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Fforwm Cerrig Cymru



Welsh Stone Forum

NEWSLETTER

Number 1 October 2003

A warm welcome to the Forum's first Newsletter and a big thank you to all of the contributors who have produced articles for this issue. Thanks also to Lin Norton for producing the cover heading. As Editor, producing this Newsletter has been very much a steep learning curve, particularly getting to grips with 'new technology' so if there are any glitches in what you actually receive please bear with me. We had intended producing this Newsletter in two formats, electronic and hard copy, in order to keep the costs down and speed up distribution. However, due to the size of the finished copy it is probably too large to send to most of you as an e-mail attachment so, for the time being, we are producing it in hard copy format. Hopefully, in due course, we will be able overcome this problem so that those of you able to receive electronic communications can receive it in glorious technicolor.

This first issue covers a wide range of topics from planning issues to individual building stones as well as Forum business, short notes and the first field meeting report. Jonathan Adams' article on Cardiff's Millennium Centre is a fore-taster for the field trip on 29th November the details of which, along with those of all of the Forum's other meetings until the end of 2004 are to be found elsewhere in the *Newsletter*. Below is a report and reminder from Tim Palmer for all those of you who have yet to pay your first subscriptions. I think that you will agree that what has been planned for the next 15 months is both of great interest and good value for money so I encourage you to spread the word and recruit as many new members as possible. Finally, any comments on the Newsletter, would be gratefully received no matter how critical! You can either send to me at The Department of Geology, The National Museum & Gallery, Cathays Park, Cardiff, CF10 3NP or e-mail me at Steve.Howe@nmgw.ac.uk.

Membership and subscriptions

At the time of going to press, the Forum has just over 40 members including individuals and organisations. Compared with the 400+ names and institutions on the original mailing list established for the Cardiff conference this is a bit disappointing, although we know that there was some duplication. We hope that more people will join us in the coming few months as word gets around. Please tell your friends and colleagues if you think they might be interested, or persuade your workplace to take out an Institutional subscription. The present subscription period runs up till the end of 2004 and the current rates are as follows:

Postal member (all communication by mail) £8.00

Electronic member (most communication by e-mail; some by mail) £5.00

Institutional member (allows Institutions to circulate copies to all their members) £15.00

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The Forum is very grateful to those members who have made additional donations on top of their subscriptions. Current assets exceed £500, and should be enough to support this year's programme.

Forum Committee

For those of you not at the inaugural AGM the current Forum committee comprises the following people:

Chairman: John Davies (Countryside Council for Wales)

Vice-Chairman: Jonathan Adams (Percy Thomas Partnership)

Secretary: Tim Palmer (University College of Wales, Aberystwyth)

Treasurer: Jana Horak (National Museum & Gallery, Cardiff)

Publications Secretary: Stephen Howe (National Museum & Gallery, Cardiff)

Events Organiser: To be decided

Ordinary Committee Members:

Malcolm Coulson (CADW)

Kieran Elliott (Stone consultant, Tregaron)

Rex Harries (Stone consultant, Newport)

Edward Holland (Monmouthshire County Council)

Peter Kendall (Carmarthenshire County Council)

Judi Loach (Welsh School of Architecture, Cardiff)

Graham Lott (British Geological Survey, Keyworth)

Gerallt Nash (Museum of Welsh Life, St Fagans)

Eric Robinson (Watchet)

Ian Thomas (National Stone Centre)

David Thompson (Gwynedd Archaeological Trust)

Dave Wille (Stone consultant, Carmarthen)

The Committee is elected each year at the AGM, which in 2004 will be in Aberystwyth. It is hoped that the composition of the committee will be as diverse as possible to ensure that all aspects of the Forum's remit can be covered. Getting people to stand for committees is getting increasingly difficult so we are especially grateful to all those who 'volunteered' this time around. Anybody interested in becoming involved in the future should inform the Secretary prior to the next AGM.

Programme 2003 / 2004

Sat 29th November 2003: Cardiff

2.00 p.m. Visit to the new Millennium Centre in Cardiff with Jonathan Adams (Architect, Percy Thomas Partnership) and to other stone-related projects in the Cardiff Bay area, with Lynda Garfield. Please contact the Secretary <tjp@aber.ac.uk> if you are interested in coming on this trip.

Sat 27th March 2004: Aberystwyth

11.00am AGM in the Arts Lecture Theatre, Old College (on the sea-front), University of Wales Aberystwyth, followed by a talk on: 'Stone Building in Aberystwyth' by Tim Palmer. Lunch in Town, followed by a tour to look at examples of historical and modern stone use with Tim Palmer and Dr. Ian Thomas (Director, National

Stone Centre). The tour will include a visit to The Old College to examine the wide variety of materials (limestones; dolomites; sandstones; marbles; 19th C concrete blockwork; and Ransome's Artificial Stone) that were used by John Pollard Seddon and his successors in one of Wales's top 10 Victorian Gothic buildings.

Sat 19th June 2004: Swansea

A field meeting to examine 'Stone building in Swansea'. Leaders: Dr Dyfed Elis Gruffydd and Dr Ron Austin. Further details to follow

Sat 21st August 2004: Brecon

A field meeting lead by Dr John Davies to look at stone in the Usk Valley and Brecon. Meet at 11.00am at Brecon Cathedral Car Park. Although at first sight the stone dressings of churches in the Usk valley might be expected to consist predominantly of Old Red Sandstone, this is not universally the case. This excursion will attempt to identify a pattern in the use of freestones in the regions and make some recommendations about the future use of stone in the area. Sites to be visited will include Llangors, Cwm Du, Llanbedr Ystrad, Iw, Llangattwg, Llanfoist and Llanofer.

September / October 2004: North Wales

A slate Seminar in North Wales, under the direction of Terry Hughes, a consultant and author on slate and stone roofing in England and Wales. The meeting is supported by McAlpine slate, and will include a visit to Penrhyn quarry. Further details to follow.

PAPERS AND ARTICLES

Slate walling lessons – Wales Millennium Centre under construction.

Jonathan G.Adams (Percy Thomas Partnership)

The slate walling on the Wales Millennium Centre is now around 85% complete. This particular sub-contract, about which there was so much scepticism, has run smoothly right from the start, more smoothly indeed than the brickwork. This is testimony to nearly five years of hard work carried out by the architectural team to develop and to test the techniques, and also a great affirmation of the trust that we felt able to place on the masonry team of Gwilym and Richard James of Trawsfynydd. Although it is difficult to judge it in some ways – it is after all unprecedented – the work they have done seems to everyone involved to be superb. It has surpassed expectations in the pace of its execution, the quality of the masonry and, most of all, in its visual impact. The scale, the colours and the textures are, by common agreement, far more impressive and more beautiful than any of our drawings and models led anyone to expect (I would prefer it to be that way around than vice-versa!). But, has it all gone exactly to plan? Well not entirely, and there are some interesting lessons for us to learn from the few deviations that have occurred.



Fig.1 The Staggered Planes of Slate Walling

The first of the important ideas to be compromised was the use of the green slate from the Gilfach quarry, near Whitland (those who went on the Whitland Abbey visit may remember seeing a stack of roof tiles from the same source stored behind Mr Lewis's garages). It was vital to the original concept to have slate from the widest possible range of Welsh sources, which of course gave us the widest range of colours. The Gilfach material not only gave us a valuable contrasting colour, but also meant that not all of the slate would come from north of Dolgellau.

The main contractors, Sir Robert MacAlpine (SRM) told us very early on in the construction phase that Health and Safety regulations meant that they would incur massive mobilisation

costs just to set themselves up within the derelict quarry before they could even begin to extract the material we needed from the waste tips. According to SRM the cost of recovering material from Gilfach would have made it cheaper to use Carrera Marble. We had only intended to use a few tonnes in any case. As it happened, SRM offered to obtain green slate from Penrhyn instead. I had seen a lot of green material at Penryhn, all of it in the form of quartz rich, knotty boulders, which were apparently prized by landscape designers.

Nonetheless, with Gilfach seemingly off limits we agreed to use the Penrhyn stone. With hindsight I cannot help but suspect that I agreed to this concession a little too easily. As I explained in my talk at last year's conference, the large contractors are concerned chiefly with the issue of risk and how to avoid it, as it is this that affects their profit margins. The acquisition of the Gilfach material would have depended on SRM's own labour: *their* risk in other words. The alternative material from Penrhyn came from Alfred MacAlpine (no connection in this case to Sir Robert MacAlpine) who were already providing almost 90% of the material we were planning to use, from Penrhyn and Ffestiniog. By reducing the number of suppliers the main contractor significantly reduces his risk, and in Alfred MacAlpine they have a supplier with a large commercial turnover who is willing to take full responsibility for the supply of material.

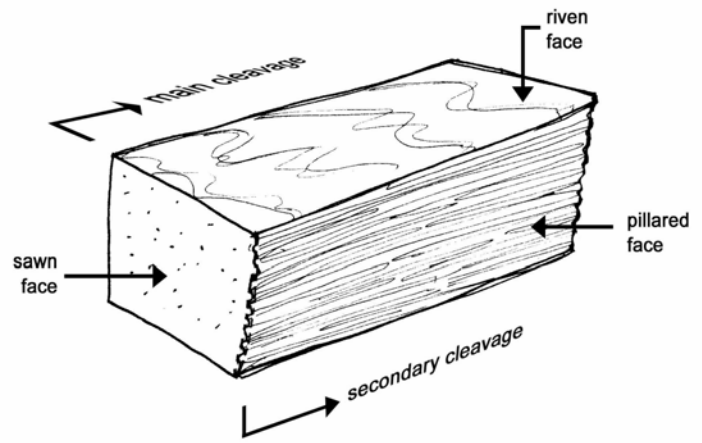


Fig.2 The Grain of Roofing Slate

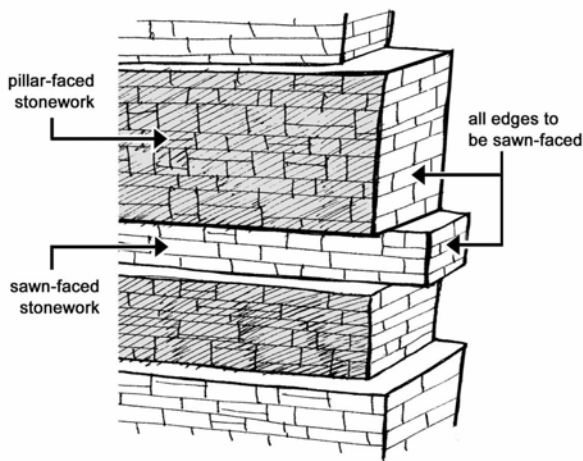


Fig.3 Corner Stonework as Intended

possible to distinguish the intended green bands as a distinct colour. Had the Gilfach material been used it would have stood out like a bold pinstripe. The only real colour contrast now comes from the rusty black slates of the 'Winsilate' quarry at Corris.

The walls of the WMC take the form of staggered planes (fig 1). The various bands of slate that run across the face of each of the planes of the wall have either their sawn face outwards or their pillared face, *i.e.* the face of the secondary cleavage (fig 2). The bands are designed with great precision to ensure that there is always a satisfactory contrast in either the colour of adjacent bands or the face texture, sawn or pillared. The walls vary from 600 to 900mm thick. Regardless of whether the slate bands are sawn or pillared it seemed important to me that the wide edges of each plane of the wall should be made up entirely of sawn faced stones. The idea was to give the impression of a cleanly 'cut off' edge (fig 3).

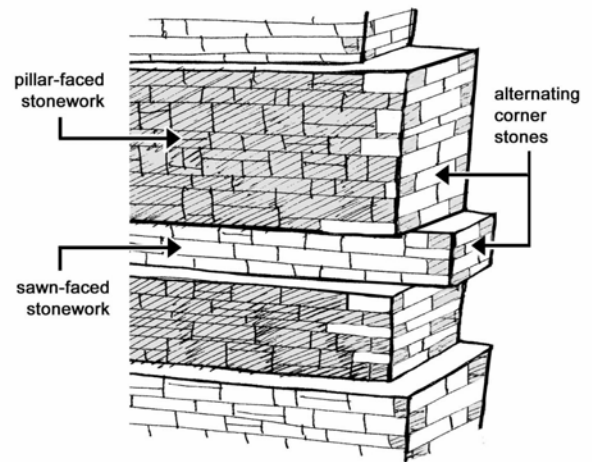


Fig.4 Corner Stonework as Built

This idea was confounded by the rudiments of the slate walling technique. The masons would always deal with a right-angle corner by bonding consecutive courses, alternating between sawn and pillared faces to ensure that a full bond was achieved up each edge (fig 4). They did this with some care, apparently oblivious to the carefully drawn details that required the fully sawn edge. I can only assume that they weighed up the ‘architectural’ proposal, realised that it would prevent them from bonding properly around the corners, and quite pragmatically did it the way they felt best. Chwarae teg; they are the experts. They worked so quickly that, by the time I had noticed, it was simply out of the question to go back and change it to the way I wanted it, even if they could be persuaded to go against the convention of centuries.

Whenever a piece of stone is needed to be long and to be laid so its length runs back into the thickness of the wall, as when a bonded corner is constructed, it is natural that the cleavage planes run perpendicular to the face of the wall, and it follows that the outward face of the stone will be sawn, across the grain. This leads to another minor glitch, which should, in hindsight, have been obvious: whenever a very small piece of stone is used in order to fill a hole in the bond, it really has to have to sawn face. It is one of the beauties of slate walling that stones of all

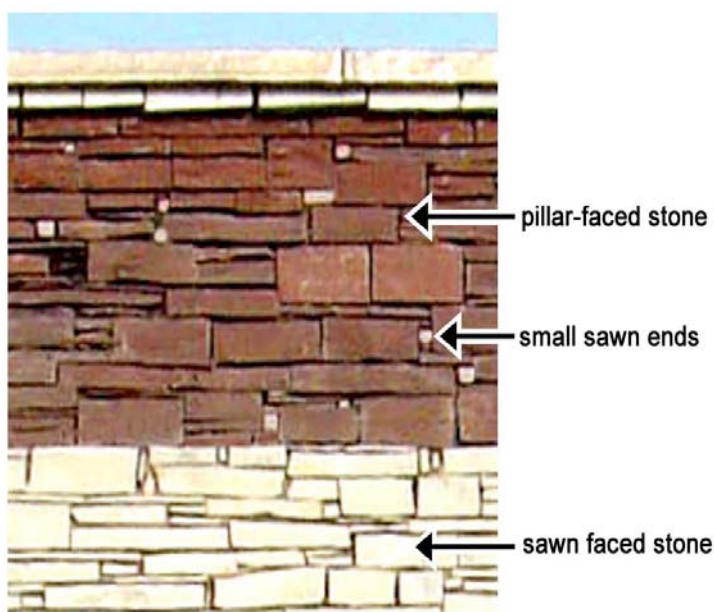


Fig.5 Detail of Slate Walling

sizes are used, right down to an inch square. But even these small pieces will extend eight to ten inches through the thickness of the wall. This means that in the bands of slate that are intended to be made entirely of pillar-faced stones, you inevitably see little, sawn-faced pieces, standing out like white speckles against the dark background of pillared stone (fig 5).

In the end, these idiosyncrasies are not disappointing: they are entirely consistent with the idea that the stone should only be used in ways that are dictated by the character of the stone. The building will be the richer for it.

I only wish the same could be said about the lintels that were meant to support the base of the slate walls above the north-elevation colonnade. In what could be described as a case of contractor

‘dumbing-down’, the 4-metre long solid slate beams that would have spanned between the columns have been replaced with reinforced concrete beams with thin veneers of slate stuck onto their faces. These veneers will be less than an inch thick and, regardless of how hard the concrete specialists try to match them to the real slate walling, I fear they will appear obviously to be fake.

The greatest dilemma of ‘design-and-build’ contracts, such as that which is being used for the WMC, is that the contractor is entitled to substitute materials and construction methods provided that the client accepts the alternative. On a building like the WMC this puts a huge burden on the client who, quite rightly, is most concerned with fundamentals of the building performance rather than the fine points of slate walling. When the contractor tells the client that he will guarantee concrete beams, but can give no guarantee on the solid stone equivalent, there is no hesitation in taking the synthetic substitute.

The contractor tries to offer consolation by claiming that the vast majority of people just won’t notice the difference. To all Stone Forum members: *you* will notice the difference. I am sorry that I couldn’t deliver the great monolithic lintels that would have been a highlight of the building to those for whom man-made materials are not intrinsically superior. I hope that the slate walls will give you pleasure nonetheless.

The use of Carboniferous sandstones and grits from Arfon and Môn as a freestone over a wide area from Llandudno to northern Ceredigion.

John H.Davies (Countryside Council for Wales)

The oldest division of the Carboniferous Limestone (Dinantian) of North Wales and the North of England consists of a series of sandstones and conglomerates referred to generally as the Calciferous Sandstone. Although these beds occur across North Wales, from Llangollen in the east to Anglesey and Arfon in the west, it is in Anglesey and around the Menai Straits that their character enabled them to be used as a freestone. Here they are known collectively as the Anglesey Grit and comprise beds also known as the Basal Conglomerates, Lligwy Conglomerates and Lligwy Sandstones.

In Anglesey and Arfon, there are other bands of the coarse sandstones, pebbly sandstones and conglomerates, at higher levels within the Carboniferous Limestone sequence, which are also used as freestone. The general characteristic of these rocks is that they consist of strongly cross-bedded sandstone, with quartz grains and occasionally rounded quartz pebbles. The cement can also be variable, consisting of dolomite, calcite or quartz. They are referred to by the names of the localities where they are crop out as follows:

Lligwy - Benllech Sandstone, Helaeth Sandstone, Lligwy Sandstone, Lligwy Bay Conglomerate, Basal Conglomerate
 Llangefni Pencraig Sandstone, Basal Beds
 Penmon - Fedw Sandstone, Parc Sandstone
 Straitside - Moel-y-don Sandstone, Carnedd Sandstone, Edwen Sandstone, Fanogle Sandstone
 Arfon - Loam-Breccia Formation

The character of each of these sandstones is variable but distinctive and it is thus possible to be confident that each sandstone building stone was obtained from a relatively small area, even from a single quarry. The most obviously quarried area for the Lligwy Sandstone, both historically and at present, is at Creigiau, south of Dinas Lligwy, on the main road from Benllech to Amlwch. However, other outcrops occur at places such as Moel-y-don, on the Menai Straits, opposite Felin Heli, where a pink variety of the stone is located and which has been used in the stringer courses of Caernarfon Castle.

These sandstones have so far been identified by the author at the following churches as ashlar or dressings:

Mon	Arfon	Dyffryn Conwy	Llyn	Eifionydd & Dwyfor	Ceredigion & Merionydd
Penmon	Caernarfon Garrison church)	Conwy Church	Aberdaron	Beddgelert	Strata Florida
Aberffraw	Llanbeblig	Caerhun	Clynnog Fawr		Llanbadarn Fawr
Capel Lligwy	Bangor (Cathedral	Eglwys Gyffin			
Beaumaris					
Llanfaes					
Rhos Colyn					
Llanfair PG					
Newborough					
LLanwen					

and similarly in the following castles and other buildings:

Mon	Arfon	Dyffryn Conwy	Llyn	Eifionydd & Dwyfor	Ceredigion & Meirionydd
Beaumaris	Caernarfon	Plas Aberconwy		Cricieth	Castell-y-bere
		Diganwy Castle			
		Aber Garth Celyn (gatehouse)			
		Dolwyddelan (second tower)			

QUARRYING AND PLANNING CONTROL

Peter Kendall

In recent years the general public has shown increasing awareness of environmental issues. Lobbying by interest groups has encouraged the development of new Environmental Directives, legislation, and protective designations at European, National and local levels. Some traditional industries see such measures as threats to their continued existence.

Mineral working, including quarrying, is one such industry. Our society and way of life rely upon a steady supply of minerals and mineral products. For their part, the minerals industries are an important component of the rural economy, where other employment opportunities are often limited. And yet, many planning applications for quarrying generate fierce objections. This is true not just of new sites, but also for proposals to extend existing workings.

Many factors have contributed to this situation. For example, powerful modern plant and equipment enable larger quarries and excavations to be worked. These have the potential to be far more disruptive than quarries were say 50 years ago. Rural roads are often narrow, with few passing places, and not always suited to intensive use by large modern heavy goods vehicles. Also there has been a substantial social change in much of the British Countryside. Low wages and limited job opportunities have encouraged young people to move away, whilst commuters and retired people move in with expectations about a good quality of life. Such people rarely work in traditional rural industries such as quarrying, and may be resentful of environmental impacts from such industries, which impinge upon their expected rural idyll.

Most of these problems are associated with quarrying for aggregates, where rock is blasted and crushed into pieces of various sizes. These are used to make products such as tarmac, buildings blocks, concrete, etc. In contrast, quarries which produce cut stone for building and roofing tend to be smaller, with different, often less significant environmental impacts.

The Welsh Stone Forum is working to increase awareness and understanding of natural stone and slate as building materials. The availability and use of these traditional materials has helped to create the character and ambience of the Welsh environment. If those characteristics are to be maintained, both in the construction of new buildings and the repair of old ones, there will have to be sources of suitable stone. Often such sources will need to be separate from existing aggregate quarries. The specialised techniques for extraction and shaping of building stones and slates do not fit in easily with modern large scale mechanised quarrying. Also, completely different types of stone may be necessary, which are not worked as sources for making concrete or tarmac.

The development of new small quarries for building stone offers opportunities for economic development and regeneration of the countryside. Some farmers are already looking into the possibility of small quarries as farm diversification. There is need for residents of rural areas to be aware of such opportunities. Also, for planning authorities to take account of them in a constructive way in their policies and decisions.

Egryn Sandstone: A lost and rediscovered Welsh freestone.

Tim Palmer (UCW, Aberystwyth)

Just as you can wait an hour for a bus and then two come along at once, so it seems to be with information about forgotten Welsh building stones.

Last year a group of stone enthusiasts who live north of Barmouth contacted Dr Denis Bates at UCW Aberystwyth with an enquiry about a stone quarry near Dyffryn Ardudwy, about 4 miles south of Harlech. It yielded a honey-coloured sandstone that looked rather un-Welsh (i.e. not hard and grey), more the colour of an English Jurassic rock. Could it be Jurassic? Not such an odd question when you consider the variety of Jurassic sandstones and limestones just offshore in Cardigan Bay, which gave rise in the recent geological past to large



Figure 1. Egryn Sandstone used as dressings, ?C18th cottage, Egryn Abbey

region, as well as in Harlech Castle (built c. 1285), and extensively at Cymmer Abbey (built by the Cistercians in the late 12th C) near Dolgellau. He had also noted the reference given in *The King's Works in Wales*, where documents referring to the building of Harlech Castle are quoted. They mention payments for shipping stone from 'the free quarry at Egrin' and also for sending fuel and tools to the smithy at the same quarry. Egryn is represented on the modern maps, about a mile south of Dyffryn Ardudwy, by Egryn Abbey – actually a modified medieval hall house recently acquired by the National Trust. The dressings for the windows of one of the earlier stages of its conversion, as well as jambs and lintels in the adjoining cottage (Fig. 1), are made of the same mystery stone.

Fig 2. The east and south faces, now covered by slipped soil, of the probable medieval quarry at Egryn, from which the freestone for Harlech Castle and Cymmer Abbey were obtained

A stream runs inland from here, and cuts a steep gorge about half a mile east of the 'Abbey'. There are several quarries on either side of this gorge, which are cut into the Llanbedr Slates, the geological unit that underlies the Rhinog Grits. They appear to be largely C19th in age and produced crude grey slates and flagstones. They are certainly not the 'free quarries' (i.e. Freestone quarries) that supplied Harlech Castle, though there is a local belief that stone was supplied to Harlech from

boulders that were carried onshore by ice movement along the coastline north of Towyn. However, the geological map indicates that the area in question lies on the western side of the Harlech Dome, a region of Cambrian (c. 500 million years old) slates and sandstones that dip steeply towards the east in that region. The sandstone unit in this sequence is the Rhinog Grits, but this is usually grey and very hard and splintery, giving rise to the abundant quartzite boulders that are seen in the substantial field walls that characterise this small and beautiful area of Wales.

We went to look. The sandstone in question has the very slightest greenish tinge, and a faint cleavage, which indicates that it has been caught up in rock folding at some time in its geological history. We concluded that it wasn't Jurassic, but was probably from an area of the Rhinog Grits that had undergone a certain amount of weathering, maybe associated with local faulting. This gave rise to a texture visible under the microscope, consisting of angular quartz grains and some larger lithic fragments sitting in a matrix of clay minerals. A local farmer told us that the stone had once been used for building chimneys.

At the same time, and also unknown to us at Aberystwyth, our intrepid President John Davies had noticed a stone with exactly the same characteristics used in old churches in the same



this site. However, further up the valley, on the south side, is a bluff made up of a very different stone: very similar in colour, texture, and fabric to the mysterious stone of Cymmer, Harlech, and the Egryn Abbey dressings.

When we visited this site, we felt immediately that we were getting close to the source of the mystery stone, but there was no sign of a substantial quarry; just hillside, bracken and stone walls. It wasn't until we consulted the aerial photos of the site, conveniently taken in low-angled sunlight, that we noticed a large area of unnatural flatness a few hundred yards further inland. Its east and southern margins meet at a sharp right angle, and are

marked by grassy slopes about 8-10 feet high (Fig. 2). This is not a natural landform, and we suspect that this is the site of the original medieval quarry of Egrin, its walls now entirely covered by soil and vegetation that have slipped down over it from further up the hillside. The surrounding area is extremely densely peppered with stone mounds and other archaeological sites; there appears to be one such site on the putative quarry floor. Could it represent shelters for quarrymen or draft animals, or the forge referred to in the Harlech documents?

It is always dangerous to let the imagination range too widely as a result of a single site visit by neophytes to an area that has been widely studied by experts. However, the existing evidence at least suggests that it would be worth closer scrutiny, and that medieval quarrying must be added to the list of possible influences on the rich archaeological landscape of the Egryn region. Archaeological excavation would doubtless yield additional dates. Even the extant buildings of the region point to the possibility of stone production going back to at least the late C12th (Cymmer Abbey). There must have been extensive accessory buildings and routes for taking the stone down to the shore for sea transport. A trackway excavated in 1974 on the seashore below Egryn Abbey (Musson, Taylor, & Heyworth, 1989, *Archaeology in Wales* 29, 22-26) was dated at between 1158 and 1212 AD by Carbon dating, the interval in which Cymmer was being built.

We have also noticed pieces of what we are now calling Egryn Sandstone used in the churchyard at Dolgellau, and at Machynlleth, where what was apparently a mullion from an earlier window, fashioned from the stone, had been incorporated into the rubble wall fill during the 1830's alterations (seen during the recent repairs to the east end). Doubtless we will find many more examples of use of this stone over north-west Wales (an area sorely lacking in dressable stone for traditional building construction, and where the freestone of Egryn must have represented a valuable commodity) now that we know what to look for. Watch this space.

Field Meeting Report

On Saturday 20th September, the Forum held its first day field trip, visiting Whitland Abbey, Lampeter Velfrey, and Ludchurch. Fourteen people came on the trip, which was run by John Davies, Pru Edwards, and Tim Palmer. One of the members said at the end that, at each place, every time he had looked round there had been 2 or 3 different conversations going on about different aspects of the structure and the materials under scrutiny; so much so, in fact, that he couldn't make up his mind which of the different groups to join. It seems that is about as much of a ringing endorsement of what the Forum is all about as we could hope for, and so I view the day as having been a huge success.

The reason for visiting the Cistercian Whitland Abbey is clearly an historical one. John Davies has long been interested in the uses of stone in Welsh medieval building, and in what can be learned from the study of stone in buildings of known ages about changing land ownership between the Welsh and the English. The remains of the C10th Whitland Abbey do not show a lot of the original structure above ground level, but there is enough to see that the original structure was built of local walling stone with limestone dressings. The source of the limestone has been controversial; it is largely a pale white or buff limestone, probably of Jurassic age. The CADW site board that was there last year said that the limestone was oolitic, but that is not our experience (and the board has now been removed). On the other hand, there is a local belief that the stone came from Caen in Normandy, as undoubtedly did a lot of stone for medieval ecclesiastical architecture in England. A third opinion was that this stone came from Dundry, about 5 miles south of Bristol, where there has been a long history of quarrying from the upper beds of the Middle Jurassic Inferior Oolite Series.

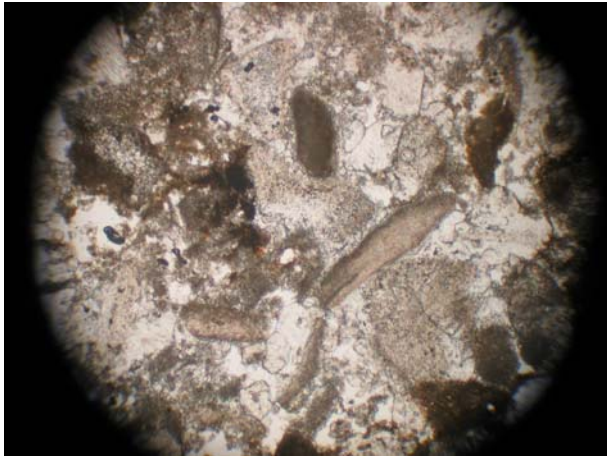


Fig 1a. Dundry Stone garden block. The last piece ever quarried.

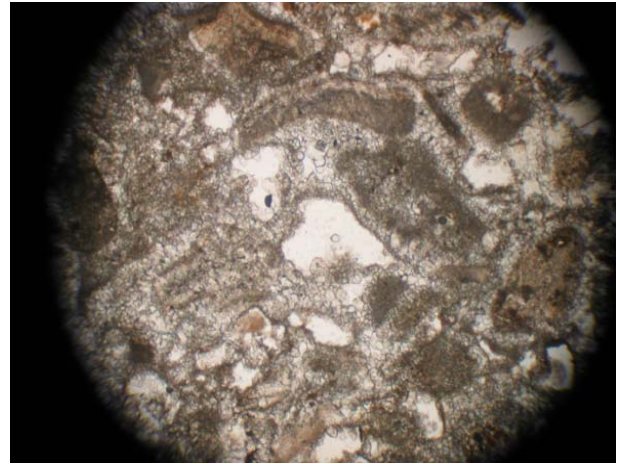


Fig 1b. Whitland Abbey collection (TJP) from a stone pile in the farmhouse across the road. (By kind permission of Mr & Mrs Lewis)



Fig 2. Dundry Stone and Sutton Stone (the white stone 5th from the bottom) in the former farmhouse opposite the abbey.

Dundry was a major source of medieval stone, and it was quarried over a wide area of hilltop in the vicinity of Dundry Common. A large block sits in the churchyard, possibly a sample to be scrutinised by visiting clerks of works. Similarly, the top of the church tower is ornate and very intricately carved; one can't help thinking of its role as a medieval advertising billboard. In later centuries, some stone was obtained from underground workings and the last of these closed early in the C20th. The C19th quarry entrance is still there, but on private land. In the garden of the landowner is a large block of stone, believed to be the last block ever extracted from the quarry. The village is perched at the western end of the top of Dundry Hill, down the steep north side of which it is only about 4 miles to the River Avon and thence by barge to the Bristol Channel and beyond.

We have been able to take samples from the garden block and the quarry walls. From Whitland, we have freestone material from the abbey site that were taken in earlier archaeological excavations and which is now in Carmarthen Museum, and also from the private collection of the present landowner. Comparison of the thin-sections from the samples show a finely crystalline, non-oolitic, shelly limestone, that is extremely similar from all of the sites sampled (Fig. 1 a & b) and which, incidentally, is unlike most of the other limestones from the English Jurassic (many of which are oolitic) and Caen Stone. We are about as satisfied as it is possible to be that most of the Whitland freestone originated in Dundry, and must have been shipped in barges to near the site of construction. However, a few paler blocks, a couple of which

can be seen in the former farmhouse opposite the abbey site (Fig. 2), do indeed have a Welsh origin. They appear to be Sutton Stone from the Vale of Glamorgan, Wales's only good quality Jurassic limestone freestone. The Dundry story does not stop at Whitland however. There is lots of it at Strata Florida (also a Cistercian abbey), and a probable piece in Aberystwyth Castle (from which most of the freestone dressings have long since been

robbed). As early records show that both freestone and masons were imported from Bristol to Aberystwyth Castle, it may well be Dundry that this stone came from.

The church at Lampeter Velfrey can be viewed as a case history of how an interest in stone may bring together the historian with the administrators of the C21st world. This historic structure displays the story of the use of local materials: grits and conglomerates of Ordovician or Devonian age; impure Ordovician limestones (which were also burned locally for lime); laminated flagstones, possibly of Devonian age, for external use, which were supplemented with North Wales slate slabs in the Victorian alterations and Carboniferous ‘marbles’ for interior monuments (a topic that would rapidly repay some close study). Recently the fabric of the church has been extensively repaired and cleaned, but that process has introduced new materials. Where there was not enough reclaimed stone from the original fabric, new Pennant Sandstone, saw cut and hydraulically split, has been brought in from South Wales. It may not matter that it looks different from the original and it may only be stone buffs who notice. But it would be good to know that the advisors on the historic and planning aspects of such changes are always aware of what they are doing, and whether obtaining small amounts of stone from closer to the original sources is an option that has been considered. This relates directly to the ideas about a special planning status for small, local and one-off stone-extraction jobs of the sort that are considered elsewhere in this Newsletter.

A more immediate stone decision is about to present the parish with a probable five-figure bill. The door is approached from the road by a path about 20 yards long, sloping slightly and with low steps at either end. It consists of a row of handsome grey flagstones, laid end to end and flanked by cobbles. The flags are of an unknown siltstone, but have characteristic string-like trace-fossils and should be easy to identify with a little work. They are not from a source that is currently available. They are very attractive, but too narrow to comply with the requirements of the Disability Discrimination Act. Hence, to comply with the law, they will have to be raised. They can be put down again with their long axes across the line of the path, but then they won't reach to the road. Also, those that are cracked will be lost. So a charming and traditional pathway will either show a marked break part way along its length, where the reused materials give way to the new (possibly unmatching) stone. Or worse, the arguments (economic, but weighty) for the replacement with beautiful, new, matching, concrete slabs will prevail and the traditional materials will end up in a skip, or (much more likely) on the contractor's patio.

Tim Palmer

SHORT NOTES

Strata Florida Abbey

At Strata Florida, four exotic building stones have been used; Caerbwdi Sandstone from Caerfai Bay, Pembrokeshire, which was worked for capitals of pillars; Westphalian (Coal Measures) sandstone from St Bride's Bay, which is found as blocks in the stone farm buildings and in the small garage (this stone was also used in St David's); Dundry Stone, from Dundry Hill, Bristol, which was extensively used for buildings in south Wales, such as Llandaff Cathedral, Whitland Abbey, St Dogmael's Abbey, St David's Cathedral, and in places like Carmarthen Castle. The stone was also used in Dublin and Waterford, in Ireland.

It is probably significant that Llywelyn the Great granted the lands on which stand the main quarries to the Augustinian Canons of Penmôn and Beddgelert priories.

It is hoped that this provisional survey will be augmented in the future, and that detailed work may be possible to match the architectural history of these buildings with the use of stone.

John H. Davies, Countryside Council for Wales

Geological Survey of Brecon

The geological survey of the Brecon 1:50,000 Geological Sheet was carried out in 2002-3, funded by a consortium comprising the British Geological Survey (BGS), the Environment Agency (EA), and the Planning and Environmental Legislation divisions of the Welsh Assembly Government (WAG). Its aim was to provide coverage of an area that includes part of the Brecon Beacons National Park and the upper Usk Valley, for which there are no modern geological maps. In particular, the need for a map of Quaternary deposits of the district, for the purposes of modelling groundwater movement, aquifer vulnerability risk, geohazard assessment (landslip and flood risk) and potential bulk mineral deposits, was a priority of the co-funding partners. With the limited resources available, the Old Red Sandstone terrain was rapidly mapped to determine the main geological boundaries and the more complex Silurian strata in the northwest, including the global stratotype of the Llandovery Stage, were surveyed in greater detail.

The survey was carried out using a combination of traditional mapping techniques and photogrammetric interpretation. The results have led to a better understanding of the complex glacial history of the region and the revision of the Llandovery stratotype. A number of major landslips in the Brecon Beacons and Usk Valley have been identified. Provisional findings suggest that the valley west of Brecon contains relatively high-quality bulk mineral resources. There is no current building stone extraction within the map area, although there are several small quarries working sandstones of the Lower Old Red Sandstone St Maughans Formation nearby. The map will be available late in 2003, along with an explanatory booklet due for publication in 2004.

Bill Barclay, British Geological Survey



President Dr John Davies at Whitland

Do you have an article, an idea, an opinion, a photograph, or a concern that you would like to see in the *Newsletter*? Or do you know someone who might? We welcome submissions on any stone related topic, ancient or modern, in Welsh or English. Please send them either to the Editor, Stephen Howe, at the national Museum of Wales, or the Secretary, Tim Palmer, at Aberystwyth [tjp@aber.ac.uk].