

HOW OLD IS THE "OWLD MAN" : DISCOVERING ANCIENT MINES

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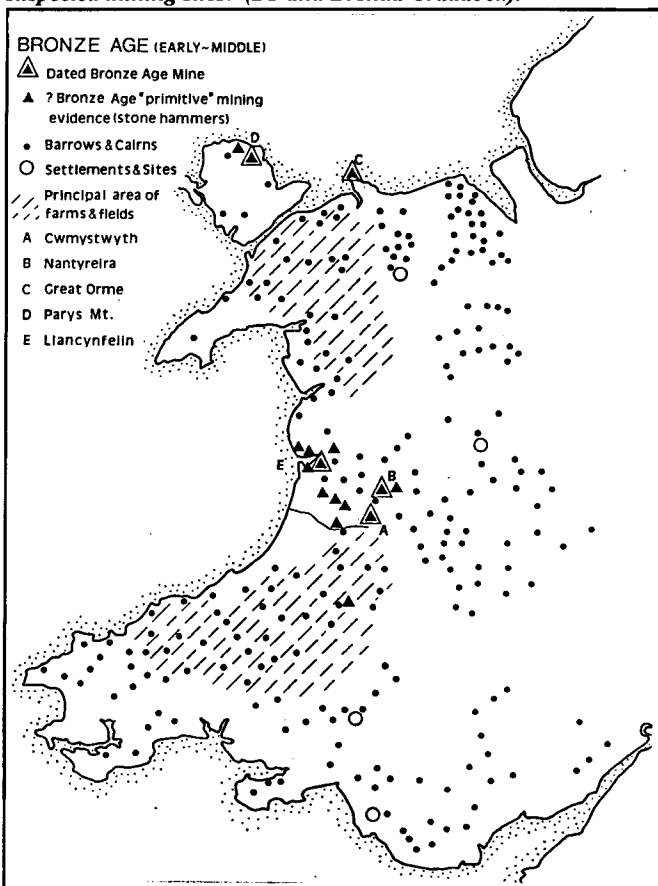
As visitors to NAMHO many of you will have been exploring old mines for years, and perhaps felt on occasions a certain closeness to the "owld man". A kinship, familiarity with a shared concern of excavating tunnels, and at certain moments in the darkness and stillness at the end of a level, you may well have had a sense of them being there, perhaps an imagining, a vision of what they looked like, how they worked, indeed how they *saw the world*, both above and below. There are still other ways of establishing a relationship with these 'ghosts' of former miners, either through the study of documents, or else by means of archaeology. The mining archaeologist can open up yet another dimension, through painstakingly reconstructing either a moment in time, or else a detailed record of the use and re-use of passages, spanning months or perhaps hundreds of years, by means of the detailed recording and sampling of sections cut through mine spoil, infill, or the working floors of former miners.

However, to stare on the face and form of a working miner, caught in the moment of his death some 1500 years ago, as he was buried under the collapse of his insufficiently shored working (and mummified for posterity), is not perhaps what you might expect! This was the fate of 'Copper Man', an Indian miner working the seams of atacamite ore within the upper reaches of a copper deposit at Chuquicamata in the Atacama Desert of Northern Chile. His mummified remains were found during the 1900s re-working of a small mine which has now disappeared, swept away by the excavation of a 1.5 mile wide pit. currently the largest opencast copper mine in the world. His remains, plus his hafted stone tools, baskets etc., which were recovered, are now in the American Museum of Natural

History, and these have proved to be invaluable to our own study of primitive mining techniques and tools. Though separated by thousands of miles and a climate as different as one could ever imagine, we can still share some affinity and respect for the relentless toil he underwent in working with little more than sticks and stones in pursuit of ore.

Yet this type of working, we now know, was also the origin of metal mining in Britain. The testimony of these earliest metal miners being the lichen covered beach pebbles which now poke rather incongruously out of the turf of long since buried tips of fireset rock perched on hill-tops such as at Copa Hill, Cwmystwyth, 420 metres above sea level, in the heart of the Cambrian Mountains.

Fig. 1. Bronze Age features in Wales, showing identified and suspected mining sites. (ST and Brenda Craddock).



Miners, in particular metal miners, have, since the earliest times, pursued and re-worked the mines of the 'owld man'. This familiarity with earlier, but undateable works, is all too easily taken for granted, thus there appear to be relatively few well documented accounts of the discoveries of what might have been unusual and clearly very ancient workings. Miners themselves would probably not write things down, nor necessarily preserve what they had found, and there was little commercial value attached to ancientness.

The earliest record that I am aware of for the discovery of what we would probably now refer to as a 'prehistoric mine', is the account provided by Lewis Morris of the opening up of the old Twll-y-Mwyn Mine near Darren, Talybont in mid-Wales in 1744. Morris was an antiquarian, poet and man of letters, as well as being the Crown Mineral Agent for this part of Cardiganshire. From his description of the site, it is clear that he recognized this working as being pre-medieval, indeed pre-Roman in age: "this mine seems to have been wrought in the beginning of time, and before the use of iron was found out, and when mankind knew the use of no tools but stone". Such an account provided a fascinating insight into the sorts of discoveries which await us today. In the margin of his manuscript he sketched one of the stone mining hammers and compared it to those he found at another site, Tyn-y-Fron Mine in the Rheidol Valley. Investigating this last reference, the Early Mines Research Group has, in the last couple of years, identified yet another Bronze Age mine within this part of mid-Wales.

There are still other descriptions, many of which refer to mines in Wales, to be found amongst the mining literature of the last

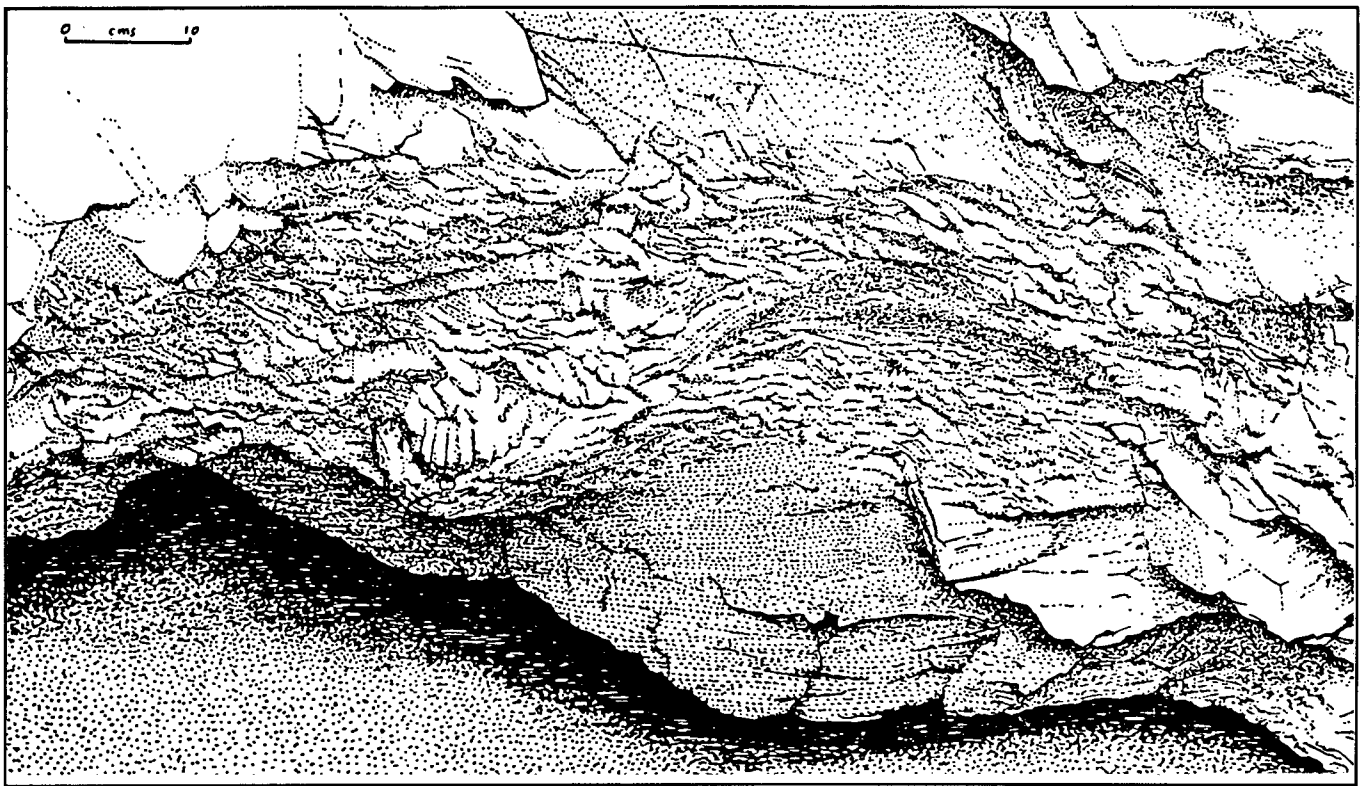


Fig. 2. Hammer-worked surface of roof of a small mined gallery at Copa Hill. (Brenda Craddock)

century, in particular within the pages of the *Mining Journal*. Most of these reports mention the finding of primitive-style fireset workings and sometimes refer to finds of wood, antler, or stone tools. The majority of reports referred to such sites as being Roman. However, in May 1874, Professor William Boyd Dawkins visited the location of surface workings (opencasting) for copper being undertaken by the Alderley Edge Mining Company at Brynlow on Alderley Edge near Macclesfield in Cheshire. Here the miners had laid bare an intensely hollowed and pitted landscape which suggested to Dawkins a much earlier period of working. Within many of these pits he noticed glacial cobbles, some of which had been grooved for the purpose of being used as mining hammers. The occurrence of these grooved hammer stones became quite a talking point at the time, and speculation abounded as to what they were. It was even suggested, quite seriously, that they may have been weights to keep the thatch on impoverished miners' huts.

Fortunately for us, Dawkins studied and made a serious collection of these tools and wrote a number of papers on the find. He drew parallels with sites in Egypt, America and in Anglesey, and his comments about the age of these workings have stood the test of time. He states: "these implements imply a ruder phase of the art of mining than has hitherto been known in the neighbourhood of Manchester - a phase which may point back to the Bronze Age, when the necessary copper was eagerly sought throughout the whole of Europe".

Within one of these pits exposed at Brynlow, the Rev. Sainter writing in 1878 referred to the discovery of a crude oak shovel. Although this was recovered from the pit and illustrated by him, it became lost, that is, until it was rediscovered by Alan Gamer, the local author, whilst still a young boy, beneath the stage of his local primary school. This was brought to The Manchester Museum in 1991. A small sample was later subjected to radiocarbon dating, giving a result of c.1750 BC - suggesting an Early Bronze Age date for the shovel, and thus by inference, confirming Dawkin's hunches of over a hundred years earlier regarding the age of these primitive workings.

Between 1935 and 1939 Oliver Davies carried out investigations on early Welsh metal mines under the auspices of the British Association for the Advancement of Science. This mostly consisted of fieldwork and documentary research, although a number of the spoil tips of mines which had yielded stone hammers in the course of re-working were sampled. In the absence of independent dating methods these excavations were fairly inconclusive - Davies concluding that they were of the 'Roman or old Celtic Period'. Around about the same time, gold miners at Dolaucothi in South Wales broke into flooded stopes 145 feet below surface at Allt Ogofau. From these ancient fireset stopes were recovered a baling ladle and a fragment of what appeared to be a large drainage wheel similar to those found in the Roman mines of Rio Tinto in Spain. This object has since provided a radiocarbon date of c.90 AD. Roman tanks and leats for hushing were also recognised above the mine, as well as pick-cut levels such as the Upper and Lower Penlan Wen Adits, some similar in form to many of the Roman workings on the Iberian Peninsula. However, Dolaucothi was quite unique in Britain, and even here we find little evidence of concerted archaeological excavation, either above or below ground, to determine the dates and sequence of mining.

By the 1960s, cavers and mining enthusiasts were also making significant discoveries, although the interpretation of some of these were fraught with problems. At Llanymynech, following explorations by members of the Shropshire Mining and Caving Club, several finds of Roman coins had been made within the shallow labyrinthine passages of an old copper mine, the Ogof Llanymynech, including one coin hoard buried within stacked deads well inside the mine.

Exploration at Draethen in South Wales, by the Bristol Exploration Club, uncovered the remains of firesetting sealed beneath stalagmite, plus finds which included a counterfeiter's hearth, Roman pot and a Viking or early medieval bone comb. It seemed that all of this evidence pointed to the re-occupation or re-use of what may have been a Roman or still earlier lead mine. Again no proper excavation was carried out

In 1968, Dr. John Jackson of the National Museum of Ireland published the results of archaeological work which he had carried out on the spoil tip of a primitive copper mine on Mt. Gabriel, on the Mizzen Peninsula of SW Cork. These discoveries provided the first archaeological evidence for Bronze Age mining in the British Isles, but at the same time generated more than twenty years of controversy over its interpretation. On the slopes of Mt. Gabriel some thirty or more short, cave-like, mine adits, had been excavated along the anticlinal axis of a folded cupriferous sandstone unit within beds of Upper Old Red Sandstone. These had been worked using firesetting, with the aid of stone and wooden tools. Further archaeological work at this site has since been undertaken by Dr Billy O'Brien of the University of Galway, and it is now possible to piece together the story of prospecting, seasonal working and small-scale production. Little or no evidence survives here of settlement and nothing of the smelting, but since 1995 the excavation of another site, at Ross Island in Killarney, has yielded a number of exciting finds including hut foundations, pottery and smelting pits suggesting the presence of a Beaker Period mining camp dating from about 2400 BC, thus pushing back the date of the 'owld man' in these islands some 500 years.



Plate 1 (above). View north towards summit of Copa Hill with gash of pre-historic opencast with spoil-heap extending downslope to the west.

Plate 2 (centre). Excavation in the entrance cutting at the Copa Hill mine, July 1995.

Plate 3 (bottom). Part of the 5m long hollowed-out alder log used as a launder some 4000 years ago. Note the large cobbles used as mining hammers piled on the right.



To many mining historians, the name 'Great Orme' has become synonymous with Bronze Age mining. It was in the late 1970s and early 1980s that Duncan James accompanied by one or two friends searched the shallow workings of a 19th century copper mine beneath the Great Orme's Head at Llandudno in search of the evidence for prehistoric mining. This included crystalline copper mineral-coated caverns with bone and stone tools which had been referred to in the accounts of old miners. In 1986 a carbon-14 date from charcoal sealed beneath flowstone-cemented deads provided the first proof of Bronze Age exploitation in Britain. Since that time a great deal has happened. An archaeological excavation carried out by the Gwynedd Archaeological Trust in advance of the planned construction of car park in the Pyflau Valley, uncovered evidence of a major prehistoric opencast mine buried beneath 19th century mine-spoil in the vicinity of Vivian's Shaft. As a

result of this discovery plans changed, the mine was opened up as a tourist venture and the site was excavated to reveal a large area of opencast trenches situated upon a stockwork of veins carrying malachite and chalcopyrite dissecting the softened dolomitised limestone. Up to twenty radiocarbon dates have been obtained from charcoal and bone tools. Most of these date from the Early-Middle Bronze Age c.1900-1500 BC whilst a few date from the Late Bronze Age and one of Iron Age date. The working implements of the mine consist of many thousands of pieces of utilised and un-utilised bone, mostly of domestic animals, which were used as scraping and prying tools in the soft dolomite, and large numbers of barely-used stone hammers. Hundreds of metres of narrow, irregular mine passages extend to a depth of some 30 metres beneath ground level although many of these were cut and cleared-out by later 19th century miners.



Plate 4 (above). Remains of a twisted-hazel withy used for holding stone tools, Copa Hill.

Plate 5 (below). Part of a discarded hammer-pick made of red-deer antler.

Plate 6 (bottom). Organic material preserved in waterlogged copper-rich sediments found beneath the wooden launder. Includes burnt-withey, basket and a fire-stick.

The occurrence of bone tools in large numbers is fairly unique to the Great Orme, undoubtedly the largest prehistoric mine yet uncovered within the British Isles. Elsewhere, unmodified or notched tools made from river or beach cobbles selected on the basis of shape, weight and smoothness appear to be the typical indicators of Bronze Age mining. On a map of the British Isles, the known sites of early metal mining form a very patchy distribution, although most are to be found close to the western seaboard of Britain and Ireland, but notably absent from South West England (a source of both tin and copper necessary for to making of bronze), Snowdonia and Cumbria. These are metalliferous areas where one might expect to find them. The concentration of these within mid-Wales (Fig. 1) therefore, is unusual, but almost certainly significant.



Those of us investigating the origins of metal mining in Britain met at a meeting in Snowdonia in November 1989. The publication which resulted from this, *Early Mining in the British Isles*, edited by Peter and Susan Crew) is one of a number of publications since produced which chart the development of this field of research in the British Isles. However, we have come a long way since then, and a great deal more is known about the subject.

The on-going archaeological excavation of what we now know to be a relatively undisturbed prehistoric metal mine, i.e. one which does not appear to have been re-worked during the 18th and 19th centuries, has continued at regular intervals near the top of Copa Hill,



Cwmystwyth since 1986. A view of the landscape of Cops Hill from the west makes a fascinating study of the evolution of a metal mining landscape over a period of almost 4000 years. The prehistoric opencast has exploited the outcrop of the Comet Vein on the brow of the hill. This end of the Comet is the only part of the complex of lead-zinc lodes which carries appreciable amounts of copper pyrites and this site is the only place where copper could effectively have been worked early on, the veins on the lower slopes being covered with glacial moraine. The latter has later been partly removed by an early phase of hushing on the vein itself, and then by a late 18th century phase of hushing which cuts the earlier.

The Bronze Age opencast which has the appearance of a weathered quarry some 40 metres long, 15 metres wide, and reaching a depth of over 10 metres, exploited the main copper-lead-zinc sulphide vein here (Comet Lode) plus a branching stockwork of associated small lead and copper veins, and seems to have been worked intermittently between about 2000-1600 BC, at which point it was abandoned and relatively quickly filled-up with peat, scree and silt. During its working period some 5000 metric tons of rock were removed and tipped to the side, and later down-slope as the working went deeper. The story of the subsequent excavation can provide us with an idea of how the most ancient 'owld man' may have worked, as well as giving us some idea into problems of excavating mines and recovering evidence; some of the signs to look for and the pitfalls to be avoided.

The excavation and recording of sections cut through mine spoil tipped outside the mine provides the initial access to datable evidence (often in the form of burnt wood from associated firesetting which can be sampled for carbon-14 dating) as well as a complete or partial sequence of the intermittent phases of mining. However, tips can be re-deposited or excavated through during the process of re-mining, and an understanding of the relationship of these through a very thorough surface survey of the site is essential. In 1986, I worked on my own on top of Copa Hill, cutting a 12 metre long trench through what it became clear was an *in situ* prehistoric tip, and out of this came the first dates for upland Welsh mines, providing an answer to some of Oliver Davies' original questions.

The Early Mines Research Group was formed in 1988, and following successful small excavations on the top of Parys Mountain in Anglesey and at Nantyriera, a relatively inaccessible site high on the western slopes of Plynlimon, we returned to Copa Hill in 1989 with a larger team, intent on excavating through hundreds if not thousands of years of accumulated sediments within the opencast with the goal of uncovering the workings of the prehistoric miners. Logistically this soon became a problem, since all the scaffolding and shoring had to be brought up the hill by hand. Yet the discovery of an undercut within the buried wall of the quarry was soon to reap its rewards, in so far as this exposed the roof of a Bronze Age mining gallery, on the surface of which the imprint of stone tools used during its original excavation had been beautifully preserved (Fig. 2).

Excavations carried out within the interior of the infilled opencast from 1993 onwards, revealed a buried landscape of rock trenches, pillars and working floors of the prehistoric mine, which were buried beneath some 6-8 metres of waterlogged peat and organic silt. The latter was stuffed-full of beetles, pollen, wood and plant remains. All of this infill had to be recorded and sampled before removal. The subsequent study of all this evidence was to provide evidence of subsequent mining, pollution, vegetation history, and climatic change in the landscape thereabouts since the Middle Bronze Age, proved to

be a fascinating story. Layers of leaves of oak, birch and hazel were found lying within the peat, some more than 3000 years old and with the autumn colours still visible. These stand testimony to climate change and landscape clearance within the uplands, a fact which is finally brought home when you glance over the shoulder to the bare mountain sides and glaciated terrain of the Ystwyth Valley today. A long-term study of the pollen history of the blanket-bog moorland above the mine has evolved out of this project, and may well provide still earlier record of the amount of de-afforestation which has taken place and the piecemeal demands for fuel for firesetting activities or smelting associated with this earliest working of the mine.

The study of the stratigraphy of sediments infilling early mine workings, whether this be above or below ground, is extremely important in the process of gathering evidence. We may be dealing with a period in which there is little or no written evidence, and few identifiable or dateable mining remains. The inter-relationship of mining and naturally deposited layers is always telling you something of importance, although interpretation is not always easy.

At Cwmystwyth, 18th century and later 19th century mining was carried out on Cops Hill below the level of the old man's workings. This is often the case. A shaft sunk through the 'old man' met with a rise from the end of the Copper Level, stopped upwards at the beginning of the 19th century to gauge how much of the lode above had been removed in antiquity, and perhaps also to try and drain the workings. A connection was obviously made, since at the very end of this gunpowder level, a collapse in the roof has brought with it a number of stone tools. There are now many examples of mines in the UK (e.g. Penmorfa Adit, Great Orme; Parys Mountain, Anglesey, Tyn y Fron, and Cwmrheidol in Wales and at Ecton in North Staffordshire) where stone tools or other early mining artefacts have been found deposited and out-of-place within modern underground workings or on spoil tips. The former examples may well help to provide an explanation for such occurrences.

Meanwhile our own excavations within the prehistoric mine at Copa Hill gradually got deeper and narrower as the mining infill of the trenches cut on the veins was removed and then winched-out by hand. Recording in these situations often requires a lot of improvisation as well as a good sense of balance (Plate 2). In the absence of shot-holes, pick marks and other good directional indicators, it was found that careful recognition of the contouring of the rock sides could provide us with some indication of the direction and sequence of mining. One example of such a sequence was found earlier this year, in the form of a trench on a vein driven up-slope and into the opencast from outside, then continued at a later date in the opposite direction from the interior.

The discovery of a working floor within the base of a large entrance cutting (evidently cut to help drain or de-water the workings after a period of abandonment) provided us with a number of seasons of work. The waterlogged base of this rock-channel contained many different fine-grained mining sediments, walked-surfaces and numerous wooden finds, including perhaps the single most important item ever to be discovered within a mine working of this type and period. This five-metre long drainage launder which had been hollowed-out from a single log of alder using a flat bronze or copper axe and wooden wedges, before being placed above the floor of the channel on branch and brushwood supports, in which position it was found in 1993. The launder was situated in the entrance-cutting to the mine, adjacent to deeper vein workings from which water may once have been baled (see Plate 3). As far as we know, this is the earliest example of mine drainage, dating

from at least 1900 BC.

Lying beneath this laundry and preserved amongst the waterlogged sediments were other important finds. A twisted hazel withy, once used to bind a stone hammer, was found in two halves, probably dropped and discarded on the spot at which the bindings broke (Plate 4). Other items included withy-ties and rope used for haulage, or for tying faggots of wood, as well as the remains of a basket which appears to have been thrown on to a fire after breaking. The remains of several antler picks (Plate 5), one of which had been re-used as a hammer, was reminiscent of prehistoric flint mining.

Stone hammers are ubiquitous within almost all the layers of mine spoil. More than 600 near-complete examples have been recovered from the excavations on Copa Hill, suggesting that many tens of thousands of pebbles were collected and brought up to the site. Over 75% of these appear to be beach pebbles (collected because of their resilient properties) which means carriage from the coast some 25-30 kilometres distant and 420 metres altitude below. The presence of partly used or else unused cobbles amongst these suggests seasonal working and the replenishment of supplies by people living on the coast and then journeying inland during the summer months, perhaps accompanied by grazing flocks of animals.

There is some minor evidence for specialization of tool types. In addition, some of the flat surfaces of hammers provided a dual or secondary use, as anvils for crushing quartz and ore fragments.

A better understanding of the use of stone-tool technology in the mining of metals might be gained through reconstruction and experimentation. A number of different ways of hafting barely modified cobbles of a variety of sizes has been attempted, using a combination of withies, rawhide and string and wooden handles. They were almost certainly used under-arm, most probably following the softening and cracking of the rock surface by fire. Using a combination of fire, antler picks, pry-sticks and hammers, several tons of rock have been experimentally mined using such tools. Experimental firesetting has also provided us with an idea of the demands of mining on surrounding resources. Throughout the lifetime of the mine this may have meant the consumption of up to 5000 tons of timber.

Debate over the question of what minerals or metals were sought for in these first British metal mines rages on and on. Even more perplexing for prehistorians is the problem of provenancing metal. The sources of the various different types of Bronze Age metal in circulation, in particular arsenical bronze and tin bronze, as well as a host of compositions in between, many of which are defined by inclusions of trace elements such as nickel, antimony, zinc, silver etc, have given rise to as many different theories as there are people making them. The destination of much of the mid-Wales metal produced during the Early Bronze Age has never been satisfactorily explained. It is has been assumed, with a certain amount of justification, that copper was the main metal sought during this period. However, the evidence, as we see here at Cwmystwyth can be interpreted in a variety of different ways. Most of what we now see in the veins here, and arguably what was left by the earliest miners, is galena. Furthermore, surrounding a small vein within the floor of an entrance, were found numerous large lumps of lead ore apparently discarded during mining. Similar amounts are also to be found within the prehistoric tips. Yet elsewhere some veinlets consisting of nothing but lead have been worked, and layers rich in crushed galena are to be found in some parts of the mine. Much of the visible copper mineral has been dissolved away, although there are also significant amounts of crushed

chalcopyrite scattered amongst the cobbling residues within the tips. There may have been minor production of lead for inclusion in bronze, as well as for experimentation in the production and use of metals.

In 1997, whilst working for the Manchester Museum, the National Trust and the Derbyshire Caving Club on the Alderley Edge Landscape Project I carried out excavations in search of prehistoric and Roman mining evidence on Alderley Edge in Cheshire. At Engine Vein the remains of a number of emptied pit workings, excavated using stone tools, are to be seen in the sides of the later opencast. Fortunately a section cut some five metres back from the southern edge revealed a shallow Bronze Age prospection pit containing a hearth and the remains of broken tools which had been placed in the bottom of the working. This was a quite different style of mining from that witnessed in Wales, to some extent governed by the geology of the bedded sandstone deposit. Grooved stone hammers had been used to remove overlying sandstone and conglomerate in an attempt to follow thin mineralized horizons containing surprisingly small amounts of malachite.

Meanwhile, while carrying out safety works on top of an infilled shaft in 1995, on the north side of Engine Vein, the Derbyshire Caving Club had also unearthed a pot containing 464 early 4th century AD Roman bronze coins. Full excavation of this previously unsuspected shaft was held-back until the start of the archaeological project. However, the results of the latter were astounding. The shaft, about 1.8 metres square at top, and about 12 metres deep, was emptied, and the infill deposits were recorded by means of a running section. From the base of this, a cross-cut level had been driven to Engine Vein. The shaft appears to be unique on account of its size and smooth walls and the significant twist in its axis. The dating of timber planks found beneath a floor in the base of the shaft suggest that the mine was most likely worked for a short period not long after the Roman invasion, possibly whilst under military jurisdiction, and that it may well have been abandoned before 100 A.D. Whilst there have been numerous reports of 'Roman' shafts within the various mining areas of Britain, this is the only substantiated example known.

Unfortunately the situation is confusing for the mining historian since there are many narrow pick-cut adits erroneously referred to as 'Roman Levels' within some of Britain's oldest metal mines. As Warrington Smyth, a mining geologist with the Geological Survey, rather pithily pointed out in his description of the Cardiganshire mines in 1849 (perhaps whilst thinking of the example of the 'Roman' coffin level above Level Fawr at Cwmystwyth): "it is hardly necessary to observe that the retailers of tradition who here ascribe to the Romans, as do the eastern Irish to the Danes all works of more than a few generations since, overlook the fact that it is a little more than two centuries since gunpowder was generally introduced in mines and that all subterranean operations, up to even the period of Sir Hugh Myddleton's successful adventures, were effected by means of the hammer and 'gad', or miner's wedge". Even now, it is only after making a very careful study of the distinctive sorts of pick-work present, along with the dimensions, and types of profiles found in levels of known Roman date (examples being Pot Shaft on Alderley Edge, the Penlan Wen Adits at Dolaucothi, and those at some of the Spanish mines) that we may be confident in making a educated guess as to what is or isn't Roman. However, this is a rather specialized field and requires not inconsiderable skill.

Just as we should be wary of referring to a mine as Roman on the basis of finds of Roman pot sherds or coins on the floor (or else hidden within the deads), so should we be wary of relying

on inscribed early dates, initials, or graffiti on the walls of levels to date the period of the old man's working. As found at Brynlow on Alderley Edge, within an area of known 18th century workings underground, the initials J.W. and the date 1769 simply refer to the desires of wandering quarrymen for immortality rather than to the age of the tunnel itself.

Large double-sided mortar stones, examples of which have been found now at a number of Welsh, Northern Pennine and Lake District mines, have rather confusingly on occasions been referred to as prehistoric. Within the book *Beneath the Lakeland Fells* published by the Cumbria Amenity Trust, which consist of contemporary pictures of Lake District mines, there is a reference to Bronze Age mining at Coniston, a claim based on the discovery of such mortars at Simon's Nick - a classic working of the Elizabethan Period and later. However, a careful look at these anvil stones will show that most of these have been worked with iron bucking hammers. Indeed, at Cwmystwyth we find crude dry-stone walls constructed around some of these mortar benches, in the make-up of which we can see blocks with shot-holes in them.

Amongst our earliest mines, how can we differentiate between trials or prospectings of different periods? The use of firesetting in mining was common under certain circumstances at least until the 17th and 18th centuries within a number of the mining regions of Britain. However, the presence of irregular hollows in the rock, particularly where these form 'cave-like' arched openings dominated by the natural shape of the fire rather than by any linearity or control exerted by sharp metal tools (such as we can see at Mt. Gabriel) should make us aware we might be looking at something much older.

However, in the course of fieldwork we have also found a number of other rather enigmatic fireset features. Within the side of the prominent quartz vein, otherwise referred to as the Old Lode, outcropping high on the Pen Cerrig y Mwyn ridge above the lead mine of Nantymwyn, a number of fireset undercuts and hollows had all the appearance of being prehistoric, except for the absence of stone tools. In one place here the remains of a hearth, charcoal and crushed quartz were examined, the sampling of which rather surprisingly provided a very early medieval, most likely a Saxon date for the working.

For a number of reasons this period is particularly interesting, since the sources of Dark Age - Saxon and Viking metal (in particular silver) - remain an enigma. For Esgairmwyn, another reputedly ancient mine within the uplands of Wales, we can read once more of what Lewis Morris has to say about the discoveries of the miners in the mid 1750s: "it is plain that they carried their ore on their backs in wicker baskets, along the said wooden steps and stemples. Gadsticks were found in the south vein along with pieces of ore-baskets made with rods in a frame". Interestingly he notes that there was little or no evidence for the use of iron tools, although clearly there is no mention of stone tools either. The next phase of mining, an attempt to drain the old bottoms, he dates as no later than Elizabethan, the inference being that the period of the 'old man's' workings therefore were a good deal earlier. Possibly this was mining by the monks of Strata Florida Abbey, but then again it could have taken place centuries before that.

Somewhat ironically, far fewer tools have survived within metal mines of the medieval period than we have recovered from all of our early prehistoric sites. Medieval - Tudor coal mines on the other hand, such as those found in the course of modern opencast coal mining near Coleorton, Ashby, in Leicestershire, have contributed greatly to our understanding of medieval mining practice and technology. There may well be some useful comparisons and similarities to be made here if only medieval metal mines could be so easily identified.

So just how old is the 'owld miner' then? We have shown here that it has been possible to push back the date of mining copper ores for smelting to at least 2400 BC. But what of the mining of metallic minerals for pigment? Little to nothing is yet known of such activity in these islands, yet we are quite happy to accept that Neolithic man was mining flint very selectively by means of underground shafts and galleries beneath the chalk downs of southeast England more than 6000 years ago. Minerals such as malachite (green), azurite (blue), galena (black when powdered), hematite (red) and pyrolusite (black) were almost certainly being collected for use as long ago as the Mesolithic, and surface deposits at some of our known Bronze Age mines (such as Alderley Edge) may well have been exploited around about this time. Within Germany, France and Switzerland a number of neolithic hematite mines have already been identified, some apparently dating from around 5000 BC. Does this mean that the earliest mines were for iron?

This brings us back full circle, to the place where we started. For right on our doorstep, here within the Forest of Dean, we may yet find evidence for the very earliest period of mining. I recollect, for instance, being shown a number of small hammer stones found within the hematite or ochre workings of Clearwell Caves, and recently Jonathon Wright and Martin Strassburger have collected such implements from old scowler workings at Drybrook - one of which is clearly grooved and rather similar to the now classic type of Alderley-type of mining tool.

Using the axiom that most of what there is to know, still remains to be found, it seems most likely that the task of uncovering the origins of mining during the third, fourth, and fifth millenia BC will continue to be a challenge for some of us well into the 21st century AD.

Simon Timberlake