THE GREAT ORME EXPLAINED

by Diane and Nigel Bannerman

THE GREAT ORME EXPLAINED

By Diane and Nigel Campbell Bannerman.

Published by Campbell Bannerman Publications

ISBN: 0-9540 184-0-0

Cover design: Di Bannerman.

First published & printed in March 2001 by Campbell Bannerman Publications, 'Carreg Wen', 27 Abbey Road, Llandudno, Conwy, North Wales, U.K. LL30 2EH. Tel. 01492 879416.

CONTENTS

Foreword

This gazetteer has been compiled as a research resource for the Bronze Age Coast Project and has been on going since 19.6.1994. One of the first rewards was the discovery that Badgers Cave, already known as a Neolithic habitation, was a Prehistoric mine. Diane had realised from the number of mines she was plotting around Badgers Cave that there had been considerable activity in the area over a very long period of time and an investigation was begun.

Field walking, aided with specially taken aerial photographs, to locate known and new sites, led to the discovery that what had been thought to be a field bank was in fact a very large stone circle. Other features known as 'Cross Ridge Boundaries' which date back to Bronze Age – Neolithic times have also been found along with numerous small workings of all ages. Close to the Lighthouse a set of trapezoidal stone lines seems to be the remains of a large oval barrow not previously reported.

Work around the shores of the Great Orme revealed copper slag ballast jettisoned by sailing ships that came from the Warrington and Swansea smelting works for copper ore. Traces of the jetties were found from where limestone was sent to build the bridges over the Conwy and the Menai and to build docks and public Buildings in Liverpool and elsewhere.

The discovery of large fish traps in the sea near the Bishop's Palace at Gogarth and Black Rocks enabled coastlines, washed away centuries ago, to be redrawn. In a future volume the discoveries of the sites of the lost Township of Penlassoc, the huge earthwork fort of Castell Tremlyd and the lost Palace of Helig ap Glannog will be recounted, but for the present we will content ourselves with the Gt.Orme. Investigations of the local fish traps also led to a 'paper', a classification of Fish trap types, being published in 'The International Journal of Nautical Archaeology'- a professional publication.

There are still many discoveries to be made on and around the Great Orme for it has a long and varied history; the extensive Bronze Age mine workings alone give it a special place in the history of Mankind.

Compiling this gazetteer has given a lot of pleasure, and we hope it will continue to do so for years to come as we hope to keep adding to it. We have received a great deal of encouragement from others, indeed we have even noticed that early and quite incorrect versions of it have started to appear – is not imitation also the sincerest form of appreciation? So we now present this pilot edition, hopefully more will follow; if you should have any comments or additional material we would be very glad to hear from you.

Nigel & Diane Campbell Bannerman.

THE LOST LANDS OF GOGARTH.

The discovery of two ancient fish traps close to the ruins of The Bishop's Palace in 1996, led to an investigation of the area resulting in a picture of a coastline changing over the past six hundred years. Methods of fish trap construction and indications of sea level change have also been found. The beach below the remains of the Bishop's Palace has yielded revealing evidence of what traces can be found after a substantial building has been destroyed by coastal erosion.

Aerial Reconnaissance and Photography.

On the 19:3:1996, a carefully planned aerial reconnaissance and photographic flight was undertaken during the lowest usable tide that year, to examine and record known, and suspected, intertidal sites as well as to prospect for new ones. The two fish traps described here fall into the latter category.

The last section of the outward leg of flight was over Llandudno West Shore and the beach on the southern side of the Great Orme. It was not suspected that there were any old man-made structures visible there as the beach had often been walked in earlier years, but curiosity had been aroused by local traditions, reported by Ashton and others, of traces of a Roman fort or villa in that general area.(Ashton.1920 p.212)

Identification of the Gogarth Fish Traps.

At first sight from the air, the Western Gogarth Fish trap was taken to be an old sewer outfall, but the 'hook' at the offshore end looked rather odd, so a number of photographs were taken. These were carefully studied while waiting for the next low tides. Initial reactions of those who knew the area was one of bewilderment for the fish traps did not appear to have been previously reported and the western one was visually obvious and in good condition.

Coastal Command aerial photographs, from 1947 and 1973, and Ordnance Survey maps back to the first 19th century One Inch map, show the site covered in sand. The channel known as the 'North Deep' which runs more or less parallel to Llandudno's West Shore is also shown on the maps to the south of its present course. It is believed possible, that this has been the situation for more than 300 years as the fish traps, which are situated in the present channel, do not appear on any of the Lewis Morris Charts.

It may well be that long sea defence groynes built in the 1990's changed tidal currents causing the channel of the North Deep to move northward, closer to the West Shore, revealing these fish traps. However in the 1900's Llandudno Council had to build a stone groyne to stop scouring by the sewer outfall, so it is possible that the movement of the North Deep is part of a natural trend. The Western Gogarth Fish Trap has the appearance of being very well preserved and not to have received much erosion or storm damage. One area towards its southern end seems to have been breached or suffered some interference, as if an attempt had been made to destroy it. However it is also possible that changing tidal currents caused a sandbank to encroach upon the fish weir from the south covering the original sluice where fish are trapped, and that the breach is an attempt to form a new sluice. This theory is supported by the lines of existing post stumps, which at this point are angled slightly down the west slope of the weir. If this were the reason for the breach, it would seem to have been rather futile. The good condition of the weir appears to be due to it having been rapidly buried in sand, at some time in the past, when perhaps it was still in use. Well preserved, though rather soft wooden posts, the tops of many of which are visible at surface level, also give the impression of only recently being exposed to marine borers having been previously sealed below a cover of sand that has prevented attack.

Surveying the sites has been a rather lengthy process due to the infrequent occasions and short amounts of time that the fish traps appear above water. Observations on site at the Gogarth Fish Traps show that they only appear at, and below, Mean Low Water Springs or 0.9m above Chart Datum Liverpool, and that Low Water occurs at 60 minutes before Liverpool.

It is only possible to work on the Gogarth Fish Traps for 40 minutes during tides below 0.5m. above Chart Datum which occur about 20 times in the course of a year, in daylight, at around 6.30 a.m. / p.m. This is before breakfast or during dinner and is one of the reasons that such sites are often not researched. Aerial photography too, is usually conducted when the sun is fairly high, but, extremely low tides mostly occur in spring and autumn, close to the hours of sunrise and sunset, which is also a time when mist and poor visibility is likely to occur. When it was found that no aerial photographs taken at extreme low tide were available, a photographic flight had to be undertaken.

Fish trap types.

The Gogarth Fish Traps are situated on the southern side of the old, 1845 & 1876, sewage outfall pipes [161] [Nichol 1885] and it would appear that the sewer is laid over the northern end of the most westerly one. The configuration of the Western Gogarth Fish Trap, [163] is a type 5, rectilinear. The Eastern Fish trap [162], a type 7, 'S', is not as well preserved.

Tidal currents, to some extent directed by the 1870's sewer outfall pipes, have removed sand to a depth of 1.8m on the southern side, revealing the stone ballast upon which they are laid and the underlying red clay. This bed of red clay also forms the base of the Western Gogarth Fish Trap.

The Eastern Gogarth Fish Trap is not, thus far, as well exposed as the Western Gogarth Fish Trap, where it can be seen that it was constructed on the bed of red clay, which at some time represented the beach level. From the ease with which survey pegs are driven into it, the Western Gogarth Fish Trap that rises 0.6m. above this clay bed, seems to be constructed of the same red clay with an armouring of stones. The stones themselves are in the main rather rounded and probably eroded out of the glaciogenic and colluvial sediments of the adjacent Gogarth Terrace. [Addison 1995]

This use of a mixture of clay and rock in the construction of fish traps is rather interesting as many other fish traps in the area exist only as rather faint outlines; especially where there is little readily available rock in the immediate vicinity. It could well be possible that these other fish traps too were constructed of a mixture of clay and rock but since being abandoned the clay has gradually washed away. This also lends weight to the theory that the Western Gogarth Fish Trap especially, has been buried in sand, and hence protected from the action of waves for a considerable period of time.

Wooden posts from the Western Gogarth Fish Trap inspected thus far vary in diameter from 70mm to 140mm, but in the main are around 100mm, being spaced at 0.6m. intervals or thereabouts. From the very good condition of the bark and the lack of scuffing it is thought that the posts were placed in oversize holes in the red clay / rock embankment and secured with puddled blue estuarine clay. This blue clay has not been observed occurring naturally on site and may well originate from deposits noted further along the beach to the east.

The blue clay is much more plastic and possibly has better shock absorbing properties than the red that is actually rather friable. The builders of the weir obviously thought the blue clay had qualities which made it worth importing to the site and this careful selection of materials, along with the very regular design and execution of construction, is evidence of a skilled and well developed technology.

These details imply that the weir was constructed above low watermark by raising a ridge of the local red clay in which holes were excavated. Posts to hold the wickerwork part of the trap were then placed into the holes and held firm with puddled blue clay. An armouring of stones to prevent erosion completed the construction.

Sea level Change Indications.

While removing part of a post from the Western Gogarth Fish Trap for sampling, it became clear that the work described above could not have been done underwater. It would have required the site to be dry for a longer period than it is today when it only appears for a short time on the lowest of tides. Suggestions that driving the posts into the seafloor below low watermark from boats created these traps seems most improbable.

The site is only accessible at very low water which, at the best, only occurs a few times a year. As operational fish traps need to be inspected and maintained on a very regular basis it would seem evident that these traps were built at a time when sea level was several metres lower. To work effectively the upper part of a fish trap needs to be at, or close to, high water mark, and/or abutting a cliff or bank. The lower part, the `sluice' should be close to Low Water Neaps - a point that can be several metres above Extreme Low Water mark.

Near to Aberllieniog the remains of fish traps, parts of which remain below low watermark on the lowest tides have been identified by the Bronze Age Coast Project. G.Momber has also remarked on the possibility of a three metre lower sea level at Gorad Beuno, in Caernarfon Bay, in the last millennium. [Momber G.1991]

Marine Biology.

When the Gogarth Fish Traps were first inspected in 1996 there was little marine growth evident, mussel shells were present but from their very fragile condition appeared to be very old. Mussel spat [Mytilus edulis] was becoming established in early 1997, and at the end of that summer a little Kelp [Laminaria Hyperboria] had established itself on the Eastern Gogarth Fish Trap. During post surveys, when stones were occasionally moved to facilitate measurement, numbers of Sand Eels [Ammodytes tobianus] were disturbed which accords with comments that fish traps tend to be colonised by creatures that act as bait to attract larger fish. [Jones.C.p30.1983] By the spring of 1998 mussels were becoming established and a few sea anemones [Actinia equina] were present on the Western Gogarth Fish Trap.

Sections of two posts were carefully excavated from the Western Gogarth Fish Trap in October 1997, where anaeorobic conditions have preserved them beautifully; both were found to have been recently invaded by the common Piddock [Pholas Dactylus] to a depth of 100mm. Again this suggests that they have only recently been exposed.

Dendrochronology, and C.14 Dating.

One of the posts from the Western Gogarth Fish Trap was sampled and identified as Alder [Alnus] by P. Denne at the BioComposites Centre, University of Wales Bangor. The wood, though looking very fresh with the bark still in place, was considered to be very degraded and possibly quite old. Unfortunately insufficient growth rings were present for dendrochronological dating. A sample taken to the British Museum C.14 Laboratory, was dated as being from a tree cut

down around 1500 A.D.[cal.] While this is just one date and as such can only be used as a 'range finder' the study of charts and maps dating back to the late 16th century and local enquiries suggest that it is accurate.

Associated Finds.

At the southern end of the Western Gogarth Fish Trap blackened Oyster shells [Ostrea edulis] were revealed by the erosion of mud between the rocks of the trap. This could indicate that this trap was used to store oysters that had been collected from beds elsewhere, as was the case at Gorad Gyt, Bangor. A single rib, probably bovine, was also found eroding out of the south end of this fish trap.

Coastline Changes.

The positions of the Gogarth Fish Traps give clues to the previous coastline and indicate a former channel of the North Deep. The Eastern Gogarth Fish Trap appears to fan out at its northern end into an area of boulders that indicate a previous shoreline onto which it abutted. The present shoreline some 200m. to the north consists in part of eroding glaciogenic and colluvial sediments, protected by recent sea defence works, and carboniferous limestone cliffs. The lower parts of the cliffs do not show the deep weathering seen at other places on the Great Orme shoreline, this is no doubt due to them having been exposed only comparatively recently.

Due to sand cover to the north of the sewer outfall pipe the northern end of the Western Gogarth Fish Trap is not visible. But by probing the sand in a grid pattern with an air lance it was possible to trace the outline of the trap to where it originally abutted the shore.

Plotting a receding coastline

The information gathered from investigating the Gogarth Fish Traps has made it possible to estimate where the coastline was when the fish traps were last in use. This would have been around the C.14 date obtained from the post from the Western Gogarth Fish Trap, and is the suggested 1460 coastline. Other clues have shown later coastlines.

There is a very strong local tradition that the two large rocks known as 'The Sisters' were once a hazard to ploughing, not to shipping, as they are now. Mrs. Miriam Jones, who died in 1910 at about 90 years of age, lived in a cave [165] close by. She told of her father, when a youth, ploughing fields which lay between Gogarth Abbey and the sea. This would be in the 18th Century. [Ashton p191. 1920] The grandson and great-grandson of Mrs Miriam Jones are well known to the author and have confirmed that family traditions hold that the Sisters Rocks were a nuisance to their ancestor whilst ploughing.

However Ashton's popular 'modern' version is preceded by an account given of Richard Jones of Gogarth by Thomas Rowlands, whose farm was by the Gogarth Abbey ruins, which Rowlands refers to as the Monastery ruins. *'I have heard him relate how his father used to say that he used to strike the share of his plough against the two large rocks that are by now way out in the sea and known as the Old Man and the Old Woman. This indicates how much land is swallowed up year after year.'* [Rowlands 1840]

The Lewis Morris chart of 1748, which shows the 'Nunnery', or Bishop's Palace, being a little way in from the coast, while not showing any prominent rocks on the beach, could be taken as inferring that 100 years before the 1840 tithe maps `The Sisters' were in a field. They could give a clue to the depth of material that has been eroded, as they stand some 3m above present beach level, which is very close to the level of the gardens 150m to the north, where the tithe system walls can be traced. To the west of the fish traps the sea has eroded cliffs of clay and stones that are 10m. high. However directly inshore of the traps, the land is very close to sea level and after observing old field boundaries at the edge of the beach, it is felt that a depth of 3-4m. is all that has been eroded in this area. Though there are no exact reference points, a reasonable estimation from the above can be made for the 1740 coastline.

The 1887 Ordnance 25inch map shows the shoreline virtually where it is today, due no doubt to efforts by property owners and the local council to control erosion. However when modern maps are overlaid with the 1860 Llandudno town map and tithe maps from 1840 it is possible to trace old field boundaries still in existence on dry land and plot others which have been lost to the sea as well as the 1840 shoreline.

Archival Evidence.

A stone axe [155] was discovered on the beach a little to the east during sea defence works in 1952 which were taking place in an area that is shown on the 1840 tithe maps as dry land. [Patterson D.1952] There are also reports of a stone circle somewhere near to Bishop's palace [172] suggesting that the area was popular 4,000 years ago.

An Eroding Palace.

The remaining ruins of Bishop's Palace, or Gogarth Abbey [172], built by the Bishop of Bangor and burnt and sacked by Owain Glyndwr around 1400, stand on the top of a 10m. cliff of eroding glaciogenic and colluvial sediments. These consist of a mixture of sand, gravel, clay, blocks of local limestone, and rounded igneous boulders of all sizes transported to the site from many miles away by glaciers. These circumstances provided excellent conditions to attempt to discover if any traces could be found of a substantial building after not only the destruction of its fabric by man and

the sea, but also of the very ground it stood on. As there are several sites in North Wales where buildings have supposedly been lost to the sea in similar conditions, observing the process actually occurring is extremely useful and instructive.

It was realised that the natural process of beach armouring was taking place. The sediments and clay, which formed a large proportion of the materials in the cliff, were being carried away, while the boulders and blocks of limestone which remained were descending more or less vertically to become part of the encroaching beach, while in plan, or as seen from directly above, remaining roughly in place. This concentration of stones helps to prevent further erosion. Unfortunately the building materials of the Bishop's Palace, which in the main are `freestone' blocks of limestone, mingle with the underlying stone and when they are acted upon by the waves soon become indistinguishable.

However Terry Williams pointed out that among the beach shingle were small pieces of roofing slate, which were rather thick, 1cm. -1.5cm. in cross section. This is much thicker than modern roofing slate and is more in keeping with the early `Moss Slates' such as had been found by Cecil Jones and Owain Roberts on the 14th century Pwll Fanog shipwreck. Moss slates are usually small 25cm. X 14cm. X 1.5cm and roughly triangular. After a number of careful searches several large fragments and one almost complete specimen were found.

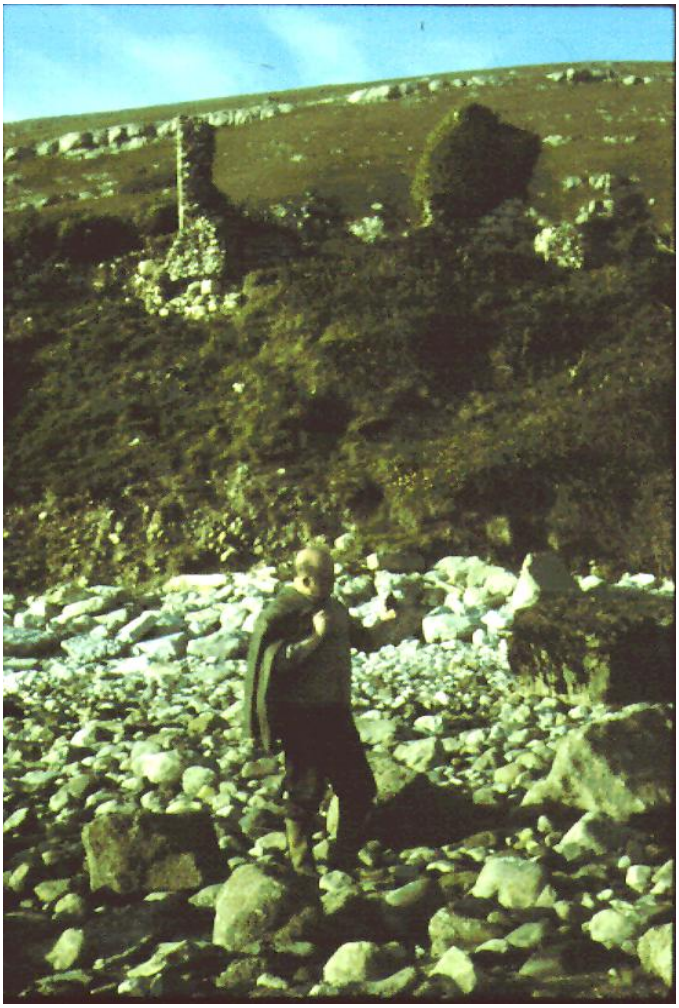
One fragment was inspected by Professor Dennis Wood who identified it as a very distinctive type of slate, which most likely had come from a quarry close to Bangor, which belonged to the Bishop of Bangor, that had not been worked since the 14th century. This identification makes it fairly certain that the slate had been used on the roof of the Bishop's Palace and was not evidence of a shipwreck, while also making it clear that on sea eroded sites identifiable traces of buildings can survive.

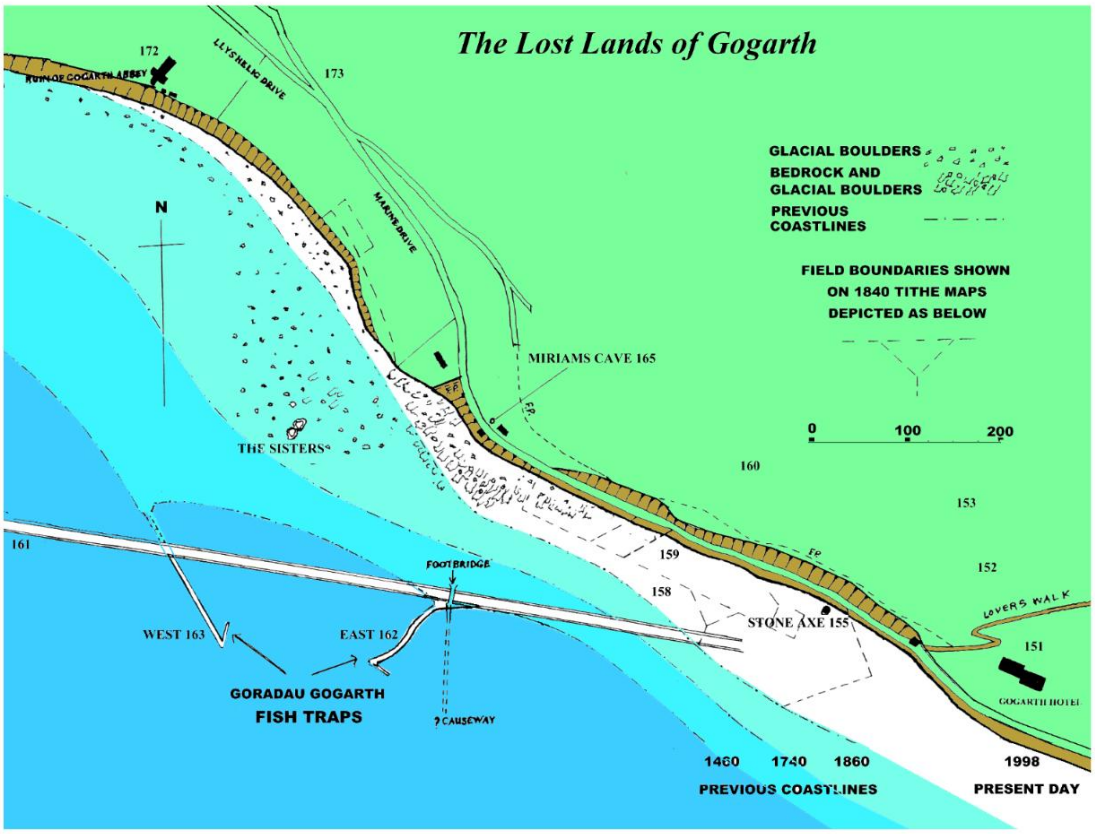
In the past the shore has yielded artifacts. In 1857 Miriam Jones and her husband found a stone font and other artifacts on the beach below Bishop's Palace. It was given to Mr G.A. Humphreys by Miriam just before her death, and is very possibly the one that his grandson Mr. Wilson kindly allowed me to photograph. [Bezant Lowe. vol.2.p.236. 1927]

The following thought occurred while examining the site of the Bishop's Palace. As the stones that formed its walls were staying, in plan, more or less in position, should erosion continue for another hundred years any researcher inquiring as to where the Bishop's Palace lay, would be directed to an area of beach some distance from high water mark. Unless records were available, which made it clear that due to erosion the ground level had effectively dropped 10m or more, the researcher could be misled into thinking there had either been a most unlikely rise in sea level or that the tales of a Bishop's Palace now under the sea were the fairy tales of simple country folk. This could, in part, help to answer questions about another site in Conwy Bay, the lost Palace of Helig ap Glannog.

Stone font found at the Bishop's Palace

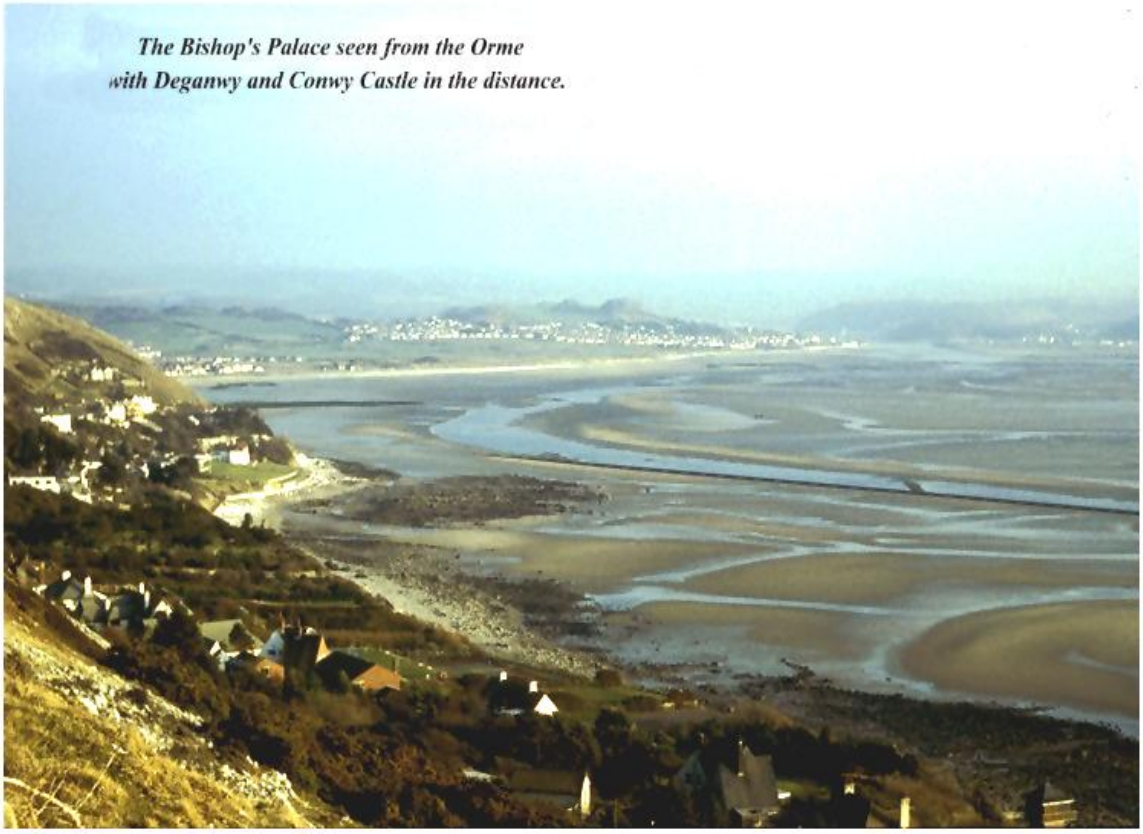
Terry Williams of Bangor University examines a slate on the beach at the Bishop's Palace, West Shore, Llandudno 1998.





Previous coastlines of the West shore Llandudno

Photo of the Gogarth fishtraps West shore Llandudno



The Bishop's Palace seen from the Orme with Deganwy and Conwy Castle in the distance.

The Bishop's Palace from the Great Orme with Deganwy Castle, Castell Tremlyd and Conwy Castle in the distance. Circa 1400

Elephants Cave Quarry {109}

Pigeon's quarry and cave {91}

QUARRIES AND LIMESTONE MINES.

It is fair to propose that the earliest extraction of rock on the Gt.Orme took place in the Neolithic period, or earlier, when stones were taken - perhaps not very far - to construct monuments or huts of which there are very many on the headland. Above the Lighthouse is a small quarry [32] the 2m high face of which seems very weathered. This may be due to the line of the face following a well weathered joint or that the quarry is very old and was used to provide stone in prehistory. Close to the quarry is a possible Tumulus [28]. While this is no kind of proof of its age, it is as well to bear in mind that there is very probably much still to be discovered and prehistoric quarrying is but one subject which must be considered and researched.

Over time, the different types of limestone which form the Gt. Orme have been used according to their qualities, the massive harder beds yield blocks suitable for facing and constructing public buildings, harbours and bridges, while stone from the more easily broken strata has been used for building houses and roads. In the first part of the 19th Century 'Paving Stones' were collected from the foreshore and shipped to the developing large towns on the Mersey. This practice became a problem and was eventually banned by Government order to protect the beach. The Quarries of Llandudno form a very important and still very visible part of its history and many families in the town today can trace their lineage back to those who took part in this industry. It is important to remember that from the 1800's Llandudno's Quarries were primarily organised to export stone by sea to the new industrial towns.

It is something of a puzzle that the Gt. Orme quarries were not more developed, Coastal quarries to the east and west were extensively worked in less favourable situations where, as at the Abergele quarries, fifty horses were used to cart stone to the coast or such as at Llandulas, a railroad and pier had to be built out across the beach to deeper water to enable ships to be loaded. [Dodd.1990.p.224.] At several sites around the Orme there is, depending on wind direction, sheltered deep water right up to the cliffs where natural quays occur that are not beset by strong currents. I have manoeuvred a 12m. / 14 tonne sailing vessel alongside, without difficulty, by both Pigeons Cave [91] and Ogof Llech [26] and feel sure that the vessels, of similar size and larger, that were used in the coastal stone trade in the past, could have operated successfully in such locations.

Lime and Limekilns

There is also another very important use for limestone, for as its name implies it is a source of lime. Lime is produced by heating limestone to a high temperature in a kiln which creates quicklime, a rather reactive substance, which when 'slaked' with water becomes lime. There are many uses for lime such as fertilizing and adjusting the pH of soil in agriculture. It is also used for making cement, mortar, lime plaster, and whitewash, which protected the fabric of the traditional cottages of the area. Conwy Castle itself was originally whitewashed which would have made it even more impressive whilst also protecting the lime mortar. Occasionally red or yellow ochre and other pigments found locally were added to whitewash for decorative effect.
Near the junction of Church walks and Abbey Road, Shafft yr Odin [136] 'The Lime Kiln Shaft' and Quarry [137] would seem to mark the site of a Limeworks. This capped shaft is in the grounds of the new St.George's school and is now a decorative well, it was used as a well when the place was a nursery garden and was possibly the water source for the implied Limekiln. A further limekiln was, according to Thomas Rowlands, situated just to the north west of St. George's Church. (Rowlands.1892)
Coal or 'culm' [anthracite slack] was no doubt used to fire the Llandudno kilns although as yet no direct evidence has been found. In the three years ending in 1841 the Conwy built sloop 'Lady Willoughby' which took Gt. Orme copper ore to Swansea brought 17 cargoes of coal [1144tons] to Llandudno on return voyages (Davies.1939). It is very likely that most of this coal was used in the boilers of the steam engines of the mines but there was a demand for lime locally and Orme lime was supposed to be of high quality.
It appears that limestone suitable for converting into lime was exported by sea possibly due to shortage of fuel on the Great Orme

Limestone Mines

Some of the more spectacular Quarries on the Great Orme are those which have been worked by the 'Pillar and Stall' method which, as the name implies, involves mining out large 'Stalls' and leaving 'Pillars' to support the beds of unwanted rock above. This is done when a particular bed of rock has special properties and this practice has resulted on the Great Orme in the creation of 'Rock Studio Quarry', [101] serving Quarry Jetty [219] and 'Elephants Cave Quarry', [109] and 'Y Craig Quarry' [113] serving Quarry Jetty [220]. Where this bed outcrops or is close to the surface, it has been quarried normally as at Tyn y Coed Quarry, [132] and the Quarry [160] near the Gogarth Hotel. From this Quarry stone is thought to have been have been taken through archway [159] under Marine Drive to a Quarry Jetty on the beach below [158]. All these workings are on a particular bed of limestone known as the 'Affini Philipsi Bed' from the fossil coral, a Lithostrotion, which is found in it. (Lewis. 1998) This limestone appears to split and cleave into good sizes for

building purposes and it may well have been seen to have other virtues of which we are unaware at this time. Suffice it to say that it was seen as being worth pursuing underground in what are properly described as limestone mines.

Quarries

Apart from meeting local needs, limestone was also exported by sea from the Gt. Orme to supply the demand for building stone and stone to be burnt to make lime for mortar. Unfortunately, once again, most of the actual port records were lost in the Conwy Library fire but perhaps records of vessels from the Gt. Orme arriving at other ports may provide more information. From the mid 18th Century onwards the market for Welsh stone was created by the enormous growth of cities - the Chester Chronicle of 2nd. May 1755 carried an advertisement requesting stone from the Anglesey Quarries. [Dodd 1990 p.223]

At various points around the Gt. Orme can be seen traces of limestone quarrying which involved little more than lowering blocks of stone directly from the cliffs into boats. Traces of iron mooring rings have been seen near Ogof Llech [26], Porth Helig [73] and Pigeons cave [91].Just to the east of the cave on a broad ledge there is evidence of limestone extraction which took place during the building of the Cob, the Telford suspension bridge in 1826, and the Stevenson tubular bridge in 1848, at Conwy. Several large blocks of limestone with shot holes can be seen at this point. Gelignite or other high explosives leave many compound fracture lines radiating from shot holes which renders the stone unfit for building purposes. As these are absent it is reasonable to suppose that the explosive employed was black powder which has a slower burn and causes less shattering, it is also a much older type of explosive. However as black powder was used until quite recently this cannot be relied upon as a dating method. There is also at this point a chute cut in the cliff down which large blocks of limestone were lowered onto barges moored below.

Mr.Joseph Hughes was the quarry contractor who organised this activity and possibly the trial tunnels in Pigeon's Cave which were driven in the hope of discovering copper ore, (Roberts, J.1909). During the building of the Stevenson Bridge at Conwy, 161,450 cu ft of limestone blocks, each weighing between 5 and 8 tons, were used for facing purposes. These were obtained from the Gt.Orme and Penmon Quarries. (Baughan)

Masons Quarry [184], which is alongside the Marine drive, above the site of the old Gunnery School has a thin bed of rather poor sandstone running across its face. In the limestone there some shot holes which appear to have been charged with black powder. On the opposite side of the road an incline [183] runs down to Llys Helig drive suggesting that the quarry pre-dates the Marine drive. Could there be a link with the Bishop's Palace area, and the Gunnery School, or is this a thankfully abandoned attempt to extract limestone on a large scale?

On the top of the Gt. Orme are three quite large quarries:

Ffrith Ewigod Old Quarry [33], [Mountain pasture, or sheepwalk, of the Does]. Although being quite sizeable this is in rather a remote place and as yet no information regarding it has come to light.
Rofft Quarry [84]. The source of Craig Rofft sandstone. Here are extensive rather shallow workings that have been back-filled with spoil from the clearing of the Great Orme Mine site. Beware of being led astray by traces of copper ore and the occasional tiny flake of copper stained bone revealed by rain washing!
Bishop's Quarry [178] Property of the Bishop of Bangor, a very popular place for fossil hunting and recognition.
As with all sites it is important to remember that removing fossils and mineral specimens from faces where they are 'In Situ' can visually spoil the site and render it useless for future study and research. It is better to take photographs of in situ fossils and minerals and only collect from broken rock that has fallen from the face.

The Quarry Men

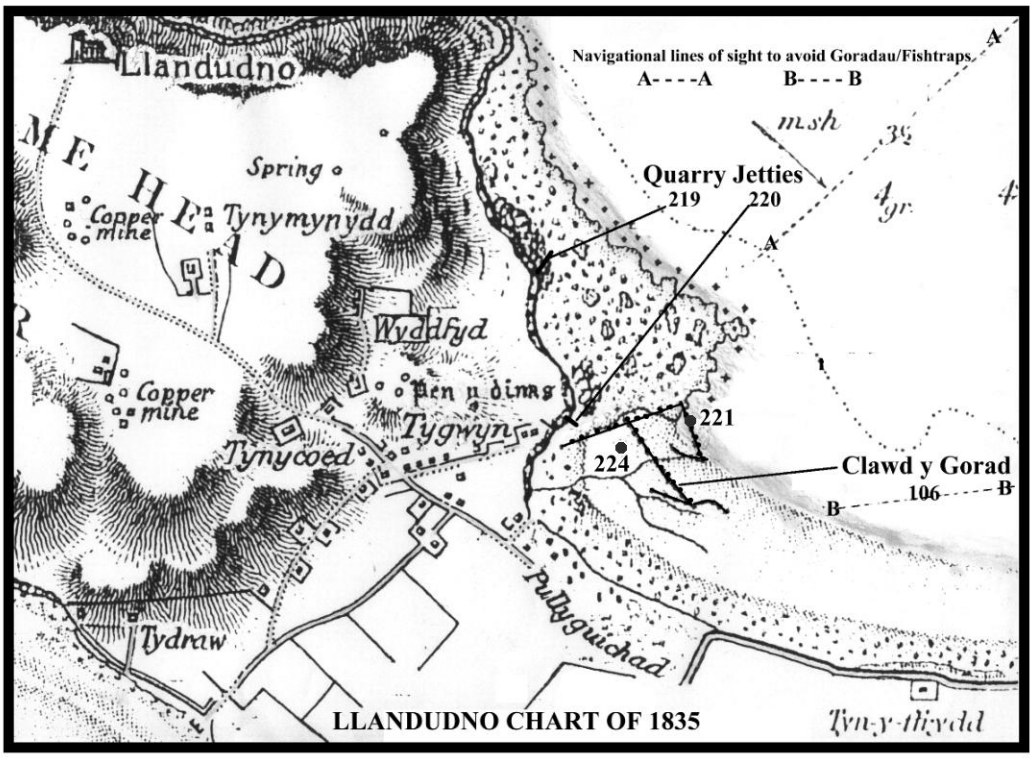
In the past quarry men were not the sort of people who were described at length but fortunately Thomas Rowlands recorded the following in his Memories of Llandudno:

'We meet a handsome man of normal height, with a happy smile on his lips. The way he extends his hand out indicates that it hurts him to do so, and we notice at once that he has been a martyr to rheumatism; and his voice is rather shaky as he greets us - that's Joseph Hughes - a man full of adventurous spirit. One of the first adventures we remember was the raising of the massive stones at Porth yr heli to build the strong towers of the Tubular Bridge at Conwy, and he had several men working for him. One of the men, Hugh Hughes [a mute] Dolfechan, [Now the Vicarage Tea Gardens] met with an accident that proved fatal but he only had himself to blame. There was another character among his workers - a fairly young man, full of poetic spirit, namely John Roberts, Cae'rfaban. One morning whilst travelling across Mynydd Isaf in the direction of the quarry, someone asked him where he was going so early, and in his ready style he answered at once...

Across the mountain and over the stones,
I am travelling to Porth yr Heli
To work very, very hard
For twelve hours for half a crown,
Half a crown is not enough
For lifting heavy stones for a man.

When land for building began to be sold Joseph Hughes bought a plot of land near to the entrance of the mine [The Ty Gwyn] - one of the most unlikely places to build at that time. The majority wanted to build in the Old Inn field or Church Walks - for views then were important; but by today we see that Joseph Hughes best understood the future, and he started to build Belmont House on the best site on North Parade. He was mocked a great deal then as were James Williams and David Lloyd when they were building the first two houses in St.George's Crescent which seemed like tall towers in the middle of the sand, but it did not take long to convince people that they were right.' (Rowlands 1892)

Joseph Hughes's son was to become Councilor Joseph Hughes of Craig y Don.



In closing this chapter reference must be made to the huge quarry that never came to be. In the 1850's the St.George's Harbour Company planned to build a huge breakwater across Llandudno Bay with stone quarried from the Gt.Orme in much the same way that a large portion of Holyhead Mountain was removed for the breakwater there. Such a feat of engineering would have destroyed a considerable portion of the headland and who is to say that after such a huge harbour had been built the rest of the Gt.Orme would not have been taken away by sea?

Large stone circle.

The Lletty ’r Filiast chamber. Di Bannerman ’98

STONE CIRCLES

EARTHWORKS, STANDING STONES & TOMBS

After a little study it soon becomes evident that to set foot anywhere on the Great Orme is to tread on the handiwork of others, yet paradoxically it can also feel very wild and untamed.

Much of the early work of man has been lost when land or stones were used for new purposes or when, for religious or other reasons, ancient sites were deliberately destroyed. Removing the gravel covering and stone work of barrows for road making and building materials has been documented in other areas such as at Cashtal Yn Ard chambered burial mound on the Isle of Man. (Megaw.1938). Around 1600 Sir John Wynne of Gwydir remarked on the removal of three standing stones above Penmaenmawr. *'These stones ... have been digged uppe by some idle headed youthes within this six yeares, and were rowled downe the hill,'* (Wynne. 1906 pp.26, 27). While this act is portrayed as youthful vandalism, Daniel Defoe was in no doubt as to the feelings of the people of North Wales, at the beginning of the 18th. Century, on the origin of standing stones: '*the people make no difficulty of saying that the devil set them up.'* (Defoe.1990.p.385) Little wonder then those ancient monuments have often been the targets of religious fanatics or honest god fearing men, depending on one's own point of view. The extent of destruction is difficult to assess, but in Defoe's time the amount of monuments in North Wales was apparently similar to the number found in Wiltshire. It also seems that many sites identified on the earliest Ordnance Survey maps of the area are no longer to be found.

However perhaps the most spectacular erasure of a site is the complete removal by quarrying of the summit of the mountain above Penmaenmawr along with the huge hillfort of Braich y Dinas which stood on it;

`...a strong and invincible fortiffication compassed with a treble walle and within every walle are to be seene the ffoundation of att leaste a hundred towres all round and of eaquall bigness....This castle when ytt stood was ynpregnable... the way or entrance unto ytt is ascendynge with many turnynges... so that a hundreth men may defend themselves in this castle agaynst a whole legion....and yett ytt would seeme that there weare lodgynges within these walles for twenty thousand men...the strongest, surest, and safest refuge ..in all Snowden;...a princlye and royall fortification, strengthened both by nature and workmanshippe..' (Wynne.1906 pp.22/23)

Considering the fact that the quarrying of this site seems to have been going on since at least five thousand years ago, when microdiorite was taken from here for stone axes, it is a moot point as to what is most important. Should it be considered an archaeological site, or a living, traditional, local industry, with a longer history than any other - perhaps in the whole world?

To unravel the many different phases of earthworks on the Gt. Orme will take a great deal of further study but in the past few years it has become evident that it could well be very rewarding. My work to date has been inspired by the thought that, given the existence of extensive Bronze Age mine workings, it is reasonable to suppose that there would be other sites close by, associated with the prehistoric miners. Although this sounds a bit too much like stating the obvious, when I produced my first paper on the search for smelting sites in 1992, little attention had been paid to the possibility that there were a lot of associated sites still to be found on the Great Orme outside of the prehistoric mine site. The Pen y Dinas Hillfort site [110], which is usually described as Iron Age, attracted some attention, as had the Hwylfa Ceirw stone enclosure and avenue. That there was the odd Neolithic cromlech and a few hut circles possibly of iron age date was well enough known, as were the large areas of probably medieval ridge and furrow, but in 1992 the close proximity of a large prehistoric mine to these sites was only just coming to general notice, and had not given rise to a re-appraisal of the headland.

In mining areas it is not unusual for different religions and cultures to exist side by side due to the interchange of mining expertise between different mineral fields. Mining communities such as those of the metalliferous mines of Derbyshire, were comprised of locals as well as miners from Cornwall, Wales, North Yorkshire and Germans who first introduced the use of explosives into the lead and copper mines. The 'Barmaster' who oversaw legal aspects of mining at the Barmote Court and had power above the coroner took his name from the German 'Bergmeister'. Also in Derbyshire, Cerberos the Phantom Dog which guarded the underworld was known as the 'Bar guest' from the German ghostly hound the 'Berg Geist' while on the Great Orme, it is perhaps no coincidence that the Cromlech near the main mine site is known as 'Yr Lletty Filliast' the 'Lair of the Greyhound Bitch' [215]. It is as well to keep in mind while

studying an area such as the Great Orme that different cultures could have lived side by side in prehistory, as they did in recent history, when miners from all over the British Isles worked the Gt. Orme copper veins together.

A survey of the Gt. Orme was begun with the permission of Tom Gravitt the Borough Council Countryside officer. Jo Jones, whose input has been vital, assisted Diane and myself in the survey. Many, usually pleasant hours, of field walking and the study of maps, aerial photographs and papers, bore fruit with the discovery of a large partially robbed out Large Stone Circle [1]. Some of the stones that formed it had been noticed by others but had been dismissed as of no importance, or as a field boundary.

Stone Circles

Before the identification of the Large Stone Circle, [1] for which a provisional date of 2000 BC has been ascribed, no stone or other circles had been recognised on the Gt.Orme. In the surrounding area there are quite a number.

At Llandegai traces of two monuments of similar size were recognised from aerial photographs taken in 1959 and were dated to 2000 BC, (Crew & Musson1996)

The following is my note written on the identification of the Gt.Orme Circle;

'A curved line of stones had been noted in 1995-6 after a gorse fire. Others too, had remarked on the feature, but it had been dismissed as a field bank. During the 1996-7 Autumn and Winter a program of field walking, coupled with very careful examination of maps and aerial photographs was followed specifically to locate unrecorded sites. After inspecting the site, and an aerial photograph taken by Coastal Command on 20th. January 1947, it was realised that the curved feature was a segment of a large circle, 70m in diameter, which had been partially robbed of its stone. This possibly occurred when the 'Park Wall' was built in the 1890's. The surviving segment was perhaps, at that time, hidden by gorse. Visible on the same photograph but at the present time covered in gorse, tangential to the circle and almost parallel to the Park Wall is what seems to be an avenue running southwards for 60m. Slightly to the East and within the Park Wall another smaller circle appears as a crop mark on the aerial photographs'. Nigel Bannerman 30:12:97.'

Jo Jones while conducting a geophysical survey in the Cromlech Field [215] found traces of a circular Henge monument around the central mound.

Cross Ridge Boundaries

There are indeed many field boundaries on the Gt. Orme that are thought to be medieval but unfortunately it has become the rule to dismiss every ridge as such. It was therefore important to try to identify features similar to ones that had been reported and researched in other areas and were recognised as being typical of a certain period. Research shows that 'Billy's Wall' [86], which is a line of stones in an earth bank across the limestone ridge to the North of the artificial ski slope, fits the description of earthworks known as 'Cross Ridge Boundaries' which are found in the Cleveland Hills.

'On the North Yorkshire Moors, in Northeast England, is a series of linear boundaries that are characteristically placed across upland spurs and promontories. Survey and excavation suggests that these boundaries operated in conjunction with natural features to define areas of the prehistoric landscape which may have been concerned with ritual during the final Neolithic and Early Bronze Age.' (Vyner.1994)

Vyner's paper describes a number of these features in some detail and also remarks that they are sometimes associated with the Early Bronze Age cairn or burial mound. The top of the ridge some 70m. N.N.E. of Billy's Wall [82] is called Pen y Bwlch and a cromlech or dolmen is supposed to have been sited in the area but was destroyed possibly in the 19th century.

This discovery prompted the inspection of the area around what is believed to be a Bronze Age cairn [186] that occupies the high point at the western end of the Gt. Orme. The public footpath which runs downhill towards the south east following the Parc Wall, is actually following the top of a ridge, but the fall of the ground to the north is obscured from view by the height of the wall. 125m. down the ridge from the cairn a low 0.6m. earth embankment crosses the ridge from a small escarpment on the south side to a similar one on the north side with three shallow angles in its length of 40m.[187] It has been recently cut through at one point presumably to allow the smooth passage of motor vehicles. There are no stones apparent in the construction of this embankment. This could be due to them having been robbed to build the Parc Wall or it could also be that, as sometimes is the case, rocks were never incorporated in this particular cross ridge boundary if that is what it is.

At a similar distance, of 120m, and in the opposite direction from the Bronze Age cairn [186] another low embankment [6] can be seen running in a North Easterly direction across what is at that point a very broad ridge. This feature, first identified by Jo Jones during a field walk, could also be a cross ridge boundary and is possibly also associated with the cairn. The configuration of two cross ridge boundaries with a cairn between fits in with patterns in North Yorkshire. Other possible ridges have been seen on the Gt. Orme but as they do not exactly follow the criteria for Cross Ridge Boundaries they have been omitted from this section.

Embankments.

Many small embankments can be seen criss-crossing the Gt. Orme. Some are the result of 'Ridge and Furrow' cultivation, which has been employed for millennia and would no doubt take a similar period to comprehensively research and describe. In some places aerial photographs reveal one set of ridge and furrow overlaying another.

Other larger embankments are field boundaries while still others such as the embankment [60] below the Bus turning point by St.Tudno's church have the appearance of being part of a defensive structure. The embankments of Pen Dinas hill fort are of course defensive; however there are other large embankments that deserve attention.

Large embankments

From the West wall of St. Tudno's Cemetery three long parallel embankments [57] can be seen running in a North Westerly direction for about 130m. Visible on 1947 Coastal Command aerial photographs but since almost completely destroyed by a southern extension of the Cemetery are two more some 200m. long, with what appears to be 50m. of a third embankment partially destroyed.[61] These embankments all curve slightly to either side of a straight line and are narrow at either end becoming broader and higher towards the middle. Along the Southern fence and by the South East corner of the cemetery it is possible to examine cross sections of the surviving ends of these ridges which appear to be composed of earth with the odd stone. In the past these ridges have been described as 'trackways', field boundaries or agricultural ridges, but their large triple tapering configuration does not seem to fit too well with any of these descriptions.

Stone Avenues

Hwylfa'r Ceirw [47] is comprised of two almost parallel rows of stones running about 30 degrees East for some 150m.from a stone enclosure to the top of the cliffs on the Northern side of the Great Orme. As far as is known it has never been scientifically dated. Although it is similar to Neolithic structures elsewhere, some suggest it is but a cart track, completely ignoring the fact that at its Southern end it is far to steep for any horse drawn cart. At the Northern end is a sheer cliff or a precipitous gully, leading down to the sea 200m below. Over the years the site has attracted much attention but has not as yet been excavated. Its name translates as the 'Watching Place of The Deer' which has led some to conjecture that it was part of a deer farm belonging to one Madoc who had an abode at the nearby well Fynnon Rufeinig [53]. The name could also be derived from old religious ceremonies with men dressed as deer. The cliffs below the North end are known as Cilfin Carw - the deer leap? To the west the area at the top of the cliffs between Hafnant Gully and the Lighthouse [20] is known as Ffrith Ewigod - the mountain pasture or sheep walk of the does.

What may well be another Stone Avenue [64] was identified during the survey that appears to lead in a Southerly direction from the South fence of St. Tudno's Cemetery towards the Summit. This may also be the route of a road marked on the 1835 chart.

It would be most useful to check the alignments of these stone avenues and large embankments against past star or constellation positions.

An Ordnance Survey type map of around 1820 AD shows a feature described as; '*An Ancient paved way thought to have gone over lands now submerged'.* This feature approximately follows the line of Gloddaeth Avenue and is situated at about its mid point. This must have been quite a substantial feature and as it had a similar alignment to the Hwylfa Ceirw stone avenue it might be that it was a prehistoric structure associated with the Madoc St. Barrow. It has been observed that about the winter solstice, looking along Gloddaeth Avenue, the sun sets on the top of Penmaenmawr Mountain where the fortress of Braich Dinas once stood, while in the opposite direction the full moon is rising over the sea. Precise observations have not yet been made.

Standing Stones

Standing stone or Orthostat [30] This is one of many large stones on the North Western corner of the Great Orme that appear to have been placed upright or on edge. They have been dismissed by some as 'Glacial Erratics' which of course they are not, as they are all carboniferous limestone of which the Great Orme is composed. A glacial erratic is a rock carried away from its place of origin by a glacier. To date no erratic [e.g. granite] larger than 0.5mx0.3mx0.3m has been observed on the Great Orme while on other low hills in the vicinity larger boulders can be seen such as at Pydyw where there is a granite erratic just below the summit which measures some 2mx2mx1.5m. Perhaps during the last glacial period the lower ice, which carried the larger erratics, flowed around the Great Orme while the upper layers, which overrode it depositing small erratics, plucked larger blocks of limestone from the cliffs to drop them just inland. It is felt that this however does not fully account for the `standing stones' as some are relatively thin and the question must be asked could they have survived the, at least, 15,000yrs. that has elapsed since the last glaciation. Limestone is very susceptible to frost wedge action, and other weather induced, erosion. It is more likely that this area of boulders has been modified in the distant past for religious or other purpose, and has suffered the effects of more recent religion inspired vandalism. It remains an area which should receive close attention, Jo Jones identified a boundary feature here running from SH 7583 8405 to SH 7587 8421.

Barrows and Megalithic Tombs

The Lletty 'r Filiast chamber with its associated mound is quite well known and the traces of surrounding ditch and Henge feature discovered by Jo Jones in a geophysical survey further enhance the importance of this site. The tomb has been described as belonging to the Irish Sea Group 'A' Dolmen.

A probable Neolithic / Bronze age Barrow [23] near to Fynnon Caseg [16] was destroyed during the construction of the Marine Drive, It was described as, *`A round stony cairn ... Near the Centre of the mound was a shallow hollow in the ground containing fine dark ashes.'* (Proc. L.C.B.F.C.1910)

Two further Cromlechs or Dolmens are traditionally supposed to have existed on the Orme until the 19th century. One was in the Pen y Bwlch area [87 - 93] which could have been associated with the Cross Ridge Boundary [86] while another, which was situated somewhere in the Parc close to the Summit, was supposedly taken to adorn the Maze at Gloddaeth Hall.
Above the Lighthouse, stone lines [28] were recognised during the 1996/97 field walking when the following note was made,

In plan two trapezoidal features of stones set in the ground similar to structures found in Europe belonging to the Neolithic Lengyal culture. They could also resemble Viking settlement remains such as are seen in other coastal areas of the Irish Sea. The larger of the two structures appears to have been subdivided towards the narrow end with remnants of an internal wall still visible. The main Walls are now largely covered with gorse and heather. The extant stones are only one course high. The smaller structure is overlain in part by the foundations of a World War Two Nissan hut with associated generator hut base. [29] Jo Jones / D & N Bannerman.
Further research shows that the larger of the two structures is very similar to trapezoidal components of Welsh, Manx and other Neolithic structures in which similar converging lines of stone with a line of burial chambers between form part of trapezoidal barrows. (Megaw.1938)

The Madoc St. Barrow. A large oval Barrow known as 'Y Gorseddau' occupied a field in what today is the middle portion of Madoc St. It was leveled by Mr. Peter Jones the tenant of Pwl y gwichiad Farm early in the 19th Century. During this work he discovered several urns containing what he believed to be cremated human remains.

Thomas Kendrick may possibly have discovered a cremation with Roman coin grave goods.

See 'Kendrick's Cave' chapter

Cave Burials

Fragments of human bone found at the Great Orme Mine site could be the result of an accident. Considering the extent and complexity of the prehistoric workings it seems odd that more human bones have not been found.

The Burials in Kendrick's Cave [114] dated to 14,000 BP, 12,000 BP and 5,000 BP are more fully dealt with under that heading. These are the only dated cave burials on the Gt. Orme to date. Human remains have been found in four other caves or limestone fissures in the area;

Corkscrew Cave [141]. Here in a very restricted passage Geof David discovered fragments of human bone that could have been from a very early burial. He has commented that the east entrance could well have been partially 'dug' at some time in the past, possibly by Victorian artefact hunters.

The Lady of the Little Orme. Human and animal remains were found in a rock fissure during quarrying operations on the Little Orme some time before 17.8.1896. The human remains have been recently researched and are believed to be those of a woman, who died between the ages of 54, and 63 years, around 5,500 BP. (Kenneth Dibble.1997)

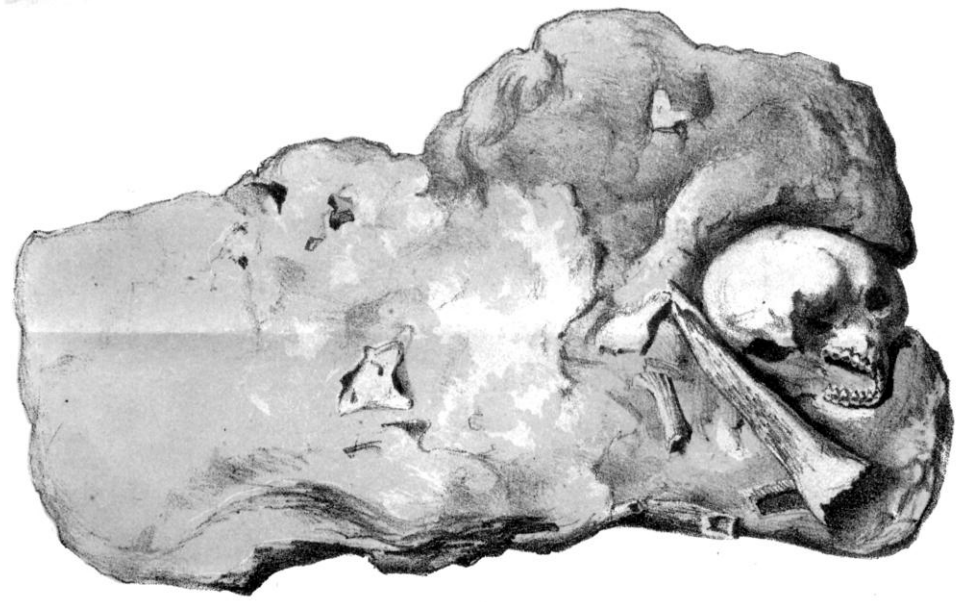
It is not clear whether this was a burial, or the site of an accident. However this find along with the subsequent research has given a useful insight into the Neolithic, for though from various indications she would seem to have had a hard working life, she lived to a respectable age, perhaps eventually dying from cancer.

Ogof Pant-y-Wennol. Excavated by Mel Davies and Tom Stone. Finds in this cave seem to cover a wide period of time but the inhumations, in the opinion of Mel Davies were late Neolithic or Bronze Age. Others including Tom Stone, have suggested they may possibly be Mesolithic. (Tom Stone.1994)

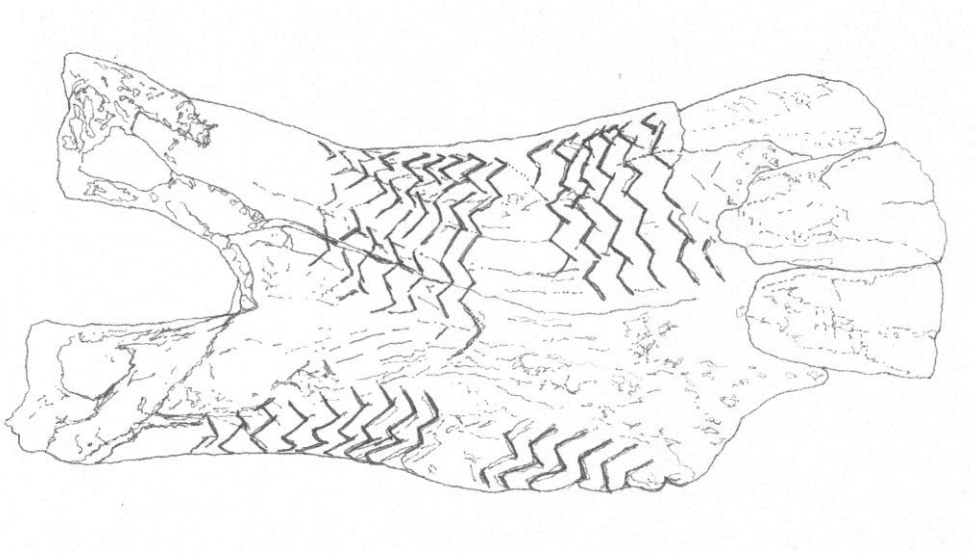
Skeleton's Cave [166] where human bones were found embedded in stalagmite; these were displayed in a cottage for the curiosity of tourists in the 19th century and are now thought to be in the National Museum at Cardiff.

The cave burials listed above give some idea of the range of dates to be expected in any new dig in the area, or indeed in the reappraisal of any previous excavation. There is the possibility that sealed beneath glacial till, there could be far older remains, such as those from 230,000 years ago in the nearby Pont Newydd cave. This is a factor that should be taken into account in excavations. Glacial till should not be considered the sterile baseline, but rather as an intermediate horizon, below which material of the greatest importance could lie.

Skeleton's Cave.
Picture courtesy of Ron Williams



Kendrick's Cave
Decorated horse's jaw bone.



KENDRICK'S CAVE

.

Two gateposts on Hill Terrace

This artist's impression shows the view across what is now Llandudno Bay, looking towards the Little Orme. 14000 years ago the sea level here was over 100 feet lower than it is today

Kendrick's Cave is recognised as a site of international importance, a decorated horse mandible from the Upper Palaeolithic being found there, along with other bones and artefacts, which show a history of human usage of at least 14,000 years. Its last official occupant was Thomas Kendrick who with considerable labour fitted out the upper part of the cave as a home and the lower part as a workshop and tourist attraction. While engaged in this work, he came across various bones that were apparently dumped outside his workshop with rubble from the cave. These bones were noticed by a visitor from Bangor who had medical and archaeological knowledge; he asked Kendrick if he knew what they were, and when Kendrick answered 'No', he explained that they were very old and that some of the bones were human. The bones were later examined by Professor Boyd Dawkins, who confirmed the identification.

Thomas Kendrick, the eldest of five children, was born in the Parish of Llandudno and christened in Ebenezer Calvanistic Methodist Chapel on the 2nd. December 1821 as Thomas Cynric a surname he shared with two brothers, William and Joseph who died in infancy. Their younger brother, John, and sister Anne were christened with the anglicised version of Cynric - Kendrick. The family lived in a cottage at Pant-y-Wennol in Craigside, close to another important cave site, Ogof Pant-y-Wennol. At some later stage they moved to Bryn-y-Bia Farm where the father, William, died aged 42 on the 1st of May 1835. Thomas the eldest was in his 14th year and he with his mother and the rest of the family was sent to his father's birthplace, Ysceifod, in Flintshire. There, under the provisions of the poor law, they were entitled to a settlement. The expense of the move, being thirty shillings, was borne by the Parish of Llandudno.

Before Thomas was 21 he was back in Llandudno where he and his brother William were working as copper miners. They were, no doubt, supporting their mother and the rest of the family, who in 1841 were all living at no.4 Tan-yr-Ogof ['Below the Cave'] Terrace, which is directly below Kendrick's Cave. When his mother, Anne, died on the 5th.of January 1860 aged 72, Thomas, by then 39, was still a bachelor and after her death he lived alone at Tan-yr-Ogof, the rest of the family having left home.

Llandudno was changing very rapidly, the copper mines closing as the foundations of the Victorian seaside town were being laid. Thomas, who it appears, had stepped into his father's shoes, provided for the family and looked after his mother until her death, obviously decided he was going to become part of the new tourist industry.

' *After working as a miner for a considerable period the 1871 census records him as having become a Lapidary cutting and polishing stones'* [E.Parry.1996.]

Kendrick knew exactly what he was doing. His lapidary workshop, with the adjoining Grotto he created by excavating in the lower cave, was in the best Victorian tradition. Tourists, then as now, wanted to be entertained and informed. They wanted to go away with souvenirs of scientific, as well as aesthetic interest, and also to be able to regale friends at home with their accounts of the Stone Age burial site that had been discovered. Kendrick responded to demand by cutting and polishing local beach stones and showing visitors the prehistoric site along with bones found there. He would, no doubt, also tell tourists that the famous Palaeontologist Professor Boyd Dawkins had declared that this was a most important site, and generally play the showman. In no way is this an attempt to belittle him, it is quite the contrary. He realised that he had a site with potential and took advantage of it. As a miner who was familiar with the belief that the mines had been worked before Roman times, he would have suspected that the remains he was finding were old. By casually leaving large bones, which he had most probably found in the upper cave, near the entrance of his workshop, which was in the lower cave, he made sure that they came to the notice of visiting 'Gentleman Antiquarians.' They displayed their knowledge of the past to the taciturn rustic portrayal of himself that he presented to them. For Kendrick knew that as a simple miner his opinions were of little consequence and would never 'pull in the visitors'. But once a leading antiquarian had pronounced his cave an Ancient Burial Site he could start collecting the entrance fees. Thus the value of the site and of the finds was first recognised. Without Kendrick's foresight the cave could well have been quarried away for materials to build the new hotels.

In cross section the cave is rather like an hourglass in which all the sand has run into the bottom half and has formed a peak, which reaches up to and has blocked the narrow waist. While Tom Stone and Mel Davies were excavating in the upper cave they found the way down into the lower cave, Mel went down but was unable to get back up. Having no permission to enter the lower cave he had to leave very discretely past the owner, Miss Humphreys, who was taking a nap in a deck chair by the lower entrance. The connection is now permanently sealed. There are two entrances into the upper part where Kendrick made his home and one into the bottom chamber which was both his workshop and show cave. Outside the top entrances is a broad artificial ledge where the descendants of his herb garden still grow. This ledge is skirted with a parapet wall. Beneath it is a sheer cliff down to the bottom entrance. Kendrick must have spent considerable time levelling the floor in the upper chamber and building various partition walls, some of which can still be seen. It was this floor of disturbed material which was most carefully excavated by Tom Stone, who, after finding small human and other bones, small pieces of Neolithic pottery etc. formed the following opinion '*that the larger bones had been removed during Kendrick's modifications to the upper cave and placed outside the lower entrance'.* [Stone.1994]

Why should this have been done? Kendrick obviously wanted the upper cave as a private residence for himself; furthermore access to the bottom cave was easier for the tourists where Kendrick also had his Lapidary's workshop. The following extract summarises the work and contemporary opinions in 1885, but while it does not make clear whether the finds were made in the upper or lower part of the cave, it makes clear in the last sentence that there were questions being asked:

'A cave in the south escarpment of the Great Orme's Head has been in the gradual process of exploration by a person named Kendrick. In its silt and breccia he has discovered fragments of Human skeletons, indicating by their dimensions that the individuals to whom they belonged were about 5 feet 6 inches in height. Some of their tibias are to be seen embedded in situ. There has also been found a considerable quantity of swine's teeth, each marked on the fang with from four to six transverse lines, and perforated at the extremity with a hole, through which ran probably a tendon of a reindeer or some other ligament, stringing them together as a necklace. From the same cave deposit there have been extracted several bears' teeth with a hole in each of them for their suspension as earrings; and two lower equine jaws with the enamel of the four incisors highly polished, and with zigzag marks on the surface of the maxillary bone. These were probably also hung from the necks of cavemen as ornaments. The whole cavern, or a portion of it, has been considered to have formed a burial-place for some Iberian tribe; but the careless and irreverent manner in which the dead in it appear to have been disposed of seems to indicate that it might have been the habitation of a race of cave men akin to the Eskimos, whom Professor Boyd Dawkins, in his Early Men in Britain, describes as so indifferent to the sepulchre of deceased relatives, that they sometimes cover their bodies with snow, and leave them to be eaten by dogs or foxes. The cave, which contains a natural reservoir of water, has only been partially excavated, and further researches seem most desirable, as they may lead to the finding of very important relics of its original inhabitants, as well as settle any doubts which may have arisen as to the accuracy of the present explorer's statement, on which the truth of the discovery of the above mentioned remains in that particular cave rests'. (Ingram.1885)

On first examining the lower cave I recognised the hand of a miner in the way that retaining walls had been constructed without mortar; most striking was how certain parts of the work were contrived for effect rather than practicality. In short, Kendrick had cleared out the lower cave as an attraction. It is possible that this work was never completed, for as Diane Campbell Bannerman pointed out at the time, the tunnel follows the wall of the chamber around the central heap of rubble, almost circumnavigating the lower chamber, which would, if completed, have made a nice little round trip for tourists.

That Kendrick was ‘manipulating’ the site seems almost certain which raises the question, did all the bones originate from the upper cave or did some of them come from another site entirely? Kendrick was after all previously employed in the copper mines, the upper workings of which contain many pieces of bone that the Victorian miners believed originated from Roman times or earlier. Although these are almost always stained green with copper compounds, when they are exposed to the weather on spoil tips they appear to bleach. Growing up in Llandudno, young Thomas Kendrick almost certainly knew of Ogof Pant-y-Wennol and other caves such as Badger’s Cave where Tom Stone has found artefacts. (Stone.1994) He must also have known of Skeletons Cave where a skeleton embedded in a slab of stalagmite was found. This was exhibited locally in the 19th. Century and is now possibly in the national museum at Cardiff. Did he embellish his ‘tourist attraction’ with artefacts from elsewhere? It is a distinct possibility, but it is most likely that if he did, he obtained them from the immediate area which should inspire the search for other possible sites rather than any censure of Kendrick.

While Geof David was excavating Corkscrew Cave (141) he observed that, especially at the east entrance, there were signs that it had been previously ‘dug’ - perhaps by Victorian artefact hunters and perhaps even by Kendrick himself. [David 1999 pers. comm.]

Without diaries or other records it is difficult to positively link Thomas Kendrick with other sites on the Orme but a clue which could link him with Badger’s Cave was found by Jo Jones during our work there. Among the many names recorded in candle smoke on the passage roof, Jo spotted that of W.Gowland with the date 1888. This is most interesting, for a W.Gowland F.S.A. F.C.S., read an important paper to the Royal School of Mines on the 18th of May 1899 entitled; ‘The Early Metallurgy of Copper, Tin and Iron in Europe, as illustrated by Early Remains and the Primitive Processes surviving in Japan’. If this is the same W.Gowland how did he come to visit a remote mine on the Orme in 1888 twenty or more years after mining had ceased in the area? It is distinctly possible that Thomas Kendrick was involved, as at that time he was running his prehistoric show cave and lapidary’s workshop and as such would be the local to talk to about old mines.

Did Kendrick show Badgers Cave to Gowland? There is a very telling paragraph in his paper where he discusses firesetting:
‘Primitive man had evidently observed that stones are splintered by fire, and had applied that knowledge to assist him in his mining operations. This is indisputably proved by the remains of charred wood and charcoal which have been found piled up at the end of his burrows in North Wales, Cardiganshire and the Mitterburg in Austria.’ (Gowland. 1899)

Peter Challis has made an interesting comment.
‘With reference to the visit of ‘W.Gowland, to Badger’s Cave in 1888, and the question you pose as to how, if it was W.Gowland F.S.A. who visited the cave, he came to visit it. I wonder if, given that a paper was read to the Royal school of Mines by him that he could have known or have been alerted to the subject by Sir Clement Le Neve Foster. As you are no doubt aware Le Neve Foster was the Government inspector of Metalliferous Mines for Wales and the I.O.M, et al. He and his family resided at ‘Min y Don’ , North Parade, Llandudno. He became Professor of Mining at the Royal School of Mines in 1890, having been one of its first and star pupils’.[Challis.2000]

By 1888 he was also involved with the Camera Obscura as is made clear in this extract from Archaeologia Cambrensis for that year;

‘Discovery of Roman Coins at Llandudno. In April last Mr.Thomas Kendrick, who keeps the Camera Obscura in the Tygwyn Road, at Llandudno, while engaged on an alteration of the roadway, came upon what he believes to have been an ancient fireplace, near which, embedded in the clay, were seventeen Roman coins with one piece of pottery. The coins were forwarded by Dr.H.Thomas, of Llandudno, to the British Museum to be catalogued by Mr. Barclay V. Head, Assistant Keeper of Coins, who has published a list of them in the Numismatic Chronicle, vol.viii, Ser.3, p, 163. It appears from this list that the coins are of the following Roman emperors:-one of Galienus, A.D. 253-267; two of Victorinus, A.D.265-267; thirteen of Carausius, A.D.287-293. In Mr.T.Kendrick's grounds, near the Camera Obscura, is a bone cave,in which a necklace of bears' teeth and human remains have been discovered.’ (Jones. 1885) (Was this a cremation burial with grave goods? N.V.C.B.)

A few examples of Kendrick’s lapidary work still remain; two gateposts on Hill Terrace, capped with elongated pyramids of coloured beach pebbles are believed to be Kendrick’s works; perhaps there are more.

Obviously Kendrick at 67 was still very active and on the lookout for artefacts and archaeological sites and even though he was now referred to as Mr.Kendrick and owned land, his finds had still to be submitted to the British Museum by a local Professional.

Thomas Kendrick was born of a poor family, but when he died of bronchial pneumonia aged 76 on December the 26th 1897; he left an estate of £436-10 pence, worth today perhaps £120,000, to his sister Anne. He seems to have been a person who took his responsibilities seriously, worked hard and imaginatively, and had a greatness of heart. He lies buried near the south east corner of St.Tudno's church on the Great Orme.

On his carved white marble tombstone, which is also a touching memorial to his father and mother, are the following words, perhaps penned by him, thanking his friends and comforting them:

'To me you all were kind and true,
While here on earth I was with you.
Then do not mourn, you did your best
You kindly loved me to the last.'

There are still those in Llandudno who bear his name of which they are rightly proud.

Fortunately Kendrick's cave passed into the ownership of Mr. Humphreys, a true Victorian who believed in preserving what was good and building a new world for mankind. He was a keen archaeologist and a prominent member of the Llandudno and Colwyn Bay Field Club. The cave is still in the ownership of his family who, in the 1970/80's, permitted Tom Stone and Mell Davies to dig in what was the disturbed material in the upper cave. During this work Tom became convinced that the finds made by Kendrick had originated in the Upper Cave for as he put it to me:

'The bones supposedly from the bottom cave were all big ones, while I was digging in the rubble Kendrick had left in the top cave. I found all the small ones!'

Objects with similar decoration to the zigzag lines on the horse's jawbone have been found in Britain and France. This artefact alone, makes Kendrick's Cave a site of International importance. C.14 dating by the British Museum has shown that the Kendrick's cave artefacts include a human burial at 14,000 years BP, the decorated horse mandible at 12,000 years BP and a further human burial at 5,000 years BP (Cook & Jacobi.1997)

Kendrick's cave is an internationally important cave and is protected by law. It is also on private land. Please respect its status and the owners who have protected it.

WATER POWER AND WATER PROBLEMS ON THE GREAT ORME

TOM AND JERRY

It seems rather odd that the occupants of an area without any rivers or even streams should have been able to use waterpower, but on the Great Orme waterpower was exploited in several most ingenious ways. The scarcity of surface water is due to the many fissures and joints in the layers of limestone which channel any rain underground where it is then trapped in places by horizontal layers of impervious shale. The fissures and joints fill up with water to form 'Water Tables' above the shale beds. Where the shale beds outcrop on the rocky slopes the water appears as springs, but, as soon as it has trickled down past the level of the shale bed, it disappears once more into the fissures of the next bed of limestone below.

These water tables presented great difficulties for the miners and appear to have stopped those in the Bronze Age from going any deeper than about 70m below the present ground level at the Great Orme Tourist Mine site. The obvious solution was to drive long tunnels into the mineral veins from just above sea level to drain this underground water. It is just possible that this was attempted in prehistoric or Romano - British times but there is no hard evidence for it as yet. [See Roman Mining]

In 1748 Lewis Morris commented:

'There was formerly a great Copper Mine at Llandudno, - - - which now lies under water; but it might without much Difficulty be recovered, by proper engines: until a great Level can be brought up, for which the Place is well situated. Mine Works, lying thus on the Seaside, are, upon many Accounts, much preferable to those in the Inland Parts'. (Budenburg.1987)

Lewis Morris's suggestion for a 'Great Level' was not taken up for 86 years as it involved driving almost a kilometre of passage through mainly hard limestone to create the Penmorfa drainage adit begun in 1834 and completed by 1842 [146].

Morris's 1748 chart of Conwy Bay places the Great Orme copper mines in the area of the Ty Gwyn shaft [121]. He would doubtless have known that mines in the Pyllau area were suffering badly from water problems and perhaps, at the time of his survey, mining was taking place in the Ty Gwyn area. There are no known records for 18th century mining there, but it must be remembered that this is not unusual, for there are no known records of mining at all in the Hafnant area, where there was considerable activity. [37-39-44-45-49-51etc.]

Running southwards from the Ty Gwyn Shaft [121], at just above the level to which it is flooded, and 3m below the large 1846 [?] Ty Gwyn Adit [119], is a smaller level that could have been an early drainage level surfacing near to the Cottage Loaf public house near to where there was a Farm house called Tynpwll [The House by the pool]. In 1843 *'a line of shafts and levels by the shortest route' (*Williams.1995.p.28) was constructed to supply water from Tynpwll to the steam engine at the second Ty Gwyn pumping shaft to the west of the Empire Hotel which was most likely the Victoria Shaft. [125]

At this point it would be 2-3m below the high water mark of Spring Tides, and storm surges, from which it would be protected by the long natural ridge of sand and shingle which supports the promenade and gives it its beautiful curve. Copper deposits around the Ty Gwyn seem to have been below sea level and the older smaller passages in the vicinity which are driven in the softer indurated scree/till rather than the harder limestone appear to form access ways to different parts of the ore body.

Some time around 1827 a system of pumping water from the main mine workings was devised, which was powered by the flow of water from Gogarth springs, some 1,000m to the east. The pumps underground in the mines were connected to a system of rods which went up Vivian's Shaft [211] to the surface, and continued above ground on top of a series of supports which were free to rock backwards and forwards. The rods and supports went across the top of the Orme, to just below Gogarth Spring [176]. Here they were connected to a large tank, mounted within a pivoted framework, in such a way, that when the tank was filled with water, it would topple over, pulling on the rods and activating the pumps in the mine. The pivoted framework and tank having spilled out the weight of spring water as it toppled over, would then be pulled back into the upright position, by the weight of rods hanging in the mineshaft. The tank was then was ready to be filled once more for the next 'power stroke'. This type of framework was generally known in mining areas as a 'Flop Jack Engine' and the system of rods were called 'Brammock Rods'.

On the Orme they were better known as the 'Tom and Jerry', after a pair of riotous men about town, in Pierce Egans 1821 'Life In London'. Mr. Thomas Jones the Agent of the New Mine [212] from 1827 is credited with the installation of this machinery. The flow of water from Gogarth Springs is not very large, and this was possibly the reason that the Flop Jack Engine, having been found unsatisfactory, was replaced in 1846 by a water pressure engine. (Williams.1995 p.34).

A Flop Jack engine relies upon the weight a large volume of water for its power, whereas a Water Pressure engine is powered by water under pressure, acting against a piston, in a manner very similar to a steam engine.

Water pressure, or hydraulic engines, are arguably the earliest form of engine which harnessed high pressure and the technology developed with them was later taken up by steam engines, which are mistakenly portrayed as the first `real' engines. They are thought to have originated in the mines of the Oberhartz of Germany in the early 1700's. The first reliable reports are of three, which worked together in the gold and silver mines of Schemnitz and Kremnitz in Hungary in 1749. Designed by M.Holl, Chief Engineer of the Imperial Mines they were operated by water piped down from a mountainside reservoir at over 120lbs.per square inch. Heavy rods connected the water engines to a three-stage system of pumps that raised over three-quarters of a million gallons of water, every twenty-four hours, from 600 feet below ground. [McNeil.1972 p.11]

The Great Orme flop jack engine was probably sited close to the Gogarth Spring where there are the remains of a small reservoir [175]. The water pressure engine would have to have been located lower down to allow a head of water to be created. If as suspected it was sited directly below Gogarth Spring close to Marine Drive in the Tom and Jerry Cottage / Hydraulic Engine House [173] the height difference of 70m would give a water pressure of 100lbs per square inch. A typical water engine of the period would have had a 0.63m diameter piston with a 3m stroke, which, working with 1 tonne of water at such a pressure, could pull the rods with a force of almost 20 tonnes. A flop jack engine would only produce a pull of 1 tonne.

Such a water engine would have been quite a large affair, over 6m high with the piston rod fully out and would have required quite a substantial house or very likely a pit dug into the ground to enable it to be firmly supported laterally. The author and Dr David Gwyn of Gwynedd Archaeological Trust inspected what could be the remains of such an installation where the Tom and Jerry Engine House is supposed to have stood. [173]

From the West End of the Brammock rod system there is a row of pits in which the supports of the Brammock rods were pivoted. It is possible that near to Bishop's Quarry [143] there was an 'Angle Bob' [179], to enable the rods to

change direction. To the east of this the rods passed through a small cutting [201] as they went downhill by way of more pits to their eastern end at Vivian's Shaft [211]. Later the Brammock rods may have been diverted to a higher shaft or to the Old Mine steam engine to supplement its power.

In 1848 it was proposed that a water pressure engine should be installed to pump water from 195 feet below the Pen Morfa adit, 175 feet below sea level but it is not known whether it was ever installed. (Williams.1995 p.34)
Water was collected from the Old Mine and ran down a culvert on the line of the Tram tracks to a reservoir known as 'Llyn Mawr', the 'Great Lake', behind where the Empire Hotel now stands. This clean water was used for the steam engine that pumped water from the Ty Gwyn shaft. This being polluted with mud, copper compounds, and sea salt, was unsuitable for steam production, so it was used to power a 15 foot diameter waterwheel on the site of the Min-y-don Hotel. The water wheel drove an ore crusher after which the water, quite dizzy from its adventures since landing as rain on the top of the Headland, was allowed to run into the sea.

Apart from the sites that were occupied by these various forms of water power, nothing remains of the Flop Jacks, Angle Bobs, Water Wheels or Water Pressure Engines except bits of the odd bearing in a Brammock Rod Pit. This to the Author who takes delight in old machinery was a great disappointment until a good friend, Keith Roberts, told him of a Watkins and Watson water pressure engine that powered the organ bellows in Ebenezer Chapel, Lloyd Street. It had been removed when an electric blower was fitted, but two years later after many false hopes it was run to ground and bought at the scrap price of bronze. Little restoration and polishing were necessary and it is now exhibited at rallies where it is much admired as a rare and fine example of its kind. Research has led to the belief that this Llandudno water engine was constructed in Islington, London, around 1898. [Elvin.1960]

ROMAN MINING ON THE GREAT ORME

Before looking at mining it is perhaps as well to mention other indications of Roman activity on and around the Great Orme. On the Lewis Morris charts of Conwy Bay the words 'Caer Gonwy' - Conwy Fort - appear on the sandbanks exposed at low water, but no location point is identified, (Budenberg 1987). There is a distinct large oval patch of rocks at SH 7415 7990, which was thought by the author to be Caer Gonwy, it was visited in 1995 during an expedition to Llys Helig. During this visit Terry Williams made the comment; *'It is very odd that such a distinct group of rocks should not have a definite name.'* This neatly expressed the feelings of all present. In 1996 the site was photographed from the air and what appeared to be part of a circle of stones was noted but as at that time it was thought that the area was badly eroded the site was not revisited. Field work and aerial photographs in 1997 suggested that there had been a rise in relative sea level and that Caer Gonwy was possibly an inundated site which increased interest in it, and its possibilities for 'on site' research.
There was however no corroborative evidence to support the name of the patch of rocks as being Caer Gonwy until after a lecture on this research when respected local historian Mr. John Evans recounted being taken to Caer Gonwy in the 1930's by his father in a mussel boat. His father told him it was an excellent place for mussels, very large ones being found there, due to it only being accessible at the lowest tides, which prevented overfishing. He identified what he described as '*The large circular patch of rocks which just showed at low water'* as being the same one shown on slides during the lecture and also confirmed that the rocks were known locally by fishermen as Caer Gonwy. Lewis Morris may never have seen the rocks themselves for at low water they are hidden, to some extent, by surrounding sandbanks to the north, east and south. When viewed from seaward, to the west, they can be confused with the extensive Bwrlingau rocks.
It should be pointed out that 'Caer' was used to denote Romano Welsh forts as in Caerhun and Caer Gybi whereas Celtic forts were denoted by 'Din' as in Dinas and Din Lligwy. Is Caer Gonwy the site of a Roman Camp? Ashton records local folklore that there was one in Conwy Bay but is not very precise as to its location:

'Roman coins and tile fragments have also been found, testifying to the existence of a Roman camp on the south-eastern edge of the headland at a point long since eroded away' (Ashton p.189, 1920). This was possibly on the eastern end of

the eroded Gogarth shelf, quite close to the Davies excavations at Pen Morfa, but Ashton does not give the origin of his information. Ashton further complicates the issue by reporting; *'Fishermen assert that pottery, presumably Roman, has been found at a point near the outfall'* (Ashton p.212, 1920) identifying a point 1,000m to the west. [176]

Both the above-suggested sites appear to have been described to Ashton by local fishermen, and could well apply to Caer Gonwy. He seems to have been in contact at sometime with Miriam 'Yr Ogof' Jones or her family who were Farmer / Fishermen and had lived in a cave [165] on the Southeast corner of the Gt.Orme. From their home cave Caer Gonwy, or the Roman camp, would have been indicated as being over on the sandbanks. Other fishermen could have described it as being near the end of the sewer outfall which it would be if approached in a boat going out with the tide around the Gt.Orme from Llandudno's North Shore to collect mussels at low water before returning with the incoming tide. In short, directions depend on the starting point.
In 'Evolution of a Coastline' Ashton mentions one find, in 1907, of Roman coins at Craigside Hydro, on the Little Orme, and another larger hoard a half mile to the east of 5,000 coins mainly of the fourth century. In 1888 Thomas Kendrick found seventeen Roman coins of the third century AD near his cave [114]. Ashton decided that these coins were *'probably of money intended for the payment of workers in the Great Orme mines'* which was a fair enough assumption, but an assumption never the less, without evidence, which to some, has since become almost a fact. A further indication of Romano-British activity was unearthed close to Lletty 'r Filliast burial chamber [215] of a single Romano - British potsherd, [Jones.1997].

Castell Tremlyd, a large earthwork fort between Llandudno and Deganwy, is also claimed to have been a Roman camp at some time [Cox 1894]

As yet hard evidence for Roman or Romano - British mining on the Orme has not been found. What are needed are reliable dates from an actual working. This situation may well change in the future as good circumstantial evidence for mining during this period does exist, which would have satisfied many archaeologists in the past.
It would seem from C.14 dating that the major period of prehistoric mining on the Gt. Orme was between 3,700 and 3,100 yr. BP and that, by the end of this time, the vein workings were down to the water table. Extraction of any remaining mineral above this level was beyond the scope of existing technology and continued to be so until the advent of explosives and steel tools in the past few hundred years.

When the Romans arrived in North Wales, and had established the 'Pax Romana', they would have commissioned an audit of resources. Upon discovering that the mines were worked out to water table, the ore body might well have been ignored for a while, but within the Empire were mining engineers who were well able to organise and direct the draining of the Great Orme. It is going beyond credibility to suggest that Romano British would not have attempted to access the ore reserves below the Great Orme in the 300 or more years of Roman Influence.

Oliver Davies MA may well have uncovered evidence of this during his 1938/39 excavations just North of the Pen Morfa drainage adit [146], [Davies1948]. This adit was driven between 1834 –1842. Davis says; *'in its present form it is recent; but at some distance along it was found a coin of Aurelian.'* Obviously this find was made when an older working was discovered or followed while driving the 1842 adit. This certainly seems to be the implication and in 1938 Davies could well have been collecting 'local knowledge' from the children or grandchildren of the miners who drove the adit. Another possible clue appeared while going through the archives. The Dawson map of 1816 shows a 'Copper pen' where copper washing was known to have taken place after the driving of the 1848 adit using water that came out of it. The question must be asked did the earlier 'Copper pen' make use of water flowing from an earlier, perhaps Roman adit?
On his excavation plan Davies identifies an Old Shaft [150] to the west of the Pen Morfa Air Shaft [149] and to the east there is a possible run-in adit [148]. Either of these could be 'The Rabbit Venture' or 'Gogarth Mine'. Perhaps it would be better to consider the locality as the 'Gogarth Mines Area' for there is possibly another adit at the rear of the Gogarth Abbey Hotel [151]. Mr.Irvine, then owner of the Gogarth Hotel reported that a considerable amount of water issued from this working after the disastrous downpour in 1993. These mines seem to be attempts to intercept the main North - South veins in a similar manner to the workings around the Ty Gwyn mine where access passages have been driven through the indurated scree/till that skirts the hard limestone in both areas.
In 1938-9 Davies did not really have time for a proper excavation of this site and his report in 1948 feels rather incomplete, maybe as a result of finds being lost during the intervening Second World War. He did however find three Romano - British potsherds that Dr. V. E. Nash-Williams of the National Museum of Wales ascribed to the second - third century AD These together with stone hammers and quern stones left Davies in little doubt that the site had been a Romano - British mining settlement. He was of course not aware of the extensive Bronze Age workings beneath the Great Orme, but if this knowledge had been available to him it could well have served to reinforce his conclusions.

The subject of Romano - British mining on the Orme is one that seems for some peculiar reason to evoke theories and sometimes, passionate comments. These range from those who are prepared to produce maps of the route along which ore from the [unproven] Roman mines was taken towards Rome, to statements that 'The h**k n***d b******s from Sorrento never set foot on the Orme'. (Anon. 1996. Lives near cromlech.)

THE HORNBY MINING AREA.

This area which comprises the Northwest cliffs of the Great Orme contains its fair share of interesting sites and puzzles. There appears to have been a settlement site of Hut Circles [20] and probable a Barrow [23] just to the North of Fynnon Caseg [16]. A group of prehistoric tools [24] has been found in the area and to the South and West there has been mining activity. Seen from the sea, Cerrig Uffern or Hell's Rocks, provide a wonderful display of the effects of ice action. Last but certainly not least is Ogof Llech.

The Hornby Mines and Veins.

These are the Gun Site Mine [9] and the West Lookout Trials [8,9, 10,11,12,13]. The veins exposed in the West Lookout Cliff run almost due North and reappear in Hornby Gully around and above Hornby Cave [15] and Hornby Gully Top Entrance [14].

Yet again the original names for these workings seem to have been lost, hence I have pressed into service a name arising from a famous event, the wreck of the Brig Hornby, which is also the earliest reference to these mines;

'*On the first of January 1824, the Brig Hornby, bound from Liverpool to South America, with a cargo valued at upwards of sixty thousand pounds sterling was driven from her course by a heavy gale; and, about midnight, was dashed against the rugged front of the Great Orme's Head, and instantly sunk. One of the crew happened at this terrible moment to be out upon the bowsprit, and he was flung by the concussion upon a narrow shelf of the rock, where he lay for some time stunned and confounded; but at length, exerting that mechanical energy which Providence beneficently supplies for self preservation, even in the total absence of consciousness, and sometimes achieves more than deliberation would dare to attempt, he succeeded in getting to the top of that frightful precipice, and crawled to a*

smithy at a little distance, where he was found at five o'clock in the morning by some workmen employed in the neighbouring copper mine. He told his melancholy story, but was laughed at by his incredulous auditory; for all that he could say was that he had climbed up that horrid steep that had wrecked the vessel; how he knew not, and the thing appeared impossible to those acquainted with the place. At daylight, however, [for it was winter] portions of the wreck were discovered near the spot, and the truth of the man's story afterwards made apparent. (Hicklin.1856.).

This account, possibly the most accurate of many, makes it clear that the sailor, one John Williams who forsook the sea and became a miner, climbed the Western Cliffs above Hornby Cave, possibly by way of Hornby Gully. While it is true he was apparently in a traumatised state, he would have been used to climbing and working ships rigging in gale conditions. Crawling a 'little distance' from the cliff top would strongly suggest that the smithy was somewhere close to Fynnon Caseg [16] and not at the main mine site around Vivians shaft [211] 2 Km away or in Llandudno which is 3 Km distant. The exact point of the Hornby's impact is also clear, as in this gruesome account from 'Llandudno and How To Enjoy It';

'One cavern of this North-western crag is celebrated for the wreck of the brig Hornby, whose timbers, spars, crew, rigging and freight were jammed into it, as a hideous conglomerate, by the raging sea' and in later years*, 'It was good speculation to rummage the cave and its pebbly floor for the hardware [knives, spoons, &c.,] which formed the main cargo. And on a calm day Sam Brooks and his crew will take you there in his good boat.'* (Price.1860.pp.59-60). Was 'Sam Brooks' one of the Brookes Family who owned Quarry Jetty [220]?

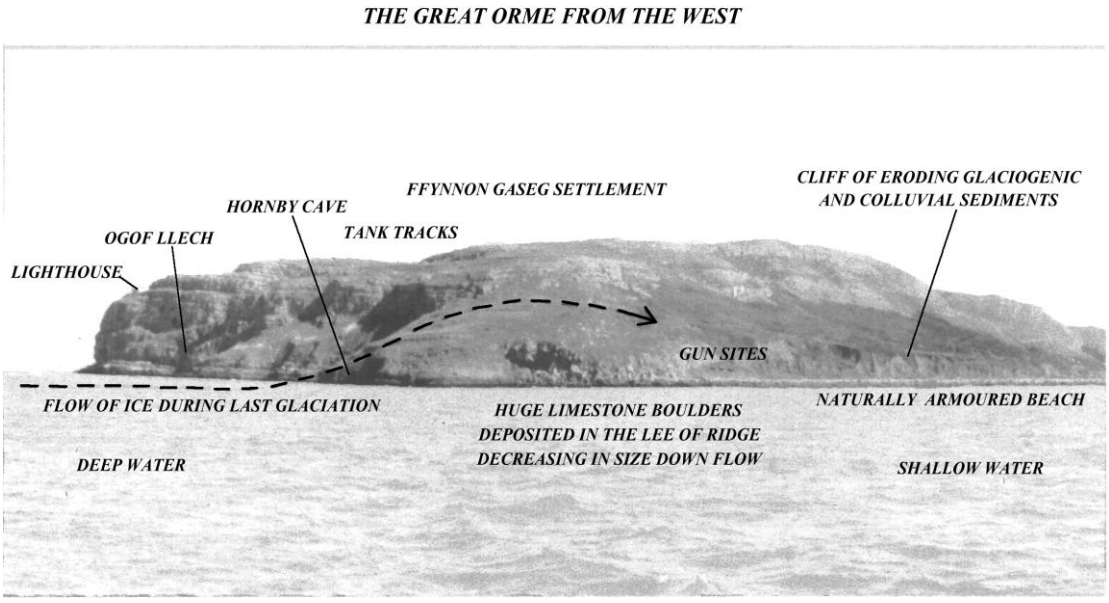
It is also recorded that ten people were sent to Caernarfon gaol for plundering the wreck. (Wynn Jones.1973 p.139)

When I first visited one of the short levels in the cliff below the site of the World War 2 west lookout post, I was not much impressed. It seemed to be a pointless working, perhaps one of those which were the result of miners persuading gullible investors to employ them. However further visits in better weather led me to realise that the levels followed traces of copper ore which are visible in the cliff face in the form of veinlets running north towards Hornby cave. Within the levels there are signs of vertical shafts that have been backfilled. There is an adit running in from sea level [9], through the indurated till/scree, towards the levels in the cliff above, which could well represent an attempt to drain workings, or to facilitate easier ore extraction. It is obvious that around the entrance to the adit there has been considerable erosion by the sea resulting in the loss of any surface works or buildings that may have stood at the site. A good indication of this is the three World War 2 gun emplacements that have together slid some 10m down towards the sea in the past 45 years.

Among the scree and spoil below the levels are numerous specimens of copper ore and what could be hammerstones i.e. rounded stones of hard volcanic rock showing possible signs of use as tools. After showing the site to among others, Emma Wager and Roger Doonan the consensus of opinion seems to be that it is a possible early mining site worthy of further investigation. That traces of ore are visible in the natural face of the cliff further reinforces the proposition that man could have been attracted to the site in early times.

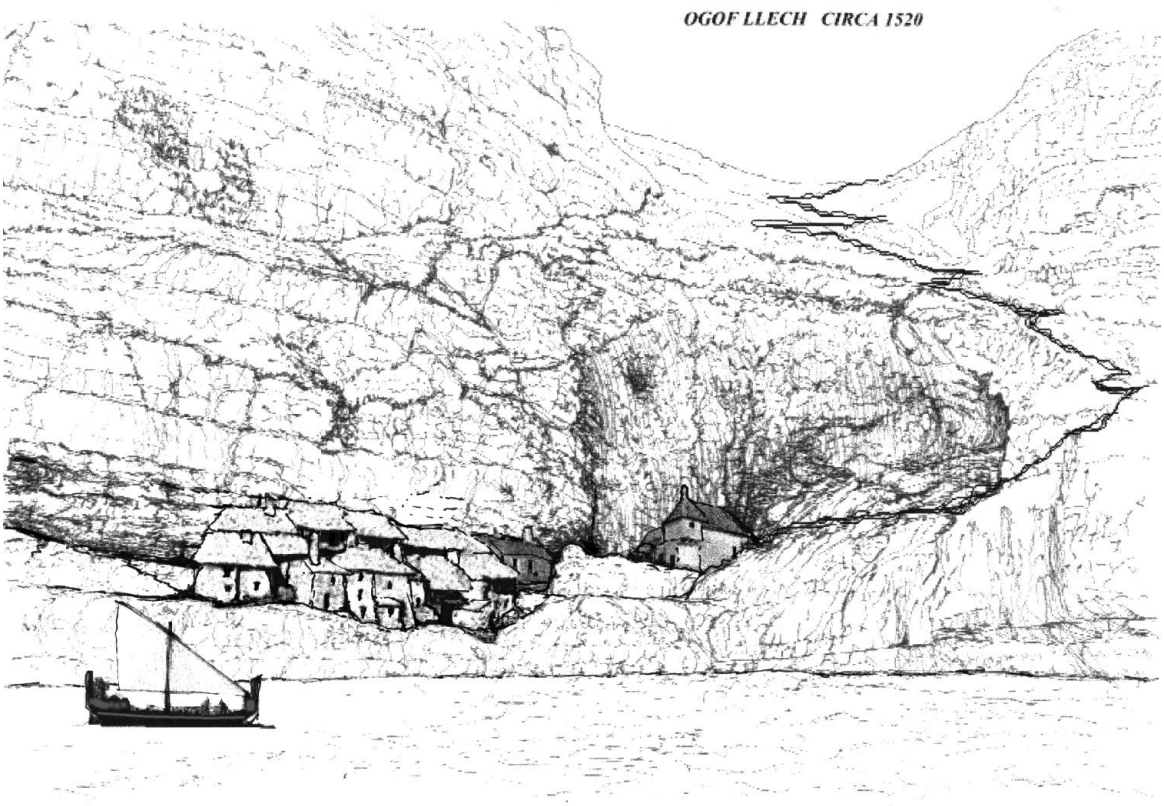
The ledge at Ogof Llech

The much weathered but still fine masonry inside Ogof Llech



Ogof Llech

The great puzzle of this area is Ogof Llech [26], which is almost at the foot of the cliffs. Until a few years ago this cave was accessible down a zigzag path which had been created with great effort at some time in the past. At one point steps had been cut in the living rock to allow passage around a spur of the cliff, but the last part of the path where it traversed a horribly insecure cliff of boulders, has been destroyed in an avalanche. The cave can now only be reached from the sea by bringing a boat alongside the cliff and scrambling up ledges.



I have had the delight of guiding several small parties of archaeologists and historians to the cave. By the time the small entrance has been reached they have all been wondering aloud ‘what on earth they were doing’ to follow such a madman up a bird plagued slippery cliff to look at such a miserable opening in the rock. One peep inside generally silences their complaints.

They find themselves looking into a small octagonal chamber 2m wide and 3m high. It is lined with fine ashlar masonry, with an integral bench of finished stone around the remains of a circular stone table.
The walls are faced with close fitting blocks being surmounted by an ornamental cornice. Stalagmite and moss have begun to hide some of this expert work which would not be out of place in any cathedral. One writer describes it; *‘Its shape is a half octagon, and at the entrance there are two columns of masonry, one either side of the entrance’* (Jones.1875)

On the right hand side of the entrance is a small alcove where it would seem there was a stone font at one time that would have been filled by the constant trickle of water from within the rock. The cliff face around the entrance is covered with stalagmitic flowstone, which on the left hand side, has had a channel cut across it in order to collect the water running down the cliff and direct it to a collection point. Carved into the flowstone above this channel is a head apparently wearing a Bishop's mitre, or is it mediaeval pillbox hat? Other carvings, an owl, and / or a swan are supposed to have been seen in the past but are not now evident. The carving and channel have been executed in a very much cruder manner that the lining of the chamber and could indicate two separate periods of work.

Comments by several writers suggest that the water springing forth was considered to be special, some linking it and the chamber with St.Tudno, (Jones 1875),

The general impression gained from the site is that, on account of its spring, it has been an important religious site that has been embellished at some time in the past, at considerable cost, as is shown by the construction of the path and the lining of the chamber.

A poem in Welsh, thought to be from around 1520 could offer more information. It states that there was also a large building, *'a castlet with bulging wine press',* in which *'Grandiose knights in stately mien'* might feast along with two hundred uninvited peasants. There is certainly room for such a structure on a large ledge, running north from the cave, which is under an overhang of the cliffs. This same ledge eventually dips gently down to the sea making it an ideal place to land boats especially if it had been prepared as a rustic harbour. This is done by firmly fixing bundles of saplings and twigs down the shore in a wide strip to land boats on, thus protecting hulls even in quite rough conditions. Boats could then be pulled up above high-water mark. The poem suggests boats were indeed landed here. Although this today may seem rather odd, it is well worth remembering that there are very few places in the area where boats can go alongside at all states of tide. Further as the ledge goes around the Northern point of the Gt.Orme there is lee from Northeast round to Northwest.

The date 1520, and the conformation of the chamber, could significantly link the sight with certain arcane groups, and may have been a knight's temple.

In the past the only approach by land to the site was along a path across a cliff face. It was protected, from above, by overhanging cliffs. Any unfriendly landing from the sea could be easily opposed, but boats could land or depart at any state of tide again protected by the overhanging cliffs. There was also a plentiful supply of fresh water. All in all, the site is an excellent natural stronghold. Its qualities were obviously understood by the Germans, who had made a point of seeking out covert landing places in peace time, for in 1915 Ogof Llech was the scene of an attempted escape, in a U-boat, by three German prisoners of war. The men, all Officers, escaped from Dyffryn Aled P.O.W.Camp, near Denbigh, between roll call on Friday, August 13th and the Saturday morning roll call. The escape had been co-ordinated by a prisoner from the same camp who had been returned to Germany in a POW exchange. The signal from Germany to say that a U-boat would be waiting at a prearranged point was given in a letter in the form of a wedding notice –

'The Wedding will take place on [date] at [time].'

They were however recaptured in Llandudno on the following Monday. When Lieutenant Kommander Herman Thorens was caught in Mostyn Street by P.C.Morris Williams he had in his possession twenty three pounds, eight shillings and thruppence, in English money [£23.42p]. The men had signalled to a U-boat from a ledge but because they were afraid of being seen from above they stayed at the back of the ledge and therefore were not seen from the U-boat. However the U-boat was seen by a Coastguard on the Gt.Orme, who signalled Blundell Sands, who passed the message to a destroyer flotilla, which apparently arrived twenty minutes too late to attend to the U-boat. (Cooks 1954)

It is believed that actually two U-Boats were involved, U-38 commanded by Kapitan Valentiner, and U-27 commanded by his cousin Kapitan Wegener which was sunk one week later. (Parry.1996)

THE HAFNANT MINING AREA.

AND BADGER'S CAVE

The Hafnant Mining area encompasses the area of mines to the East of Hafnant Gully as far as the West walls of St.Tudno's cemetery, and North of the Park Wall to the sea. After discussions with Andy Lewis and Edric Roberts I adopted the name for the sake of convenience, for if there was a name for this area, it has been lost. I have made many enquiries but it seems that, at this time, there are no known surviving records of the mines in the area. This view was reinforced during a discussion at the 1997 N.A.M.H.O. meeting with C.J.Williams who indicated that he too had not found any archival references to these workings. Hopefully researchers will one-day remedy this shortfall.

Mine workings in the area seem to fall into two groups, those which follow the line of a vein and/or fault which runs North West from Hwylfa 'r Ceirw Shaft [36] down to Hafnant Chasm [238], and those associated with Badger's Cave [28] which are possibly more or less pipe veins or pockets of mineralisation. Just where Ogof Hafnant fits in is a debatable point as visits to date to this inaccessible site suggest to me that it is connected to both and is perhaps the focal point of the mineralisation.

Badger's Cave

Also known as Ogof Pryf Llwyd / the Grey Pest's Cave, Ogof Tudno / St Tudno's Cave.

This rather remote and quite well hidden mine has attracted various visitors over the years. Quantities of broken beer bottles recount past revels while the remains of ladies handbags hidden by the top of Ogof Tudno Shaft suggest that it has also been a den of thieves. Badgers have
laboured mightily in the narrow fissures but have not been seen there for a few years. More recently the Orme Goats have taken it over leaving their distinctive perfume as proof of occupancy.

From the 1950's onwards William Roberts was employed by the local council to 'fill and make
safe' disused shafts on the Orme. He reports having capped a 60ft shaft just within the entrance to the left, beyond the low wall. This shaft has been probed for but has not been found. As the whole site is proving to be most important, any unauthorised attempt to discover it or 'prospect' for souvenirs could only result in censure and the possible destruction of artefacts.

The first known authoritative account is from when Tom Stone dug here in the 1970's, which he did with his usual care. Tom was of the opinion that it was a natural cave system with a Victorian, or possibly slightly earlier, trial level running through it. He named the area where he was working Ogof Tudno to distinguish it from the rest of the system. His digging revealed fragments of charcoal, burned bone, various marine shells, a fragment of a horse scapula and further into the 'cave', amongst some recent discarded badger nest material, a pointed bone tool. Tom believed that the site had been used as a rock shelter in Neolithic times and that there could possibly be a burial somewhere in the fissures. At the time of Tom's dig, prehistoric mining on the Gt.Orme had not been proved nor was its scale even suspected. (Tom Stone 1994)

As a result of her archival researches Diane suggested that the site should be reassessed as a possible prehistoric mine site and I visited the site on 9.1.1995. On this first visit I started to feel that in the main the 'cave' passages were in fact a system of worked out mineral deposits in the form of 'pipe veins' and 'flats' and that the cave could well be a very early mine. During a further visit with Dave Chapman on 11.1.1995 fragments of charcoal were seen embedded in stalagmite along with an area of mineralisation on a passage roof, which appeared to show the marks of stone hammers.

Returning home I immediately contacted by telephone, A.Lewis, T.Parry and E.Roberts, who are all 'leading lights' on the history, prehistory, and geology of the Great Orme. They indicated that they were not aware of any evidence of prehistoric mining at the site and that it was considered to be a natural cave system with a Victorian trial running through. However when the possibility that the site was an early mine was put to Tom Stone the same evening, he found it acceptable. After re-examining drawings of the pointed bone tool and fragment of horse scapula he had found at the site twenty years earlier, he observed that, in the light of recent discoveries, they were typical Bronze Age mining tools. (Bannerman 1995)

Crucially what I had realised on my first visit was that although the 'natural' passages have the hallmarks of a typical limestone cave or pothole, there are traces of mineral to be found everywhere. The mineral is in the form of calcite

crystals with inclusions of the copper sulphide ore chalcopyrite, which has caused the calcite crystals to become stained green with the secondary copper carbonate ore, malachite.

Limestone caves are usually formed when beds of limestone are partially overlain with impervious beds, as are found in Derbyshire, where rain, which is already slightly acidic falls on the gritstone moorlands creating streams which run over beds of clay and shale until they reach the exposed beds of limestone. At this point the streams usually disappear underground, due to the acidic water having enlarged lines of weakness, by dissolving away the limestone to form potholes and caves. Where turbulent, acidic water runs rapidly through a cave system shallow depressions rather like scallop shells with distinct sharp ridges between them are formed on the walls roof and floor as the rock is dissolved and eroded. Very similar formations can also be found in ice caves where melt water pours through glaciers as well as on sand beaches where there are strong currents.

These shallow scalloped depressions can be seen in Badger's cave but I feel that here they were caused by the very hot, high pressure [Hydrothermal] solutions that later deposited minerals as their flow and temperature decreased, which all happened many millions of years ago. It can be observed at several points that the scalloped formations underlie deposits of mineral. Further there is no good evidence that there was ever an impervious area overlying the Gt. Orme limestone where streams could have been formed which in their turn created caves. It is just possible that such a watershed did exist and was destroyed by tectonic movements tens of millions of years ago and that at sometime in the equally distant past the passages formed were invaded by hydrothermal solutions, but this is academic. My point is that Badger's Cave is essentially a system of worked out mineral deposits.

When any space underground in limestone ceases to be actively enlarged, water with dissolved limestone [Calcium Carbonate] in it tends to seep in and over long periods of time thick stalagmitic deposits are formed. This has happened in Badger's Cave, which further enhances its cave-like appearance. The process is most useful to archaeologists as it can encapsulate and preserve delicate evidence of man's past activities such as the particles of charcoal identified in the second visit.

The entrance to Badger's Cave is in a cliff face at the top of spoil and scree slopes, which drop steeply down towards the sea. It is reasonable to propose that this has been the case for many thousands of years and that visible mineral in what was also a natural rock shelter could have attracted the attention of the very earliest miners. At such a site there is the possibility of finding in situ datable material from the earliest mines. At other early mining sites in the area it is difficult, if not impossible, to be certain where the original pre-mining surface was. For example, the Bronze Age surface level at Vivian's shaft could well have been 10m. above present ground level. Hence traces of earliest mining may have been destroyed during the evidently extensive mining operations of the Bronze Age or the more recent 18th. and 19th. century phase of mineral exploitation.

In addition to the notes, surveys and drawings of finds Tom Stone kindly made available to me I also discovered a stone hammer and a fragment of copper stained bone in the Victorian spoil below the entrance. Unfortunately Tom was unable to revisit Badger's with me due to ill health but by making a video of the site both below and above ground I was able to discuss my opinions and ideas with him. He, in turn, was able to advise me as to finer points of his research and extend to me valuable advice.

This preliminary research pointed to Badger's Cave being a multi-use site, and possibly a most important one, as similar sites in the area have been used since as much as 14,000 years ago in the Upper Palaeolithic. Uppermost in my mind was the fact that what appear to be prehistoric workings are demonstrably close to what was the post glacial surface and that there was a chance of identifying very early mining activity.

The desire to start digging immediately had to be suppressed for, as with any site, let alone one with so much potential, it is important that proper channels are followed. Badger's Cave is also within a Country Park and is surrounded by Sites of Special Scientific Interest. I therefore approached the landowners Mostyn Estates and Aber Conwy Council, who very properly asked that the Great Orme Country Park Officers, Gwynedd Archaeological Trust, and The Countryside Council for Wales, should be consulted and their approval sought. I was already acquainted with most of those who came to inspect the site having met them during other projects. The process proved to be most useful with their observations and recommendations being taken on board in the project planning.

In the spring of 1996 permission to begin excavations and to recover material for dating was eventually given to me personally, after totally understandable delays due to the difficulty of getting all interested parties together at the same time to discuss the proposal.

To the east of the main cave entrance was what appeared to be the sealed entrance to a level or shaft, Hoping that this might give access to further workings, I began excavation, assisted by members of G.O.E.S., of what has come to be known as Ogof Tudno Shaft [29]. After the first day or so of digging it became obvious that the excavation of the shaft

would be a major undertaking so it became a G.O.E.S. Project. This shaft is oblong in section, being generally 1.5m. by 1.9m. and in the summer of 1996 it was cleared to a depth of 12m. To deter the foolhardy a locked steel gate was installed at the surface. Shot holes and finds such as a strip of galvanised iron from a bucket at a depth of 9m. coupled with the development of very thin stalagmite between stones, showed that the shaft had most probably been backfilled in the 19th. century. This caused considerable comment, as it was not usual to backfill shafts at that time, especially when they were in remote areas. It was the general practice either to leave them open, or build a wall or a beehive shaped structure over them. Occasionally they would be blocked with timbers just below the surface with rocks piled on top, perhaps in the hope that an arch would be formed. Eventually the timbers would rot and quite a number of very deep holes have suddenly appeared in the most inconvenient places and at the most inconvenient times as a result of this dubious practice. Judging from the very considerable amount of spoil that appears to have come out of Ogof Tudno Shaft, it is either very deep or has fairly extensive workings leading off it for future excavators to discover.

Whilst discussing Ogof Tudno Shaft, Tom Stone recalled a local story that a group of 19th century mine owners who had been involved in prospecting on the Great Orme had found a very promising new area. As copper prices were down and investing in the smart new town of Llandudno looked an equally good prospect, they eventually decided, on the turn of a coin, to build hotels and houses for rich tourists. The tale ends with the decision being taken to thoroughly seal the shaft leading to the mine, in which, along with copper and lead, some silver had also been found. The bottom of the shaft was not reached nor were any side passages discovered when, for various reasons, digging in the shaft was eventually halted in the autumn of 1996.

During the first day's excavation of the shaft and just below the surface debris, in what I now believe was spoil from an unreported dig, a section of bovine rib with two incised lines was found. It was later examined by Rodger Jacobi, of the British Museum, who suggested that it was of an upper Neolithic date. Diane Bannerman has suggested that the incisions might be an Ogham inscription. As far as I can ascertain, this artefact came from a low bedding plane close by, which had been dug out by 'young cave explorers'. I feel this was also the source of a possible hammer stone, found amongst the same tangle of clay and old plastic fertiliser bags, in which the section of rib was discovered. Subsequent enquiries revealed that some years earlier, the then schoolboy diggers had used fertiliser bags to contain and transport spoil, from their dig in the bedding plane, to their dump at the top of what is now Ogof Tudno Shaft.

The bedding plane is part of the Badger's Cave system and having examined it, I am fairly sure that the section of rib had been in material moved from further into the system by burrowing animals that seem generally to have redistributed loose material around the passages.

From my first visit to the site I had been convinced of its importance and after initial work there I formed the opinion that any further work should only be conducted under the close supervision of a well-qualified archaeologist with specialist digging experience. I therefore invited archaeologist Jo Jones, a research student of Liverpool University, to direct the dig and the sampling of material for dating. Jo was very keen to do this, as she needed a field project for her Ph.D. The first task was to sample in situ charcoal for C.14 dating to give a 'range finding date' from which we could form a general perception of the age of the site. As C.14 dating was not available to him, Tom Stone's work had relied on 'Typological dating', i.e. the age of an artefact being decided by comparing it with similar ones from a site the age of which had been agreed by a consensus of experts.

Taking samples for C.14 dating has to be done with great care. The point of origin has to be carefully recorded with notes, plans, drawings and photographs for future reference. It is also vital to ensure, and be able to show, that the sample is not contaminated with anything, such as cigarette ash, which could distort the result.

The first attempt to secure a sample from beneath the stalagmite floor of a side passage in Badger's Cave was unsuccessful, as it was not possible to secure sufficient charcoal. The second, and this time successful, sampling was from a boss of stalagmite on the wall of the main passage, where I had discovered a vertebra embedded in the formation. A nice large fragment of charcoal was found in a matrix of stalagmite in association with angular particles of mineral, some minute bones and the vertebra. The material in the sample suggested that it was fairly typical prehistoric mining spoil, similar in composition to spoil found in other early workings on the Great Orme and I had no problems with identifying it as such subject to further examination. The sample was still too small for regular dating at the British Museum, who forwarded it to Oxford for Accelator Mass Spectrometry dating.

This is a more expensive method and I well remember the discussion with Jo as to whether it was worth while spending five hundred plus pounds dating the sample, especially as we were unsure of funding. The discussion, which was held sitting in mud and very old badger droppings, went as follows:-
'It's a lot of money, so what are we hoping to learn? It's just one date and as such could only be considered a range finder.

Yes, agreed, but if it should prove an important date it could attract funding for more.
Well, what do we mean by an important date?

OK, let's look at it this way. The stalagmite boss it came from appears to have been broken by the Victorian miners, so it's earlier than that. If it should prove to be a Medieval mine it would be fantastic, there isn't one on the Orme, and not many elsewhere.

That's true, and the same would apply to Viking, Dark Ages, Roman or Iron Age mining.
Any of those dates would be absolutely brilliant, and we wouldn't be too upset it we found we were working in a Bronze Age mine either.

An earlier date? – No, forget I asked that, let's give the go ahead for an A.M.S. date.'

There then followed a long wait, for the Oxford laboratory was very busy. Jo asked if Vince Wood, a colleague from Liverpool, could join us to help with the excavation and a huge amount of what was termed 'Post Victorian Debris' was sifted through. In the main this was a mixture of clay and old badger nest material, which the creatures had dragged out of their living quarters in the small side passages. It was amongst this material that Tom Stone had found a beautiful pointed bone tool some twenty years earlier, which is now in the National Museum at Cardiff. It was agreed that what was obviously much older material e.g. that which was covered in stalagmite flows, should be left until the results of the first radiocarbon date were received.

Many days of work produced a number of recent badger skeletons, some interesting insights into their diet, Victorian beer bottles and a clay pipe. Jo deservedly found a small but very nice flint knife. Vince and I knew she was pleased as she became very off- hand and non-committal about it. Unfortunately it was out of context but it gives important insight into what could be expected in the, as yet, undisturbed older contexts.

Even though we were sure that the material through which we were digging was recently deposited, all finds were carefully recorded, photographed and sections prepared. Evidence that we were not the only ones interested in the site came with the discovery that some vandal had stolen a piece of charcoal out of a section which Vince was preparing for drawing. This was a stupid act as the specimen was out of its original context and furthermore it interfered with the recording of the site.

Among the many names recorded in candle smoke on the passage roof, Jo spotted that of W.Gowland, with the date 1888. This is most interesting, for a W.Gowland F.S.A.,F.C.S., read a most important paper to the Royal School of Mines on the 18th of May 1899 entitled 'The Early Metallurgy of Copper, Tin and Iron in Europe, as illustrated by Early Remains and the Primitive Processes surviving in Japan.' [Gowland.1899] If this is the same W.Gowland how did he come to visit a remote mine on the Orme in 1888 twenty or more years after mining had ceased there? It is distinctly possible that Thomas Kendrick was involved here as at that time he was running his prehistoric show cave and lapidary's workshop.

Did Kendrick show Badger's Cave to Gowland? This is of more than casual interest for it is just possible that some of the artefacts, Upper Palaeolithic or more recent, originated from Badger's Cave as is more fully discussed under the heading 'Kendrick's Cave'.

When the A.M.S. date finally arrived it was far older than expected, indicating that the charcoal was from a period several thousand years before copper mining was supposed to have occurred in this part of the world. If the date is correct, and the context is 'secure' as it seems to be, it is as well to consider certain points. The term 'Mining' is quite precise in its meaning. Entering an underground space and moving a little loose earth or rubble around, say to clear an area to lie down, is not mining. Digging out blocked passages, especially filled shafts or extracting any rock or mineral certainly is mining. No matter how many thousand years old an underground working may be, it is still a mine. [Gilmour.1997].

Copper ores are not just used for smelting into metal. Malachite and Azurite are both very beautiful semi-precious stones as well as being used as bright green and blue pigments. They have also had a place in folk medicine. A copper compound, I believe copper sulphate, was used in Derbyshire in a folk remedy to treat intestinal worms in cattle. In 1760 Dr. John Rutty referred to the vitriolic liquid flowing from the copper mineral lodes on Parys Mountain Anglesey in an address to the Royal Society. He recommended it as

'a powerful detergent, repelling, bracing, styptic, cicatrizing, antiscorbutic and deobstuent medicine – not only by external use in inveterate ulcers, the itch, mange, scab, tetterous eruptions, dysenteries, internal heamorrages, in gleets, the fluor albus, and diorhea,[sic] in the worms, agues, dropsies and jaundice. (Rowlands.1981)

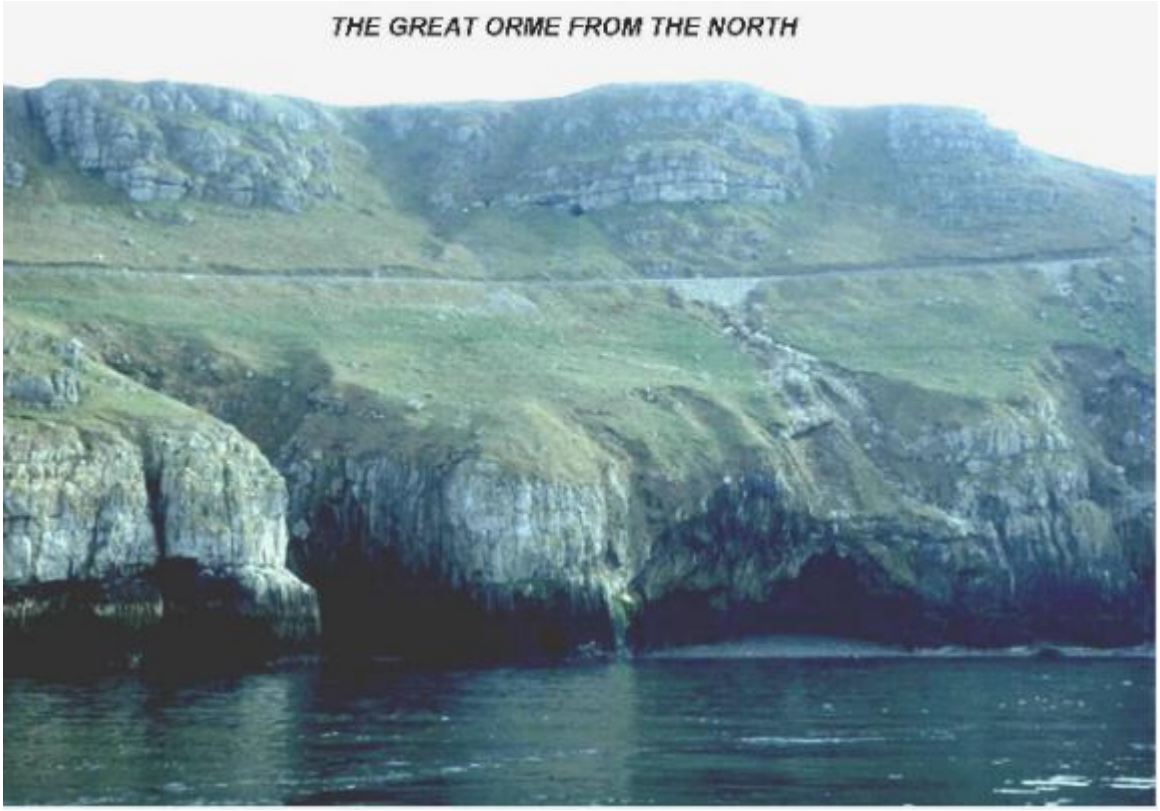
This is not proof that copper compounds were used in prehistoric medicine but does show that they were recognised in folk medicine and may help to explain why ore could have been removed at so early a date
.

Beach studies a little to the east have revealed areas of indurated scree showing that in the past, where there are now sea cliffs, there were slopes running down to the undulating plain where the sea is now. This would have been the landscape below Badger's cave in the Late Paleolithic, Mesolithic and Early Neolithic periods, making the cave a very tempting habitation site.

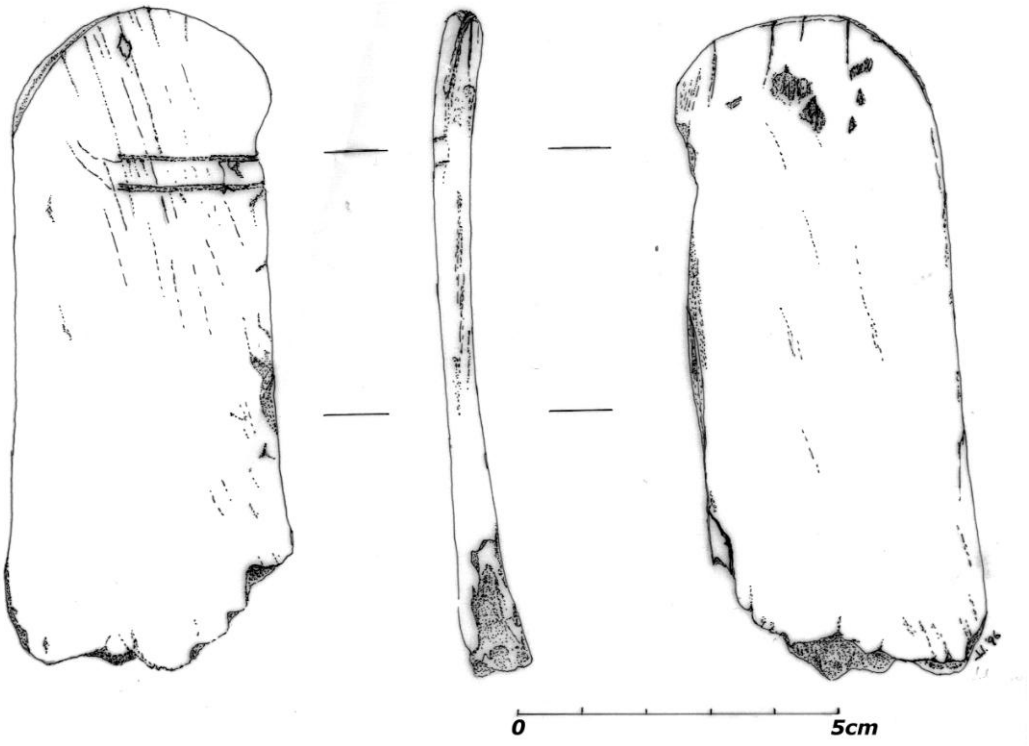
Ogof Tudno Shaft{29}

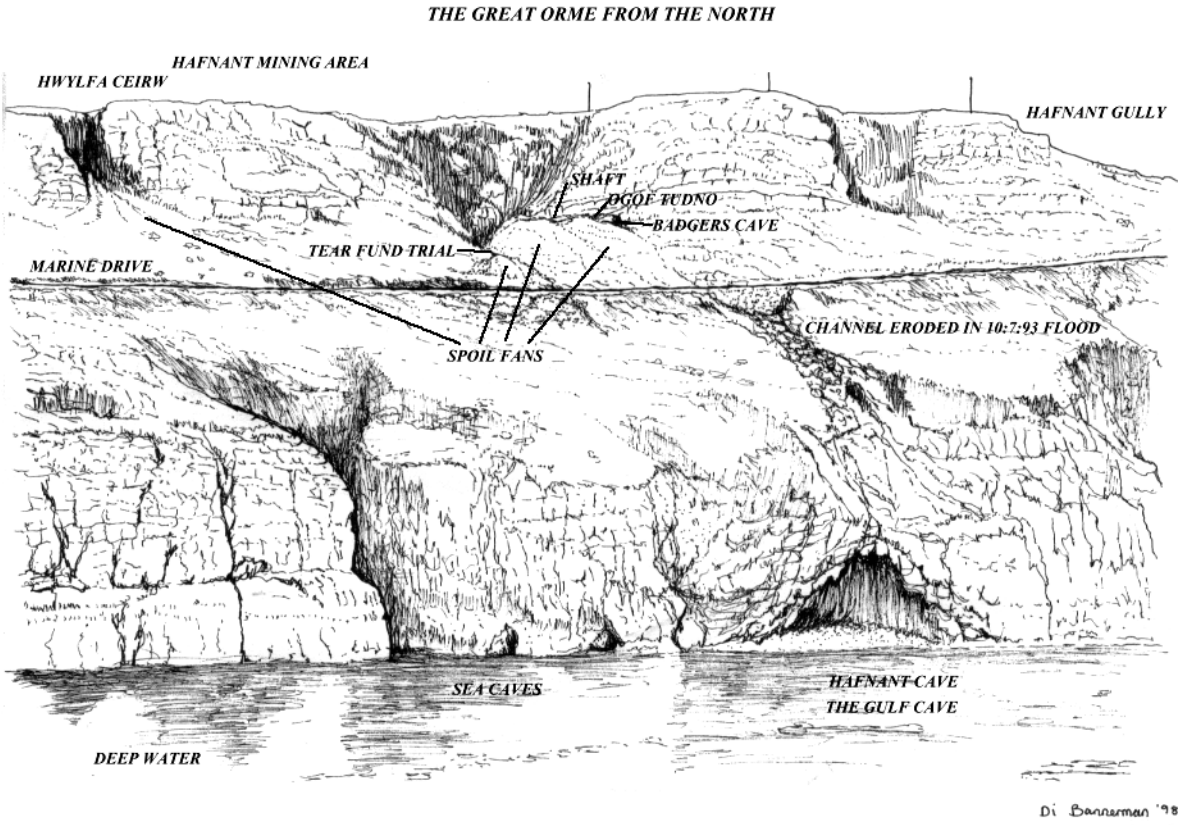
The author's son assists archaeologists at Ogof Tudno

Jo Jones, archaeologist, at the entrance to Badger's Cave

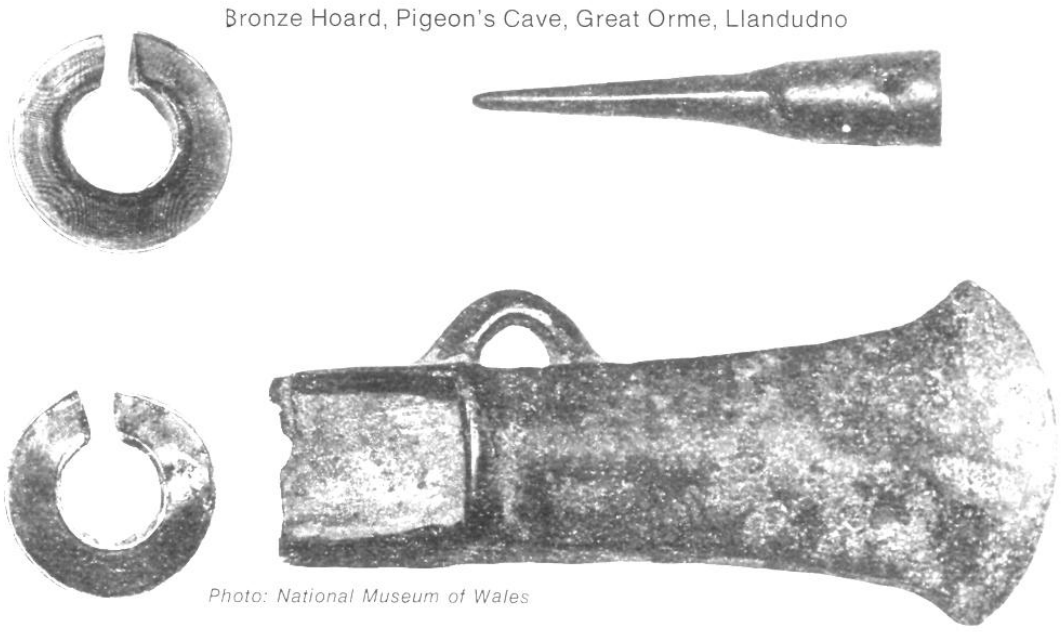


Incised bone





St.Tudno's Pathway.



PORTH YR HELYG.

The Mining Area, the springs, a possible Bronze Age ore washing site, sea port and St.Tudno's Pathway

Porth yr Helyg / The Port of the Willow, could well take its name from the groves of willow that occur on its slopes. It should be pointed out though that the willow is of a dwarf variety, which grows among, and no higher than, the grass tussocks on the hillside. It is a peaceful place, where a trickle of water from the slopes above, at one time replenished a roadside horse trough (74) but as with many other parts of the Headland, it has seen much human activity.

Apart from the signs of mining, quarrying and prehistoric activity, which are dealt with in the first part of this chapter, there are traces of where the coastline was some 8,000 years ago. These clues have made it possible to see the northern cliffs of the Great Orme in a very different light, as is shown in the second part of the chapter.
Little is known of Porth yr Helyg Adit (73), an important mine working which is reported to be 150 fathoms/ 274m long, running in a southerly direction. It was probably driven in the late 1840s to de-water the area around Pink Farm where there are traces of old workings (78) (79) (80) (218). It is distinctly possible that the ore found there originated from a vein [or veins] which seem, more or less, to run along the line 'A'-'B' in Fig. 1. Dolomitised limestone can be observed in the exposed bedrock of the shore around the Porth yr Helyg Adit (73) and in a worked vein running from SH 7745 8334 to SH 7745 8340 (80). Evidence of this vein is also indicated by workings at points along the line.

Edric Roberts has linked this adit with an anecdote, related to him by the Mostyn Agent Mr. George Hiller, to the effect that Colonel James Mostyn [died 1969] walked through the Great Orme by way of the Pen Morfa Adit and the Porth Helyg Adit. Mr Hiller confirmed this account to me and added that the Colonel commented on the dangerous condition of the adit. [Hiller. 2001] In the 1980s the entrance to the adit was in a very unstable condition and a local mine explorer, Billy Davies, was trapped for a time. Following this incident the roof was apparently brought down with a charge of explosive by persons unknown.

J.Roberts makes reference to *'scores of tons of Roman copper slime'* being removed from the Fynnon Galchog area. This more likely to refer to fine particles of ore discarded by Bronze Age workers, for although there is circumstantial evidence, there is no hard evidence, as yet, of Roman mining on the Gt.Orme. It is worthy of note that the same reference also mentions two other 'Roman' washing sites at Fynnon Rufenig SH7655 8386 (53) where '*many tons'*

were removed and in the vicinity of Siloh Chapel SH 7790 8245 (126). From the latter it is claimed that *'hundreds of tons of Roman copper slime'* were removed in the 19th century and shipped out for processing and smelting. (Roberts J.1907)

Fynnon Galchog could be translated either as the Lime Well from Calch / lime, or the Washing Well, from Golch / to wash (pers. com. Dr.Cecil Jones) both being relevant. (This illustrates the importance of preserving and using, historical Welsh names, as translations however careful, can miss out important clues.)

Between Fynnon Galchog itself SH 7775 8367 (89) and Pink Farm Spring SH 7742 8361(77), are quite a few springs (76), which would all seem to be associated with the same geological horizon. They provide conditions, i.e. a reasonable amount of water and gently sloping ground, ideal for ore washing, which are not common on the Great Orme.

This suspected Bronze Age ore dressing floor at Fynnon y Galchog (76), not to be confused with Fynnon Galchog (89), has not yet been properly investigated but from evidence to date there are very promising indications. This takes into consideration a radiocarbon date which came out as 1200 +/- 60BP which calibrates to 720-740 and 680-690 BP from the Fynnon y Galchog area (Lewis 1994). This may relate to minor Dark Age exploitation of the area or be an anomaly. However it is felt that the suspected washing floor itself would not be the best area to attempt to recover dateable material from, as it appears to have been very thoroughly worked over, probably in the last century.

An investigation of what appear to be waste tips on the steep hillside below the 'washing floor' could well be more fruitful, especially as the 1993 floodwaters have already cut some nice sections through this material. This comment is of course made with the benefit of hindsight as when G.O.E.S. excavated the site, the tips had not been revealed.

During the phenomenal downpour on June 10th 1993 more than 125mm of rain fell in two hours. A huge amount of water poured down the sides of the Gt. Orme at many points, cutting channels as it went. Below the Fynnon Galchog area was revealed what appeared to be a prehistoric waste tip, consisting of crushed dolomite, chert, particles of malachite and azurite, and chips of copper stained bone similar to those found in the prehistoric mines (211). There were also flakes of chert exposed that may be tools, or the remains of them, in one of the channels.

After the storm it was possible to observe in the Porth yr Helyg area that while during normal conditions water will seep downslope through the grass, soil and fissured rock, it is only during such very rare, extremely heavy, rain storms that the hillside is actually cut into. At Porth yr Helyg the existence of old, grassed over storm cut channels that for some reason the water avoided in 1993, suggests that such catastrophic events have also taken place in the past, possibly since ore washing took place there.

Washing, cleaning and dressing ore, is not only necessary before smelting can take place, it also serves to reduce its weight, as impurities are discarded - vital if it is to be transported any distance at all. Gwynedd Archaeological Trust has surveyed the site. Hut circles have been identified in the immediate vicinity and bronze artefacts recovered. A pair of gold earrings (?), a bronze palstave axe, and a bronze dart point were found by two boys behind a loose boulder in May 1898 around SH 7780 8383. (90) (Savory.H.1958)

Porth yr Helyg is today one of the few places where a landing from the sea can be effected on the Orme. It is relatively sheltered and in the last century boats came alongside the cliffs to the east to load limestone, which was lowered down a still visible chute cut in the rock (96). Limestone was possibly extracted at other points in the Porth yr Helyg area. Vessels even smaller than known Bronze Age craft were used in this industry. There is no documentary evidence for the 'Copper Slime' from the Fynnon Galchog area being embarked at Porth yr Helyg in the 19th century thus far, but it would have been both a logical and practical exercise. (The Gt.Orme comes under the jurisdiction of the Conwy Harbour Master and records of 18th/19th century shipping activities would have been documented in the Conwy Port Books, but it would seem that these copies were lost in the Conwy Library fire.) Hence the beach below the Fynnon Galchog area - Porth yr Helyg - could well have been a Bronze Age landing place or 'port' from which copper ore was shipped to smelting sites.

Initially there was concern with the steepness of the hill side down which it is proposed that ore was carried at Porth Helyg until Steve Lee, a surveyor, pointed out that the present day tarmac roads going up the Orme deal with similar gradients.

The springs of the Fynnon yr Galchog (76) area tend to dry up somewhat in summer, whereas springs down by the shore such as Fynnon Helyg (66) continue to run quite strongly, which could have provided water for ore washing all year round. David Chapman has found traces of what could have been a washing site in the vicinity and though there has been sea erosion in the area this is yet another site worthy of further investigation.
A deposit of tufa with winkle shells and charcoal embedded in it, about 3m.above high water mark, was noted at SH 7726 8392 which appears to mark an as yet undated and unreported midden. (70)

The possibility of finding the wreck of a Bronze Age ore carrier is one that bears some thought. Ore, or partially smelted ore, could be envisaged as being transported in as many hide bags, each of perhaps 50kg, as a boat could carry. If a vessel, so laden, should become swamped it would sink immediately and very likely remain on the sea floor where it sank. As was pointed out by Dr.Cecil Jones, a cargo of copper ore would pin a curragh or similar vessel very firmly to the bottom, as was the case with the 15th century Pwll Fanog slate wreck in the Menai Straits. It is possible that some of the structure of the vessel would survive buried under the copper ore cargo.

The chance of finding such a wreck is perhaps remote but would be of such great importance that it should be borne in mind by anyone engaged in underwater activities. Hopefully the kelp covered tufa concretions discussed in the next section indicate that there has not been too much disturbance of the seabed below low water mark. An underwater survey could be most interesting.

Understanding past sea level movements and associated changes in coastline plays a very important role in interpreting sites and local trade routes. For this reason, while examining all areas, indications of sea level change have been looked for. Two presented themselves at Porth Helyg, one at low water mark, and one at, and just above, high water mark. Both are concerned with the deposition of 'tufa', a type of stalagmite formed in the open air by springs of calcium carbonate rich water. Such springs are quite common on the Gt.Orme as are tufa deposits and deposits of scree cemented by tufa into a conglomerate, properly known as indurated scree. Before going into details it would be helpful to look at events since the glaciers retreated

At the end of the last ice age, during which ice hundreds of metres thick had flowed down from the north, the northern cliffs of the Great Orme were left sheer and polished by the ice that had scraped past them. When, 16,000 years ago, the ice retreated it left behind an undulating plain of 'Till' - boulders, sand and clay, the remains of Scottish mountains that it had ground away and carried south. Sea level was over 35m lower and our ancestors would have been able to walk from the Great Orme to the Isle of Man, then a range of hills rising out of the plain.

For the next 8,000 years frost wedge action and other weathering processes eroded the northern cliffs creating great slopes of scree running down to the plain. Over the course of time they were cemented together as described. At the end of this period Mesolithic hunter gatherers who are thought to have inhabited caves and rock shelters would have witnessed changes that were about to take place. (See; 'The Hafnant Mining Area and Badgers Cave') Some 8,000 years ago rapidly rising sea levels were killing the forests of alder and oak that had become established on the plain turning the woodland glades into salt marshes. Great ridges of Till, the remains of which now form offshore shoals such as the Constable Bank, protected the marshes from wave action but as sea level continued to rise, the marsh peat and the remains of the trees, were buried beneath grey – blue clay deposited in salty estuarine conditions.

The arrival of seawater would have stopped the cementing of the scree slopes, as calcium carbonate is not deposited in those conditions. About 6,000 years ago there was a temporary reprieve as sea levels appear to have dropped a few metres allowing trees to take root in the estuarine clay. After this, sea level began to rise again, and wave action washed away the upper sand and clay leaving ridges and layers of boulders protecting the underlying Till in a process known as 'armouring'. (Brown.1997) Exactly when the sea started to erode the indurated scree along the northern cliffs is not known, though it was possibly in the past 2,000 years, but it has now almost all gone leaving only patches of cemented angular fragments in the intertidal zone.

Low Water Mark.

Figs 3 and 4.
There has been considerable erosion of the clay and scree below Fynnon Galchog where the beach is about 50m wide at low water on spring tides. At such low tides an ancient deposit of indurated scree is revealed at low water mark. This is being eroded into rather delicate structures, which are themselves being destroyed in storms. Tufa is not deposited in seawater, indicating that the deposit was formed during a period when the sea level was more than 12m lower.

It is possibly contemporary with the tree stumps and peat bed to be found at low water mark in Llandudno Bay 1.5 km to the East, for which there is one date of 8,000 C.14. (cal) years B.P.

The positions of these indurated scree deposits are most important as they enable an estimation of an earlier coast to be made - at least 50m out from the present one, giving a more gentle lower slope than at present.

High Water Mark

Figs 5. and 6.
At and within two or three metres above high watermark are several features, which could point to relatively higher sea levels within the past few hundred years. First are terraces possibly formed by the sea eroding scree slopes and

revealing beds of limestone, which are now several metres above high water. It could be argued that this effect has either been caused by some cataclysmic storm in the past, or by quarrying activities. On balance however, having observed the area in bad weather, and after examining more obvious quarry sites, it is felt that the first proposition - sea erosion during times of slightly raised levels - is more valid.

Secondly and perhaps more significant are the washed out bedding planes of Porth yr Helyg Cave (71) that are now, in places where springs are active, becoming filled with deposits of tufa. This would seem to indicate that the bedding planes in the limestone were washed out, or eroded, when relative sea level was somewhat higher. Subsequently a fall in sea level has allowed tufa to be deposited as well as formations more commonly associated with caves.

It is just possible that the springs that are depositing these formations came into being as a result of the driving of the Porth Helyg Adit. (73) While this cannot be totally discounted, these springs do appear to be on the same horizon as others which can be observed to the East and to the West of the formations within the bay of Porth Helyg.

Reports that sea going vessels owned by the Wynnes of Gwydir were taken up the river Conwy to Llanwrst could perhaps indicate that in the immediate locality of the Gt. Orme the relative sea level could have been slightly higher in the past 1,000 years. Today no vessel drawing more than 0.5m could be expected to approach that town. Interestingly Hubert Lamb in 'The Little Ice Age' suggests that world sea level could have been slightly higher in the 14th and 15th centuries. (Lamb.1982)

St.Tudno's Pathway.

Just to the west of Porth yr Helyg is St.Tudno's Pathway (58). Running down from St.Tudno's Church it now ends, in very dangerous conditions, at the top of a cliff. However it is felt that in the past there was a more gradual slope at this point that allowed the pathway to continue down to a landing place by the sea. This lower slope of indurated scree may have been eroded away, possibly not more than a few hundred years ago.

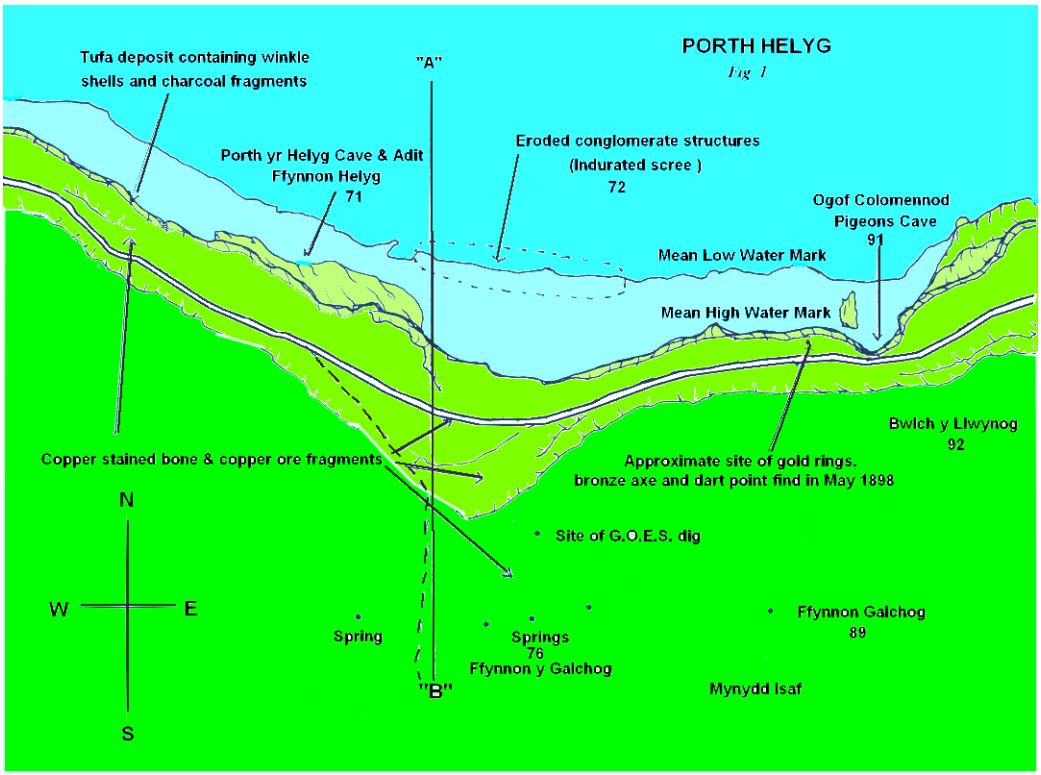
The existence of this pathway completely alters the way the area around St.Tudno's Church should be considered. Before 1830 there were no actual roads to the Great Orme, which was effectively cut off by the marshland of the Morfa Rhiannedd, access by land, it would seem, was along the beaches of the North or West Shores. The township of Llandudno is shown on maps and charts up to 1835 as being around St.Tudno's Church as the name implies: Llandudno / The Enclosure of St. Tudno. The site of the present Llandudno town was undrained marshland at that time. The extensive traffic to and from the Mines and Quarries of the Great Orme before 1850 was by sea. Large sailing boats from Warrington, Flint, Anglesey and Swansea would dry out on the beaches between tides for unloading and loading. Effectively this made the Great Orme a busy seaport difficult to reach from the mainland. A landing place or primitive harbour at the bottom of St.Tudno's Pathway would change the original Llandudno from an inaccessible cliff-top township to a very defensible port. Is it possible that loss of access to the sea was a contributory factor in the abandonment of the St.Tudno's Church area as a centre of population? The siting the church has been questioned before:

'*As to why a church should have been fixed in the 5th or 6th century so far from any known haunts of man, on an open windswept plateau, has never received a satisfactory explanation. The most likely one is that it was built to serve the spiritual needs of the people living on the plain where the sea now rolls, both on the north and south west sides of the Head.'* (Ashton.1920)
Ashton goes on to mention the possibility that there was a pathway down from the top of the cliffs by Hwylfa'r Ceirw (47). In fairness to Ashton it must be said that the lower part of St.Tudno's path is only really obvious, initially, from the sea, after which it is more recognisable on land.

From the landing, the Pathway would have led up the very steep slope by a series of hairpin bends running counter to the present hairpins. Reaching the top the Pathway continues up a gentler slope, before arriving at a large earth embankment, which it passes through at an angle as if it were part of a defensive system. It has been suggested that this embankment was once part of the enclosure around St.Tudno's Church – Llandudno, (Aris 1996). The embankment however does seem to be part of a larger system which could be prehistoric. Christian churches were often built on earlier religious sites.

A folk tale that a Giant and Giantess were buried to the south outside the Churchyard has been noted. (Hall.1804)

Another legend concerning St Tudno was that he had in his possession one of the thirteen 'treasures' of Britain – a magical whetstone. This had the ability to distinguish between brave men and cowards, for it would sharpen the weapons of the former, but blunt those of the latter. [Glazebrook. 1962] Another of the 'treasures' was the magical sword Excalibur, or Caledffwlch in Welsh. This association seems to further indicate the importance of this site in the distant past.



Sea level movements and coastline changes Figs 1 and 2

North South Cross Section at Porth Helyg

Fig. 2

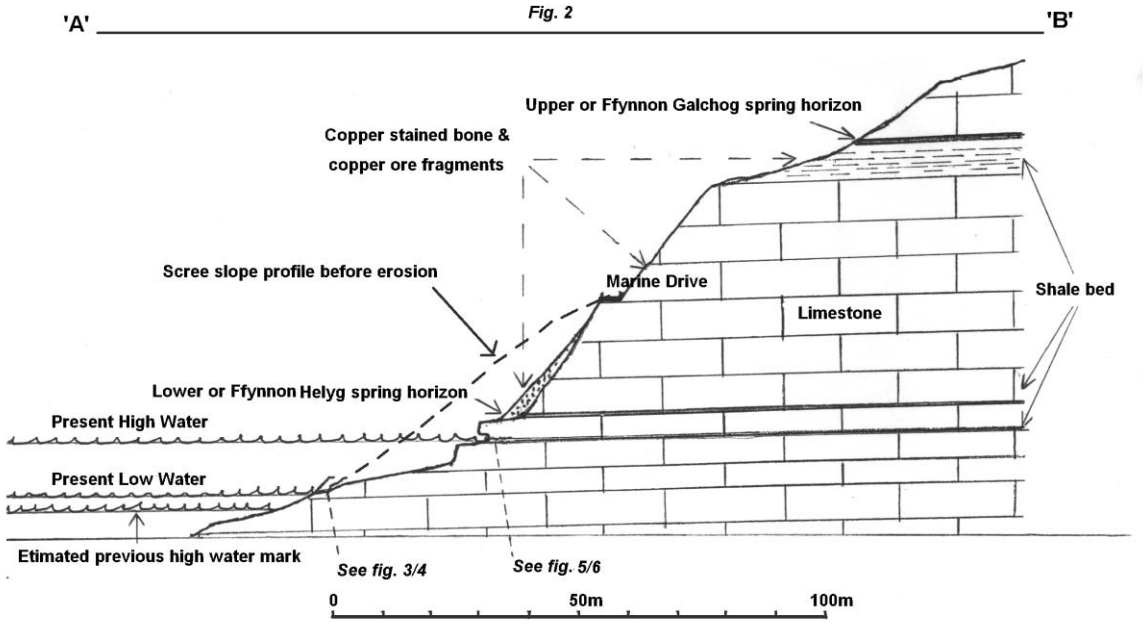


Fig.3

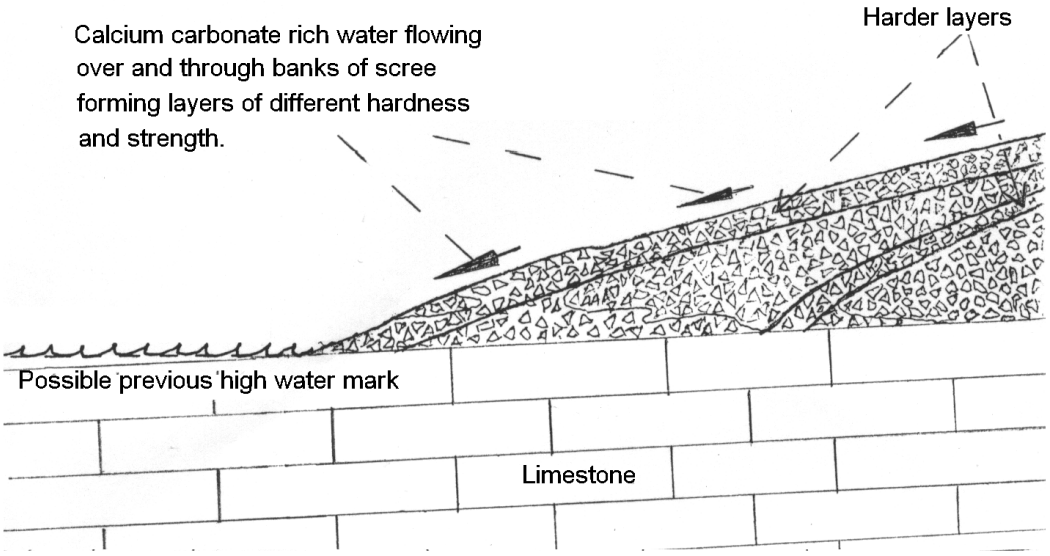

Calcium carbonate rich water flowing over and through banks of scree forming layers of different hardness and strength.
Harder layers
Possible previous high water mark
Limestone

Fig.4

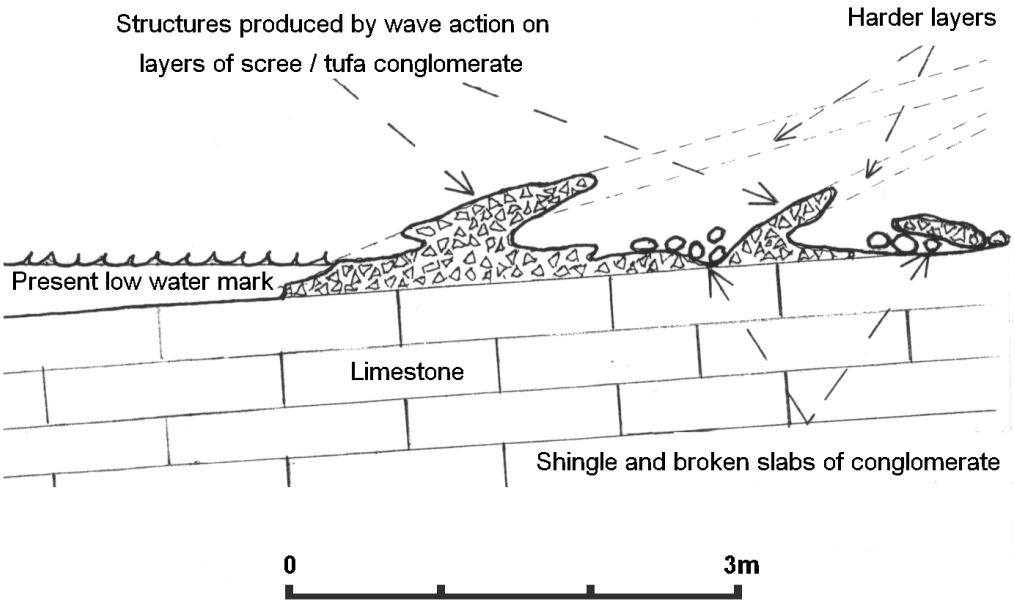

Structures produced by wave action on layers of scree / tufa conglomerate
Harder layers
Present low water mark
Limestone
Shingle and broken slabs of conglomerate
0
3m

Fig.5

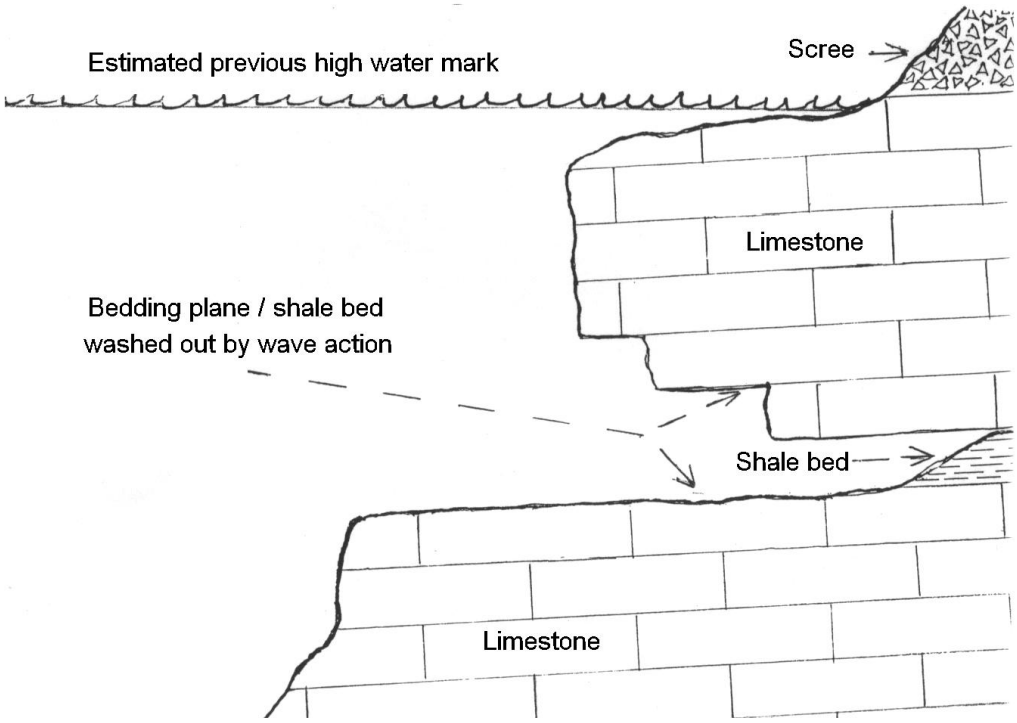
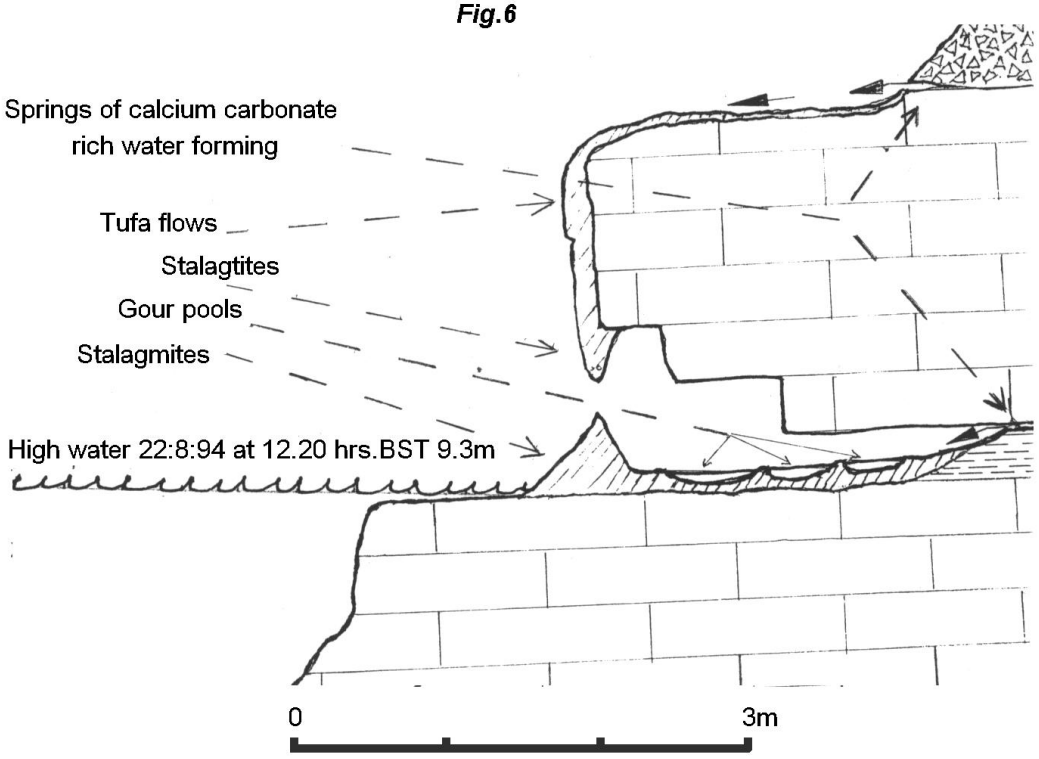
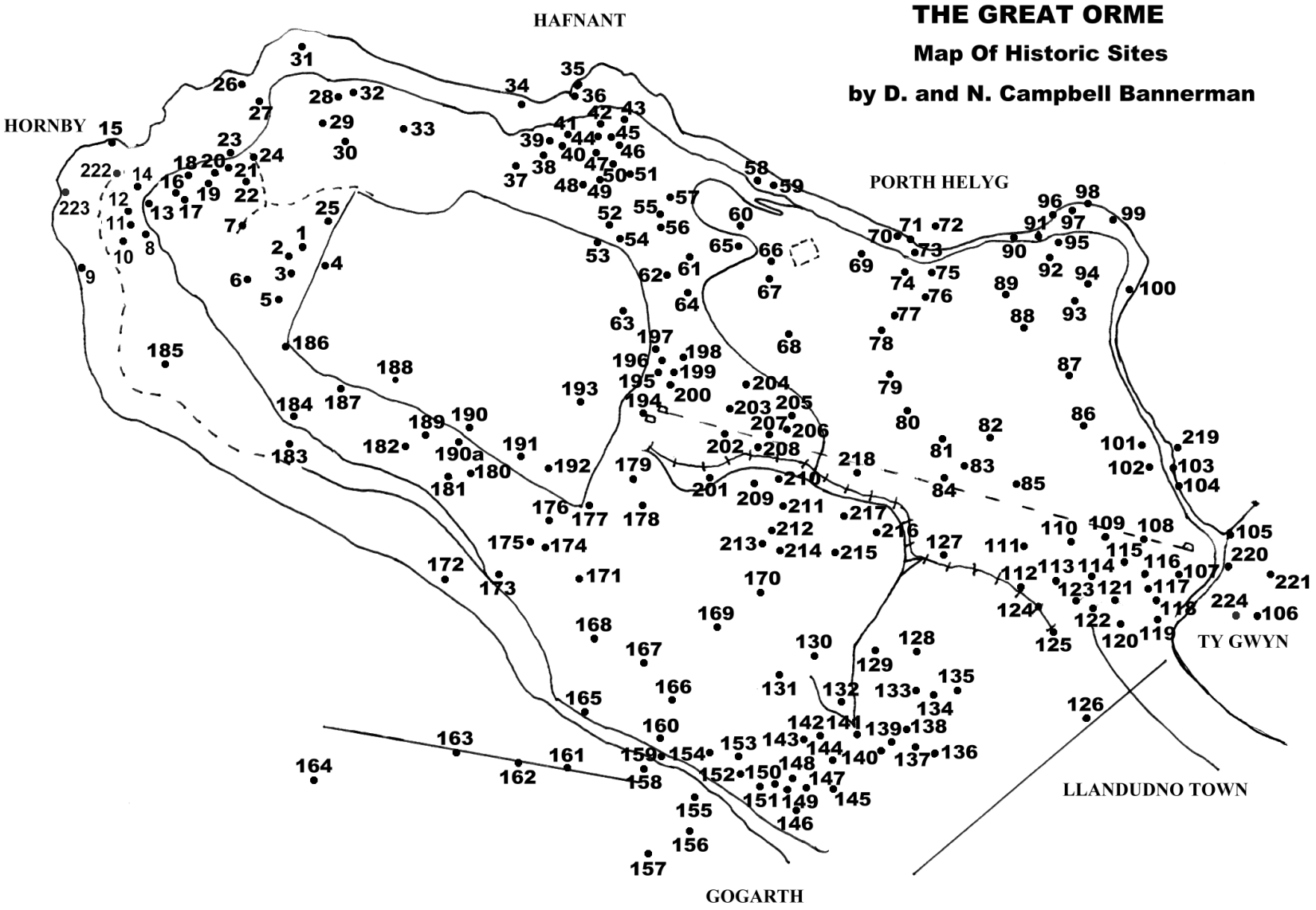

Estimated previous high water mark
Scree
Limestone
Bedding plane / shale bed
washed out by wave action
Shale bed
Limestone

Fig.6


Springs of calcium carbonate
rich water forming
Tufa flows
Stalagtites
Gour pools
Stalagmites
High water 22:8:94 at 12.20 hrs.BST 9.3m
0
3m


THE GREAT ORME
Map Of Historic Sites
by D. and N. Campbell Bannerman
HAFNANT
HORNBY
PORTH HELYG
TY GWYN
LLANDUDNO TOWN
GOGARTH

By Diane & Nigel Campbell Bannerman

A gazetteer of the mines, caves, quarries, historic and prehistoric sites on and around the Great Orme and Llandudno.

1.Large Stone Circle SH 7567 8386
Several sites have been previously recognised in this area namely:
SH 7561 8383 Hut circles and enclosure.
SH 7562 8378 Field banks
SH 7557 8373 Hut circle, above Creigiau Cochion?
These are within or very close to the large stone circle that is about 260ft in diameter.
A curved line of stones had been noted in 1995-6 after a gorse fire. Others too, had remarked on the feature, but it had been dismissed as a field bank. During the 1996-7 autumn and winter a programme of field walking coupled with very careful examination of maps and aerial photographs, was followed specifically to locate unrecorded sites. After inspecting the site and an aerial photograph taken by Coastal Command on 20th. January 1947, it was realised that the curved feature was a segment of a large circle, which had been partially robbed of its stone. This possibly occurred when the `Park Wall' was built in the 1890's. The surviving segment was perhaps, at that time, hidden by gorse. Visible on the same photograph but at the present time covered in gorse, tangential to the circle and almost parallel to the Park Wall is what seems to be an avenue running southwards for 60m. Slightly to the East and within the Park Wall another smaller circle appears as a crop mark'. Nigel Bannerman 30:12:97.

2.Hut circle and enclosure. SH 7561 8383. Situated inside near the rim of the large stone circle.

3.Field banks SH 7562 8378. Listed as such in the Great Orme management plan of 1973 they may be the rim of the large stone circle.

4.Circular crop mark. SH 7572 8382. Noted on the 1947 RAF aerial photograph. Possibly a henge.

5. Hut circle SH 7557 8373. Above Creigiau Cochion.

6.Cross ridge boundary. SH 7546 8373 to SH 7558 8379. Identified by Jo Jones in early 1997 possibly in the same system as [186] & [187]

7.Gun Sites. SH 8394 7550. Second World War artillery emplacement at the end of a concrete road, from the Marine drive, known as the Tank tracks.

8.Southern West Lookout trial. SH 751 839. [See also 9,10,11] A silvery metal ingot discovered here in the 1970's was traded in at the scrap yard.

9.Gunsite Adit, Cowboy mine. SH 750 838. So called because of the wood props at the entrance. Possibly connects with the West Lookout trials above. (13)

10.Run In Shaft SH 7514 8389. Possible connection with Gunsite Adit / Cowboy Mine [9]. [A.L.] Could also be connected to [11]

11.Middle West Lookout Trial SH 7316 8393. A 12m long passage with a minimum width of 0.5m running due North. 1.5m high at entrance, becoming a 2.5m high vein working. At 4m. in, a depression indicates a shaft in the floor. A few shot holes are present. This passage follows a 0.5mt wide vein of calcite/dolomite with specks of malachite that is visible in the cliff.

12.West Lookout Vein SH 7515 8396. A 10m long passage with a minimum width of 0.6m Running due north and dipping down 3m, a boulder obstructs the entrance. 1.8m high at entrance, becoming 0.4m high at the end. Traces of malachite and quartz crystals in calcite around entrance.

13.Northern West Lookout Trial. SH 7515 8398. An 8m long passage with a minimum width of 0.5m running due North. 1.5m high at entrance, becoming 1.8m high. At 4m in a shaft in the floor goes down 1.5m towards recent backfill. The roof of the passage follows a shale band, which, from small springs in the cliff to the right of the entrance, apparently forms a spring horizon. The passage appears to be following the same vein as [12] that is on a 7mt lower contour 20m. due South. Mineralisation is visible in the cliff.

14.Hornby Gully Top Entrance. SH 7518 8405 A 2m long passage with a minimum width of 0.75m apparently running almost due south. A 0.5m high entrance, it has been almost completely back filled. Mineralisation can be seen and this passage probably marks the Northern end of one of the Hornby / West Lookout veins.

15.Hornby cave. SH 7520 8420. Named after the wreck of the Brigantine Hornby. It's sole survivor, John Williams was thrown ashore from the bowsprit to the rocks in 1824 during the early hours of the morning of New Years Day. Somehow in the darkness he managed to scale the cliffs in a dazed condition and at five in the morning crawled into a mine smithy near the cliff tops. The miners doubted his tale until dawn broke and the remains of the brig could be seen. He forsook the sea and became a local copper miner. An entrance 20' high 15' wide leads to a 25' long cave [at low water] and a 40' high rift leads to the surface.

16.Ffynnon Gaseg. SH 7528 8404. A signpost marks a small spring.

17.Ogof Caseg. Mare's Cave. SH 7539 8408. 10m. from the road, a small chamber 3'x3'x3' with dirt fill on the left that could be removed.

18.Fynnon Caseg Ore Washing Site SH 7535 8405.Old verbal reports of signs of ore washing. [A.L.]

19.Cairn. SH 7541 8408. Near Ffynnon Gaseg.

20.Hut circle. SH 7541 8408.

21.Hut platform. SH 7545 8410. Hut circle settlement.

22.Tyllau Brwyn (named by GCPC) SH 7545 8408. The first entrance is in a small outcrop at the west end of the parking area, it is 1m high and 50cm wide, it closes in after 1.5m but a 10cm rift continues for about 3m. The second entrance is at the same altitude 10m further west, it is about 60cm wide and 30cm high opening up slightly and continuing for about 3m.

23.Barrow.SH 7544 8413. Destroyed during the construction of the Marine Drive.

24. Tank Tracks. A concrete surfaced road leading up from the Marine Drive to site of World War 11 installations. Also Implement find spot. SH 7550 8410. This somewhat arbitrary position has been given for finds reported in Arch. Camb. 1935, pp.202/3 under the heading `The Distribution of the Graig Lwyd Axe and its Associated Cultures. *`In a valley on the north western side of the Gt.Orme, displacement of turf disclosed a small industry resting directly on the bedrock and close to a small spring, a number of flint flakes and two or three worked implements, among which was a scraper made from a Graig Lwyd axe [identified by microscopic examination], a rubbing stone, highly polished, a hammer stone, well pitted and of the `limpet scoop' variety, and a very large round scraper fashioned from a fossil fragments of bone too small to identify, and many oyster shells.'* In a footnote the Graig Lwyd scraper is compared to one found in the upper estuary clays at Rhyl and the hammerstone is thought to be a type of fabricator associated with Mesolithic flints and sometimes with Neolithic implements. This is also the possible find spot of a stone axe mould.

25.Swallit hole. SH 7578 8399. Fluted hollow in the limestone pavement measuring 2.5 mt. across, 1.5 mt. deep. Possible pothole. *'The pavements are on the massive White Limestone of Late Asbian age, the equivalent of Loggerheads Limestone elsewhere. ... the pavement is on very pure limestone with less than five per cent insoluble residue. Local rumour has it that a stunning circular formation of clints was the result of a World War bomb, but in fact it is a natural feature formed by water running to a central point, gradually dissolving the limestone in its path. ... Limestone pavements hold great interest for biodiversity. Their clints and grikes create microclimates ancient woodland species to survive despite being surrounded by miles of grazed moor and grassland'* C.V.Burek & J.Deacon. `Earth Heritage' Countryside Council for Wales Journal, no.10 1998 p.19.

26.Hiding cave, Ogof Llech. SH 7550 8435. Reputed to be the cell of St.Tudno. The path to the cave has collapsed and is now impassable. Just inside the entrance is an octagonal sandstone wall (dia.2m). Lined with` very good quality masonry wrought in 1470' [according to Lord Mostyn in 1870]. The walls are now covered in wet moss and flowstone. Some of the graffiti dates to 1896 and 1901. There is a short continuation opposite with a fill blocked narrow rift. A small fresh water spring and a carving of a human face are near the entrance. Possibly used as a temple, a footpath connected it to Gogarth Abbey at one time. [Wm.Ashton `Evolution Of a Coastline' P.190, 1920.] During the 1920's a dentist, Mr. Hopper, often fished from `Hopper's Rock', while attempting to improve the path he uncovered steps already cut into the rock.

27.Ogof Gwylan .SH 7554 8426. A steep path leads down from the car park towards the sea; the entrance is 3m up a sheer wall in the second from the top limestone terrace.

28.Stone lines. SH 8428 7580. In plan two trapezoidal features of stones set in the ground similar to structures found in Europe belonging to the Neolithic Lengyal culture. They could also resemble Viking settlement remains such as are seen in other coastal areas of the Irish Sea. The larger of the two structures appears to have been subdivided towards the narrow end with remnants of an internal wall still visible. The Main Walls are now largely covered with gorse and heather, the extant stones are only one course high. The smaller structure is overlain in part by the foundations of a World War Two Nissan hut with associated generator hut base. [29] Recognised during the 1996/97 field walking by the Bannermans. Have also been compared to Manx and other Neolithic structures in which similar converging lines of stone with a line of burial chambers between form part of barrows. [Connection with [32]?

29.Hut foundations SH 7576 8421. World War Two radio / radar aerial site with associated Nissan hut foundations and generator hut base which in part overlie an earlier possibly prehistoric structure. [28]

30. Standing stone or Orthostat. SH 7582 8415.
This is one of many large stones on the north-western corner of the Great Orme that appear to have been placed upright or on edge.

31.The Lighthouse. SH 8444 7568. No longer in use. Now a private dwelling. When it was built it also became the Gt.Orme semaphore telegraph station [in 1859] taking over from the original on the summit.

32.Old quarry. SH 8430 7582 This quarry seems a little odd as the 2m. high face is extremely weathered, is it possible that it was the source of materials for the nearby stone lines [28].

33.Ffrith Ewigod Old Quarry. SH 7598 8422.

34.Ogof Hafnant. The Gulf cave. SH 7640 8428.

35.Sea cave. SH 7650 8435. Smugglers cave [Tom Stone.].

36. Sea cave. SH 7650 8433.

37.Hafnant Trials. SH 7628 8413.

38.Hut circle. SH 7640 8410. In the Hafnant area.

39.Badger cave, Ogof Pryf Llwyd. Ogof Tudno, SH 7640 8416. See ‘The Hafnant Mining area and Badgers Cave’ ‘The cave has four entrances- the largest on the right being 2.5mx2m high. A large passage from here that continues for about 8m. There are numerous small passages emanating at various levels. Back near the entrance a low passage extends to the left with a hollow sounding rotting fibre dirt floor. Again numerous small crawl passages lead off. The cave is an archaeological site and has yielded a hearth containing the bones of sheep, pig, hare, fox and fish. Miners have also been active here in the pursuit of copper ore.’ Description from Cambrian Cave Register.

40.Ogof Tudno Shaft. SH 7643 8415. Cutting into hillside, large amount of grassed over spoil running downhill. Beginning of the summer 1996 G.O.E.S members began to excavate workings above and to the right of Ogof Tudno, by 8.9.96 they had reached a depth of 37ft down a 6ft-diameter shaft that appears to be opening out to the North. Large rocks hamper further work.

41.Tear Fund trial (ref. Geoff David). Llandudno North Adit (ref.C.C.R.) SH 7645 8417
The 120cm high entrance closes down after 2m. There is a small hole in the floor covered in boulders. This can be descended by moving the boulders (replaced on exit) to drop into a mine level. It can be seen from within that the adit has had a wall built across it to prevent entry. Walking passage continues for about 10m. to a 6m. deep shaft in the floor. Scaffold pipes have been laid across the shaft to a continuation of the level beyond. There are a few small natural solution cavities in various parts of the roof. Geoff David working with a party from St. David's school dug out the entrance and named the trial after the Tear Fund charity.

42.Possible run in adit. SH 7655 8420.

43.Cairn.SH 7665 8420. Hwylfa'r Ceirw.

44.Vein working SH 7653 8411 This vein working in the top of the cliff has a spoil fan below it and in from the top of the cliff is a possible associated run in shaft

45.Possible run in shaft. SH 7656 8416.May be connected with Hwylfa Ceirw shaft. The Hafnant mining area.

46.Fire setting trial. SH 7657 8416. G.O.E.S. conducted fire-setting experiments here.

47. Hwylfa'r Ceirw Stone Rows. SH 7656 8409. Two parallel rows of upright stones running from the eastern corner of the Hwylfa'r Ceirw Enclosure, north to the cliff edge.

48. Hwylfa'r Ceirw Enclosure. SH 7651 8401. A rectangle of upright stones. South of Hwylfa'r Ceirw Stone Rows.

49.Trial. SH 7656 8404. Run in adit.

50.Field system. SH 7660 8410. Adjoining Hwylfa'r Ceirw.

51.Hwylfa Ceirw Shaft. SH 7667 8406. Ginged shaft, run in or possibly filled in, surrounded by spoil heaps.

52.Hut group. SH 7660 8390. Enclosed hut group north of Ffynnon Rhufeinig.

53.Ffynnon Rhufeinig. Roman Well. SH 7655 8386.
Ffynnon yr Llety Madoc [The well of Madoc's abode]
`At sometime towards the end of the 19th. Century ‘Fynnon yr Llety Madoc’-‘The Well of Madoc’s Abode’ was renamed ‘Roman Well’ [53] no doubt because of pronunciation difficulties for English tourists and local traditions that the water was used by the Romans, for washing copper Ore. Recently political correctness has demanded that it be sign posted as ‘Fynnon Ruffling’, the Welsh translation of ‘Roman Well’, and thus the original rather beautiful Welsh name is in danger of being lost.' [N.B.]

‘This well can be found on the road that goes across the Orme in the direction of the Lighthouse. Passing the hotel on the summit on the left we arrive at the enclosure wall of the golf ground, and after traversing the road for 160 to 180 paces we find a small recess in the wall where a quantity of water will be seen. It is evident that the spring has been tampered with, as the signs of a useful well are absent. On the flat ground to the N.E. side of this well unmistakable signs of habitation can be traced, and it is believed that they are the remains of the Abode of Madoc. Madoc is supposed to be Madoc of Gloddaeth, or his Father Madoc ab Iorwerth Goch of Creuddyn, who flourished in the 13th. Century, the Gt.Orme being his deer ranch. In support of this statement it is interesting to observe that this part of the Orme is called to this day Gwylfa'r Ceirw, viz. the watching place of the deer. It is also of interest to note that distinct traces of husbandry can be discerned on the ground in this vicinity. Besides, this was without doubt a Roman (?) copper ore washing well; many tons of copper slime have been carted down the Orme from this spot and shipped, and traces of the yellow stain of the copper washing is visible today.’ John Roberts. North Wales Weekly News 1907.

54.Hut platforms. SH 7670 8383. East of Ffynnon Rhufeinig. Excavated by Emma Wager, Sheffield University 1996.

55.Long Hut platform. SH 7674 8393.

56.Long Hut platform. SH 7674 8390.

57.Earthworks. SH 7675 8398. Ridges or track ways west of the Old Rectory.

58.St.Tudno's Pathway. SH 7705 8400.Traces of old pathway to beach.

59.St. Tudno's Pathway Spring .SH 7708 8400

60.Earthworks.SH 7697 8390.Earthworks can be seen to extend east and west.

61. Long Embankments. Visible on Coastal Command aerial photographs taken 20th. January 1947, almost totally destroyed by graveyard extension but still visible by its Southeast corner.

62.Long Hut platform. SH 7675 8375. South of cemetery.

63.Small Quarry. SH 7663 8364.

64. Possible Stone Avenue. SH 7678 8374 to SH 7679 8360. Leading from south side of graveyard towards the Summit.

65. St. Tudno's Church.

66.Ffynnon Tudno. St.Tudno's well. SH 7726 8378.
`This Ancient well is situated near St.Tudno's Church. It can be found a short distance to the East from St.Tudno's, it is also somewhat lower down on the sloping ground than the Church. The natives considered the water of this well of

good quality and it was much used. The masonry about this well looks very ancient and quaint and was evidently put there by a practised hand; on each side of the well a small niche has been made in order that a small pitcher can be placed which was used to bail the water to a larger vessel. Being in close proximity to St.Tudno's Church, and being known by the patron Saints name for generations, it has undoubtedly a connection with St.Tudno's Church, and its water has been probably used in the Church for religious purposes for many centuries.' John Roberts. North Wales Weekly News 1907.

67.Trial. SH 7705 8376. 1845 mine entrance.

68.Ffynnon Powel. Gwaith Ffynnon. SH 7712 8346. Legend has it that Mr.Powel who was not a native of the Orme was refused water one dry summer for his farm by his neighbours. As he was a humble but righteous man who refused to be abusive to them for their lack of kindness, the Good Lord took pity on him and caused a spring of sweet water to burst forth from the ground by his farmstead. [T.Parry]

69.Trial. SH 7733 8381. Possible trial with spoil heap below.

70.Midden SH 7726 8392. Fragments of charcoal with winkle and other marine shells embedded in tufa.

71.Porth yr Helyg Cave SH 7746 8380. A very low washed out bedding plane going back 2-3m. Which contains stalagmitic gour pools formed by one of the calcium carbonate rich springs of Fynnon Porth yr Helyg. SH 7746 8380. Several springs are to be found at this location that appear to run quite strongly all year round.

72.Indurated scree SH 7755 8389. These formations are only visible at Low Water Springs. See ‘Porth yr Helyg’

73.Porth yr Helyg Drainage Adit SH 7747 8380. Little is known of this important adit which is reported to be 150 fathoms/ 274m long and running in a southerly direction. It was probably driven in the late 1840's to de-water the area around Pink Farm where there are traces of old workings. [78] [79] [80] [218]. Edric Roberts has linked this adit with an anecdote, related to him by the Mostyn Agent Mr. Hillier, to the effect that Colonel Mostyn walked through the Great Orme by way of the Pen Morfa Adit and the Porth Helyg Adit. In the 1980's the entrance to the adit was in an unstable condition and following an incident, when a local person was trapped for a time, an unknown person apparently brought down the roof with a charge of explosive.

74.Porth yr Helyg Horse Trough SH 7743 8374. Fed by springs further upslope whose water was collected in a dam and piped down in a 4-inch cast iron pipe.

75.Prehistoric Waste Tip. SH 7745 8373. The torrential downpour on June 10th. 1993 revealed, below the Fynnon Galchog, what appears to be a prehistoric waste tip, consisting of crushed dolomite, chert, particles of malachite and azurite, and chips of copper stained bone similar to those found in the prehistoric mines.

76.Ffynnon y Galchog SH 7753 8365. Lime Well. Can also be translated as the washing well. Possible Bronze Age mineral processing site. There seems to be some confusion here with Fynnon Galchog [89], which is the `official' Fynnon Galchog. It is this [76] well or, what would better be described as a number of intermittent springs, that deposit a whitish lime concretion or tufa, where evidence of ore washing has been found. To date no excavations have taken place at the `official' well that flows steadily all year round.

77.Pink Farm Spring. SH 7742 8361.

78.Suspected Mineshaft. SH 7739 8357.

79.Trackway.SH 7740 8345. Pen Y Bwlch.

80.Bannerman's Vein. SH 7745 8334 to SH 7745 8340. Referred to by this name in N.W.W. News, June 93. Shaft revealed in 1993 flood, filled in shortly after. Vein runs north towards Porth yr Helyg. Pieces of chert with malachite adhering to them were found after the flood. The possible source of similar material found at Fynnon y Galchog washing floor. Copper stained bone fragment found on path 1.12.94. [73.]

81.Cairns.SH 7754 8325.Two cairns at the edge of Roft Quarry.

82.Feature.SH 7768 8326.May be natural. Gorsedd Uchaf. [Eng. The Upper Meeting Place]

83.Cave SH 7761 8318. Small square quarry, open one side with cave in opposite wall to North. Back filled with several possible crawls off.

84.Roft Quarry SH 7755 8315. Craig Roft Sandstone found here. This quarry was also used as a dump for spoil from the Great Orme Mines site.

85.Wyddfyd trial and shaft. SH 777 831. A short adit leads to a near vertical shaft. The original floor of the adit is covered with loose rock, mainly from early excavations by Billy Davies and co. Excavations recommenced on the 12th September 1993, by Dave Flowers, Eric Sellors and Steve Lea. This work assisted by a temporary lifting wheel and bucket reached the solid base of the shaft at 4.5mt below the adit floor, confirming this to be only a trial.

86. Billy's Wall SH 7798 8330. Recognised by authors as a cross ridge boundary. Similar to structures found in the Cleveland hills. May be connected with 87.

87.Burial chamber. SH 7795 8341. [Possible.] Pen Bwlch. A burial chamber is reported to have been located at this point, perhaps linked in the same ritual landscape as the nearby cross ridge boundary known as Billy's wall. However another position for this burial camber is sometimes given and this is shown on the plan as 93. SH 7796 8366. There is no visible trace at either position.

.

88.Hut platform and field system. SH 7780 8356. Mynydd Isaf.

89. Ffynnon Galchog. SH 7775 8367

[The limey well] " This well is found on the flat ground below Pen-y-Mynydd farm to the N.E.; The water of this well was considered very good, and it was a great favourite among the old villagers, who thought the water was excellent for young children, indeed this water has been carried in bottles away to other places, believing it was beneficial and helped to develop good teeth and strong bones in children. There is no doubt that this well was used by the Romans as a copper washing place. The Llandudno copper miners carried the water to the mouths of their shafts in order to wash the copper ore, but the Roman way seems to have been to carry the ore to the wells to be washed. On the flat ground near this well many years ago scores of tons of copper slime was carted down the Orme and shipped to the smelting works. This slime was the washings of the copper that was let to run on the surface of the mountain, and being left for a period was formed into semi hard material. Distinct traces of this material can be seen unto this day. This well has never been known to go dry even on the occasion of great drought. There is an old story connected with the well. A maiden and her brother from the village went to Ffynnon Galchog for water - it was winter - and in the twilight of the evening they had filled there cans and were retracing their steps home again. All at once they both observed what they believed to be a man coming to meet them. He was dressed in the garb of a gentleman of those days: grey breeches, swallow tailcoat, red waistcoat, high Blutcher boots with red tops. They both stared for some time, when suddenly he commenced to whirl around, he then took the form of a pack of hay, and it whirled and rolled until it rolled over the Orme and into the sea. Sometime after a great fish was caught in the bay and a roll of hay found inside. It was believed that it was the same pack of hay that was seen rolling down the Orme from Ffynnon Galchog." John Roberts, North Wales Weekly News.1907

90.Small Hoard. SH 7780 8383 Gold earrings [?] bronze palstave and bronze dart point found behind boulder by two boys in 1898. [H.Savoury. Arch Camb. 1958]

91.Pigeons cave. Ogof Colomenod. SH 7784 8384. A fisherman's path leads down to a level platform 10m above sea level. A ledge continues round overlooking the small bay. The overhang is about 30m wide, 13m high and 13m long floored with shingle. A climb down a 4m shaft to a small chamber with a 4m drop through a hole to sea level on the right. On the left there is another excavated 1m deep shaft. This was discovered by GOES in 1986 and dug to a depth of a few metres before it flooded. It has since been filled in. To the right of the shaft a level goes southwards for 30m with the passage gradually lowering to a stoop. The level is floored with sand and shingle. Back at the top of the shaft the ledge continues until it peters out and a traverse regains the ledge further on near another mine level. This is about 10m long and curves to the right. From this entrance a 3m drop lands on the beach below.

92.Bwlch y Llwynog. SH 7791 8379. Eng.- 'The Pass of the Fox' a very steep gully that would present a problem to a goat never mind a fox!

93. Burial chamber SH 7796 8366 [Possible.] See 87.

94.Mound. SH 7800 8367. May be natural, Gorsedd Isaf.

95.Lloches yr Arf. SH 7792 8382 .A shallow rock shelter about 3m high, 2m deep and 3m wide. Dug during the 1970's by Mel Davis, all of the fill material has now been removed. Various archaeological remains were discovered. Cave and adjacent overhangs possibly destroyed during the making of the road.

96.Pigeons Cave Quarry stone chute SH 7790 8391. A chute cut in the cliff down which large blocks of limestone were lowered onto vessels moored below. See 'Quarries'.

97. Pigeons Cave Quarry SH 7794 8390 To the east of `Pigeons Cave' [91] on a broad ledge there is evidence of limestone extraction which took place during the building of the Cob, the Telford suspension bridge, 1826, and the Stevenson tubular bridge 1848, at Conwy. See `Quarries'.

98.Mainc y Stewardiaid - The Stewards Bench SH 7799 8395. A cliff ledge, just above high water mark. `The tradition is that, when the stewards of the House of Gloddaeth had been found guilty of an offence against the tenantry, it was custom to sentence them to sit on this bench naked during one, two, or more tides, according to the enormity of the offence committed, on cold days or nights, when the wind should be blowing from the north or north-east, and when the waves were certain to wash over them. The tide did not rise sufficiently high to drown the culprits. This tradition is recollected, with the best results to the steward and the tenantry, and for a great number of years the best of feeling has existed between them.'[Williams]

99.Dutchman's Cave. Ogof Ellmyn. SH 7811 8394.

100.Ogof Haner Dydd. Eng.-'The Midday Cave.' SH 7834 8376. It was said by boat trip skippers, while pointing out the wonders of the Orme, that at 12 noon on the 21st March and 21st September the sun shines directly into the mouth of this cave. This is doubtful as the cave faces east, and an observation made on the 19.1.1998 at 0910hrs GMT, revealed that at that time the sun was illuminating the interior of the cave. It is realised though; that to tourists being taken for a boat ride the 'Ten Minutes Past Nine Cave' does not sound as good as 'Ogof Haner Dydd'

101.Rock Studio SH 7813 8324. Quarry.

102.Cave. SH 7815 8319.

103.Ty Gwyn Beach adit. SH 7822 8317. The adit is driven through a fissure inclined to the right a few degrees off the vertical. At the entrance over a dozen stemple holes can be seen in the left hanging wall, also some larger holes which may have been part of a sea defence system. Clearance work started in the spring of 1992 from the entrance where several weathered steps cut into the rock were covered with loose rocks to protect them. Excavations soon exposed the original 19th century floor at the entrance; this was followed as the base of the excavation into the adit, rising at a slight gradient. Work ceased in May 1993 at a distance of 21.8m from the entrance with a 1.8m working face under an area of broken rocks. A temporary-working gate was fixed at this time at the first left-hand bend of the adit. An estimated 40 tons of material was removed by wheelbarrow, dug often with bare hands due to the glutinous clay.

104.Toll Gate trials. SH 7823 8313.

105.Llandudno Pier SH 7818 8273 to SH 7860 8328. Built in 1875 for Victorian holiday makers to promenade along and to receive pleasure steamers from Liverpool and the Isle of Man. Piers and steamships were the forerunners of today's airports and passenger jets. They allowed large numbers of holidaymakers to be quickly transported in relative comfort to fashionable resorts.

Building a pier had the same effect for a 19th century Welsh resort as building an airport has had for Spanish coastal villages such as Benidorm. Cruises departed here for the Menai Straits and Anglesey, to be welcomed back by band music that was also much appreciated in wartime, by convalescing soldiers ashore. Occasionally after dark the music was also appreciated by the crew of a First World War German U-boat lying quietly on the surface just off the end of the pier with its hatches open.

During a Conservative Party conference, delegates were strolling on the pier, the selection of a candidate for East Kent was being discussed when someone said. `What about Margaret here?' Mrs. Thatcher accepted on the spot and some time afterwards became a Member of Parliament for the first time. [That part of the pier has since been replaced]

Also remains of First Pier SH 7839 8285. The First Pier, construction of which began in 1858, was built to take shipping and was to have been one of the first moves in making Llandudno into a commercial port serving Ireland. This was perhaps a slightly vain hope as the railway link to Holy Head had already been built in 1850. However plans were drawn up and an imaginative engraving exists that shows the railway terminus in North Parade where the Cenotaph now stands. An 1853 act of parliament permitted a railway to be built within 5 years and a pier within 8. It would seem possible that a section of railway and a pier were built at the last moment to 'stake a claim'. A photograph taken in 1859 shows what appears to be a rather flimsy structure without longitudinal bracing between the cross braced piles. The Old Pier was badly damaged in the terrible storm of Wednesday 26th October 1859 which wrecked the Royal Charter at Moelfre with the loss of four hundred and fifty nine souls. The following eye witness account is from the Caernarfonshire and Denbigh Herald of the 29th October 1859;

'After breakfast I got on my 'dreadnaught' and prepared to face the weather, to witness the effect of the gale during the 'last quarter flow' and the 'first quarter ebb', which I expected would cause great damage around the bay, especially to the pier. I had not to wait long before it began to show its powers. At half past nine o' clock the storm raged with great violence, with a very heavy sea running direct into the Bay, from the N.N.E. At a quarter to ten o' clock part of the Railway, with a large portion of the Roadway of the New Pier erected this year, was carried away by a heavy wave; and shortly after this, about ten o' clock, one grand wave completely swept over the pier from one end to the other, and which for a second or two was completely concealed from view and at the same moment struck the timbers with such violence as to cause a report like distant thunder, and to shake the earth under my feet at a distance of nearly quarter of a mile.

In another moment, piles, thirty feet long, sprang with great violence into the air, and the sea had made a breach through about one-third of the pier. About high tide another wave swept over the in-shore portion, and carried away one third more, with equal if not greater force. The oldest man here says that he has never witnessed a more severe gale in this quarter. I have just returned from viewing the effects of the gale now that the sea is out, which is dismal indeed. The whole beach is covered with wrecks, and the Esplanade with hundreds of tons of shingle and large pieces of rock, which will cost some hundreds of pounds to repair. There is a vessel at this moment laying at anchor, about four miles from shore, without masts or rigging, with two men and a boy on board and we have no life boat or any craft fit to go out to them.'

While researching the general area of the First Pier in 1999, where there are also the remains of fish traps, it became apparent that considerable remains of the First Pier are still in existence. Furthermore photographs taken later in the century showed it still standing. This was completely contrary to accepted thought that held that it was badly damaged in the 1859 storm and demolished soon after. I consulted with Ron Williams and Bob Barnsdale and it was soon shown that the First Pier was repaired, and continued in use, until after the present pier was built in the 1870's. The deck of the First Pier was slightly lower than the present pier, which was built across it, and it seems that the First Pier was used to land materials for its successor.

106.Clawdd yr Gorad. / 'Dyke of the Fish Weir'. SH 7830 8285 to SH 7845 8270. This fish trap appears on an Admiralty chart by Lieut. Chas.Robinson, 1835, off the coast between Holyhead and Rhyl, but is not named. It would appear to been a large Type 7 'S' Fish trap with a Type 8 curvilinear modification. It may have also made use of part of the structure of an earlier Type 5 rectilinear fish trap, Gorad Banners Ddu, [221].

107.The Wine cellars. SH 7822 8282. Two walled up undercuts excavated by G.O.E.S. in the late 1980's. 6'high by 10'long, partially bricked across then continues for another 10'. Used as a wine cellar by two houses subsequently demolished

108.Happy Valley trial. SH 7813 8296. Halfway up tree covered slope, a hollow with overgrown spoil heap on downhill side. Possible run in trial or lost Ty Gwyn shaft referred to by C.J.Williams in `British Mining No.52.' Page 27. Subsequently dug 1997-98 when a shaft was excavated to a depth of 45 feet from where a 6 foot high passage ran 30 feet to the North West at the end of which were found the remains of a small dog or fox.

109.Elephant's Cave. SH 7804 8297. Chwarel y Fach. Happy Valley Quarry ceased work in 1897. This cave / limestone mine backs on to the two houses Ardwy Orme and Glain Orme. Somewhere within it was the 'Builder's grave' a slit in the ground leading to a second cavern, which was collapsed by Dante Roberts the then owner of Tyn-y-Coed quarry. In the 1970's the Elephant Cave dig that was in the right hand wall of first cavern revealed a dog leg passage leading to outside the cavern. It was named `Brenda's Stream Passage' after the seven year old daughter of Dave Jones [1946-1997] who with his brother Keith, Billy Davies, Keith Griffiths, and Duncan James were beginning the explorations which led to the paper by Duncan that has led to so much more research and discovery. Dave Jones put forward a theory that 'The Builders Grave', 'Brenda's Stream Passage', and other signs of natural cavities, perhaps also including `Ogof Hanner Dydd' [100] were part of the `Elephant Cave System'

110.Hillfort. SH 7790 8295. Pen Y Dinas. This site has never been comprehensively studied. It has been ascribed to the Iron Age due to similarities with Iron Age Coastal Sites around the Irish Sea. The excellent natural defensive position that it occupies, has existed since at least the last Ice Age, and could well have been used earlier. This ideal fortress site is only marred by an apparent lack of water, but has this always been the case? Around the top of the saddle which connects the Pen y Dinas promontory to the Gt. Orme there are traces of springs that may well have dried up when the 18th. /19th. century mining operations lowered the water tables. Approximately oblong in plan being some 230m. North to south and 125m.east to west. Cliffs provide defence to the east and south while ramparts can be traced on the steep northern and western sides. Along the western side a blackthorn overgrown trackway leads gradually upslope to just before the southwestern corner where it passes through the ramparts. Estimates of the number of hut circles vary from 5, [R.C.A.H.M.] to 65. [Jones S.G.] In 1993 the Gwynedd Archaeological Trust, the results of which are as yet unpublished, conducted a contour survey, which included ramparts and a number of possible hut circles. [Oct.1997] [`An Inventory of the Ancient Monuments in Caernarvonshire Volume 1: East' 1956 The Royal Commission on Ancient and Historical Monuments in Wales and Monmouthshire: 114, no.367]

[Jones S.G.1994 `Deciphering the Metallic Arts of the Bronze Age; A Proposed Criteria for the Identification of Ore-Washing Sites Associated with Early Copper Mining in Wales.' unpublished MSc dissertation. University of York: 50]

111.Tyn y Fron shaft. SH 7775 8292. Prospect Terrace. A large shaft of almost 300' depth. During the mid to late 1830's the Ty Gwyn tramming adit was driven 534 yards from the North beach to join the Tyn y Fron shaft. Records indicated that the shaft had failed to connect with the Ty Gwyn promenade adit by a few yards, but in 1986 G.O.E.S. proved that the connection had been made. A drainage level had also been driven but this had been blocked by the construction of the pier pavilion in 1884.

112.6,Ty Gwyn Rd. SH 7777 8282. The gardener was said to have fallen down a shaft at the bottom of the garden, which was then filled in, presumably after the gardener had been retrieved. Further up the slope, during the digging of the foundations of a new house in 1996, Mr. and Mrs.Howells found midden bones, also the top half of a human skull, thought by the police pathologist to be very old. The skull, which is deformed, is believed to be from an elderly female, and is now stored at Llandudno Museum.

113.Y Craig. SH 778 828. Quarry.

114.Kendrick's cave. SH 7798 8281. Upper and lower caves. Palaeolithic human remains discovered in 1879. Some discovered items on display at the Great Orme Mines Ltd., and at Llandudno museum. The human remains consisted of four incomplete skeletons from three adults and a child, and have recently been dated as being 14,000 BP, 12,000 BP and 5,000 BP by Jill Cook of the Quaternary department of the British Museum, at a lecture on 10:5:97 organised by N.Bannerman.

115.Ty Gwyn incline. SH 7807 8288.

116.Hole in the ground. SH 7812 8285. Excavated by Billy Davies 1993.

117.Southcliffe Hotel, Hill Terrace. SH 7815 8281. A shaft in the kitchen now filled in. Source was Les Willis, a builder. Situated directly above the Bryn y Mor hotel, this may be part of the Ty Gwyn mine system.

118.Bryn y Mor hotel. SH 7812 8278. In the basement kitchen cupboard, a bricked up mine entrance, it may be part of the Ty Gwyn mine system.

119.Ty Gwyn adit. SH 7817 8273. 1835-1853. Ty Gwyn mine company changed to the Tyn Y Fron Company in 1846 produced more than 100,000 tons of copper ore. Mine offices, workings, engines and two shafts were located in the vicinity of the Empire hotel; the workings ran down towards the beach and upwards in the direction of the Tram Station. The entrance portal was blocked when the Pier Pavilion was built, but in 1965, while constructing a sub-station, a J.C.B. bucket struck stones. Tom Parry realised that these formed the ginging of the roof of an adit. By removing some keystones he gained entrance to the passage below, but was instructed to fill in and block the hole. He wisely took bearings before doing so.
In 1986 the Great Orme Exploration Society entered by digging down 15 feet beyond the blockage. Access is now possible by means of a manhole in the gardens above. The level runs straight to Tyn y Fron shaft, a distance of 534 yards. Rubble and infil now blocks the connection. A short way in from the entrance, in the walls, can be seen evidence of two glaciers meeting. Crossing the adit from East to West is a smaller level whose portal was somewhere under the Grand Hotel, it leads to the Ty Gwyn shaft and back into the tramming adit. This level also served another shaft to the West of the Empire Hotel, and possibly the Tram Station well no.125.

120.Mineshaft SH 7810 8273. Under Old Police Station cells, Court St. Reported Aug.1994 by Charles Judge, opened and closed during alterations. Possibly connects with walled off passage in the Ty Gwyn mine.

121.Ty Gwyn shaft. SH 7805 8276. Capped shaft approached from the Ty Gwyn adit, measuring 12' across and flooded to sea level, which is aprox. 10'below the adit and 70'below the brick domed cap. The water is crystal clear, of a beautiful azure tint, and of unknown depth. What is possibly pumping gear can be seen about 30' below the adit. The water rises and falls up to 4 feet about 2 hours behind the tide.

122.Empire West Wall Shaft SH 7799 8278. Shaft reported in this alley may actually be under joiner's shop.

123.Tan yr Ogo Terrace Shaft. SH 7791 8279. Memory of shaft here described to A.Lewis by elderly Tan yr Ogo resident.

124.Spring. SH 777 827. Set into the wall besides the Tram tracks, this may have been one of the springs supplying the Victoria well. It is now dry due to recent drainage work.

125.Ffynnon Victoria. Victoria well. Tram Station well. SH 7786 8270.
In 1957, in the road in front of the tram station, an old shaft that had been used as a well collapsed, it was 12' in diameter and at least 130' deep. Council workmen discovered that the shaft had been covered by a domed brick construction, probably placed over when Church Walks was built. This is very possibly the second Ty Gwyn Pumping shaft as it is similar in size and method of closure as the Ty Gwyn shaft. [121]

`This well was situated on the western side of the now Orme Tram Station. It is a deep well and had a copious supply of water. At one period in the history of Llandudno this well supplied the water for the community. We find the following record in the proceedings of the old board of commissioners at a meeting held September the 24th 1855: "John Hughes was engaged at 15s per week until the 1st of November next to pump water from the Victoria well for the public, to pump water for three hours in the morning and the same in the afternoon. 2s-6d to be allowed for an extra man on Saturday to help him". We understand that the above mentioned person was John Hughes, Cambria, Who was well known for many years as a town porter. It may be observed that this well possessed a strong spring of water. It seems more than probable that the same spring supplied a well, which the town has much used, just behind London House, Old Road, and also a well which was situated just at the rear of Siloh Chapel [126], called Ffynnon Tyn-y-pwll. Therefore this spring supplied three wells. About the last named were distinct traces of Roman copper ore washing, as from about the site of Siloh Chapel years ago many hundred tons of copper slime was shipped. Connecting this with the fact that a Roman (probably Bronze age) burial ground existed in a mound which formerly stood on Madoc Street where it is believed some of the Roman mine overlookers were buried, it may reasonably be inferred that a large Roman copper depot at some remote period occupied the land where the above - mentioned chapel now is erected.'(Ref.4)

126 Siloh Chapel SH 7790 8245 Possible prehistoric ore washing site Hundreds of tons of Roman copper slime removed from here in 19th century. [John Roberts N.W.W.N. 1907] Garden walls in this area have been examined and possible hammer and quern stones were identified but nothing positive was found.

127.Ogof Deuben. SH 7753 8293. Cave open at two ends.

128 Area of ridge and furrow SH 7755 8260 These features which cover most of the upper miniature golf course were revealed by morning sun melting frost January 1997 and were photographed.

129.Tyn y Coed. SH 7733 8266. Filled shaft was sunken 67 yards in 1829 by the New Mine Company. Now under a housing estate.

130.Anglesey Terrace Trial SH 7719 8259. Open cut in fault with mineralisation. [A.L.]

131.Pen y Ffridd. SH 7706 8258. First sunk in 1830 by the New Mine Company. Possibly a manganese mine.

132.Tyn y Coed Quarry. SH 7724 8251. Affini Philipsi beds see ‘Quarries’

133.Tower trials. SH 7743 8252. Two entrances with broken bat gates.

134.Haulfre trials SH 7745 8252. A short level, its entrance now walled up, leading to a blind 80-foot shaft, in Haulfre Gardens.

135.Haulfre Cafe trial. SH 7757 8252. Access, with permission, through cafe kitchen. The cafe is situated in Haulfre Gardens SH 7750 8250.which at one time was famous for its sub tropical plants.

136.Shafft yr Odin. SH 774 823. Eng.-‘The Lime Kiln Shaft’ Capped shaft in the grounds of the new St.George's school. Now a decorative well, it was used as a well when the place was a nursery and was possibly associated with implied Lime Kiln which could have been near to the Quarry [230] where it is located. An original village well. Ref.Thos.Rowlands.

137.Quarry SH 7747 8235. Now the Site of the New St.George's School. In this quarry is Shaft yr Odin [136] ‘The Lime Kiln Shaft’ which seems to indicate that the quarry supplied a lime kiln at some time. Lime was used in mortar and this could have been an important site in the past.

138.Run in shaft. SH 7740 8240. Just through the gate into Haulfre Gardens, possibly another entrance to Five-Entrance Mine.

139.Five Entrance Mine SH 7739 8239 .In a small cutting, a short constricted working. Spoil tips run down to Invalids Walk, or Lovers Walk, as it was once known.

140.Run in shaft. SH 7737 8238. Possibly another entrance to Five Entrance Mine. [Billy Davies.] Hammer stone found by Steve Lee.21: 7:94.

141.Corkscrew Cave. SH 7727 8240. Fragments of human bone discovered by Geoff David. It has two openings; a low crawl and twists to the right as you move round to the smaller opening.

142.Bedding Plane Cave. SH 7716 8240. The elliptical entrance is about 3m wide by 1.5m high. Within a few feet the largish entrance lowers at a restriction before entering a 1m high by 3m wide passage. The passage is floored with dry mud, becoming glutinous after 10m, and there are signs of digging activity. The passage continues with similar dimensions for another 10m.

143.Ogof Defaid. Lady Butler's cave, Sheep cave .SH 7725 8240.
The cave is a rock shelter formed by the collapse of some limestone bedding planes; it basically consists of some gaps between the fallen blocks and is about 2m long by 1m high. A couple of other cracks link up with the cave.

144.Zig-zag path SH 7720 8223. Victorian construction on top of, perhaps ancient, pathway to the top of the Orme.

145.Agen Glandon. (Ogof Abaty named by GCPC) SH 7720 8228.The entrance is about 120cm wide x 260cm high reduces rapidly to a width of 30cm before entering a small chamber 150cmx150cmx3m high. The walls are covered with small nodules; it has a dirt floor and contains some rubbish. From the chamber two narrow parallel rifts continue. One is about 10cm wide and continues for another 5m, the other is 15cm wide but choked with pebbles after 1.5m. On the other side of the knoll there are a couple of small holes that probably link up with the rifts. Played in by Tom Parry and friends when children.

146. Penmorfa adit SH 7710 8220 The gated entrance is situated in a cul-de-sac on the Westshore. Completed in 1842 to drain flooded workings in the New Mine, in the centre of the Orme, it is estimated that a body of water 198' deep was drained from the workings, it lowered the water table generally by nearly 400'.
`. *The drainage level is 874yds long, begun in Feb 1834 and driven by twelve miners working alternately day and night. On 14:10:1842 when less than six feet from the old workings, the miners drilled three holes through, releasing a flow of water which burst through with great velocity in a stream of not less than 396 gallons per minute, and ran through the tunnel like a cataract'*. Rails facilitated the removal of ore from workings joining Vivian's shaft, Higher shaft, and possibly Pyllau and Treweeks, they ran for half a mile to copper washing pens, now converted to a boating pond, on the West Shore.
``*It is interesting to reflect on whether the sight of the portal of the Penmorfa level could have suggested Alice's underground adventures. Indeed, there was a small copper mine called the Rabbit Venture on Tydraw farm, not far away.*" C.J.Williams. British Mining No.52.
On reaching the workings the adit forks, the right hand fork zigzags north for about 300 yards, past two flooded shafts or winzes, Vivian's shaft which is choked with rubble, and on towards its blind end near Treweek's shaft.
``*The left-hand fork leads through three sets of stopes and past flooded workings before ending blind. Access to levels above is possible from this tunnel or from `the breakthrough' In the levels above, which are predominantly parts of the New Mine, clog prints, carved initials, and tools can be seen...high up in the workings is a climbing or stemple shaft. No route has yet been found leading to the surface through either the Old or New Mines.*"(Don Smith. The Great Orme Copper Mines.1988.) It is interesting that Don Smith mentions clog prints and the sound of water in the lowest level of Pyllau, and in the main shaft of the New Mine, directly above Penmorfa level. In total the Penmorfa level ran for more than 1100 yards towards the centre of the Orme.

147.Walls. SH 7712 8217. Rectangle of old walls, with the West Side wall continuing up to the base of the cliff and down in a `dogleg' to the housing estate.

148. Possible Level. SH 7709 8227. Slightly upslope and to the East of Penmorfa airshaft. There appears to be a `run in' above and a spoil fan below.

149. Gogarth Mine or Penmorfa air shaft. SH 7708 8226. Site of O.Davies 1938-9 excavations. Sometimes known as the Gogarth Mine, (D.Bibby dissertation 1979.) the site was excavated in 1938-9 *'Underneath a deposit of dark earth containing pottery and hammer stones, was a layer of periwinkles mussels and limpet shells with 3 ollae shards, roughly datable to the third century A.D. At a previous date a coin of Aurelian (270-275 AD) was found some way inside the entrance'*. (O.Davies Arch.Camb.1948) Also possibly a run in airshaft, as it is 250 feet from Penmorfa entrance. The practice was to light fires beneath airshafts to suck out foul air and blasting fumes.

150.Old Shaft SH 7707 8225. Site of 'Old Shaft' on site plan of 1938/9 O.Davies excavation.

151.Quarry. SH 7697 8228. Accessible from Invalid's Walk, a possible run in adit.

150.Stone tool. SH 7664 8310. Finds spot the Bishop's Quarries.

152.Ogof Arth, Bear's cave, Toby's cave. SH 7693 8233. Various Neolithic animal bones found. Inhabited in the early 1900's by a Liverpudlian farm labourer, to whom Lady Augusta donated a bed, it was fitted with a door and window. Used as a scout hut in the 1960's until the scouts were driven out by the smell of goat. `Toby's Cave' painted above cave by vandals. A 2m high entrance to a 3m-diameter chamber with a dirt floor.

153.Ogaf Bys. SH 7691 8235. Cave in quarried face. A 170cm wide by 60cm high entrance widens after 3.4m to 4m by 60cm high and continues for another 4m. Shallow pits dug through stalagmite floor exposing dogtooth calcite crystals with small inclusions of chalcopyrite. N.V.C.Bannerman 3.2.1995. Artificial stone structures in grass terrace around entrance.

154.Cave. SH 768 822. Extends ten feet down, ending in a T shape.

155.Stone axe. SH 767- 822- Stone axe found on the West Shore.
This axe, believed to have been found by Mr. D. Paterson F.R.M.S. in June 1952, was only slightly weathered which led him to believe it had been dug up during work on the Gogarth end of excavations for the new sea wall. [Abbey or Hotel? N.V.C.B.] He had compared to a chipping from the Craiglwyd axe factory and it was found to be of a perfect match. [North Wales Weekly News June 19th 1952,also, Llandudno, Colwyn Bay and District Field Club. vol. xxv 1952.] There is good evidence [1840 tithe maps] that this area was dry land in the past 200yrs.

156 Possible Roman Camp. SH 7680 8220 '*Roman coins and tile fragments have also been found, testifying to the existence of a Roman camp on the south eastern edge of the headland at a point long since eroded away'*. [Ashton W. Evolution of a Coastline pp.189 - 190]

157.Stone Heap SH 7665 8210 At first view this may be taken as an 11m.x 3m. ballast mound that is underlain with red Irish Sea clay. However the discovery of a post still retaining its bark and of similar appearance to a post which yielded a C.14 date of 1460 A.D. [cal] from a nearby fish weir raises the possibility that it is some form of structure that may be further revealed by sand erosion.

158.Old Jetty SH 7688 8288 Andy Lewis suggests that this was at one time connected through Archway [159] to [160]

159.Archway under road SH 7689 8289. The Marine Drive.

160.Quarry SH 7670 8233. Area of quarrying traditionally associated with [158] and [159] [A.L.]

161.The 19th.century West Shore sewer outfall. From SH.7685 8226 to SH.7568 8248. Llandudno's first sewerage system was laid in mid 1840's by Mr. Mc.Dougal Smith, and in 1876 at a cost of 36,000 pounds the system was improved to cope with the demands of the expanding town. The following Claim was made at the time; `There is probably no town in the kingdom - sea side or inland - with a better sewage system'. [`The Climate of Llandudno' James Nicol, M.D. pub. John Heywood, Deansgate, Manchester, 1885.]
Part of the eight miles of pipes included a 1,000-yard long `tank sewer' below Gloddaeth Avenue where sewage was stored during the time of high tide to be released automatically at low tide. The whole system, which worked by gravity, was built to meet the expected growth of the town for the following 30 to 40 years. It actually had to cope for over 100 years and met the demands of a town much larger than expected. This sewage system was and is a monument to Victorian Engineering and Town Planning which was conducted with a belief in the future that had little to do with short term gain.

162.East Gorad Gogarth. SH. 7639 8235
Fish weir possibly associated with the Bishop's Palace.

163.West Gorad Gogarth. SH 7606 8240
Fish weir possibly associated with the Bishop's Palace.

164.Abbey Rocks A distinctive area of rocks, some 600m. N. - S. by 180m.E. - W., visible at Low Water Springs between 53 19'. 15 N. and 003 52'. 2 W. and 53 19'. 4 N. 003 52'. 3 W.
Taking advantage of the extremely low tides 9th. /10th, March 1997 [-0.1, -0.2 below chart datum Liverpool] the area was examined as carefully as time allowed. No limestone was found and all samples recovered were later identified by Professor D.Wood as being typical of glacial deposits of the area with nothing to positively identify their source, be it either the Welsh mountains or Scotland. Two large, prominent boulders which proved to be granite were positioned with GPS as being at 53 19'. 27 N. 003 52'. 29 W. [3m.x3m.x1.5m.] and 53 19'. 19 N. 003 52'. 36 W. [2m.x1.5m.x1.5m.]

It has been suggested by Tom Parry that the name Abbey rocks originated in Victorian times as this was when the Nunnery / Bishops Palace became popularly known as Gogarth Abbey. Abbey rocks are not shown on the Lewis Morris charts but appear unnamed, on more recent Admiralty ones. The first known use of the name is in Glazebrook's Anglesey and North Wales Pilot. This is a little odd as they could be a danger to any vessel manoeuvring around the western end of the North Deep especially as there are the large boulders which stand some 1.5m. above the surrounding rocks. This has led the author to consider the possibility that until the last century these rocks were covered in sand or were still contained in boulder clay.
Ashton refers to possible Roman Artefacts being found here see `Caer Gonwy'

Also possible site of Roman Camp. SH 7570 8240. Ashton does not give the origin of his information for this and complicates the issue by further reporting, ` A Roman camp is known to have existed, at some point now submerged, a little way from the Great Orme's Head. Fishermen assert that pottery, presumably Roman, has been found at a point near the oufall--- This may have been the camp in question.' [Ashton W. Evolution of a Coastline p.212] It is tempting to discount these two references, as Ashton appears to have been listening to perhaps unreliable local tales. Yet it is likely that the `local fishermen' at both locations were shellfish collectors liable to spot any artefacts which could mark an inundated land site or shipwreck.

165.Miriam's cave. SH 7641 8250. Before 1878 Miriam Jones reared her large family in this cave, who became known as the 'yr Ogo' Jones's [yr Ogo - of the cave]. It was mostly destroyed during the construction of the Marine Drive. A garage at St. Petrock's covers what may remain.

166.Skeletons cave SH 7672 8250. Neolithic skeleton found within, now possibly in Cardiff Museum. Gully between cliffs at the top of a slope with a large overhang, 3mt up on the left a small entrance 1mx1m. After 3m this intersects a larger mud floored passage, choked to the right, left continues down to a low termination. The floor is covered in snail shells. 10m to the west, at the base of a cliff, there is a small square shaped entrance about 40cm x 40cm and 2m long.

167.Hut platform. SH 7665 8261. Corlan Gras Pari.

168.Pen y Ffridd Goch trial SH 7651 8266

169.Building and enclosure. SH 7686 8275.

170.Trial. SH 7799 8283.

171.Stone `hut'. SH 7648 8288. North west of Pen Y Ffridd.

172.Bishop's Palace. SH 7605 8292. Ruins of Bishop's Palace dating from 12th century.

173. Tom and Jerry Cottage / Hydraulic Engine House. SH 7622 8292.

174.Ffynnon Gogarth Level. SH 7636 8298.

175 Gogarth Spring Reservoir SH 7635 8298. Supplied `Tom and Jerry' engine.
Also West end of Brammock Rods. Numerous pits in which the supports for the Brammock rods were pivoted can be seen between this point and [211].

176.Ffynnon Gogarth SH 7637 8307. The well supplied the water to power the Tom and Jerry engine. 1826-1842 aprox.

177.Hut circle. SH 7649 8311. West of the Bishop's Quarries.

178.Bishop's Quarries. SH 7664 8310.
Stone tool. Finds spot the Bishop's Quarries.

179.Approximate position of Brammock Rod angle bob. SH 7663 8317

180.Ffynnon Llygaid SH 7615 8319. A well used by the monks as being beneficial to the eyesight.

181.Ffynnon Llygaid trial. SH 7620 8318.

182.Monk's Path trial SH 7598 8324. Partially blocked mine entrance with a spoil heap below. Appears to run some way into the mountain.

183.Masons Quarry Incline. Runs from SH7565 8338 to SH 7566 8324. This incline runs down to Llys Helig drive suggesting that the quarry pre-date the Marine drive. [A.L.] Could there be a link with the Bishops Palace complex?

184.Masons Quarry SH 7565 8338. Bed of sandstone found here. [A.L.]

185.Artillery camp. SH 7525 8353. Site of a row of houses for officers. The area was used as an artillery training camp during the Second World War. The houses continued in use for some years after 1945.

186.Cairn. SH 7561 8357. A modern cairn within a kerb of prehistoric stones [Bronze Age?] above Creigiau Cochion, possibly in the same system as [187] & [6]

187.Cross ridge boundary. SH 7578 8345.possibly in the same system as [186] & [6] See `Earthworks'

188.Bryn Teg SH 7595 8345. [Eng. The Beautiful Hill]. This area of old field boundaries are cut across by the Park Wall. Was this a settlement site?

189.Banks. SH 7600 8330. Earthworks complex south of the Parc.

190.Run In Shaft SH 7614 8333 thought to connect with [190a] [A.L.]

190a.Parc level. SH 7610 8332. Explored by Andy Lewis and Duncan James before entrance ran in. Duncan thought that it would make a suitable place to display hammer stones etc. `Level leads to chamber 11m long 6m high 3.5m wide. [A.L.]

191.Possible opencast working. SH 7630 8325. Mineralisation? [A.L.]

192.Small Mine. SH 7638 8322. This open cut trial thought by A.Lewis to have been for manganese.

193.Summit Quarry SH 7649 8341. The easy way to find this quarry is to drive too far North on Summit Car Park.

194.Great Orme Summit Hotel. SH 7667 8335. Originally a Napoleonic war signal house. Site of the first Great Orme telegraph station in the chain of mechanical semaphore stations that ran from Holyhead to Liverpool. These allowed notice of a ships sighting off Holyhead to be transmitted in a matter of minutes to shipping offices in Liverpool, where arrangements could be made to receive the vessel. The telegraph station was later moved to the Lighthouse site. During the Second World War the building was reportedly part of a secret radar installation.

195.Hut platform. SH 7672 8349

196.Hut platform. SH 7671 8349

197.Hut platform. SH 7670 8350

198.Field system. SH 7680 8350. Ridge and furrow.

199.Hut platform. SH 7675 8345

200.Hut platform. SH 7675 8343

201.Brammock Rod Cutting SH 7685 8317.

202.Bank.SH 7692 8330.Bryniau Poethion.

203.Hut circle. SH 7692 8335.Bryniau Poethion.

204.Enclosure. SH 7699 8343.North of Bryniau Poethion.

205.Old quarry. SH 7711 8334. Bryniau Poethion.

206.Ridge and furrow. SH 7710 8330. Bryniau Poethion.

207.Roman's shaft. SH 7705 8330. Part of the Old Mine system. Prehistoric and 18th to 19th century workings. A tunnel at 65’ leads south into prehistoric workings; charcoal from fire setting has been carbon dated at 900 BC. A cross

cut leads to Treweek's shaft and a descent of 90 feet in Treweek's reaches a level that gives access to further extensive workings. Measured at 90'depth in 1960 reduced to 60' in 1987, now at 40' in 1995.

208.Treweek's shaft. SH 7701 8325. Part of the Old Mine system. Descends to 240' with accessible levels at 90' leading to Roman shaft, and at 220' heading south into 19th century workings, links with Higher shaft and Vivian's shaft. A 26 inch gauge tram line, dams, flange pipes, a cat skeleton and tools have been found, also dolerite mauls built into walls of deads and coated with calcite.

209.Owen's shaft. SH 7698 8315. Part of the Old Mine system. Blocked at a depth of 160 feet it has five levels off it. At 60' one level enters prehistoric workings. Flooded at 110 feet. 19th century and Bronze Age workings. Access is possible through to Higher and Vivian's shaft.

210. Higher shaft. Safft Uchaf.7705 8318. Part of the Old Mine system. Originally sunk to the Penmorfa Adit level. No trace remains above ground. Access possible from Owens shaft.

211.Vivian's shaft. Great Orme Mines. SH 7707 8309. Originally it reached the Penmorfa Adit level at about 450 feet below and extended a further 200 feet below that. Levels at 40', 110'and 130'lead to prehistoric workings. It is now run in where it passes through a shale band about 250 feet below surface. Named after William Vivian, a Cornishman appointed mine captain in 1853. Now Great Orme Mines Prehistoric copper mines. 1800 BC. Now open to the public. In Oct 88 Nick Jowett and Phil Smith absailed to the platform in Vivian's and set off for Treweeks successfully connecting the two shafts. Again in Nov 96 they made the connection from Vivian's to Owens so linking all the Old Mine shafts north of Vivian's. (Romans-Treweeks-Vivian's-Owens-Higher).

Also East end of Brammock Rods. SH 7707 8309. Close to Vivian's shaft.

212.Pyllau shaft. SH 7704 8302. Main shaft for New Mine. The New Mine appears to include most shafts south of Vivian's, the Old mine was being Vivian's and the system to the north. About 200 feet deep and run in where it passes through shale. There are three levels off it. At 135 feet one leads to large flat workings, mined out between two bedding planes, water can be heard behind a wall of calcite and rubble suggesting a connection with the Penmorfa adit immediately below. There are blind levels at 30 and 100 feet.

213.Cae Llwyn Helyg shaft. SH 770 829. Part of New Mine. A wide shaft of about 80' depth.

214.Pen y Gwaith shaft. Part of New Mine. SH 770 829. A shaft filled to a depth of 15' with old bedposts and rubbish.

215.Burial Chamber, Lletty'r Filiast. SH 7722 8294. `The Lair of the Greyhound Bitch' Neolithic burials chamber and mound which may be associated with the early mining. Before the modern road, which is followed by the tramway, was made, it is likely that the trackway from the mines ran along the Pyllau valley past the cromlech, and followed the line of the old footpath down from St.Beunos road to Tyn y Coed road, and so down the Orme. Did the Cromlech guard the approach to the mines? Though Lletty'r Filiast is a name used elsewhere for burial chambers, phantom guard dogs are connected in folklore with the bowels of the earth where such as Cerebos is said to prowl the underworld as does the Bar Guest, the ghostly hound of the Derbyshire Mines. In 1996 Jo Jones conducted a geophysical survey of the Cromlech Field and found what appear to be traces of an outer ring ditch and possible postholes of a henge monument. Jo Jones 1996 `New Discoveries on the Great Orme' G.O.E.S. Journal

216.Enclosure and structures. SH 7734 8300. Pyllau Road.

217.Hut circle. SH 7725 8305. North of Pyllau Road.

218.Halfway Station Shaft. SH 773 831. Shaft used for dumping old cable from the tramway. This shaft lies within approximately 70m off the possible southern end of the Porth yr Helyg Adit [73].

219.Site of Quarry Jetty. SH 7822 8320. Built early 19thCentury, for the export of stone from the Happy Valley Quarries. Proprietor Mr. John Smith, father of Mr. William Smith, late 18th Century china and toy dealer Mostyn St.

220. Site of Quarry Jetty. SH 7840 8291. Built early 19th Century, for the export of stone from the Happy Valley Quarries. Proprietor Mr. George Brookes senior, of the Victoria Inn. One of Mr. Brookes's sons John Brookes aged 29, was Master of a ship carrying limestone from this jetty that was wrecked on the Hoyle Bank. John's body was found near Hoylake and was interred on the 9th March 1848 in St.Georges Churchyard.

221. Gorad Banners Ddu. SH 7830 8275, to SH 7850 8289. Substantial Traces of a Type 5 Rectilinear fish trap the sluice being below Low Water Neaps could indicate that this trap is considerably older than Clawd y Gorad [106].

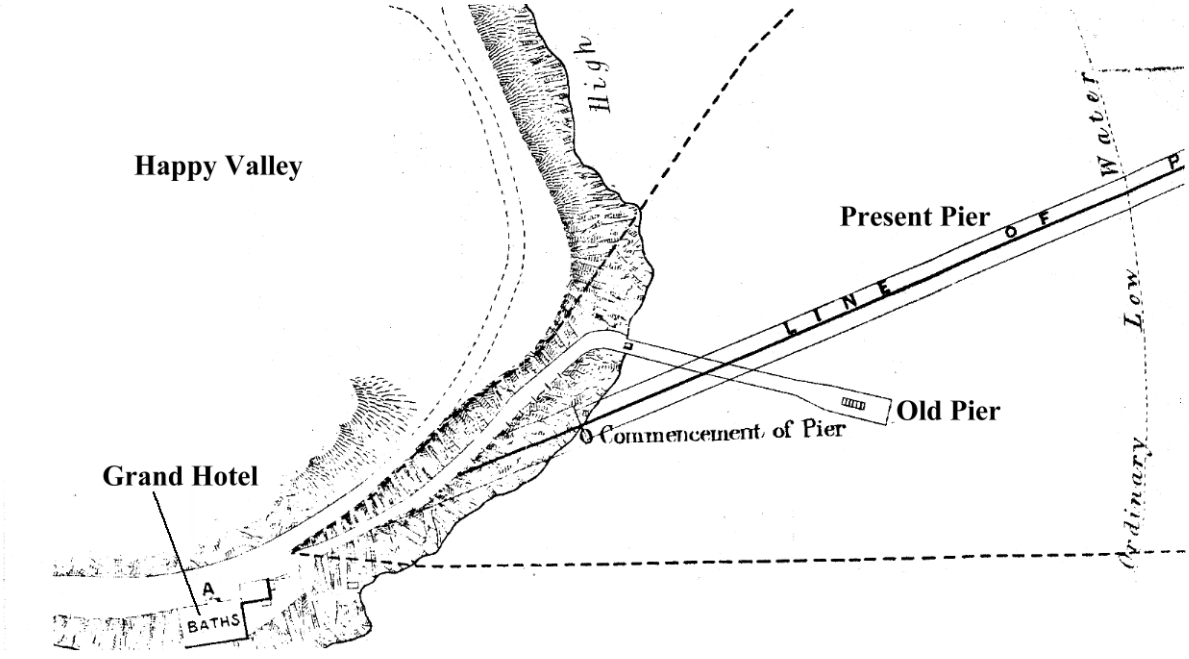
222. Western Lookout. SH 7512 8400. A Second World War observation post.

223.Gun Emplacments. SH 7510 8385. Three `Pill box' gun emplacements that are slowly slipping into the sea.

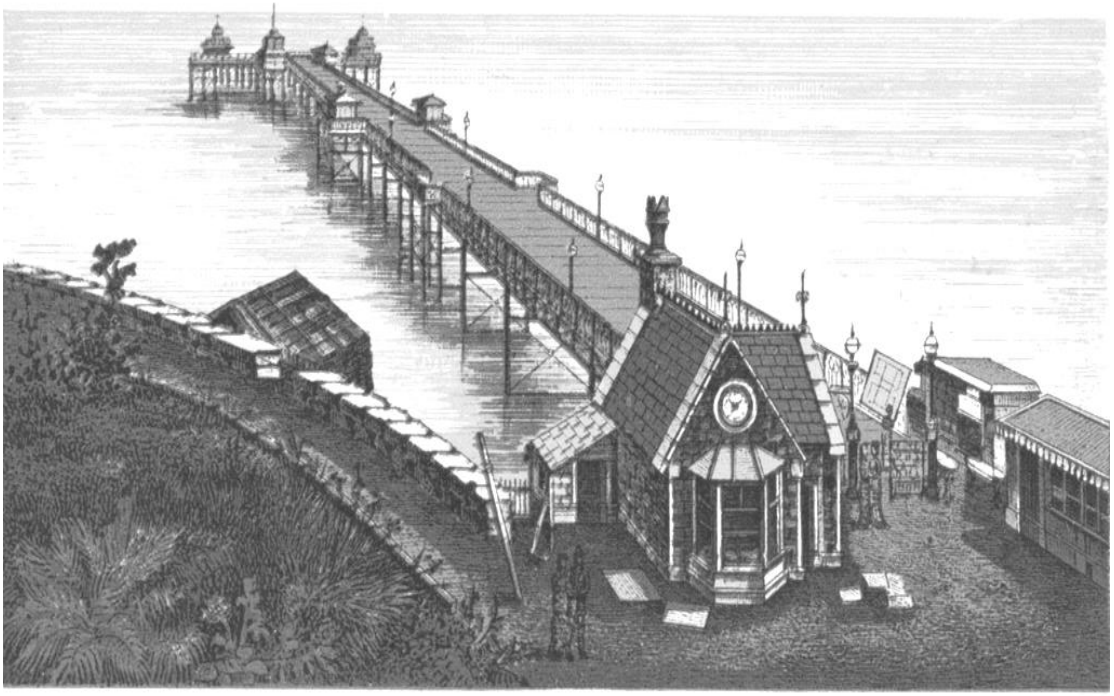
224. Mooring Stone. SH7835 8268. One of the large rocks with mooring chains set into them which were placed on the beach circa 1820. These were used by copper ore ships and tourist boats before the pier was built.

Special thanks for help with this section:
Conwy Council, Mostyn Estates, Tom Stone, C. J. Williams, Ron Williams, Bob Barnsdale, Geoff David, Andy Lewis, Dave Chapman, Sue Jones, John Bowen, Robin Griffiths [Ogfa], Edric Roberts, Tom Gravitt, Brian Sherlock, Jo Jones, Tom Parry, Alison Walton, Billy Davies, David I.Bibby, Nick Jowett, Phil Smith, Emma Wager, and all the others not mentioned, who from 1994 onwards were so generous with their help and contributions.

.

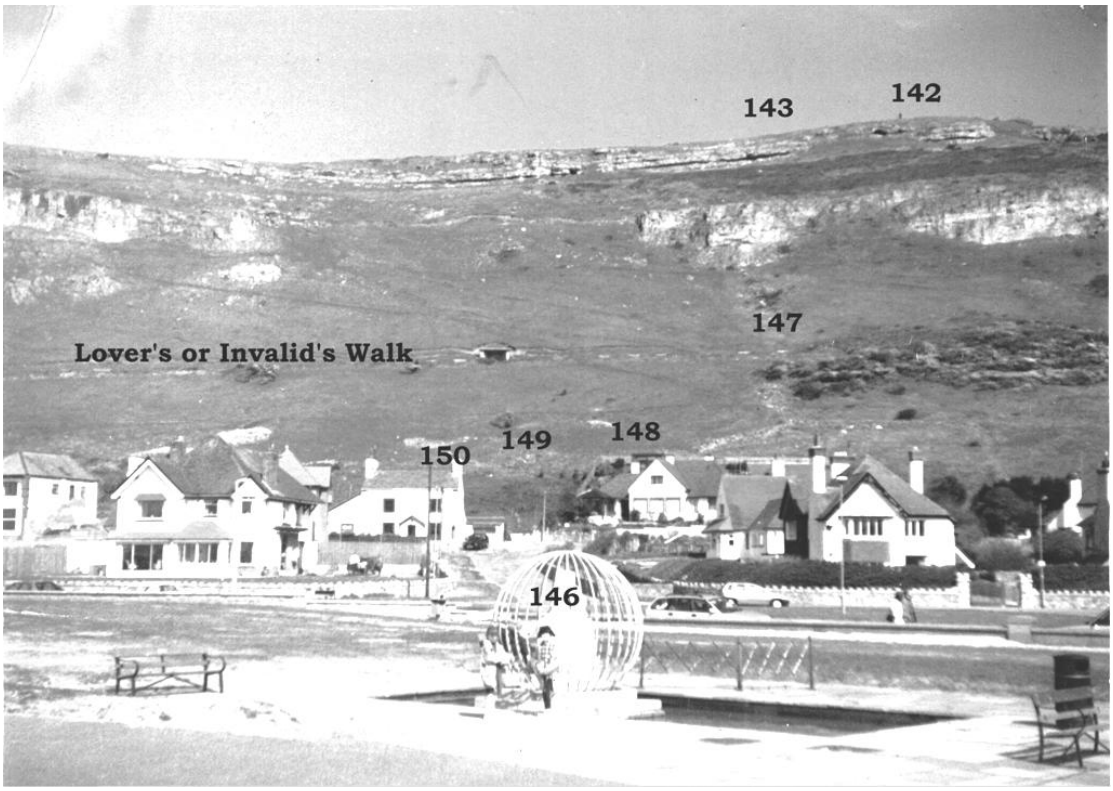


Plan of Old Pier
Courtesy of Ron Williams

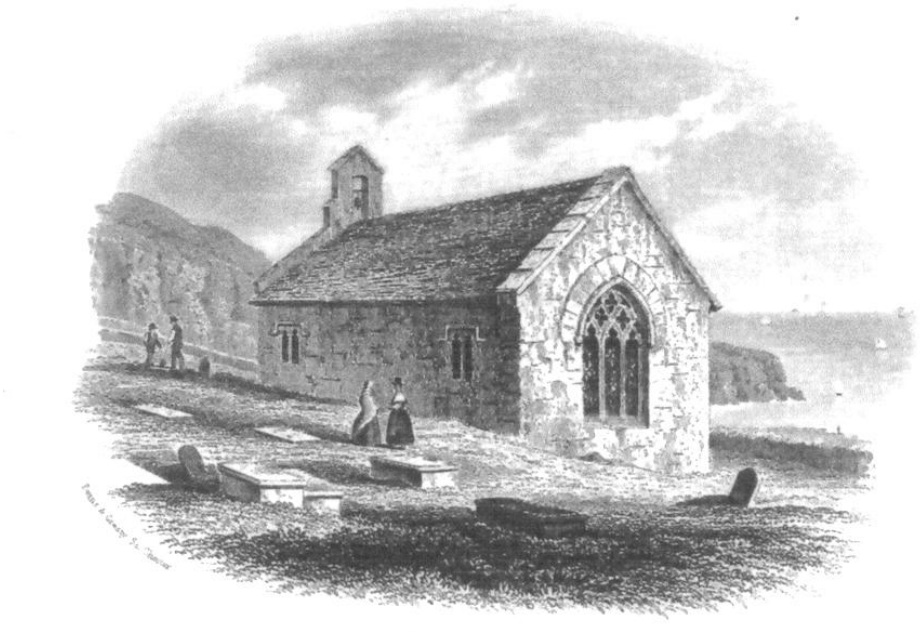


106.Clawdd yr Gorad North Parade1835

View from the West Shore



The Watkins and Watson Water Engine



St TUDNO'S CHURCH LLANDUDNO

25.The Swallit Hole

215. Burial Chamber, Lletty'r Filiast. SH 7722 8294. `The Lair of the Greyhound Bitch'

REFERENCES

Special thanks to Terry Williams for proof reading, and all his help and encouragement, and to Dr. Cecil Jones, Jo Jones, and our family who have helped considerably, especially during surveying.

THE LOST LANDS OF GOGARTH.
Addison.K. 1995 'Gogarth Terrace.' Countryside Council for Wales R.I.G.S.
Ashton W. 1920 `The Evolution of a Coastline' Southport.
Bannerman N. & Jones C. 1999. 'Fish trap types: a component of the maritime cultural landscape' The International Journal of Nautical Archaeology. **28.**1: 70-84
Bezant-Lowe.W.1912 `The Heart of Northern Wales' Llanfairfechan.
Bezant-Lowe.W. 1927 `The Heart of Northern Wales Vol. 2.' Llanfairfechan.
Jones. Cecil. `Walls in the sea-the goradau of Menai' The International Journal of Nautical Archaeology and Underwater Exploration' [1983], 12.1:27-40
Nicol. James. M.D.1885. 'The Climate of Llandudno' pub. John Heywood, Deansgate, Manchester.
Momber. G. 1991. 'An investigation of an ancient fish trap.' The International Journal of Nautical Archaeology. 20.2:95-109
Patterson D. 1952 'Neolithic Axe Head' p.70 Proceedings of the Llandudno, Colwyn Bay and District Field Club Vol.XXV.
Thos. Rowlands. 1892, 'Atgofion am Llandudno' / Memories of Llandudno' published by W.H.Smith, The unpublished English translation from the Welsh of this work was made available courtesy of Llandudno Library.
QUARRIES AND LIMESTONE MINES.
Baughan, P.E. "The Chester and Holyhead Railway" **1:**112
Davies, Ivor.E. 1939. 'A Master Mariners 'A Count Book''. Proceedings of the Llandudno and Colwyn Bay Field Club. pp.30-40

Dodd.Arthur Herbert. 1891-1975. 'The Industrial Revolution In North Wales' University of Wales. 4th. Edition. Pub. Bridge Books, 61 Park Avenue, Wrexham, Clwyd. 1990.
Lewis.A. [Geologist] personal communications, I am very grateful for the help Andy extended to me in my research for this section.
Roberts, John.1909. 'Llandudno as it was' Llandudno Advertiser 24. April.
Thos. Rowlands. 1892, 'Atgofion am Llandudno' / Memories of Llandudno' published by W.H.Smith, The unpublished English translation from the Welsh of this work was made available courtesy of Llandudno Library.
STONE CIRCLES, EARTHWORKS, STANDING STONES & TOMBS
Crew P. & Musson C. 1996 'Snowdonia from the Air' R.C.A.H.M.W. p.10.
Defoe. Daniel. 1990 'A Tour Through The Whole Island Of Great Britain' 1724/26.' Edited by Pat Rogers, Published by the Penguin English Library 1990.
Kenneth Dibble 1997 'The Lady of the Little Orme' Llandudno.
Megaw,Basil. 1938 'Manx Megaliths and Their Ancestry' Proc. Isle of Man Natural History and Antiquities Society, **IV**,ii, 219-239, no.2.
Proc. L.C.B.F.C. 1910-11 Proceedings of the Llandudno and Colwyn Bay District Field Club p.69
Stone. Tom. 1994 'A Glimpse of Llandudno in Prehistory' Journal of the Great Orme Exploration Society 1994 Supplement 2.
Vyner, B.E. 1994 'The Territory of Ritual in Northeast England' Antiquity **68**:27-38
Wynne. Sir John, of Gwydwr. 1906 'An Ancient Survey of Penmaenmawr' circa 1610,
W.Bezant Lowe edition, printed by W.E.Owen, Caxton Printing Works, Llanfairfechan.
KENDRICKS CAVE
Challis. Peter. 2000. Personal communication.
Cook, Jill. & Jacobi Roger. Palaeolithic dept. British Museum.1997. pers. comm. (mainly during their 1997 visit to Llandudno.)
Gowland W. F.S.A. F.C.S., 1899 'The Early Metallurgy of Copper, Tin and Iron in Europe, as illustrated by Early Remains and the Primitive Processes surviving in Japan'. Read to Royal School of Mines 18th of May 1899.
Ingram. Rev.Canon W., F.G.S.1885 'Extract from the Geological Magazine' Archaeologia Cambrensis.p.234
Jones.Morris 1888.'Discovery of Roman Coins at Llandudno.Archaeologia Cambrensis p.370
Parry.E. 1996. 'Kendrick, The Man Not The Cave' Journal of the Great Orme Exploration Society. p.4
Stone.Tom 1994 'A Glimpse of Llandudno in Prehistory' Journal of the Great Orme Exploration Society.Supplement 2.
WATER POWER AND WATER PROBLEMS ON THE GREAT ORME ,TOM AND JERRY
Budenberg G.F. 1987.(ed) Lewis Morris. Plans of Harbours, Bays and Roads in St. George's Channel' 1748. Beaumaris.
Elvin L. 1960 'Organ Blowing, its History and Development.' Published by Laurence Elvin, 10 Almond Avenue, Swanpool, Lincoln.
McNeil I.1972 'Hydraulic Power' Industrial Archaeology Series, Longmans
Williams C.J.1995 'The Great Orme Mines' The Northern Mine Research Society.

ROMAN MINING ON THE GREAT ORME
Ashton W. 1920 'The Evolution of a Coastline'. Southport. .
Budenberg, G.F., (ed.) Lewis Morris Plans of Harbours, Bays, and Roads in St.Georges Channel. 1748. Beaumaris 1987
Cox, Edward W. 1894 'Traces of Submerged Lands on the Coasts of Lancashire, Cheshire and North Wales.' Proceedings of the Historic Society of Lancashire and Cheshire.
Davies,O.1948 'The Copper Mines On Great Orme's Head' Archaeologia Cambrensis, pp.61-66.
Jones.J 1997. Personal communication.
THE HORNBY MINING AREA.
Hicklin. John. 1856 'Llandudno and its vicinity.' Hamilton Adams & Co.London.
Jones, Rev. Owen.1875 'Cymru yn Hanesyddol, Parthedegol a Bwygraffyddol'
Cooks. Kathleen. F.L.A. 1954. 'The Llandudno Story' written for the Llandudno Advertiser.
Parry, Tom. 1996. 'A Face in the Rock' Coastline, Journal of the Bronze Age Coast Project
Price. John. M.A. 1860 'Llandudno and How To Enjoy It.' pub. Simpkin Marshall & Co
Wynne-Jones. Ivor. 1973 'Shipwrecks of North Wales.' pub. David & Charles, London,
THE HAFNANT MINING AREA.
AND BADGERS CAVE
Bannerman.N. 1995. 'Chairman's Summary' Journal of the Great Orme Exploration Society. 1995 [3]
Gilmour, Graham.1997. Her Majesty's Mines Inspectorate. Mine inspector with special responsibility for old mines. Personal communication. & Address to 1997 N.A.H.M.O. Conference, Matlock, Derbyshire.
Gowland W. 1899. F.S.A. F.C.S., 'The Early Metallurgy of Copper, Tin and Iron in Europe, as illustrated by Early Remains and the Primitive Processes surviving in Japan.' Read to Royal School of Mines on the 18th of May 1899.
Rowlands, John. 1981 'Copper Mountain' Anglesey Antiquarian Society, Llangefni.
Stone. Tom. 1994'A Glimpse of Llandudno in Prehistory' Journal of the Great Orme Exploration Society 1994Supplement 2.
PORTH YR HELYG
Aris, Mary & Capell 1996. Historic Landscapes of the Great Orme Gwasc Carreg Gwalch Llanwrst.

Ashton, William. 1920. ‘Evolution of a Coastline.’ London & Southport. p.189.
Brown, A.G. 1997 ‘Alluvial geoarchaeology’ Cambridge. pp88
Glazebrook,F.H. 1962. ‘Anglesey and North Wales Coast’ Bangor.
Hiller.George. 2001. Lord Mostyns Agent. [retired] Personal Communication.
Hyde Hall, Edmund.1804-1811. A Description of Caernarvonshire
Lamb, Hubert H.1982. ‘The Little Ice Age period and the great storms within it’. The Climatic Scene. Ed. Tooley, Sheal. Pub. Allen & Unwin.
Roberts John. 1907 ‘Llandudno as it was’ North Wales Weekly News
Savoury H. 1958, ‘The Late Bronze Age In Wales, New Discoveries and Interpretation’ Archaeologia Cambrensis, P.14-15.
A GAZETTEER OF GREAT ORME SITES
By Diane & Nigel Campbell Bannerman
An Inventory of the Ancient Monuments in Caernarvonshire. Volume 1: East 1956
The Royal Commission on Ancient and Historical Monuments in Wales and Monmouthshire: 114, no.367
Arch.Camb. 1935, pp.202/3 under the heading `The Distribution of the Graig Lwyd Axe and its Associated Cultures.'
Archaeologia Cambrensis 1855.
D.Bibby. Dissertation 1979.
British Mining No.52 Great Orme Mines. C.J.Williams 1995
Cambrian Cave Register
Cave, Mine and Quarry Sites on the Great Orme. C.A.Lewis. 26:1:88.
Defoe.Daniel. `A tour through the Whole Island of Great Britain' edited by P.Rogers. Penguin English Library. 1971.
Kenneth Dibble. `The Lady of the Little Orme' published by K.Dibble. Llandudno 1997.
The Great Orme Copper Mines. Don Smith.1988.
Great Orme Management Plan. Conwy Council. 1973.
Nicol. James. M.D., `The Climate of Llandudno' pub. John Heywood, Deansgate, Manchester, 1885.
Jones S.G.1994 `Deciphering the Metallic Arts of the Bronze Age: A Proposed Criteria for the Identification of Ore-Washing Sites Associated with Early Copper Mining in Wales.' unpublished MSc dissertation. University of York: 50
O.G.F.A .2&3
Plans of Harbours, Bars and Roads in St.George's Channel. Lewis Morris.1648.
R.C.A.H.M. Caernarvonshire I, 1956.
John Roberts. An article in the North Wales Weekly News, 1907
Tom Stone. `A Glimpse of Llandudno in Prehistory. 'Journal of the G.O.E.S. 1994 Supplement 2
.Traditional Lore of Llandudno. Interpreted. By Charlton Hall 1865.
Williams `Complete Guide to Llandudno' pub. Thomas Williams, Chemist, Church Walks, Llandudno, 1864.
Sir John Wynn, `An ancient survey of Penmaenmawr' circa 1610 Editor Bezant Lowe. Reprint W.E.Owen Llanfairfechan 1906

'The Great Orme Explained'

All things change and the landscapes of the past fade as new ones replace them. Important aspects of our heritage slip away unnoticed, covered by soil or eaten away by the sea.

Can such lost lore be reclaimed? This monograph does just that.

The researches of Diane and Nigel Bannerman cast light anew on the Great Orme, and their work will provide many insights for those who visit this impressive place.

It makes available new information on this ancient landscape, the way in which people lived and worked here and the relics they left behind.

Just as important is the example Diane and Nigel set by their patient investigations – local people seeking their historical legacy, which they share with us – and in so doing encourage all to see the landscape of the Great Orme from a fresh perspective.

Dr. Cecil Jones,

Cemlyn-Jones Research Fellow, School of Ocean Sciences, Menai Bridge.

ISBN 0-9540184-0-0