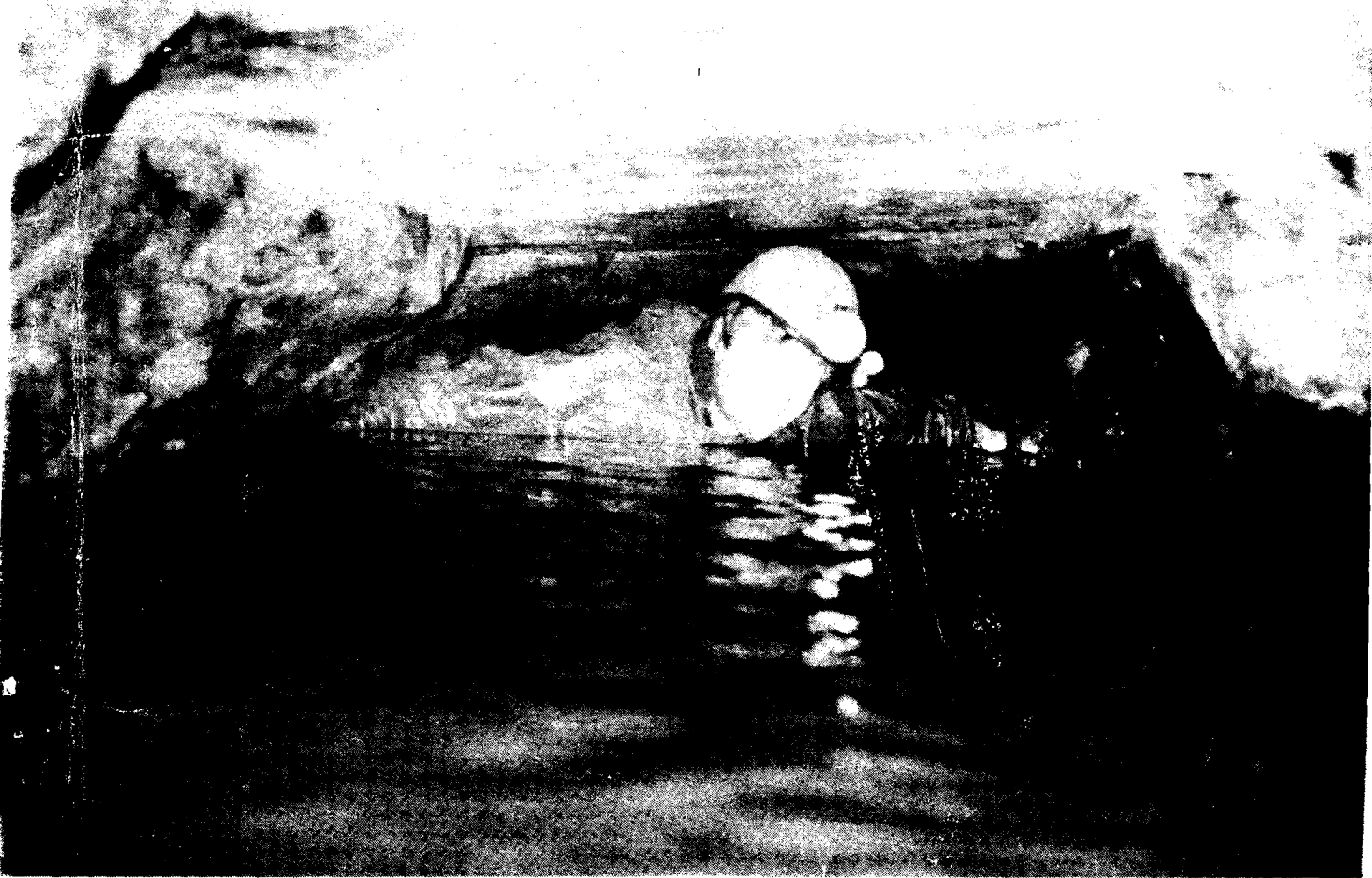


MARCH 89



# **CUMBRIA AMENITY TRUST MINING HISTORY SOCIETY**

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**NEWSLETTER NO. 23**

CUMBRIA AMENITY TRUST MINING HISTORY SOCIETY

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4. Maureen Stone, Greenside, Hincaster, Nr Milnthorpe, Cumbria. Tel (04482) 3231.
5. Librarian - Anton Thomas, 189, Greengate Street, Barrow in Furness Cumbria.  
Tel. (0229) 35951.

COVER PHOTO. by Don Borthwick.

HARD LEVEL - 27th August 88. A.D.C-P-Thomas up to his neck in the Black Cross  
Cut below the Brandy Bottle incline, Swaledale.

Some remedial preservation work has been carried out along Hard level by  
CAT and other groups, but this mine is deteriorating and may soon be inaccessible.

# 1

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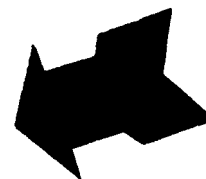
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SPECIAL THANKS TO MARGARET & PETE FLEMING FOR PHOTOCOPYING THE NEWSLETTER.

The Society would like to welcome NEW MEMBERS - DEREK HOLLAND from Barrow and NOEL WOOD from Beckermat.

\* \* \* \* \*  
\* REMINDER \*  
\* \* \* \* \*

YOUR 1989 SUBSCRIPTIONS ARE NOW DUE



If you have not already done so, please send your subscription to the Treasurer:

Wendy Battersby

46A, Salthouse Rd., Millom, Cumbria LA18 5AF (tel 0657 2169)

(£10 Single Membership, £12 Joint Membership)

If you are a taxpayer, PLEASE also complete and return the covenant form sent out with the Christmas Newsletter. Covenanting is not obligatory, but the more members who do so, the more money we can claim back from the tax-man.

Spare forms may be obtained from the Treasurer.



THE NATIONAL ASSOCIATION OF MINING HISTORY ORGANISATIONS  
BIENNIAL CONFERENCE, AMBLESIDE, CUMBRIA 1989.

HOSTED BY; THE LAKE LAND MINES AND QUARRIES TRUST.

IN ASSOCIATION WITH; CUMBRIA AMENITIES TRUST.

TEL: (05394) 32127

CONFERENCE SEC..  
SLACK COTTAGE,  
HIGH WRAY,  
AMBLESIDE,  
LA22 0JQ.

Charlotte Mason College, Rydal Road Ambleside,

Friday 14th - Sunday 16th July 1989.

As can be seen from the above letterhead, the Society is co-hosting the biennial conference with Lakeland Mines and Quarries Trust. Cumbria Amenity Trust has responsibility for the organisation of the Field Trips programme. The preliminary programme of events is as follows:-

Friday 14th July

Conference Registration 4.30 - 8.00pm.

Conference opening address, Percival Lecture Theatre, 5.30 - 6.30pm.

College bar open between 7.00 - 10.00pm.

COMRU Rescue demonstration, White Moss Common Car Park, Rydal, 7.00- 8.00pm.

Saturday 15th July.

9.00 - 10.00am - M.Davies-Sheil, :- Water Power in mines, with particular reference to the Lake District.

10.15 - 11.15am - Peter Geddyes - Restoration of Shaft and Man Engine at Great Laxey Mine.

11.30 - 12.30pm. - J A Buckley:- Development of 17th and 18th Century Cornish Mining.

1.30 - 2.30pm.- Adrian Pearce / Ivor Brown.

2.45 - 3.45 pm. - Peak District Mines Historical Society.

4.00 - 5.00pm. - Dave Hollis - Comparison of the Iron Ores of the Lake District and the Isle of Man.

7.00 - 10.00pm.- Assemble at Waterhead Pier Ambleside, for the Conference party aboard the MV Tern. For the next three hours we will tour Windermere Lake, entertained as we go by the 'World famous' - SALAMI BROTHERS. Music, stories, and tricks. A Chicken Salad is included in the £5.50 for Adults, and £2.50 for children. There is a licenced bar on board.

Sunday 16th July.

9.15 - 10.00am. - Margaret Faul - Yorkshire Mining Museum, The Development of Caphouse Colliery.

- 10.15 - 11.15am. - Rob Vernon - The Mines of South-East Spain.
- 11.30 - 12.30am. - Shropshire Mining and Caving Club, - Clive Copper Mine.
- 1.30 - 2.15pm. - Ian Matheson - Lakeland Underground, - A general illustrated talk on Lake District Mining.
- 2.15 - 2.30pm. - Conference closing addresses.
- 2.30pm Conference closes.

The Field Trips Programme runs from Friday afternoon, through to Monday afternoon. Brief details as follows:-

#### Friday 14th July

1.30pm - A walk of approximately 1½ hours duration through the surface remains of the copper mines and trials of the scenic Tilberthwaite Gill area.

3.00pm. - A walk of 1½ hours duration around the green slate quarries of Hodge Close, and Penny Rigg Tilberthwaite.

Assemble for these trips at the car park at Tilberthwaite Gill.

#### Saturday 15th July.

A choice of three trips, all commencing at 1.00pm, at the BMSC hut, Coppermines Valley, Coniston.

Route A - Suitable for families, a walking tour of approx. 2 miles, of the copper workings at Red Bell, Levers Water, and Paddy End Coniston.

Route B Underground trip. Own Harness, descender, and cows tails are essential. A descent into Levers Water Mine, and a further descent via Brow Stope, exiting via. a new connection with Top Level Extension. Longest pitch 70 feet, total descent 200 feet.

Route C Underground through trip. Own personal SRT equipment essential (and you must be thoroughly competent in its use) Top Level Extension of Paddy End Mine, Coniston. Abseil to bottom, and prussik out to day via. Brow Stope. Approx. 260 feet of prussiking, average pitch length 60 - 70 feet.

#### Sunday 16th July.

4.00 - 7.00pm. - Social event, upstairs room of the Salutation Inn, Threlkeld, Nr. Keswick. (good food available)

3.30 pm. onwards, Force Crag Mine, Coledale, Braithwaite Keswick. With the permission of New Coledale Mines, a concessionary charge of £1 per head is levied for this trip, payable to NCM. The trip is either:-

1. A walk through the working section of the mine, entering the No.0 adit, and climbing 100 feet of fixed ladder, to exit at No.1 level, for a visit to the mill, to examine the processing of the ore by gravity separation and floatation.

2. Laporte Incline. A brief visit to examine and follow the internal incline (easy angled, 33° from horizontal), driven in the 1950's from the No.3 Level, to connect the new 'Upper' mine, with the older parts of the mine.

#### Monday 15th July 10.30am. - 3.00pm. (approx)

The Mines of the Newlands Valley. Meet at Chapel Bridge, Little Town, Newlands, Keswick. A walk around the mines of the Newlands Valley, visiting Yewthwaite Mine, Castlenook Mine, Dalehead Copper Mine, and Elizabethan openworks. An easy walk in trip can be arranged to Goldscope Mine, to view the underground

...the underground waterwheel chamber. For the more adventurous, a descent can be made to view the 'coffin' levels, a descent of 70feet of the Scope and Shaft, (Abseil / ladder).

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The Delegate Fee for the Conference is £6.00 per person, payable with your booking.

In addition, on site accomodation can be offered at Charlotte Mason, as detailed,

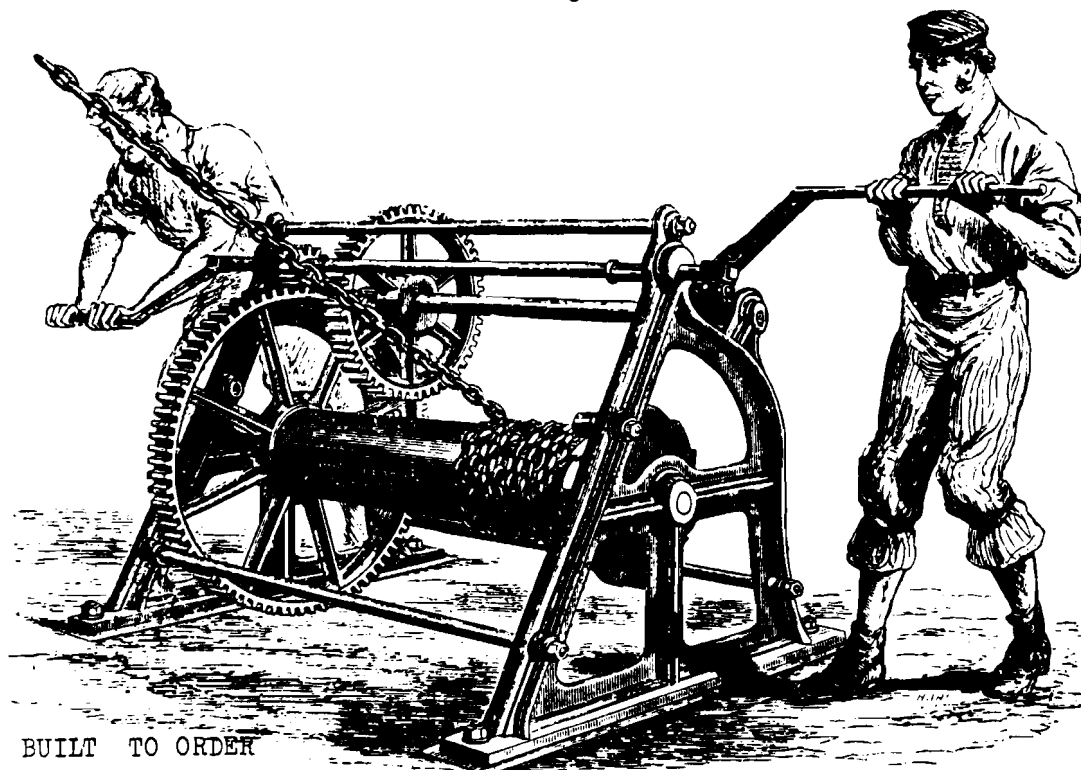
Bed and Breakfast	£10.50
Morning Coffee & Biscuits	.55p
Lunch	£4.00
Afternoon Tea	.55p
Evening Meal	£4.70.
or Full Board	£19.90 per person, per day.

All the above are exclusive of V.A.T.

If you intend to take up the offer of accomodation, a further deposit of £10 is payable at the time of booking.

Anyone intending to attend the Conference as a delegate is requested to contact the Secretary, Dave Blundell, 7, Hawes Garth, Staveley, Kendal LA8 9QH, Tel (0539)821750, as soon as possible. Cheques accompanying your bookings should be made payable to 'Cumbria Amenity Trust'. A single cheque will be paid to the Conference Secretary for all Society Members Delegate Fees.

As can be seen, from the lecture programme, and field meets programme, there is a considerable amount of work falling upon the Society. To make this Conference a success, any offer of assistance with Field Meets in particular, would be much appreciated. Of course, those assisting with the Conference, are excused the Delegate fee of £6. Offers of assistance, to Dave Blundell, address and phone No. as above. No one expects you to commit the entire weekend, if enough members 'rally around', this eases the burden on the long-suffering stalwarts of the Society.



BUILT TO ORDER

WINCHES OF ANY POWER.—PRICES ACCORDING TO WEIGHTS TO BE LIFTED.

ENQUIRIES TO ROD CHILTERN, WHITEHAVEN.

THE BRITISH METAL MINING HERITAGE

CONSERVATION, INTERPRETATION AND RESEARCH

A two day conference organised by  
The Association for Industrial Archeology  
with the support of  
The National Association of Mining History Organisations.

FRIDAY 16th AND SATURDAY 17th JUNE 1989  
LOUGHBOROUGH UNIVERSITY LEICESTERSHIRE

The purpose of this major conference is to bring together current work on the conservation and interpretation of mining sites: to consider their tourist potential in comparison with sites elsewhere in the world: and to attempt to determine priorities and guidelines for the preservation of important sites in Great Britain.

The outline programme is as follows:-

Friday June 16th

10 am Assessment and conservation  
1.30pm Excavation  
4.00pm Restoration  
7.30pm Tourism

Saturday 17th June

9.30 am The Environment  
11.30am Safety  
1.30pm Research and Publication  
3.30pm Plenary Session

The cost of each day of the conference includes coffee, lunch and tea, and is £12.50p to NAMHO members. A five course dinner will be available for £9, and bed and breakfast in David Collet Hall for £14. The complete conference, including dinner and accomodation is available at a reduced price of £45 to NAMHO members.

Booking form , and further details are available from the Secretary, Dave Blundell, 7, Rawes Garth, Staveley, Tel (0539) 821750., or from the Conference convenor Dr Marilyn Palmer , AIA/NAMHO Conference, The History Department, Loughborough University, Leicestershire, LE11 3TU, as soon as possible. Closing date for bookings 19th May.

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SCHEDULED MINING SITES IN CUMBRIA.

Newsletter No.21 page 3. Very few suggestions were submitted to the secretary, does this mean there is little worthy of preservation in Cumbria or a feeling of total apathy towards the proposed listing/scheduling.

English Heritage have now produced booklets for each county in England listing scheduled sites, if you are unsure if a site is protected in Cumbria contact the secretary. D. Blundell, 7 Rawes Garth, Staveley, Kendal, Cumbria LA8 9QH. Suggestions for listing or scheduling sites should include, name of site, description/features, 8 fig grid ref, comments

Booklets available from: Miss M. Trim, Chief Inspectors Division, English Heritage, Fortress House, 23 Savile Row, London W1X 2HE. Price £2.50

WELSH NOTES

David Bick has been hired by Anglesey Mining PLC to carry out an I.A. survey of Parys Mountain and has listed 49 features worthy of recording/preservation. Most of these are under no threat from the reworking and the company is promoting waymarked trails for the public to see the features. A leaflet is also in preparation in association with the County Council.

It is hoped to present the Prince of Wales with an ingot of copper from the Sygun Mine if enough water can be obtained to work the old stamps.

A waterwheel has been preserved at Cwm Cibrwth Mine and it is hoped to similarly deal with the flat rods, angle bob and pumps.

The timber shearlegs of the Dorothea Engine House have been cut down by persons unknown. The mill at Cwystwyth Mine is to be demolished since it would cost too much to restore. A section will be erected at Mid-Wales Mining Museum.

COURSES

I.A. Weekends in Forest of Dean 14-16/4/89 & 2-4/6/89

Residential courses with slide shows and field trips on iron mines, coal mines and ironworks. Contact David Bick for more details - T. 0531-820650.

VISIT RIO TINTO MINES

In the form of a 7 night package tour. Fly to Portugal and then drive to Rio Tinto with full board in a hotel. Daily excursions will visit the mines of the area including prehistoric and Roman sites. The cost is £350, details from J. Thorburn, Ceinionfa, Penglais Terrace, Aberystwyth, Dyfed SY23 2ET.

National Trust.

Following its success at Dolaucothi Mine, the Trust is urging people to study the prehistoric landscape of West Penwith in Cornwall and its tin mining industrial history through a series of guided walks.

**CAPSTAN,**

For raising or lowering heavy weights in Shafts, such as Pumps, H. and Door Pieces, parts of Main Connecting Rods, &c. Cast Iron Axles, Centre Pieces for Arms, Heads, and Foot Blocks, Bolts, Plates, and Straps



may be had ready to mount the wood-work, or the whole may be fitted together at the Works, marked and taken to pieces for transport.

*Prices for different sizes on application.*



## Introduction

Until relatively recently, known instances of "early" mining in the UK were generally ascribed, if at all, to the "Roman" period. Evidence took the form of suspected fire-setting, hammer stones, antler picks, inscribed ingots, coins, etc., (eg. Davies, 1937) but there was no direct evidence for the date of the initiation of these mining activities. It was also regretfully concluded that later intensive mining in the eighteenth-twentieth centuries had probably obliterated virtually all evidence of the earliest phases of mining (Tylecote 1986). Major prehistoric mining sites have since been identified and investigated in south and eastern Europe (eg. in Craddock 1980). Now, in the British Isles, C<sup>14</sup> evidence has recently accumulated from surface spoil or shallow workings which suggests significant mining activity in the late Bronze Age, both at Mount Gabriel in South West Ireland (Jackson 1968 & 1979) and also at Cwmystwyth in mid Wales (Timberlake 1987): confirmatory results of datings from similar excavations in spoil at Parys Mountain (Anglesey) and Nantyreira (in mid Wales) over the summer of 1988 are also awaited, although the hypothesis is still disputed by some (Briggs 1986; Slater 1986). The final evidence is now required to establish, unequivocally and specifically, that Bronze Age underground mining for copper occurred on a significant scale in Britain.

## The Great Orme, Llandudno

Mineralisation at the Great Orme comprises the brassy coloured copper/iron sulphide, chalcopyrite, in dolomitised vertical veins trending roughly North-south through the beds of Carboniferous Limestone. Much of the chalcopyrite near the surface has oxidised to the strikingly green carbonate mineral malachite, and this would certainly have attracted the attention of early miners. The earliest documented mining for copper on the Great Orme dates from 1692, and mining continued intermittently through to the 1880s, with peak production in the middle of that century (Williams, 1979). Evidence of earlier mining in the form of stone hammers and deer bone chisels was found by miners breaking into older workings in 1849 and 1876, but this evidence is now dispersed and undated, although stone hammers (unrilled) can still be found in the undefined context of present surface dumps. There was, however, an association with Roman coin hoards in the area dating from the end of the third century, and this prompted Oliver Davies in 1938-9, on behalf of the British Association, to carry out a surface excavation on a site near the outcrops of the ore veins at Gogarth on the southern shore. Davies (1948) had no doubt that the site represented a mining settlement, and this he ascribed to the Roman age.

In recent times the history of the mines has been documented (Williams 1979) and much of the accessible ramifying underground workings explored in detail. In the later phase of this exploration, it was recognised that some of the workings accessible by shafts at depths from 20-100m at Bryniau Poethion were of obvious antiquity, the "deads" containing stone mauls, charcoal, and bones *in situ*, and in some cases sealed by a significant layer of calcite. Some charcoal picked from these deposits gave a C<sup>14</sup> date of 990 bc confirming the antiquity of mining activity at this site and suggesting an Early-Middle Bronze Age, rather than Roman, date (James 1988). This is comparable with the uncalibrated dates obtained from Cwmystwyth (Timberlake 1987) and Ireland (Jackson 1969) and hints at widespread mining at this time and, at the Great Orme in particular, on a an impressive and remarkable underground scale.

Subsequently, as a result of the proposed development of a car park at Bryniau Poethion on the Great Orme, a further careful survey of underground workings has been undertaken by Mr A. Lewis and members of the Great Orme Exploration Society. In particular, the opening up of three previously sealed shafts has allowed access to further extensive underground workings, the upper sections of which have again shown evidence of prehistoric mining in the form of charcoal, bones, mauls, etc., in conditions that are as yet relatively undisturbed. Surface excavation by the Gwynedd Archaeological Trust is under way (summer 1988) around a major nineteenth century shaft head which is sited on outcrops of ore veins which may have been originally exploited in prehistoric times: from these further C<sup>14</sup> evidence is awaited to corroborate the antiquity of the workings.

## Conclusions

The mine workings on the Great Orme therefore present the possibility of a detailed *in situ* study of what is probably the earliest mining activity in the British Isles. The scale of these ancient workings, whose intricate pattern of tight passages extend over considerable areas below the surface of the Orme and at depths of up to 100m, are unprecedented in Europe: this would therefore be a major archaeological site of international significance. Unusually, the location of the possible evidence is already known and protected, yet "open" and relatively accessible through the good offices of the local Council. It is now hoped to be able to exploit this unique opportunity through an extended programme of careful exploration, survey, research, and C<sup>14</sup> dating in particular, using the specialist underground expertise of the Great Orme Exploration Society, combined with the professional skills of members of the recently formed Early Mines Research Group, and of the Gwynedd Archaeological Trust.

Mr. A. Lewis  
Gwynedd, Tynycoed Road, Llandudno

Dr. D. A. Jenkins,  
University College of North Wales  
Bangor, Gwynedd, LL57 2UW

18th October, 1988.

# Historic discoveries on the Orme

**DISCOVERIES** on Llandudno's Great Orme are helping to throw new light on life in pre-historic Britain.

Findings have included stone tools used by prehistoric man to mine copper.

It had been thought by archaeologists that there was no mining in Britain before the Romans.

But evidence unearthed on the Great Orme and at three other sites in Wales suggests that the history books will have to be re-written.

Tests have already been carried out at the British Museum and initial results indicate that the theory might be true - although there will have to be more tests before experts can say for sure.

Sophisticated radio carbon dating techniques have already suggested that finds on the Great Orme could date from between 1,000 BC and 1,800 BC.

The Romans did not start mining until almost 2,000 years later.

## Bronze-age tools indicate ancient copper mining

Early investigation of the sites on the Great Orme was carried out by a freelance archaeologist, Mr Duncan James, during the 1970s.

His work has been carried on by members of the Great Orme Exploration Society and the Early Mines Research Group.

Expressway engineer, Mr Andrew Lewis, who has been one of the team exploring the Bronze Age theory, said only further tests would prove conclusively that there was Bronze Age mining on the Orme, although

he had been encouraged by the findings so far.

He said the first clue that had suggested the true age of the Great Orme mines had come from stone tools.

Water dripping onto some of the implements in the mine's spoil heaps had built up a layer of calcite.

"It was of a thickness that would take centuries to form," he said.

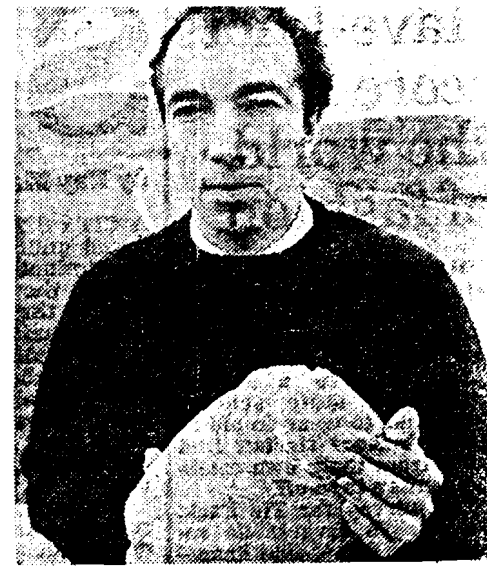
But conclusive evidence lay in the remains of fires which had been used in the mining process.

The rock would be heated and then cooled quickly with cold water to make it crack.

The stone implements would be used to do the rest of the work.

Other sites in Wales that form part of the Bronze Age link are at Parys Mountain, Anglesey, Cwmystwyth in Cardigan and Nantyreira in Plynlimmon in mid-Wales.

The Early Mines Research Group was formed to investigate the theory.



Andrew Lewis with a hammer stone

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## Virgin Island copper mine mystery

VIRGIN Gorda, one of the Virgin Islands group in the Caribbean discovered by Christopher Columbus in 1493, has an area of 21km<sup>2</sup>. At its southernmost tip is Copper Mine Point where, in the cliffs sloping down to the sea, mineral veins can be clearly seen from a vessel offshore. Early Spanish settlers carried out limited mining operations, but the major workings of the deposits were undertaken much later by British-based companies in two phases, 1839-41 and 1859-62.

In the first of these phases the workforce began by "clearing up the existing mine workings." Following this, three shafts were sunk and various consignments of copper concentrates assaying over 25% Cu were shipped to

Swansea. There were problems, however, with the local administration and assessment of customs duties, and the operation was suspended on 20 March, 1842. The facilities lay idle for the next 17 years. Then in 1859 the well-known firm of John Taylor and Sons took an interest in the property and reopened the mine. A pumping engine, made at Perrans Foundry at Perranarwartha near Falmouth in Cornwall, was installed at one of the shafts: part of the stone-built enginehouse and the free-standing chimney still stand. Below ground, the main shaft was about 380ft (116m) deep, with levels driven north and south from the shaft in ore at 10 fathoms (18.3m) intervals, some



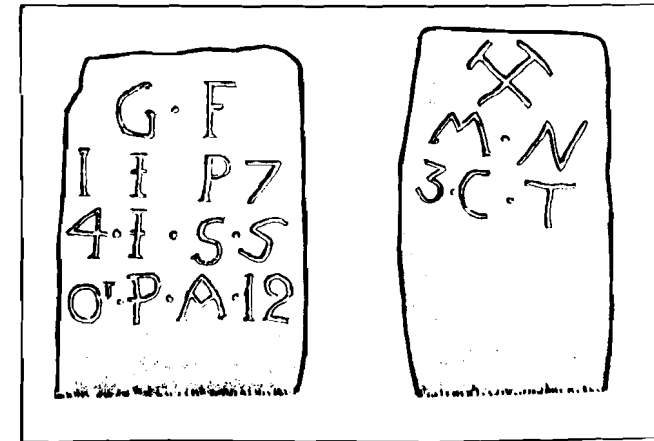
The remains of the pump house at Copper Mine Point, Virgin Gorda Island. The engine, made at Perrans Foundry, was dismantled by John Taylor and Sons to use elsewhere.

levels extending up to 800m south from the shaft, well out under the sea.

Once again, however, just as operations were well established, financial problems arose. The ore grade fell to 14% Cu, the price of copper dropped and the U.K. Government, which administered the colony, introduced high export duties on shipments of concentrates. In April 1862 the Taylors closed the mine, timbered over the shafts and dismantled the engine with a

view to shipping it back to England. At the time the mine closed, the vein was reported to have thinned out in the northerly direction but to be as strong as ever to the south.

In 1915 the mine area was leased for three years to an Englishman, W. W. Hollings, who started a small enterprise for hand picking molybdenite from the waste dumps. A later lessee, who paid £50/y, appears to have done no work at the site apart from shipping a dump sample to



Markings on the mystery stone on Virgin Gorda, thought to relate to the copper mine. If any reader can explain the markings, please contact Mr. Birchall (see text for address).

New York for analysis, showing copper, molybdenum and silver values. Now, the Canadian Government is said to be interested in preserving the ruins and promoting the area as a tourist attraction.

Possibly a relic from the earlier mining operations, a stone bearing a crossed-hammer symbol and other markings was found nearby. Unfortunately it was removed from its original position and taken to the local churchyard by a well-meaning

priest who thought it was a grave-stone. The accompanying drawing gives an idea of what markings are on the stone. If anyone can suggest the meaning of the symbols, Mr Frank Birchall of 48 Thomas Street, Porthleven, Helston, Cornwall TR13 9DG, U.K., would be pleased to hear your ideas.

Reference: Virgin Gorda Copper Mine 1839-1862, by Roger Burt, Industrial Archaeology Review, Volume VI, Number 1, Winter 1981-82.



A soapstone spindle whorl and bowl (above) and a fishing weight and handled cup found on Shetland. The items were probably made of steatite quarried by Scandinavian settlers. Photographs: Royal Museum of Scotland.



# Vikings operated Shetland bowl and plate factory

By David Keys  
Archaeology Correspondent

VIKING craftsmen were running a massive industrial complex on Shetland 1,000 years ago, according to archaeologists working in the south of the island. Located near the Shetland village of Cunningsburgh, the site is on top of Britain's largest geological outcrop of soapstone.

It is estimated that Vikings extracted up to 15,000 cubic metres of soapstone to produce up to 50,000 soapstone bowls, lamps, baking plates, spinning whorls and moulds for casting metal.

In a sample excavation at the site last year, archaeologists found 167 holes in the bedrock from which bowls and plates had been carved, and fragments of more than 100 broken soapstone bowls and other items in an area of just 35 square metres.

Surface quarrying can be seen everywhere on the site, which covers at least 4,000 square metres. However, it is possible that some soapstone was mined. The Vikings are known to have mined soapstone at Folvelseter in Norway.

Soapstone has been mined for most of the past 5,000 years. However, steatite extraction reached its peak in the period of Scandinavian settlement starting in the ninth century.

The Vikings did not have a

strong pottery-making tradition and preferred to make their pots and other household utensils out of soapstone, wood or bone.

Soapstone bowl production on the islands seemed to have died out in the sixteenth century, when ships calling at Shetland started carrying pottery bowls and plates as ballast.

Shetland archaeologists are worried that a small part of the site could be destroyed by work connected with modern quarrying.

Soapstone is the raw material from which both industrial and cosmetic talcum powder is made, and Shetland Talk — owned by Anglo European Minerals and Dalriada Mineral Ventures — is considering setting up a quarry close to the site with an access road crossing it.

The Viking industrial area is a scheduled ancient monument, so government permission would have to be obtained before the road could be built.

Recent archaeological excavations have been made under the supervision of Beverley Smith, working in conjunction with the Shetland Amenity Trust.

## FLORENCE MINE PROJECT

Dave Banks secretary of the W.Cumbria Mines Research Group would like any members with an interest in this project to contact him(Tel 0946 823812)  
It is hoped to develop the mine to provide an underground experience and mining museum. Would any members be prepared to donate or loan artifacts, papers,mineral specimens etc?

LEAD/ZINC**GALMOY IS ECONOMIC**

As a result of its recently completed pre-feasibility study, Toronto-based Watts Griffiths and McQuat Ltd (WGM) has concluded that the Galmoy zinc-lead project in the Republic of Ireland is technically and economically sound. It recommends that the owner and operator, Dublin-based Conroy Petroleum and Natural Resources plc, proceeds with a final feasibility study "so that a production decision can be reached as soon as possible".

For Conroy's chairman, Professor Richard Conroy, the independent study confirms his long-held belief that the Galmoy discovery is commercial.

Located 110 km southwest of Dublin in the farmlands of County Kilkenny, Galmoy first drew wide publicity in November 1986 when initial drilling encountered intersections grading as high as 18.3% combined metals over widths of 8-10 m and less than 100 m from surface (*MJ*, November 21, 1986, p.371). Based on assay data from the subsequent major drilling campaign, WGM has calculated proven and probable ore reserves of 6.7 Mt grading 10.87% Zn and 0.98% Pb at a cut-off grade of 3% zinc equivalent. At a proposed annual production rate of 550,000 t of ore, this would be sufficient to sustain a mining operation for at least

ten years. Conroy has contiguous exploration licences centred on Galmoy and covering an area of 231 km<sup>2</sup> and WGM believes that there is excellent potential to delineate additional reserves.

Mineralization is hosted by Waulsortian dolomitized limestones which are of Carboniferous age, and comprises sphalerite, galena and pyrite. There are two zones — the CW is 3-18 m in thickness over an area 700 m × 500 m, and the G zone is 3 m to 21 m thick over 300 m × 450 m. Both occur within 60 m to 80 m from the surface and the average ore thickness is 6 m in the former and 8 m in the latter. Solution cavities occur within the ore and overlying rocks and the extent of this karstification will be ascertained by geotechnical and hydrogeological studies.

Preliminary metallurgical studies of ore from the CW zone indicate that a 90% recovery is achievable for the zinc and a 55% recovery for the lead. Environmental considerations preclude open pit mining methods and a preliminary mining design developed by WGM envisages a combination of room and pillar and cut and fill mining methods with access via a decline from surface to a depth of 100 m within the CW zone. The design calls for a two-shift/d, five-day week for the mine and a seven-day, three-shift milling operation. The mine is designed to operate at 2,200 t/d and

the mill at 1,500 t/d. Zinc and lead concentrates will be trucked or railed to port for shipment to smelters in Europe and the initial production forecast is for 60,000 t/y of zinc in concentrates.

Conroy says that preliminary discussions have taken place with the appropriate authorities for the statutory permissions and the acquisition of a mining lease/licence. These will require the completion of a final feasibility study. Writing in the 1988 annual report, Professor Conroy notes that the joint venture and joint share subscription agreements reached with American Pacific Mining Inc. at the end of 1987 were terminated last September but since then he says, several major mining companies have expressed an interest in becoming joint venturers and these approaches are being considered.

COAL**Coal in Cumbria**

**LOSTRIGG OPENCAST SITE.** Cumbria — County Council is currently considering an application by British Coal Opencast Executive for a very large opencast site called Lostrigg, east of Workington, with reserves of 7.5 million tonnes. The application area comprises 516 hectares (1275 acres) and the proposed life of the site is 22 years. The County Planning Officer has indicated in the recently released Cumbria Coal Plan that the whole take of the site sought by the Opencast Executive is not acceptable. Whilst the County Council may accept in principle a large site in this location discussions are currently ongoing between the planning officers and British Coal, mainly regarding the exclusion of parts of the site from the application, the scheme of working and the restoration and after use proposals.

## **MAINBAND COLLIERY, WHITEHAVEN**

A start has been made on the new drift mine. A new access road made from the farm road at Woodend, to the mine site, hard standing laid for site cabins, internal road layed using quarry waste, number 1 intake drift dug out using Hymack shovel and dumper, down 1 in 4 to bed rock, (Shale), 42 m to forehead. Concrete layed on bottom and H section girders placed in sides of drift, to form water channels. Also 14' x 10' arch girders built up off bottoms of H girders to give a solid base, arches having 9 heavy duty steel struts in each girder and completely covered over with corrugated sheets and are 1 m apart. Portal built. Concrete put over arches then back filled and graded. Number 2 return drift driven the same way, but has a dip of 1 in 3-73. A local builder built sub station and portals, roads and bases for lamp room and substations. These are steel framed buildings painted green to blend in. Black Well mining - are supplying all electricity gear and installing same. Haulage house built, housing a number 3 Pick Rose haulage, to serve number 1 drift.

Contractors are on site (Donelons of Bolton). Advancing drifts into more stable and solid rock ready for drifting doscos coming.

February - Dosco Mk 2B heading machine in number 1 intake conveyor laid on, and fan.

Cutting started in number 1 drift Thursday, 2 February, 1989. Drifts are 20 metres apart.

## **AN UPDATE ON ALSTON COALMINES BY RONALD CALVIN RM**

### **Blagil Mine started October, 1986**

A previous drift mine reopened, and extended to mine semi Anthracite works a 0-5 metre thick seam, which is generally (locally) called the Little Limestone, because of the limestone beds it is associated with.

Currently employs 10 men.

No real problems with water, as seam occurs high up the hillside, and the strata is free draining. No discharges of water direct out of the mine. Road ways 6' x 6' wooden timber on grid iron, pattern.

### **Plant at Mine**

Roadways are bored and fired. Coal taken out in seam using windy picks.

Shovelled into tubs and railed out to screens then into hoppers.

Site area only 0-6 hectares.

### **Other working coal mines in Alston area February 1989**

Clerghyll Colliery, Cumbria - working

Flowedge Colliery, Cumbria - closed possibly only temporarily in Spring 1987.

These three are in Northumberland

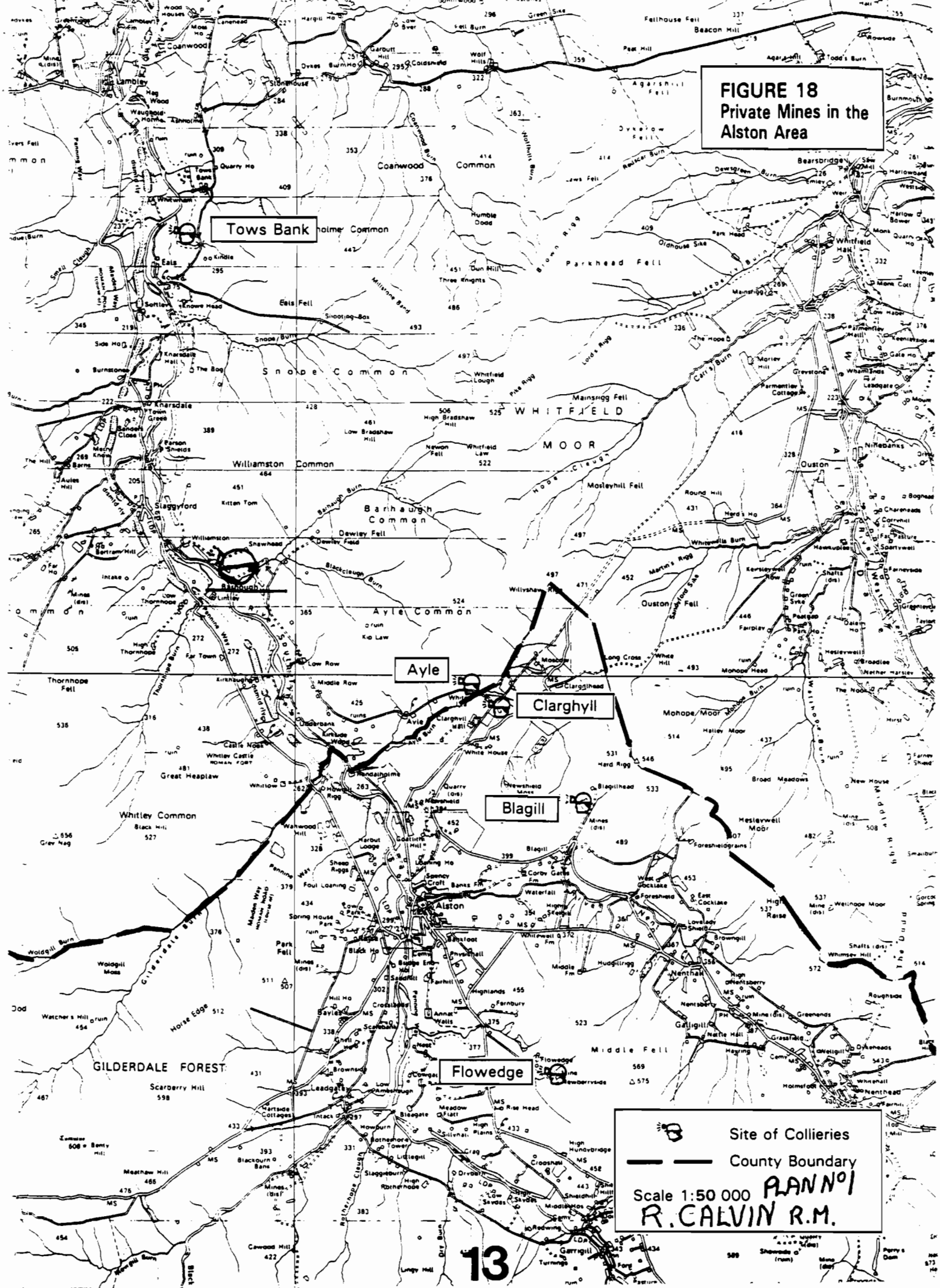
Ayle Colliery



Towns Bank Colliery

Barhaugh Colliery - Recently granted planning permission

Also there are a further four small coal mines in the western part of Northumberland north of Tows Bank Colliery

**FIGURE 18**  
Private Mines in the  
Alston Area



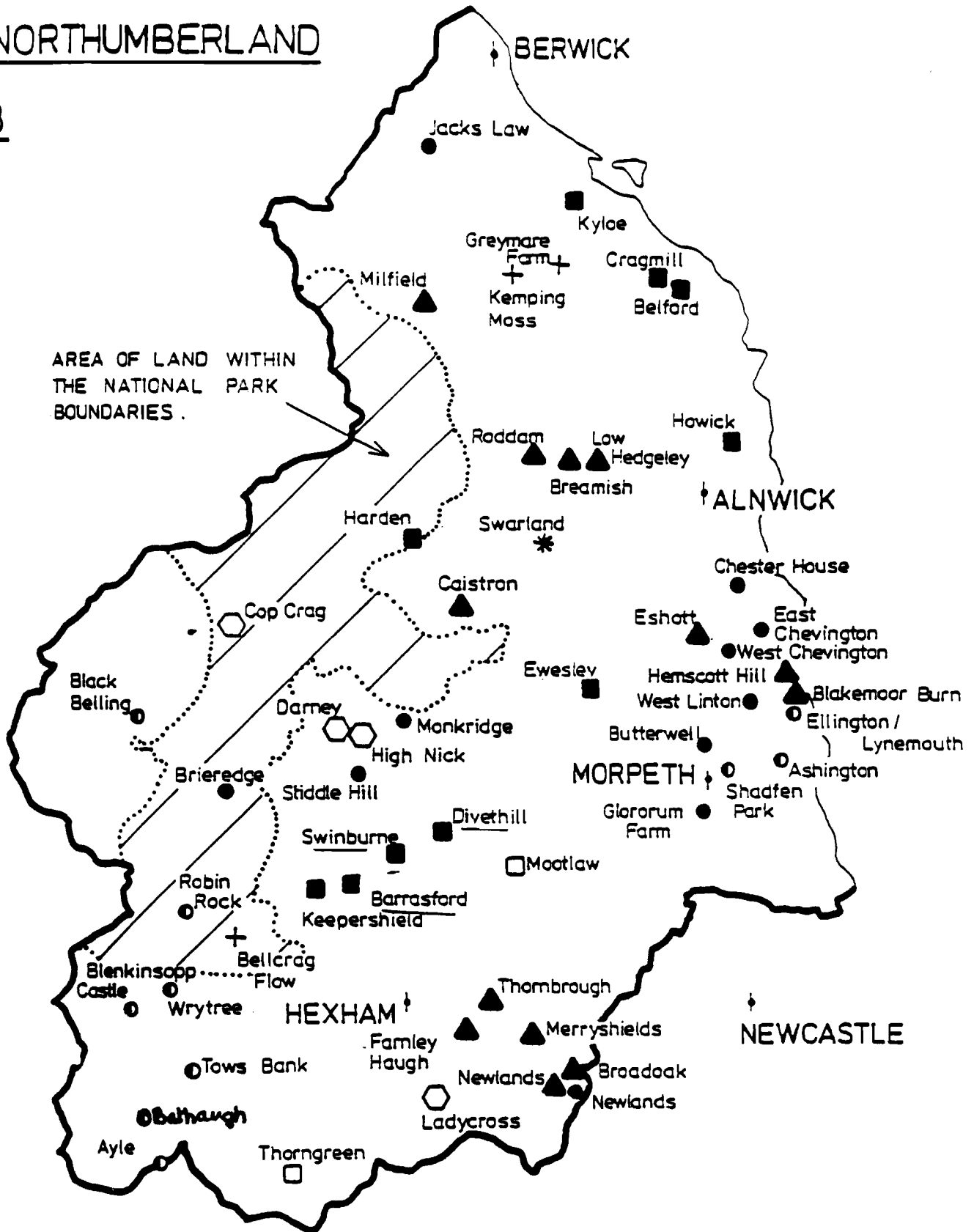
 Site of Collieries  
 County Boundary  
 Scale 1:50 000  
 R. CALVIN R.M.

## ACTIVE MINERAL WORKINGS

Plan No. 2 R.C.

## IN NORTHUMBERLAND

1988



## KEY

- |                     |                   |
|---------------------|-------------------|
| * - Clay            | □ - Limestone     |
| ○ - Coal (mined)    | + - Peat          |
| ● - Coal (opencast) | ▲ - Sand & Gravel |
| ■ - Igneous Rock    | ⬡ - Sandstone     |



## FLUORSPAR

Laporte minerals have obtained planning permission for a mine at Great Hucklow. Reserves are estimated at 1m tonnes.

Laporte desperately need new reserves after the closure of Ladywash mine and depletion of floustar in Sallet Hole nos 1&2 mines.

The mine life will be 10yrs and the ore will be mined using a revolutionary technique whereby mine waste, concrete and tailings will be used as backfill as mining proceeds

One of the conditions of the permission is that all the mine buildings at Ladywash must be demolished with the exception of the engine house chimney.

# Rush to judgment on Welsh gold mine

Gareth Parry on the controversy over an unusual tourist idea

**T**HE ALLURING glint of Welsh gold, which has for generations intermittently sparkled in the Snowdonia village of Bontddu, is about to flicker again with a vengeance.

A public inquiry ordered by Mr Peter Walker, the Welsh Secretary, will decide whether the goldmine at Bontddu can be developed as a tourist attraction which could bring hundreds of thousands of visitors into an area designated as of "outstanding natural beauty."

But the controversy surrounding the planned £2 million development demonstrates a predictable clash of ambitions between conservationists, those who want to bring jobs into an area where there are all too few, and the less than total altruism of the businessman.

Mr Bill Roberts, a millionaire property developer and entrepreneur, who made his first fortune selling frozen food, wants to develop the Clogau Gold Mine — which at the turn of the century produced the nugget that was to make wedding rings for the Queen, the Queen Mother, and the Princess of Wales — into a living museum.

He says the scheme will provide more than 60 jobs. "I am a Welshman, and I would never do anything to harm my country. I just want to give people the opportunity of seeing its beauty."

He expects that eventually some 250,000 visitors will come each year to Bontddu (population, 200) on the Mawddach Estuary, and from there ride in



Site of conflict . . . the mine whose planned new life has prompted widespread opposition

cable cars to the mountain top before taking a train into the depths of the Clogau.

The Snowdonia National Park's planning committee was prepared to give the go-ahead when the Countryside Commission, the Council for National Parks, and the Snowdonia National Park Society asked the secretary of state for the public inquiry. This will sit in April.

The national park authority has decided to support the scheme at the inquiry.

But Mr Martin Fitton, regional chief officer of the Countryside Commission, is convinced the plan is incompatible with the beauty of the Mawddach. "It would have an enormously detrimental im-

pact," he said. "Although the main issue is the landscape, the development would be at complete variance with the commission's philosophy that the Mawddach should be a place of low-key recreation".

Those born and bred in Bontddu, such as Mr Bernard Williams, aged 41, who until seven years ago was among the 10 miners working Clogau, are enthusiastic. "Anything that brings the prospect of jobs and some prosperity into the area cannot be bad," he said. "It is understandable for people to want to protect the beauty of the area, but I'm afraid beauty doesn't pay the grocery bills."

Mrs Esme Kirby, who chairs the conservationist Snowdonia

National Park Society, said: "Mr Roberts has already devastated an area of woodland to build the car park. He went ahead with no regard, and all he got from the authorities was a slap on the wrist for jumping the gun. We're hopeful the public inquiry will have sufficient evidence to make it clear that such a development would be totally unacceptable."

The Snowdonia National Park committee had taken the employment aspect into account in deciding to support the plan, said its chairman, Mr John Tudor. "We have examined the possible detrimental visual impact of the development, and we are satisfied there will be very little."

# BOOK NEWS

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RED EARTH PUBLICATIONS are pleased to announce...

## Volume 1 of the Cumbrian Iron Mining Series

### THE IRON MOOR

Alen McFadzean's second book, **THE IRON MOOR**, will be ready for distribution in May/June. Comprising 150+ pages with plenty of plates, some modern, some old, Alen expects the book to retail under £7. Substantial discounts for CAT, CIHS, NMRS, and WMS members.

The book discusses the development of the Lindal Moor and Whitriggs hematite mines, Furness, from the early workings of William de Merton and the Monks of Furness Abbey, through the intervening centuries to the final abandonment in recent times.

With material drawn from the mine reports of John Dunstan and John Rigg, the personal and business letters of Edward Wadham and William Ainslie, the account books of William Schneider and Robert Hannay, the book investigates mineral exploration, shaft-sinking, bargain setting, robbing and plundering, drawing, pumping...and flooding. The human and social aspect is represented - strikes, wages, deaths, drunkenness...

The Big Trespass, the unparalleled encroachment into the Derby lands, has a chapter to itself. With statements from the very men who brazenly removed 20,000 tons of Derby ore (Fawcett, Sprout, Hodgson, Keinen, Hutchinson and others) the events of 1900 to 1903 are portrayed in detail from the systematic and illegal plundering of the ore to the final court session in the distant capital.

The book is based on Alen McFadzean's research, 95% of it drawn from unpublished sources.

\* \* \*

Final price and discount yet to be computed, though **advanced orders** are now being taken (terms 30 days on receipt of book & invoice).

orders to Red Earth Publications, 7 Silver Street, Marton, Ulverston, Cumbria, LA12 0NQ.

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OBSERVATIONS OF THE WEST OF ENGLAND MINING REGION. by J.H. Collins.

Truro.Cornish mining classics 1988. 703pp £17.95

This book which has become a standard reference work since its publication in 1912, is a comprehensive record of geology, mining history and mineralogy in Cornwall, Devon and Somerset in the 19th and early 20th centuries.

Available from: Cornish Mining Classics, 11a, Glenfeadon Terrace, Portreath, Redruth, Cornwall TR16 4JX.

METALLIFEROUS MINING REGIONS OF SW ENGLAND by H.G Dins. Mar/89

Reprint by BGS/HMSO. 2 volumes approx £30.00 available from British Geo Survey or HMSO bookshops.

CORNWALLS MINING HERITAGE by P. Stanier.

Truro.Twelveheads Press 1988 .48pp £1.95

This book looks at the history and the remains of the Cornish mining industry.

Book by Laurie Moran:

'THE HISTORY OF BRANDON COLLIERY 1856-1960'

Available at the following libraries:

County Hall Library Headquarters; Brandon;  
Durham City; Esh Winning; New Brancepeth; Crook  
(Mobile Library); Bearpark; Willington; Belmont;  
Newton Hall.

Contents include:

Men and boys killed in the pit;  
Men lost in both wars; Football teams; Boxing;  
Pigeon Racing; Galas; Humour; Strikes.

376 Pages      Price £7.95    No Bookshops  
Ideal Gift.

Laurie Moran is an ex coal miner who worked underground for 31Yrs, this book is a culmination of 10yrs research and personal experience.

SLATE QUARRYING IN THE LAKE DISTRICT - A CAUSE FOR CONCERN.

Available from Friends of the Lake District, Gowan Knott, Kendal Road, Staveley. Cumbria. LS8 9LP. £5.00

This report has been produced on behalf of the Friends of the Lake District by Stephens associates of Kendal and boasts a foreward by Brian Redhead.

One conclusion of the report is that: "Existing planning consents for slate quarries should be reviewed by the Lake District Special Planning Board using powers contained in the 1981 Minerals Planning Act. The review should include a detailed environmental assessment of each quarry to establish more appropriate methods of working and restoration."

## BOOK NEWS

Gold Mines of Merioneth by G.W Hall. Reprint available from 17a, Bridge st, Kington, Herefordshire.

Old Metal Mines of Mid Wales Part 3 by D.Bick. This has been reprinted and parts 4 & 5 will shortly be available as a single volume. Available from Pound House, Newent, Glos.

Cornwall's Mining Heritage by P. Stanier 48pp £1.95 Pub by Twelve heads Press, ISBN 0 906294 14 2

Journal of Cork Historical & Archaeological Society Vol 92 No 251.

Contains an article by W O'Brien on dating bronze age copper mines at Mount Gabriel.

The Cornish Miner in Australia by P.J. Payton 242pp £4.95

Published by Dyllansow, ISBN 0 907566 52 9.

### "Annual Research Report 1988" Kent Underground Research Group.

102pps, photos, surveys, etc. £2.00 (post free).

Consists of 21 articles of varying length on such features as deneholes, chalk mines, wells, chalk caves, etc. An article on the technical problems of pumping and exploring a 300ft well could be useful to other groups contemplating similar projects. There is an article on basic surveying techniques which is the first in a series. An excellent field guide to the surface remains at Nenthead in Cumbria has 5 sketch maps and describes no less than 148 separate features, many of which are still visible. This article can be used as a mine trail to visit parts rarely seen. Available from R. Le Gear, 18 Bladindon Drive, Bexley, Kent DA5 3BP.

### A HISTORY OF THE LAWS AND CUSTOMS OF THE DERBYSHIRE LEAD MINES.

by J.H. Rieuwerts

Sheffield: printed by Office Liaison Ltd, 1988. 38pp., 16 refs. (including a facsimile reprint of the liberties and customs of the lead mines within the wapentake of Wirksworth in the county of Derby, by Edward Manlove, 1653.) A broad outline of mining customs is given, followed by the early development of lead mining in Derbyshire, pre-1288; Roman to 12th century; establishment of mining customs and the Barmote Courts; the Quo Warranto or inquisition; and expansion of the laws and customs.

2nd ed. Kington Herefordshire. Griffin Publications 1988 99pp 18refs.

This book aims to give a fair account of the history of the mines, of the character of the ore deposits and their relationship with the rocks in which they are embedded, of mining and milling methods, so that the sites may be better appreciated, and of the future prospects for gold mining in the area. It starts with a general account, put in non specialist terms, of the geological setting and mineral characteristics of the ore deposits; some account of mining methods and their remains; then a short general history of gold mining in the area; more detailed chapters on the Clogau and Gwynfynydd mines; some account of the lesser mines; the writer's view of future possibilities; a short account of the extraordinary technical developments at Glasdir which, though primarily a copper mine is closely linked with the gold mines; some notes on units; and statistics production.

#### **MINESHAFT RESEARCH REPORTS PUBLISHED**

Two reports containing the results of research on the treatment of disused mineshafts and mined ground were published in December 1988. The first report - "Treatment of disused mine openings" (DoE 1988, HMSO Price £18, ISBN 0 11 752152 3) reviews methods of making such openings safe and looks at the administrative and legal provisions and responsibilities for dealing with them. The second report - "Methods of comparison, storage and retrieval of data on disused mine openings and workings" (DoE 1988, HMSO Price £15, ISBN 0 11 752150 7) considers options for cost effective storage and rapid retrieval of information on mineground and mineshafts in both manual and computer systems. It gives a basis for decisions on the best information systems for use in considering planning of land use and development proposals. Minerals Planning guidance based on the results is currently being prepared and will be used for public consultation later in the year.

March 89.

## **50 years ago**

From the Westmorland Gazette, January 1939

### **Ravenous rats**

The resourcefulness of rats is illustrated by the following North Westmorland story. At the Silver Band barytes mine, on the Pennines, near Appleby, there is a colony of rats which evidently finds a living by picking up odd scraps here and there, plus what the workmen leave behind when they have their meals on the premises. Over the Christmas holiday the weather was bitter and there was a fair covering of snow on the fells. The rats must have been in a sorry plight, for on resuming work after the holiday the workmen found all the bone buttons were missing from their working overalls - the rats had eaten them.

MARK SCOTT

The Society has 3 copies remaining of "The Bibliography of the History of British Metal Mining", by R Burt, and P Waite, published by the University of Exeter, (see Newsletter No.21, October 1988, Page 4, for details).

Copies are available at a discounted price to Society members only. Price £6, as compared to cover price of £8.95p. Orders to the Secretary, Dave Blundell,

Tel (0539) 821750.

# BOOK REVIEWS

## THE KELTON & KNOCKMURTON IRON MINES, 1852 - 1923 by Richard Hewer

British Mining No.36 (NMRS)

It's always refreshing to read something new about the Cumbrian hematite mining industry, and this publication, by CAT and NMRS member Richard Hewer, is certainly packed to the bindings with the labours and fruits of original research. Richard's investigations into the mines of the Ennerdale area have unearthed some fascinating facts concerning the numerous hematite lodes traversing the region, the tonnages produced, and the histories of the various firms involved in the winning of the red ore. Of particular interest, certainly as far as the more historically minded are concerned, are the detailed accounts of the surveying and laying of the mineral railways, designed to replace the endless streams of ore-carts ploughing the muddy lonnins between the mines and the rail-heads.

The mining methods employed at Kelton and Knockmurton had much in common with the Cumbrian lead and copper mining techniques, the veins being narrow and regular and worked systematically by shafts, levels, and stopes. This is at variance with hematite mining in the limestone areas of Furness, and to a lesser extent Egremont, where the deposits were thoroughly irregular and much more unpredictable. Richard's diagrams of the veins and his highly-detailed mine surveys are professionally executed and abound in detail, though had the book been produced in the old NMRS A4 format they would have been easier to study (personal opinion of long-sighted reviewer).

The photographs are interesting, especially the one of the mine foreman, Mr Hope, who "...married on a Sunday because he could not miss a day's work.." To sum up: anyone who claims to be at all interested in Cumbrian mining should buy this book. It offers a different perspective into a branch of our mining heritage largely ignored by the authors of mining literature.

McF

## THE GOGINAN MINES Simon J.S.Hughes

British Mining No.35 (NMRS)

This book, another NMRS publication, lay unread in my drawer for a number of weeks, partly because Welsh lead mining is not a subject with which I am familiar and partly because I had recently read a protracted article - by the same author - in the UK Journal of Mines and Minerals and found it to be rather heavy. I was, therefore, pleasantly surprised to discover THE GOGINAN MINES to be a thoroughly readable book. Mr Hughes' literary style is both articulate and imaginative; consequently, readers possessing no prior knowledge of this mining area - such as myself - are not unnecessarily bombarded with a series of unrelatable place names, but are gradually introduced to the various mining locations as the text unfolds. The events, with possible origins during Roman times, are dealt with in chronological order through the Elizabethan period to the early years of the present century.

The personalities have been well researched and are portrayed with character and historical accuracy. One feels a certain degree

of sympathy for adventurers who risk their fortunes to explore the lodes, only to discover barren ground.

I am not so sure about the authenticity of the butcher's black dog, or the historical accuracy of the aged female ore dresser and the new fangled lamp. Still, folk-tales are part of our heritage - especially mining folk-tales - and we can rest assured that if Mr Hughes hadn't recorded these two examples they would have been lost for ever.

This is a book for members interested in the lead mines of Wales. It is well written, well researched, and well worthwhile acquiring. The format, as with Richard's book, is A5, and the quality of printing and production is a credit to the Northern Mines Research Society.

McF

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## Mining history

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**The Goginan Mines**, by S. J. S. Hughes. British Mining No. 35 Monograph, published by The Northern Mine Research Society, 41 Windsor Walk, South Anston, Sheffield S31 7EL, U.K. 1988. 290mm x 147mm, 88pp, 36 figs, 11 plates, appendices, bibliography. £6.00 + p & p. ISBN 0 901 450 33 2.

SOME seven miles east of the town of Aberystwyth, on the A44 trunk road in mid-Wales, lies the village of Goginan. Just north of here there is a group of lead mines which were extensively worked, albeit spasmodically, from at least the 1600s to the late 1800s. The Goginan lease was held in the 1640s by Thomas Bushell, who had successfully petitioned for the establishment of a mint at Aberystwyth to coin the silver obtained from the mid-Wales lead mines (some of the lead ran at 30oz/t of silver). Unfortunately, when the Civil War broke out, Bushell backed King Charles I and had to flee the country.

In 1836 one Matthew Francis sold the mine to John Taylor & Sons, retaining a 25% share. The mine became one of Taylor's most successful ventures, and the contemporary *Mining Journal* provided fortnightly accounts of progress. Of even more value to the mining historian, many personal papers belonging to the Francis family, including copies of correspondence from Francis to the Taylors, was discovered in the Druid Inn in Goginan village in 1956.

Drawing on these and many other sources of information, coupled with a comprehensive personal knowledge of the sites as they are today, the author gives a most interesting account of this particular group of mines. His book makes a very readable addition to the literature on the history of mining in this part of the United Kingdom. ■

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## "Mining" stamps

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**Gold Fever**. By Kenneth J. Kutz. Published by Gold Fever Publishing, 7 Whaling Road, Darien, Connecticut 06820, U.S.A. 1988. Hard Covers. 400pp. Limited edition. \$75.00 prepaid, including postage and handling.

FOR all those with a fascination for the saga of gold mining over the past 150 years and for postal history, this high quality book has to be compulsive reading. The author, Kenneth J. Kutz, has brought to bear both a near-lifetime experience as a professional mining engineer and more than fifty years as a philatelist in interweaving the story of gold mining since the earlier part of the 19th century with the postal services of the gold fields. Some forty countries and sub-national regions are covered and the most readable narrative is lavishly illustrated with full colour depictions of postal material, colour maps, line engraving reproductions and pen and ink sketches. Many of the postal covers and other material shown are of great rarity and some are unique.

The genesis of the book was, firstly, through the author's award-winning general mining postal history exhibit, initially shown in the U.S.A. Thereafter it was suggested by one of the judges that Mr Kutz might narrow this theme to the subject of gold mining postal history. Taking up this advice, an exhibit entitled *Gold Fever* was assembled and this subsequently won many gold medals and other major awards in Canada and the U.S.A., in both national and international competition.

The publication of his book "*Gold Fever*" not only allows a wider audience

to view in superb illustration some of Mr Kutz's remarkable postal history material, it also throws much light on the history of gold mining around the world and shows the part played by the postal services therein. By any standards "*Gold Fever*" must be worthy of a place in any major mining history library.

From the postal history viewpoint, it represents a major new source of reference to an intriguing field and, as such, also merits room on the shelf of any major philatelic library.

## BOOKS WANTED

Top prices paid for any of the following titles, in mint condition.

ELEMENTARY UNDERGROUND EXPLORATION	by A.WORM
EFFORTLESS ABSEILING	by A.SPIDER
UNDERGROUND FLYING	by A.BAT
EXTREME ONE BOLT PITCHES	by WILLIE DYE
A GUIDE TO SRT RIGGING	by A.BOLT
SUMP DIVING	by IVER BLUE SKIN

Replies to IAN TYLER, Carlisle.

## ARTICLES

ANCIENT MINING TECHNOLOGY IN CHINA. by Wu Zi-zhen.

Q.Changsha Inst.Min.Res., vol 6, no 4, 1986, p.42-46 (In Chinese)

GEOLOGICAL RESEARCH AND EXPLORATION IN FINLAND. YESTERDAY. TODAY AND TOMORROW.

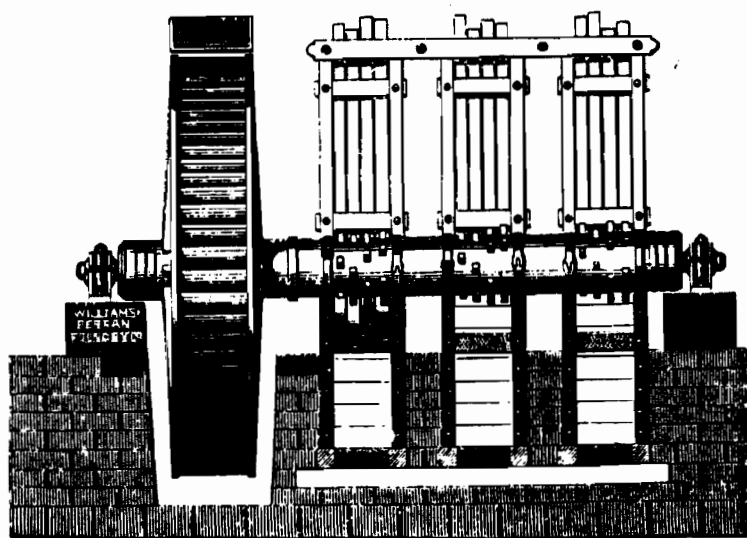
by K.Kauranne.

Vuorit.Bergshant., no 1 1986 p.9-15 (In Finnish with English abstract)

The history of the mineral exploration industry in Finland is reviewed.

THE METALLURGY OF ANCIENT PERU by Rodriguez Velarde.

De Re Met.Min.Met., vol 3, no 11, Jan/Feb 86 p.22-39.27 refs (In Spanish)



The above Sketch represents a Water Wheel working a Stamps, consisting of 12 Heads, for breaking up Ore and preparing it for dressing, or separating the Mineral from the Rubbish. In some of the large Cornish Mines, Steam Power is used to work a great number of these Heads or Stampers, which are usually constructed with long iron lifters instead of wood. It will be seen from the illustrations that Lifters are fixed in the Barrel, which is caused to revolve by means of a Water Wheel or other motive power; there are also Lifters in the uprights, which are secured to the Stampers; the Heads are thus raised from 9 to 12 in. high, consecutively, and falling their full weight (from 3 to 5 cwt. each) on the Ore, break it in pieces and reduce it to powder.



On a very cold and windy day 8 members arrived at 'Calebreck Farm' to explore the Sandbeds East vein.

The party looked at the 90fm level, which is the area most recently worked. Pete Fleming thought it was possible to gain entry via the 75fm level, alas this is now well collapsed. Undeterred he advanced on the 60fm West or Dumpy Lode Adit, again this was collapsed (although I had dug this recently the area is now run in two separate falls.

The 60fm main adit was visited next. Pete Fleming indicated that if we were to dig above the level we would hit solid rock, 15' below this we would enter a chamber then get into the level proper (a dig was started - we have contacted the rock band but no sign of the chamber).

We now moved around the site onto Sandbeds East - arriving at the 90fm East Cross Cut air shaft. The pitch was rigged and all members with the exception of D. Webb who felt unwell (I thought the pitch was rigged OK) descended to the 80fm level. Dropping down the final 60ft we gained entry to the 90fm level - all was explored to the face and stope area. On dropping down the incline to the 100fm, we found the level was sumped to the roof - a disappointment to say the least.

All members prussicked out to be greeted by the most appalling weather.

\*All tackle used on meet Ian Tylers.

## Radon and lung cancer: the link is missing

**T**HE THREAT to human health posed by radon may be exaggerated, says a physicist who has compared rates of lung cancer with levels of radon in hundreds of communities. Recent studies have claimed that radon, a radioactive gas that bubbles up out of rocks and can collect in houses, is the second most important cause of lung cancer, after smoking.

Bernard Cohen, of the University of Pittsburgh, has discovered that most places where levels of radon are high have a low rate of lung cancer. Cohen plans to announce his findings this week at a meeting of the American Chemical Society, just two weeks after the US government announced that almost every American home and building should be surveyed for the gas, a product of the decay of uranium.

Extrapolation of known death rates among uranium miners suggests that a lifetime's exposure to 1000 becquerels of radon per cubic metre of air brings a 5-per-cent risk of death from lung cancer.

Cohen has examined rates of lung cancer in Finland, Sweden, one province in China and 415 counties in the US. His results stand conventional wisdom on its head. In regions of the US where the gas bubbles from soils so intensely that there should be three times as many deaths from lung cancer among women as expected, the excess rate was only 18 per cent. Women are chosen because they smoke less. Smoking can raise the risks of contracting lung cancer from exposure to radon by as many as 15 times.

In another study, Cohen identified 40 American counties where cancer rates for women were the highest or lowest in the nation. In every case where rates of lung cancer were abnormally high, the gas was scarcer than expected. Conversely, radon was unusually high in counties where lung cancer was rarer than normal.

**Christopher Joyce, Washington DC**

The same trend appeared in Sweden. In a county with the highest average level of radon ever reported for a large area, rates of lung cancer among women were only three-quarters of the national rate.

An area of southeastern Finland with an average level of radon eight times the world's average showed a rate of lung cancer for women lower than any other in the country.

Cohen's findings discredit drastic predictions made earlier this month by the US government's surgeon-general, who said that radon causes 20 000 deaths a year from lung cancer in the US (*New Scientist*, 22 September, p 24). "I am not saying that radon does not cause cancer," Cohen told *New Scientist* before delivering his results at the meeting in Los Angeles. "I simply consider this whole project a challenge to the linear, no-threshold theory of cancer risk."

Most assessments of risk to health from cancer assume that there is no threshold below which a cancer-causing agent is harmless. Calculations of risk assume a

linear relationship: that is, each succeeding unit of exposure also raises risk by one unit.

Cohen says his results suggest that there is a threshold for cancer from radon. Whatever that level is, it lies well above the current "action level" set by governments.

● Radon might cause potholers to reconsider how much time they spend in caves, say three researchers from Manchester.

Since June 1987, Stan Fletcher and John Gunn of Manchester Polytechnic, and David Prime of Manchester University, have monitored radon in 10 British caves. During the summer, levels sometimes exceeded 3700 becquerels per cubic metre of air—almost 10 times the "action level" for British homes.

Concentrations in caves in the Peak District of Derbyshire are the highest in the country. One cave near Castleton rated about 75 000 becquerels. The research team concludes that anyone spending as few as four hours a year in caves can receive about one-third of their maximum permitted exposure. Guides in "show" caves may receive doses of radiation that exceed limits set by the Health and Safety Executive for workers in the nuclear industry. □

### FINAL REMINDER !

This will be the last Newsletter circulated to members who have not paid their subscription. (See page 1).