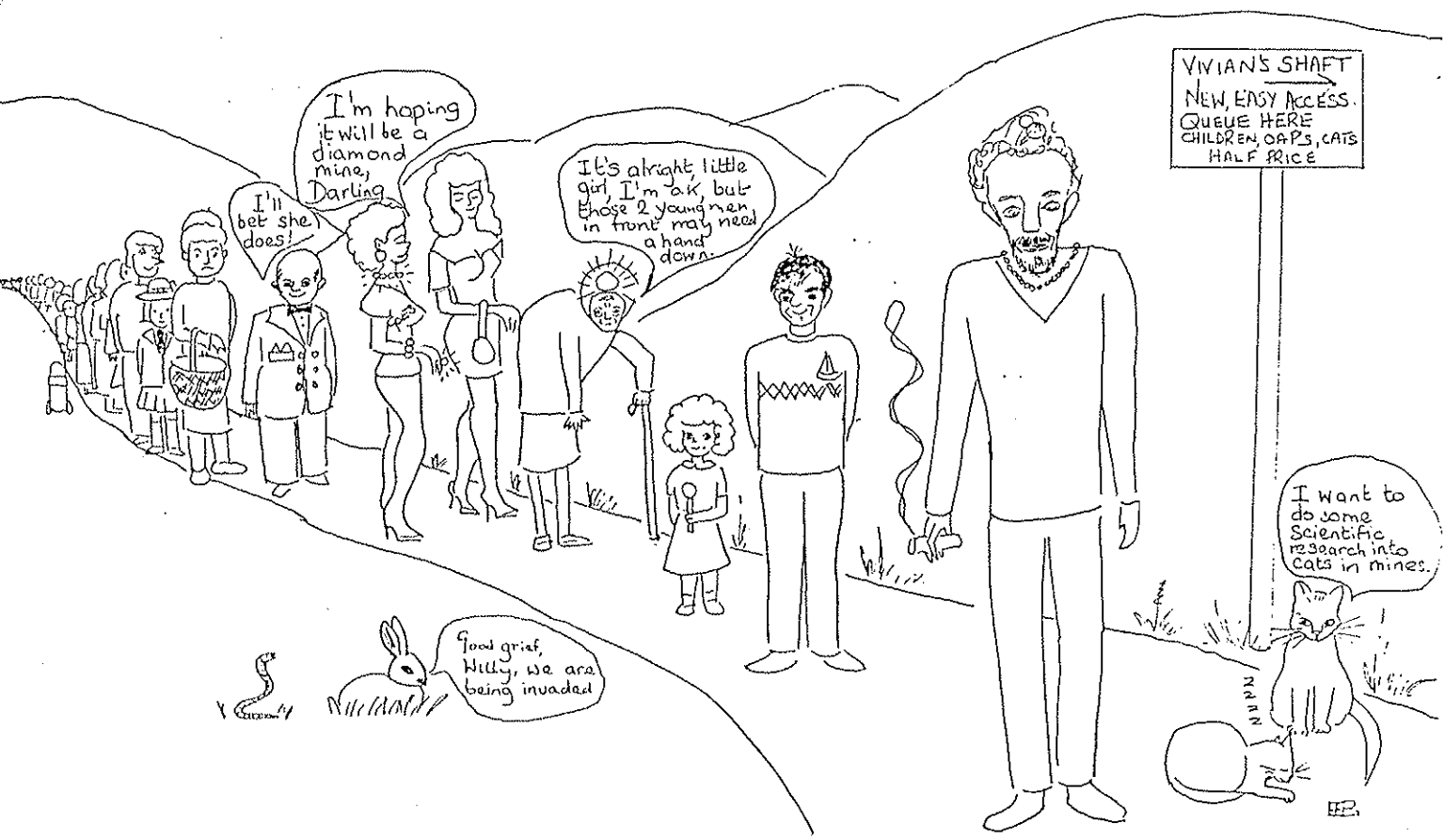
But whoever digs it will not find it an easy option - once inside the cave it is <u>very</u> cramped, and proper scientific excavation becomes difficult when you have to lie full-length on your stomach and only able to move one arm. The photograph below, taken from just inside the West entrance and looking North into the narrow part, gives some idea (the decorated ruler is 30 cms. long) - it gets <u>much</u> tighter further in !



Finally, and most important, "Corkscrew Cave " is now officially "Scheduled" as a prehistoric site. This means that no-one - not even a member of our Society - is allowed to dig in it without the written permission of the appropriate authorities - in this case the Great Orme Country Park and Aberconwy Council, for a start. They are not being spoil-sports: any archaeological dig is a scientific experiment that can never be repeated, and it is unfortunately only too easy for a digger without proper training and experience to dig right through some priceless bit of evidence in the soil, without realising that it is there, so it is lost for ever. And as the science of Archaeology develops, more and more knowledge can be extracted from ever tinier scraps of evidence.

Give the experts a chance, and they may be able to tell us not only whether our buried friend was a He or a She, but also how old He/She was, and also, possibly, whether He/She would have been a suitable candidate for Associate Membership!

G.C.D.
7/1/90



PUSHING BACK THE DAWN

The Executive Editor of "International Mining", the world's largest circulation mining magazine with a readership of over 150,000 a month, recently paid a visit to Llandudno. He was taken underground by Andy Lewis and we all had lunch in the King's Head.

He has given permission for his article to be printed in the Newsletter prior to being included in a special European edition of the Magazine to be published in May 1989.

His article is reproduced in full below.

Tony Hammond

SEVERAL YEARS' PAINSTAKING WORK REVEALS WESTERN EUROPEAN BRONZE AGE INDUSTRIAL CENTRE by Simon Walker

The period in man's history that marked the transition from the use of purely natural materials (wood, animal products and stone) to the first exploitation of metals is known as the Bronze Age. Bronze-making technology is conventionally understood to have originated in what is now the Middle East, probably some time about 3000 BC, and to have spread slowly from that region towards western Europe. In Britain, the period is known to have lasted between 2000 and 500 BC, and relics from the Bronze Age culture have been found widely throughout the whole of Europe, such is the durability of the range of copper-tin alloys that forms the group of metals known as bronzes.

Whilst the technology for the production and casting of bronze may have become relatively sophisticated the 'lost wax' casting process is still used today for precious metals. The level of mining industrialisation during the period has, up to now, generally been considered to have been rudimentary. Only in a very few European locations, principally in Bulgaria, Yugoslavia and southwest Spain, has clear evidence of Bronze Age mining been verified. In the British Isles, sites at Cwmystwyth in Wales and Mt Gabriel in Ireland have recently been identified as having been centres for Bronze Age copper mining, but in each case the level of activity was limited to shallow workings developed from surface vein outcrops.

The copper mines on the Great Ormes Head, a prominent headland that juts out from the north Wales coast into the Irish Sea, had their heyday in the 18th and 19th Centuries, when copper production provided one of the foundations of the local economy. The earliest records from this period of activity date from the 1690s, but it is clear that mining activity on an extensive scale actually took place in the area in much earlier times.

As with most other British sites, the early mining activity

at the Great Orme has up until recently been ascribed to the Romans, who were certainly present in the area some 2000 years ago. However, there is no physical evidence to support this, and recent work is now indicating that there was an unprecedented level of mining activity in the area well over 1000 years before the Roman occupation of Britain.

If this is the case, then the Great Orme mines represent one of the most significant industrial archaeological sites in Western Europe, for nowhere else is there clear evidence of such widespread mining activity at that time. The old workings, as would be expected, start at the surface outcrops of the copper veins, but it is the overall scale of the operations, in terms of extent and especially depth, that gives the site its singular significance.

The copper mineralisation was found in highly irregular vein structures contained in the massive limestones and dolomites that form the Great Orme headland, which rises to a height of 207m (679ft) above the surrounding sea. Near the surface, the veins were of malachite and azurite, while at deeper levels, sulphides formed the bulk of the ore . Mining in the 18th and 19th Centuries concentrated on the deeper sulphide mineralisation, but exploration was also undertaken in the areas of early working closer to the surface. It was from here that the first indications of the extreme antiquity of the area's mining history were found.

Shafts sunk during the 'recent' activity to access deep ore penetrated right through the older workings. The 18th and 19th Century miners reopened some parts of these workings in search of any residual ore, and often developed new drives through the now naturally cemented backfill in the old stopes. Artefacts such as bone and stone tools were found incorporated into this fill material, showing that their deposition was simultaneous.

Interest in the old mines has been reactivated in recent years. The stimulus for the present campaign was the necessity, for reasons of public safety, to cap the tops of the six vertical shafts that dated from the 'recent' mining period. One of the shafts, Vivians, which is believed to be over 150m (500ft) deep, could not be found, and a backhoe excavator was brought in to trench for the shaft collar. The shaft was plugged with loose spoil, which was suddenly freed as the excavator approached. The top of the now open shaft revealed clear evidence of old stoping, and it was decided that this shaft should not be capped, but should be left open to provide an access to the workings in the surrounding area.

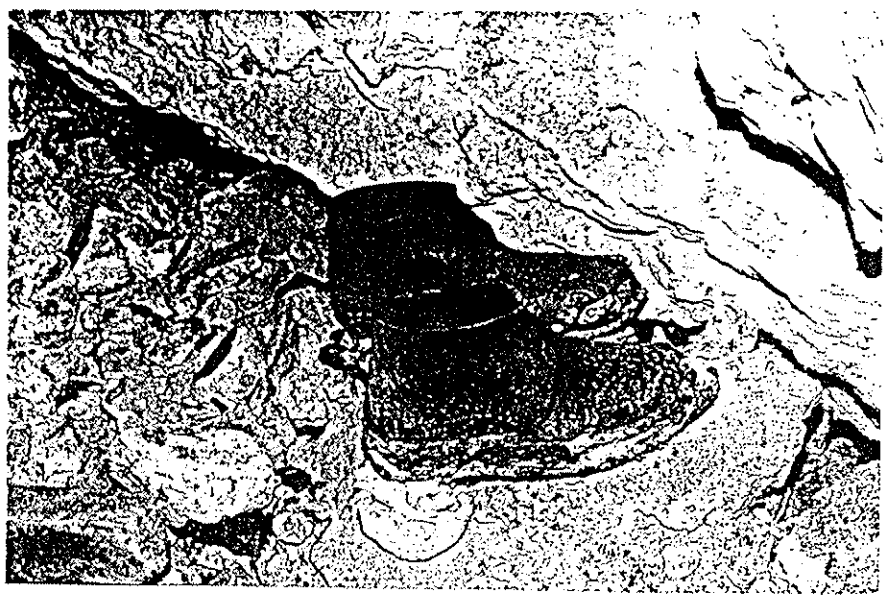
An initial underground survey by members of the Great Orme Exploration Society revealed the complexity of the near-surface workings - a labyrinth of interconnecting stopes and galleries, some backfilled, some reworked and some, in the areas furthest from the shaft, untouched. Charcoal derived from oak and alder wood supplies evidence of fire-setting having been used to break the rock, while large microdirorite stones, which have clearly been collected from the sea shore, show wear marks consistent with their use as hammers or anvils for breaking

the copper ore from the shattered country rock.

Even the surface shows evidence of early working. The Gwynedd Archaeological Trust has started excavations in the immediate surrounds of the shaft collar, and recent discoveries have included the burning marks of fire-setting and, perhaps most significantly, samples of charcoal that have revealed a radio-carbon dating of at least 3000 years - giving a latest date for the operations on the outcrop at about 1000 BC.

If this is the case, then the position of the Great Orme mines in the development of the Bronze Age culture in Western Europe takes on a radical new complexion. Nowhere else in the region have such extensive workings for metalliferous ores been found from such an early date. Nowhere else is there evidence for the social infrastructure that must have been in place to enable this centre of industry to operate. Never before have indications been found that this part of Europe may have been a major ore production and trading centre, concepts that may yet cause a radical reshaping of the commercial history of the Bronze Age period in Europe as a whole.

Authorities from the principal British scientific and historical institutions are now supporting this exciting theory. International experts have visited the site, and initial dating evidence has given added credence to its antiquity. Archaeological work is due to resume shortly at the shaft collar, but it will be some time before excavations proceed into the underground workings. Meanwhile, members of the Great Orme Exploration Society are continuing their work underground, endeavouring to piece together the spacial layout of the various stages of mining. Each visit underground explores new areas, and adds further information on this most fascinating jigsaw, which may yet prove to be the cradle of Western European underground metalliferous mining.



A pair of miners clogs left as a good luck offering

Installation of fixed ladder, Vivians Shaft

A 40 foot steel ladder has now been fitted within Vivians shaft from the grating to the concrete platform. This was installed over a two day period during the Christmas holiday, involving many society members. The ladder was donated by society member Tony Davies, manager of A.R.C. Bricks, Llandulas, to whom the we are all greatly indebted. This improved access will make the procedure of visiting the associated working a far simpler and safer exercise, and will provide the opportunity for those people who are not at home on the usual electron ladder to visit this unique site more often.

Firesetting

During a wet and windy weekend in October 1989 a firesetting trial was conducted within a small nineteenth century surface trial near to Hwlfa'r Ceirw, overlooking the Marine drive. Eventhough the weather conditions were poor the experiment went ahead, being well attended over the two days. The aim was to investigate the process of firesetting and try to recreate the conditions, in order to answer just some of the questions Bronze Age man had to contend with using this most ancient method of rock fracturing. Approximately 1 tonne of timber was taken to the site using two sledges consisting of old car bonnets courtesy of Alex Harding.In all three fire's were lit, two of wood, and a third of charcoal and timber situated within a small recess at the back of the open cut. A combination of stone hammers collected from Penmaenmawr beach and a deer antler were used to work the heat affected fractured rock surfaces. Surprisingly the results appeared to be more successful than anyone had imagined, even those sceptics amongst the group were now convinced the process was effective!

In brief the exercise concluded that the at least an equal mass of rock could be removed through the burning of an equal amount of timber. At best a ratio of 1 unit of wood to 3 units removed rock was achieved, indicating the method could be improved upon. With further thought and trial it is likely continued advancements can be attained. A full report on the complete experiment will be published in a later issue of the newsletter.

UNEARTHING ROMAN COINS BY HUW TUDNO WILLIAMS

In the late nineteenth century and the early part of the twentieth, two important finds of Roman coins were made in the area of the Little Orme's head, which at the time were amongst the four most important discoveries ever recorded in any part of the world. The largest of the two, however, was not recorded until thirty years on, as will be explained later. The other, opposite the stable entrance of Simdda Hir, past the once huge Craigside Hydro Hotel (now demolished and built upon), situated at Craigside on the road to Penrhyn Bay, comprised of approximately 550 coins found in a bank not far from the highway. At the time Mostyn Broadway was being constructed and at finishing time on a dark evening two cartloads of soil and material had been transported and dumped about halfway between St Paul's church and the former Grand Theatre, the date being 19 January 1907; so it was not until the following morning that the exciting discovery came to light. In a report by W B Lowe, MA, it was stated that the coins were covered with a black earthy matter which was distinct from the neighbouring soil and were found about two and a half feet below the surface of the ground. Some corroded pieces of bronze plate with rivets through them and hammered down on both sides were eventually picked up which suggested that the hoard had been enclosed in either a metal or wood and metal box. Four distinct coins were found with a long strip of thin copper folded around them and were first brass specimens of an earlier age than the rest of the find. The centre of one coin and a part of the copper strip had probably been soldered together.

When news of the find spread throughout the town the Broadway area was invaded by treasure hunters who eagerly pocketed specimens as they dug them out of the rubble. It was thought that at least a hundred, and probably more, were picked up in this manner. Acting on orders from the Treasury the local Police managed to gain possession of most of them, but some had been disposed of to visitors and other sources.

Most of the hoard was eventually acquired by Mr Frederick Holland, a local antique dealer who had galleries at the Prince of Wales Hotel, St Georges Crescent, those being sold to Mr Willoughby Gardener who wrote an interesting book on these finds.

After all the fuss and excitement it was discovered that the coins were not gold or silver, with the exception of the four previously mentioned, therefore not 'treasure trove'. The majority were 'third brass' and it was found that most - in fact about 97% - proved to be British struck money with the effigy of the Emperor Carausius, 287-293 AD. The remainder were of earlier emperors. Willoughby Gardener wrote that coins of Carausius are not infrequently met in small numbers mixed with others, especially in the south west and west of England. Only two large finds have previously been recorded. The first was a discovery of 545 examples of Carausius in the biggest ever unearthing of 29,802 coins at Woolmer, Hants, in 1873. The second was of 210 excavated near Rouen. Many of the coins marked ML were minted in London and some marked C in Colchester; the majority had no mint numbers upon them.

The other find was made about half a mile away by the old tollgate crossing

Penrhyn Bay (not from the present entrance to the Rhos gold course). It was then a field belonging to a farm sited on the Little Orme. This discovery contained 5000 bronze Roman coins which had been cemented together by a type of green oxide into a solid mass and were held in a one handed, red earthenware jar, 15 inches high by 8 inches wide. This find was made by a Llandudno farmer when an alteration to the road was being made during 1873. He kept this a dark secret for 34 years until his death, but following the fuss after the 1907 find, a relative reported the hidden hoard of his uncle and stated that the urn had been enclosed in some kind of stone walling. After special treatment the coins were also identified as 'third brass' with some 'second brass', and all were described as being in magnificent condition. 300 were of British mint and 200 of Gaulish mint. The London mint coins were marked with the letters PLON, PLN, MLN and MLL. Others, bearing the letters RP, RS, RT, RQ, were probably struck at Richborough, though some experts say there is a possibility that they were minted in Rome. the Gaulish coins had the following mint letters: (TREVES) PTR, (ARIES) PARL, SARL, TARL, and QUARL (LYONS) PLG. There were various effigies on the coins but almost two thirds of them bore that of Constantine the Great (306-337 AD) in different forms, and the other third had the effigy of L? (307-324 AD). There was also a few of Maximinius Daza (305-313 AD), Manimanus Hercules (286-305 AD), Constantine Chlorus (292-306 AD), two of Allectus (293-296 AD), and one of Carausius 287-293 AD). It is therefore deduced that the collection was of the time when Constantine was Emperor in the west, with Lianius I in the east. At this period the emperors stamped the effigies of the colleagues alternately with their own on the coins they minted.

Several Roman coins have been found on the Great Orme and Llandudno district but these have been isolated and scattered finds. During 1891 near Rhos on Sea and whilst converting two small fields into one large one, a vase half full of Roman coins was found in the base of a hedge. The colour of the vase was brick red with a grey lip and a photograph, taken by Mr J B Hall of Llanrwst, appeared in a volume of the Llandudno, Colwyn By and District Field Club proceedings of 1923-24. During 1888 Thomas Kendrick, working below his cave on Ty Gwyn Road, unearthed an ancient fire place and found 17 coins of the period of Carausius embedded in clay. A box of coins was discovered in a small lake in a garden in Penrhyn Bay in 1924. During 1906 at Llandrillo yn Rhos, whilst quarrying at Llys Euryn, an urn full of bronze coins containing some third brass of Constantine the Great came to light at Rhos Fynach, buried in an arch in the abbey garden and wrapped in sheet lead coins of Constantine the Great of all brasses were discovered. Several brass and one third brass of the Constantine period were found south of Gogarth Abbey marked 'Soli invids comti', on reverse figure of sun. Once coin of Constantine was found in the Great Orme workings during 1977.

Although there is no direct evidence of Roman mining in the Great Orme copper mines such as iron edged implements, etc, the discovery of the large hoards of coins in the Little Orme area, and Roman traditions of utilising any profitable amenity in areas throughout the world, surely should leave little doubt that they used local labour to work the Orme mines and that the small denomination coins were used for payment of the workforce.

STEAM POWER IN THE LLANDUDNO MINES

To our knowledge, there were four beam engines operating at the mines during the last century, one at the Old Mine and three at the Ty Gwyn Mine. There are a few facts of which we may be certain, but because of established Cornish engineering practice we may infer other data from them. The best source of data in this respect is 'The Cornish Beam Engine' by D.B. Barton.

The first engine installed was manufactured by Sandys Carne and Vivian in Cornwall, probably at the Hayle foundry. With a cylinder of 18" diameter this was a small engine and if worked with steam at 40 PSI would generate approximately 11-12 HP, not much compared to the monsters operating in deep Cornish mines[1].

This power output would have been achieved running at maximum strokes per minute. eg 15. with the steam valve wide open. It was not at all efficient as the steam had little chance to expand fully. To get maximum economy, engines were often run at around three strokes per minutes, or less, with the steam valve open for just a fraction of the stroke which allowed it to expand effectively. It was unusual to run an engine any higher than 10 strokes per minute.

As this engine was adapted to operate on two shafts for winding and also to pump and crush it was probably a rotative design. The engine probably also used a condenser to increase power and producing hot water which could be used for the boiler, thus saving on coal. This would have required some 16,000 gallons of clean cold water per day[2]. Because of the limited water catchment on the mine site, the condensing water probably came from the mine.

Fortunately this is a limestone area with alkaline water so there would have been little copper salt dissolved in the water to corrode the condensing gear. On the other hand, dissolved calcium carbonate could cause problems with scale and may have been the cause of the boiler explosion in 1856 at the Old Mine. In Cornwall, if there was no surface water for cooling and mine pump water was used, it was often necessary to install brass condensing gear to overcome this problem.

The portable 22" engine installed at the Ty Gwyn Mine was reported to be 40 HP, which suggests it was working steam at about 80 PSI rather than the usual 40 PSI which would have generated about 17 HP. The 50" Cornish engine (ex Halkyn Mine) had a reported HP of 90 at 15 spm, and therefore probably worked steam at 40 PSI though I suspect rarely operated at 15 spm.

The Sims compound engine was the largest engine of its type in the area and one of 55, of various sizes from 60"/100" to 7"/12", erected throughout the United Kingdom. This powerful 200 HP engine was probably working steam in the 50" high pressure cylinder at about 40 PSI, and in the 90" low pressure

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[1] Calculated HP at 40 PSI: {[cylinder radius^2 x 3.142] / 22.25}

[2] Condensing requirements: 1,400 gallons/per HP/per day.

cylinder at about 20 PSI, giving a calculated HP slightly over 200 HP. This engine was designed for efficiency and fuel/steam economy, by allowing steam to expand as much as possible through two cylinders rather, than power. To carry this objective to its logical conclusion a condensing phase would have been used, in the 90" cylinder, and the cylinders heavily lagged.

The best of the design seems to have been the prototype, the 50/90 engine at Carn Brea which gave the Taylor engine a good run for its money in the duty races[3]. In 1840 this engine was rating between 90M and 95M compared to the Taylor 85" engine at 98M. Usually the duty fell after some 12 months operation, but the Taylor engine, the best of its day, was still putting out 70M in 1851.

All engines needed to be repacked every 6-8 weeks with oakum/hemp and tallow. This was a simple task with most designs, but with the Sims compound design access was gained to the lower cylinder via a man hole in the top of the upper cylinder. Not only would this have been awkward and time consuming, but it would have also been very warm work as the cylinders would still be hot, so much so that cool air often had to be blown in with bellows while the man worked.

Working steam as expansively as this was costly, not only in capital terms of erecting the engine, but the engine could wreck itself very easily and with it the pitwork which was prone to heavy wear and tear anyway. Even the small engine at the Old Mine had major problems at one stage in 1856 when the main shaft failed (?main pump rod, ie pitwork).

After about 1850 the large engines, even if more efficient bushel for bushel, went out of fashion, as did the great duty races, in favour of greater numbers of smaller cheaper engines. Although we have some data from the Old Mine regarding coal imports, there is insufficient to even guess at the duty of the Sandys engine, and non at all for the Ty Gwyn engines.

Condensing requirements for these three engine, totalling 330 HP, would have been large , approximately 462,000 gallons per day, sufficient for a decent sized swimming pool, 22yd x 22yd x 6yd. The reservoir, Llyn Mawr at Ty Coch, would have had insufficient capacity for a whole day without replenishment, hence the need for supply from anywhere that it was available, such as the Old Mine and springs in the town.

What a shame we don't have a single surviving engine or engine-house to show for ourselves.

Don Smith, London, Ontario,20/09/89

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[3] Duty, foot pounds in millions (M): The number of pounds of water raised one foot by one bushel of coal. Pre 1850 a bushel was taken as ~93 lb (depending on the coal type), post 1850 as 1 cwt.

GREAT ORME COPPER MINES, Llandudno(5H 771 831)

During late 1987 an underground survey requirement as part of a proposed car park and shaft capping scheme allowed entry to be gained to three 19th century shafts at the copper mines in the Pyllau are of the Great Orme. These shafts had remained sealed since the closure of the mines in the 1870's. The survey allowed access to a complex system of workings some of which appeared to be of early origin. Throughout investigations carried out during 1988 it has been possible to recognise four distinct areas where evidence in the form of stone implements, charcoal from firesetting, significant calcite deposits, numerous bones, rock fracture patterns and spoil stratigraphy suggests a phase of mining of considerable age. It would appear that these indicators are in line with similar findings beneath Bryniau Poethion, some 80m away, from which a radio carbon date of 2940 +/- 80 BP was obtained (James 1988).

Three sites clearly display early mined out stopes which had been purposely backfilled or infilled with surface derived spoil. These have in certain areas become cemented by the deposition of calcite from percolating ground waters. Calcite flowstone up to 0.09m thick exists at one location, clearly capping a fireset produced deposit containing fragmented charcoal. Complete sequences of this early spoil infill are now exposed. This is as a result of the 18th and 19th century miners having pospected by driving headings and sometimes removing the complete volume of the material, revealing the extent and depth to which the early miners had reached. From the layout of these workings and considering geological factors, it would appear that some of these stopes may have been operated as trench mines, linking with deeper sections as the veins were following under rising ground to north.

Spoil landscaping operations for the car park comstruction at the site during summer 1988 were monitored by Gwynedd Archaeological Trust and the Great Orme Exploration Society. Surface finds included occasional 19th century iron tools and at least fifty complete or fragmentary stome implements of varying size and form. The total number of stone artefacts from the site, including those in situ underground and those removed by earlier researchers, must now be in excess of one hundred.

Four individual stone type forms have been recognised:

Type A. Hammerstones of rounded form, unrilled, depressed ovoid in shape and 4 to 13kg in weight, with particular examples up to 0.30m in length. The size of these stones would suggest a two handed use even if some form of hafting was provided. An alternative could have been some type of rope cradle where the cord was swung from a supported position on to the required rock working surface. However the occurrence of certain of these larger stones within a particularly confined early area would imply their simple use as a two handed implement.

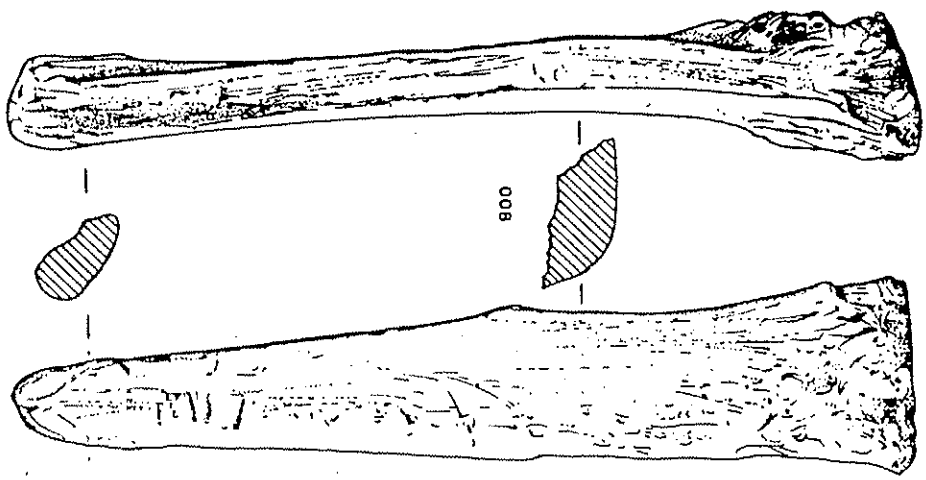
Type B. Hammerstones of rounded form, unrilled 1 to 4kg in weight with shapes ranging from ovoid to elongate. These are likely to have been single handed implements, with elongated forms used in conjunction with a type C stone as a pestle type tool. Types A and B have been located both underground and from surface spoil.

Type C. These can only be described as mortar stones, generally being of a more flattened character around 0.25m in diameter with an obvious concave feature describing wear on both the upper and lower surfaces. Used with Type B stones, they would have provided a suitable arrangement for fine processing of material, notably the ores. All stones of this type have been discovered exclusively from excavations within the surface spoil tips. None has been located below ground.

Type D. Referred to as dressing stones, these are of greater dimensions, normally around 0.50m in diameter and up to 0.30m in sectional height. The upper and lower surfaces are slightly concave, consistent with wear of a heavier grade of material processing. Several stones of this variety have been found, all from surface locations and often incorporated within 19th century masonry surrounding the shaft collars.

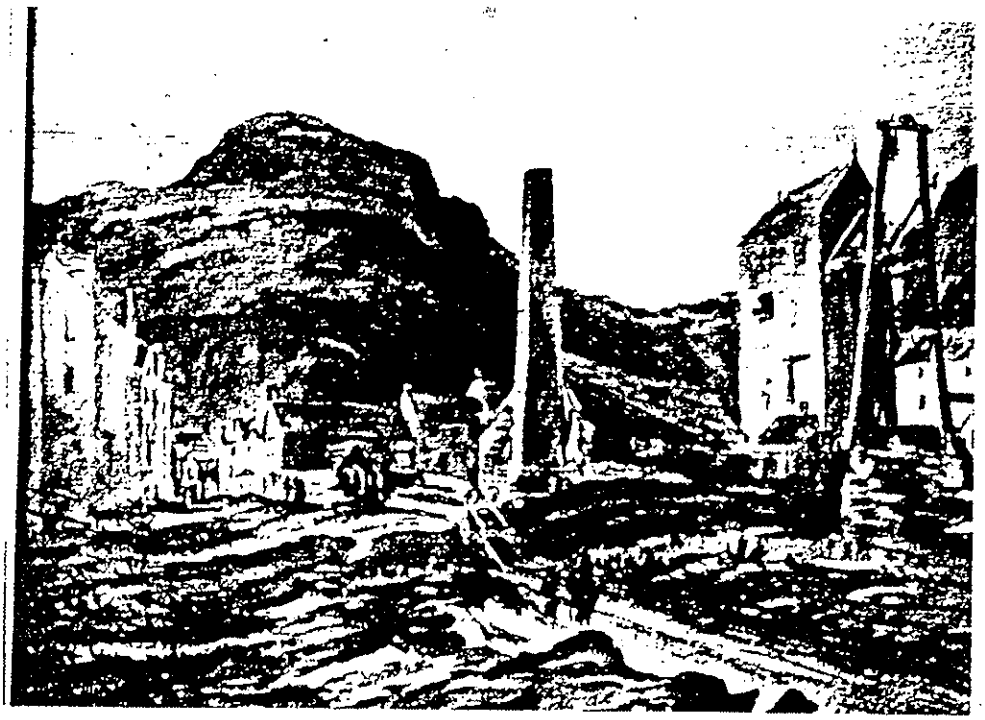
Nearly all stone types are of igneous rock. Many were microdiorite, typical of beach stones derived from Penmaenmawr headland, others were of a basaltic to doleritic character. The remainder consisted of a hard brown silty mudstone.
For the Great Orme Exploration Society.

Editors note: This article by Andy Lewis was published in archaeology in Wales vol 28 which also contained papers by Simon Timberlake and John Picken .Simons paper describes excavation of ancient mine sites at Parys Mountain and Nantyreira.Evidence of early mining is described for both sites including stone mauls and fire setting.
Johns paper reviews the occurence of various types of stone mining hammers found in several ancient mining sites in Wales.



Bone Chisel from Vivians Shaft x1

A HISTORY OF THE TY-GWYN MINE



The Great Orme Copper Mines were mined in prehistoric times as the discovery of stone and bone implements during 1849 in the vicinity of Bryniau Poethion a well known local landmark near the summit of the Great Orme proved. Recent finds as well as those of 1976 further substantiated the fact. It is also widely but not unanimously accepted that the Romans also worked the mines; the workings concerned would have involved the Old mine and to some extent of what became known as the New mine.

However this article concerns some of the brief history of the Ty-Gwyn mine which was a much later development and enterprise, but which generally produced a better quality ore than the other two and which during its comparative short life produced more more than 100,000 worth of copper ore - 93,000 worth being produced in its first twelve years between 1835 - 47.

Within the confines of the old hamlet of Llandudno were twelve farms some of which for centuries had provided the isolated village with its means of existence, mining and fishing also being important factors in the economy of the locality. One of the farms was known as Ty-Gwyn and was situated at the top end of the present promenade in the North Parade - it comprised 25 acres and 21 perches parts of which included land in "Y Fach" now known as the Happy Valley, and was the property of Edward Jones. He used to allow a local inhabitant Benjamen Edwards to graze cows on his pasture at "Y Fach". One wet day a cow slipped displacing a lump of turf showing traces of copper ore. This lead to Edward Jones successfully applying for permission from the landowners to prospect the area. Lacking capital he sold out to a syndicate which sold 126 shares in the venture, Edward Jones retaining two. William Jones of Bodhyfryd, Llandudno became the major holder with 23, the Douglas family, Holywell cotton spinners having the second largest holding with other individuals from the Holywell area also being shareholders.

During the mid to late 1830's a tramming adit was driven 534 yards from the direction of the North beach to join a large shaft of almost 300ft. named Tyn-y-fron situated in a field slightly below the present ski slope at Wyddfyd. Historical records indicated that the shaft had failed to connect with the promenade adit by a few yards, but the Great Orme Exploration, Society carrying out a survey and feasibility study of the workings in 1986 proved that the connection had been made. Another drainage level had also been driven but this had been covered and blocked by the construction of the pier pavilion in 1884-85.

The Ty-Gwyn mine offices, workings and engines as well as two shafts were located in the vicinity of the Empire Hotel running down towards the beach and upwards in the direction of the Great Orme Victoria Tram Station in Church Walks. The company had leased 25 acres from the Old mine Company at the top of the Orme. They had dug a ditch down the present tramline route from the summit which ran into a reservoir in Ty-Coch Road known as Llyn Mawr and was piped to supply a 50 inch steam engine which had three boilers and a 15 ton beam operating at 15 strokes a minute. The system also operated a 15 foot water wheel on the current site of the Min-y-Don Hotel and an ore crusher where is now sited the Belmont Hotel. A wonderful historical watercolour by Felicia Simpson painted in 1853 accurately records the mining area around the now Empire Hotel, Church Walks and Ty-Coch area.

In 1957 an old shaft which earlier had been used as a well collapsed near the Victoria Tram Station, it was over 12 foot in diameter and at least 130 feet deep. Council workmen digging down 6 foot found a dome of masonry, after digging down a further six feet it was established that the dome was intact, but some masonry below had collapsed leaving a four foot gap which had caused the subsidence. One of the popular chestnut trees had to be removed and it was seen that interwoven with the roots were bricks of the same firing as those used in the construction of the dome. In all probability placed over the old shaft when Church Walks was constructed.

The Ty-Gwyn mine Company following a court battle over a boundary dispute had a management reshuffle and William Jones and directors held a party in the Kings Head, and a fireworks display in 1846 and changed the name to Tyn-y-Fron Company. However continuous flooding which had plagued the mine from the outset finally closed it in 1853. The copper below sea level now awaits perhaps an era in the future when it might be commercially viable to mine it once more.

The lifting of restrictions on imported copper plus the transformation of the old hamlet into a popular seaside resort proved the death knell to the industry, but optimists perservered unsuccessfully until Sarah Lloyds lease was finally surrendered in 1881 one month after her death during December 1880.

H.T.W.

Editors note

This article contributed by Huw was originally written for the series Llandudno Past to Present published in the North Wales Weekly News in 1977.

THOMAS KENDRICK

During the next few weeks I hope to submit to this paper several articles and old prints which may be of some interest to the lovers of the romantic past and the perhaps less romantic present.I cannot think of a better or more apt subject to commence this series than the grossly under written almost neglected story of Thomas Kendrick,a man who was responsible for perhaps the most significant and historicaly important discoveries made in this locality,which conclusively proved that man existed here in Neolithic times.Apart from an article from the Shrewsbury Cronicle in 1870 and one or two in the Llandudno Advertiser about the same time and of course an imformative "paper" read to the Llandudno field club after their inspection of the cave on January 11th,1908 by Mr C.A.Humphreys F.R.I.B.A,followed by a booklet retailing at sixpence (2½p today!) little or nothing followed during the next seven decades with the result that very few local residents if asked who Thomas Kendrick was would be able to answer the question.

Thomas Kendrick son of a Cornish miner was born in 1821 and worked in the copper mines on the Great Orme for some years .He built the first camera obscura made of stone in Llandudno-later in 1860 Lot Williams built his wooden one on Green Hill in Y Fach (Happy Valley) which closed down in 1964 and two years later was burnt down by irresponsible youngsters.

Tiring of mining and being an ambitious and talented craftsman he set himself up as a lapidary in a cave under Pen Dinas in the grounds of Ardwy Orme,Ty Gwyn road.The lower cave,his workshop remains and is a listed building (photograph).Upper Kendricks is where the major finds were made.That also is still there.Finding business booming he decided to enlarge his cave.In doing so he broke into an inner cavern and amongst the boulders and rubble he came across human and animal remains.

The Shrewsbury Chronicle of 1890 quotes "A short time ago an old resident of Llandudno while digging in a cave in the side of Great Ormes Head for rough stones came across a number of pieces of bone and teeth,etc.These might probably have been consigned to the debris frpm which they had been removed had it not been for a medical gentleman from Bangor who recognised in them the remains of human beings and the work of human hands."

I hardly feel that the above statement by that paper did justice to Thomas Kendrick and it is highly improbable that a medical genmtleman from Bangor would have been passing the then dangerous slope which housed the cave at the moment the lapidarfy made his find.It is far more feasible that Thomas Kendrick enquired about he origins of the remains and they were submited to professors Boyd Dawkins,M'Kenny Hughes and other eminent palaeontologists of the time who concluded that they originated from internments of the Neolithic Age and that the cave had been used as a sepulchral vault by a family of Iberic Dwellers.The find was given national news prominence.The discovery was made in 1879 and the talented Mr R.A.Eskrigge,F.G.S;visited the cave about that time.From a section of a statement issued by him I quote "In this bed about one foot above the clay were found portions of the skeletons of four Human beings.The broken tibia of one skeleton and the foot of another remain to the seen in situ.I am sorry to say these bones were removed later".

continued.....

Mr G.A.Humphrey's booklet available for perusal at the Llandudno library gave an excellent description of the discoveries which incidentaly are housed in a glass case at the library and can be viewed on request.The human bones consisted of remains of a family of four,Three adults and a child and date back between four and five thousand years.A description of the human remains was given by professor Dawkins:"The Human remains consist of portions of four skeletons at least three adults and one child-and present a combination of characters similar to that determined by Professor Bush and myself in the skeletons for the sepulchral caves at Perthi Chwarwen and Rhos Niger,near Ruthin and Tyddyn Bleidden near Cefn,St Asaph .Three of the four femora are strongly carinate and the other slightly,while the only tibia sent along with them is flattened laterally."

It was assessed,because the two most perfect measured 17.9" and 17.6" respectively that the approximate stature of the people in question was just over 5'4",the size of the small Iberic Aboriginies living in Europe,west of the Rhine and north of the Mediteranean in the Neolithic era.

The remains of the associated animals included those of the Bison ,Red Deer,Badger,Brown Bear,Short Horned ox(Bos Longiferous),sheep or goat,Boar and Horse.Fuller details available at the library.

Thomas Kendrick died on the 31st December,1897 at the age of 76 and was buried at St Tudnos church.The remains found in the cave were left in care of the family and were purchased by the committee of the Llandudno Library.Thomas Kendrick was a batchelor.The family are scattered throughout the world today.He lived in a house called "miners cottage"(now Lilac Cottage) in Tan Yr ogo terrace behind the towns first town hall,Capri,Church Walks.He owned a small museum-the first one in Llandudno.

FOOTENOTE

Professor Dawkins made an elaborate classification of some of the remains found.Some of the broken bones were in a different mineral condition from the others.These consisted of bits of the marrow containing long bones of the Bison belonging to the pleistocene age.This era dates back one million,two hundred thousand years.badgers were first recorded 500,000 years ago.There is little doubt that even the oldest historicla records know not when the cliffs of the Great Orme did not tower with their proud majestic aloofness and that they were there long before the creation of man.

H.T.Williams April,1989

THOMAS KENDRICK IN HIS CAVE COME WORKSHOP-NOTE THE NOW RARE TOOLS OF TRADE THEN USED BY A LAPIDARY TO CUT AND POLISH STONES ETC

April Nature Notes, by E. Brill. FRCRS.

The Candle Rat. (Rattus Lumen).

Considerable interest has been displayed amongst naturalists following apparent evidence of Rattus Lumen in old mine workings at Llandudno.

This animal, thought to be extinct, is known to have inhabited coastal mining areas, both coal and metalliferous, and appeared to favour workings extending under the seabed. The last confirmed sighting was at Parlwr Du Colliery (Point of Ayr) during the early twenties of this century.(R.O.Dent 1924).

The creature, once considered to be amphibious, apeared equally at home in both fresh and sea water and was able to swim prodigious distances. (N.Ofio 1397)

Recent prints found in wood fungi at the Fy Gwyn Mine in Llandudno appear to display the distinctive, "middle finger" toe length peculiar to this species. A quantity of of silver sand has been spread around the area of fungi in the hope that sharper prints can be obtained, and photographed. Approaches have also been made to the NCC to instal an infra red beam triggered camera in the area.

R.Lumen was commonly known by miners as the, "Candle Rat" because of its behavioural peculiarity of carrying a lighted candle on its head on dull or overcast days in the darker levels and tunnels.

Next Month. Penmorfa Seals, fact or legend ?

MYSTERIES OF THE "MINE CATS"

During 1985 members of the society extended their explorations into some of the deep workings accessed via Treweeks shaft situated on Bryniau Poethion. Each excursion to this area brought new discoveries of workings untouched since the mine closure in the 1860's, often these contained the tools the miners had left unintentionally without any thought they where never to return to collect them. On one particularly arduous trip to new ground an unusual find was made. The remains of a cat were noted lying at a depth of at least 150ft. under ground and situated away from any obvious direct route from the surface. It was almost as if the cat had been purposely placed here, laid out on its side in this remote section of the mine. Around the cat and within the neighbouring passages a number of bluebottle carcasses were recognised, surely suggesting that the cat was dead before being brought here having had time to attract bluebottles which had laid their eggs upon it. Little else was thought about this peculiar finding.

It was not until November 1987 for the significance of this first cat to be realised. At the time the Society were involved with Ashton Mining Associates conducting an underground survey for Aberconwy Borough Council in the area of Pyllau and Maes y fachrell. The objective was to locate any near surface workings that might affect the construction of a car park planned here. Three shafts sealed since the nineteenth century were accessed, enabling exploration of a system of extensive workings.

During this period a second cat was found under circumstances somewhat different to the first. Again the corpse lay in a remote section of the mine, this time about 120ft. below surface within a "blind" working. The extraordinary thing about this find were a line of black to dark-brown patches that extended from the cat to a stone about 20ft. away which was surrounded by a half circle of the same substance, appearing to be organic in nature. A sample collected from one of the deposits contained seeds, these were identified at Bangor University as being blackberries!

Descriptions of the cats and their particular settings were made known to the Folklore Museum at St Fagans in South Wales and also to various mining history organisations. No explanations came forward, the only lead was reference to a cat that had been found in a Derbyshire lead mine, now preserved in a glass case at the Stags Heads public house in Wardlow Mires east of Tideswell. The only other reference was a connection with Cornish mining folklore that held the belief that it was deemed unlucky to mention the Cornish word for cat while working underground.

Ideas within the society to explain these strange discoveries ranged from the bizarre to the mundane, had the miners been involved with some occult practice associated with cats, could it be some element of forgotten folklore unique to the Orme or was it related to the offerings the miners made to the "little folk" known as knockers who were thought to inhabit many mines

throughout Britain and Europe up until the last century; and some believe up to the present. The significance of the organic deposits can not be overlooked, particularly the blackberries which suggest a seasonal aspect to the arrangement. Could they indicate some connection with the harvest months or is it purely coincidence.

Earlier this year we had the opportunity to discuss our discoveries with an authority on Celtic studies who was staying in Llandudno for a week. She was very intrigued by our findings and related to us what she could interpret from our descriptions. Apparently the layout is typical of some paganistic ceremony, with the cat a form of sacrifice lying to the north, while the altar or sacrificial stone lies to the east of the line of deposits, these may be offerings to the various earth, plant and animal spirits. Surrounding the stone are five patches of material, these could indicate the number of people present at the ceremony representing the four points of the compass or the four elemental forces - earth, fire, air and water, with the fifth symbolising the high priest. The ceremony may have been a commemoration to the Great Orme, perhaps perpetuating some distant link with the norsemen who are thought to have inhabited these shores in Dark Age times. In fact the name Orme is considered to be derived from horma heva viking for great serpent. Or perhaps these offerings were left here when the mines closed, as a tribute to The Mountain that had supplied copper for so many centuries.

C.A.L. 26.4.89.