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Fforwm Cerrig Cymru  Welsh Stone Forum

NEWSLETTER

Number 3 January 2006

Firstly, an apology for the late arrival of this edition of the *Newsletter*. As a bonus for this delay what you are now receiving is a bumper issue so I hope that you think that the wait was worthwhile. I am grateful to all those who have provided material and it is pleasing to see the *Newsletter* being used as a forum to report on work and ideas being developed by members. Currently the *Newsletter* is published annually but if more material is forthcoming though the year then we could consider producing extra issues. The ball is in your court!

It has been a busy year for your Council as the work of the Forum has gathered pace. We are gradually making ourselves known to the many organisations and institutions that need to be aware of our existence in order for us to be able to promote the use of natural stone throughout Wales. Our meetings programme has begun to flourish and the well-attended field meetings have generated lively debate and the exchange of valuable information. We are delighted that Steve Gray has agreed to take over the role of Programme Secretary. As you will see below next year's programme offers a varied set of events that covers the whole of Wales (and beyond), including the first full weekend meeting. If you have not yet attended a field meeting then pleased make every effort to do so this year.

A high point of the last twelve months was the launch of *Building Stones in Wales,* the conference volume, at the AGM at the Museum of Welsh Life in April. Our thanks go to Cadw for publishing this beautifully produced bilingual volume and to Malcolm Coulsen in particular for editing and seeing the volume through publication. The volume was distributed free to all those people who attended the conference but for members who were not present the volume is available from Cadw at a cost of £45.

This year's AGM will be held at the National Slate Museum in Llanberis and it would be pleasing if the turn out was as good as it was at St Fagans. The AGM is the one meeting in the year where members have the chance to air their views about the Forum and the way that it is run so come along and let us know your views.

Programme 2006

Saturday 25th March
Field Meeting: **The English Invader. Dundry, Bristol**.
***Leader*: Tim Palmer**
Visit to Dundry, south of Bristol, to look at the site of the principal freestone that was being imported into Wales during mediaeval times for use in churches, cathedrals, monasteries and castles. Tim will talk about some of the easily recognisable differences between some of the English Jurassic limestones. Bring a packed lunch and join the trip either at the Magor Service Station on the M4 at 10.45 a.m. (fewer cars crossing the

bridge is cheaper on toll costs), or at Dundry church shortly after 12 noon. We hope to look at the stone in the C19th underground quarry (bring a torch) and in the church tower with a magnificent ornamented parapet — a clear contender for the best advertising display of any pre-Reformation builders' merchant. There will probably be time to visit one of the churches in Bristol where Dundry Stone was used in the afternoon.

Saturday 8th April

11.00am: AGM and Annual Address by Terry Hughes **- Welsh Slates and Tilestones**

Venue: **Welsh Slate Museum, Llanberis**

Terry has an extensive background in the slate industry and is Britain's foremost consultant on stone roofing. Recently he has authored the *English Heritage Transactions No 9* on Stone Roofing. See his website at **http://www.stoneroof.org.uk.** The AGM will start at 11.00 a.m. and the talk will follow straight on (probably starting at about 11.45). A soup and sandwich lunch (with tea or coffee) can be provided on site at a modest cost (not exceeding £6, and paid for on the day), but it is essential to book this in advance, through the Secretary (tjp@aber.ac.uk) tel.01970-627107).

Saturday/Sunday 20th/21st May

A weekend meeting based at Mold on **The Namurian and Westphalian sandstones of northeast Wales.**

Leaders: Ray Roberts (CCW), Graham Lott (BGS) and Ian Thomas (NSC)

The Carboniferous sandstones of northeast Wales were extensively used locally, and some were also taken far out of the area. They often cause confusion. Where did they come from, and how many different sandstones were used? Can we tell them apart? This is a visit that sets out to answer some of these questions. This is also the Forum's first 2 day meeting for those who are coming from outside the area. We will be based in Mold; people should find their own accommodation. We will meet on the Saturday morning at 11.00 at Basingwerk Abbey, at Greenfield about a mile north of Holywell. There is a map at **http://www.bbc.co.uk/wales/northeast/sites/nhob_walk/index.shtml.** Meet at the main car park of the Greenfield Heritage Park, along the B5121 between Holywell and Greenfield.

Saturday 10th June

Field Meeting: Cardigan, St Dogmaels and Cilgerran

Leaders: Judith Alfrey (CADW) and Dyfed Elis Grufydd (TC Carmarthen)

Meet 11.00 at the car park of St. Dogmaels Abbey.

Saturday 1st July

Field Meeting: **Newport, southeast Wales.**

Leaders: Eric Robinson and Stephen Howe

Meet at 10.30am outside Newport railway station. Lunch can be obtained from the many of cafes in the city centre if required. Once a major port boats from Newport traded far and wide. The building stones used within the city reflect some of these trading connections as well as highlighting the varied use of locally sourced material. See Eric Robinson's article on Something to look for in Wales for a flavour of what is on offer.

Saturday 9th September

Field Meeting: **Central Wales**

Leader: John Davies

Visit to central Wales with the President, Dr John Davies. When Llywelyn the Great extended the abbey church at Abbey Cwm Hir to form a National "Cathedral" in 1228-34, there was no freestone available to him from within Wales. However, he had been brought up in Shropshire and his step-father's family owned the great Grinshill stone quarries, 12 miles NE of Shrewsbury. These Triassic sandstones are a wonderful honey-colour and contrast greatly with the local Ordovician grits, which are dark greenish-grey. Thus they are easy to identify in mid-Wales. The excursion will examine stone which was brought 60 miles to build the abbey, but after the dissolution was re-distributed around the area in local churches and mansion houses. The finest being the arcade at Llanidloes Church built in 1542. The trip will assemble in the small road to Smithfield, next to the Llanelwedd Arms at Builth Wells (SO 042513) at 11.00. We will look at the Newmead Sandstones at Builth, progress to Llanddewi Ystradenni, Llanbister, Devannor, Abbey Cwm Hir and Llanidloes.

Field Meetings Report: Monmouth

Tim Palmer

At the beginning of 2005, the Forum visited Monmouth with Edward Holland, the County Council Conservation Officer, to look at the recent restoration work on the Old Monnow Bridge (see the article in Newsletter No 2, 2004). New paving across the bridge and on adjacent areas was of a beautiful quality, varying in colour from pale salmon to pinkish buff. This sort of stone is always in demand across southeast Wales and Herefordshire; it is the traditional local paving material and in the past was extensively quarried in the Old Red Sandstone of the Black Mountains and adjacent areas. The same quarries also produced the tilestones that were laid in courses of diminishing sizes up from the eaves and which were formerly seen on all ranks of building, from byres to mansions.

Fig.1. New locally prodfuced ORS paving from the Black Mountains at the reecnrtly restored Old Monnow Bridge, Monmouth

Today, much stone for paving and tiles is imported, but locally there are still small firms with the interest and the expertise to work this resource in the traditional way. For listed building work, and to supply those customers who want to use the regionally appropriate materials for restoration and new build, these operations are essential. Bill Watkins, who provided the paving for the Monnow Bridge project and who joined us on the visit, invited us to visit his operation on the Herefordshire border just north of Abergavenny.

Bill quarries the stone up in the hills, and then brings it down to his yard for the tiles and the paving to be cut and shaped. He and his sons run the business together, but some of the information that he uses to point him to good sources of stone comes from his memories as a boy, when his father and grandfather took him round the local countryside. In the long period across the middle of the 20th Century, when concrete was king and stone was spurned, much local knowledge about resources was lost and the recollections of earlier generations become of the highest importance.

Fig 2. Slabs up to 12 feet long are sometimes available

As in many quarries in this sort of stone, it is the beds at the top of the quarry, within a couple of metres of the surface, that are the most important. Weathering, particularly freezing and thawing during the Ice Ages, helped to split the stone along its natural lamination so that it comes out of the ground as thin sheets ready to be shaped into tiles. A little deeper in the ground, the natural splitting process gives rise to a thicker product suitable for paving. Deeper still, ice-splitting is not so apparent and the stone is used for walling. In some parts of the country the fact that tilestone quarries need to be shallow and extensive

Fig 3. Tilestones of different sizes being stacked in the yard

has raised planning issues. Planners prefer quarries to be smaller and deeper, and more easily hidden by the construction of surrounding banks, but at least shallow excavations are easy to restore and return to agriculture.

Bill brings all three types of stone down from the quarry. There is a substantial market for the walling stone which he supplies to a local builders merchant, but the paving and the tilestone require skilled preparation and are dealt with in house. Some of the slabs are of enormous size and are put on one side until a suitable project requires them. The piece in the picture, on which Bill is standing, is 14 feet long. The tiles are trimmed to size – a job that looks very easy but which, in fact, is far from it – and then stacked in batched of different sizes (see picture) until required. Bill Morris can be contacted on 01873 860682.

ARTICLES

Something to look for in Wales

Eric Robinson

In all accounts of quality British building stones, Beer Stone is invariably omitted, which is both unreasonable and an oversight as historically Roman and Norman builders probably became aware of hard chalks before most other stones. Beer stone is a hard chalk of Turonian (Middle Chalk) age from southeast Devon, which can be dressed and shaped when moist from the outcrop and which then hardens. In this property it is no different from Tottenhoe Stone or Burwell Rock, but while they are often mentioned in accounts, Beer remains less so, except at Exeter and Winchester Cathedrals.

Fig 1. Turonian Middle Chalk, Beer, Devon

In the Medieval period, it was widely used as it was easily transported by sea as the cliff top Beer quarries gave easy access to sea-going vessels. In the 13th century some went via the Thames to London where it features in the tracery of the great east window of Westminster Hall. Blackened with time, it suffered blistering two years ago, which, when ruptured, revealed the stone's white chalky interior. Thinking of the location, we plumped for Tottenhoe Stone from Bedfordshire, only to be corrected by the archives which clearly recorded deliveries of stone from South Devon.

How does this relate to Wales and the normal focus of the Forum? Quite simply in its availability for sea-borne transport which gave it a real advantage over many other stones, including its Chiltern competitors. Its presence in south Wales first came to my notice when we visited St Woolos' Cathedral. Newport, in 2003 and, like everyone else, studied the impressive arch to the nave. In 1080, this was the entrance arch to the Norman building but the addition of the Lady Chapel in the 13th century means that it is now completely within the present cathedral and protected from the elements. Although everyone says that the columns to this arch "were almost certainly brought from Caerleon. They are Roman" (St Woolos Guidebook), our interest is in the Norman zig-zag decoration to the arch and some of the mouldings where dark-weathered, small flakes detach themselves and show that this work was executed in Beer Stone.

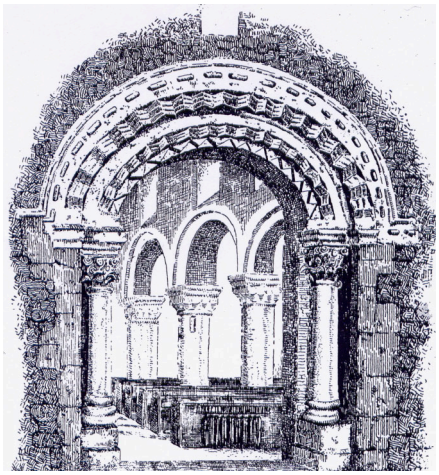

Fig 2. The 1080 Norman Arch, St Woolos Cathedral, Newport. Courtesy of the Cathedral Guide

Fig 3. Detail of the arch, Beer Stone (?) and oolite mix

A diagnostic feature of Beer Stone is that it is edible. Chewed carefully, it has no gritty particles nor the shell

fragments, which occur in Burwell, Tottenhoe, and certainly Mebourne Rock which is rich in inoceramid splinters. This is also a basis for distinguishing Beer Stone from the pale-coloured Salcombe Stone from the coast to the west of Beer which, despite being a Greensand with the occasional green grain of glauconite, has a fine silty content which tooth and tongue detects. In the interests of general health, discretely spit the test into a handkerchief; don't swallow!

Given that the Usk is tidal right into the heart of the City, there would be no problem with delivering stone of quality from South Devon to medieval Newport along with cargoes from Normandy (Caen), Dundry Hill, or the shorter journey for the fine-grained pale sandstone from Sudbrook. From what we see in the Museum at Caerleon similar traffic may have operated in Roman times, including those shaped columns for the Norman arch of St Woolos.

Fig 4. Beer Stone dressings to the Westgate Hotel (now *Baltica*), Commercial Street, Newport

If we run on the time clock some 750 years, Beer quarries were still producing dressed stone blocks mouldings for Victorian buildings in the South West and Wales. In Newport, the stone is used in the elaborate dressings to the flat slab Pennant Sandstone of the Westgate Hotel (now a club, *Baltica*) on Commercial Street. The Hotel, stands on the site of a fatal meeting in 1839 when local Chartists were shot by the local Yeomanry, and event commemorated by a modern sculpture 'Unity, Prudence, Energy' by Christopher Kelly (1989).

Other uses of Beer Stone in Wales are something to look out for as we examine the streets of Cardiff, Swansea, and other coastal sites. Hard chalks are not obvious at first. Many may have suffered over-painting to consolidate surfaces (wrong-mindedly). If they do turn up, regard Beer Stone as a likely contribution to the diversity of the urban landscape. As for Newport, there are good reasons for fitting a Forum visit to the city in the 2006 programme.

The medieval bishops' effigies at Llandaff Cathedral

Maddy Gray

The medieval episcopal effigies at Llandaff Cathedral present an intriguing (if sometimes frustrating) puzzle for the historical detective. The history of the building means that the effigies have been moved around, some of them several times. The C13th effigies traditionally regarded as those of Teilo, Dyfrig and Euddogwy are now in alcoves in the north aisle, the north choir aisle and the south wall of the choir. The Dyfrig effigy is in a particularly interesting setting, an alcove with stone plaques depicting the Instruments of the Passion and the Image of Pity (Christ rising from his tomb and showing his wounds) and a small carving of Christ in Majesty. Another, rather different effigy in the north-east corner of the Lady Chapel is identified by its inscription as that of William de Braose (bishop from 1266 to 1287). A very worn effigy in a Victorian niche in the south aisle is traditionally identified as Henry of Abergavenny (d. 1218). Finally, there is the effigy of Bishop John Marshal (d. 1496), which now lies between the choir and the north choir aisle, on a rebuilt plinth with an *ex situ* plaque carved with the Image of Pity and the Instruments of the Passion.

So far, the carvings on these monuments have been studied by architectural historians, archaeologists and iconographers. However, examination of the stones themselves is now adding to our knowledge. A preliminary study by Steve Gray of the Welsh Stone Forum suggested that some of the 'effigies' might not be effigies at all but vertical carvings, possibly from the niches on the west front of the cathedral. Wear marks on the stone indicated that they might have been exposed to weathering from above: in particular, drapery under the chin of the 'Dyfrig' effigy was still sharply carved, while the portions of drapery which would have been exposed to weathering in the vertical position were very much eroded. The feet of the 'Dyfrig' and 'Euddogwy' effigies were placed on sheared-off slabs of stone with none of the finishing one would expect from a horizontal effigy. To the left of the head of the 'Dyfrig' effigy is an angel swinging a thurible in a way which would be

improbable in a horizontal effigy but quite feasible in a vertical carving. The 'Euddogwy' effigy is much more heavily worn but appears to have a similar censing angel.

At this point the collective wisdom of the Stone Forum was called in. A group consisting of Eric Robinson, John Davies, Tim Palmer, Stephen Howe and Jana Horák in company with Steve Gray and myself and Debra Bardo of the University of Wales, Newport was met at the cathedral by John Kenyon, Eric Treharne and Joe Piffaretti on 27 November 2004. Inspection of the effigies and their alcoves suggested confirmation of Steve Gray's initial hypothesis and added further ideas. A follow-up visit was made by Jana Horák and Stephen Howe on 20 January 2005. What follows is the result of discussion by the Forum members and the representatives from the cathedral.

The alcove above the effigy traditionally identified as St Dyfrig is Jurassic oolitic limestone. The carving of the *Image of Pity* appears to be integral with the alcove while a continuous watermark runs across the surface of the alcove and the carving. This tidemark is a skin of calcite where crystals have been dissolved and re-precipitated by alternating wet and dry conditions, which suggests the carving is in its original location. The panel at the back of the alcove is also oolitic limestone and appears to have been slotted in during rebuilding of the back wall. Under the arcading are ashlar stone blocks which have also been added. Below that again and immediately behind the effigy the stone is Blue Lias. Between the two there are edges of a shelf which has been removed - hacked out, damaged or both. This all suggests a higher plinth for a previous effigy.

The chiselled-out ends of the alcove are oolitic limestone and the panel with the *Instruments of the Passion* is also oolite but greyer in colour than the former and has had several coats of limewash. Some of the ashlar blocks at the back of the alcove have also been limewashed. It is difficult to identify where the oolitic limestone comes from but similar types are found in Gloucestershire and Worcestershire. The effigy itself was identified as being of Dundry Stone (non-oolitic) with grain standing proud on the weathered surface and visible in oblique light. The 'Dyfrig' effigy has marks of pitting above the canopy consistent with rain damage to a vertical statue and the base of the feet appear to have been hacked off, possibly in order to remove the statue from a plinth built into a wall. Like the effigy, the small carving of Christ in Majesty on the front of the plinth is in Dundry Stone. The shield-bearing angels, which flank the Christ in Majesty on the plinth, as well as the outer framing of the alcove are all oolitic limestone.

The carving now described as St Euddogwy is by far the most worn of the episcopal effigies and with the least effort made to make it look as though it belongs in its present position. Like 'Dyfrig', it is of Dundry Stone and the base of the feet also appear to have been hacked off as though the pedestal has been removed.

The carving traditionally identified as 'St Teilo' is now in an alcove in the south wall of the choir. It is of Dundry Stone with characteristic echinoderms, and identical in texture to the other two. The effigy is framed by side pillars and an ornate hood (gilded by Prichard) but the outer frame post-dates the effigy: it is oolitic limestone and is a repair or replacement. The back frame is not a replacement: it is Dundry Stone, the same as the effigy. The hood also appears to be Dundry Stone and part of the original structure - which makes the Teilo statue larger than the others and suitable for the largest niche on the west front. It shows the same kinds of weathering as the other two: that is to say, full face weathering from rain driving into it as well as vertical wear from rain running down it. Other visible wear is probably due to hand polishing, especially on the face and hands of the statue, and possibly on the feet. The hand-polishing of the Teilo statue is probably the result of its traditional use as a place for the ratification of agreements. The weathering processes of stone statues are worthy of separate study, as indeed are the graffiti which successive generations have carved on them. They are all part of the after-life of the monument.

What of the other effigies? The effigy in the south nave wall is Blue Lias, a shaley stone with holes weathering out and bivalves with foliaceous calcite shell structure**.** It is badly weathered but in a way which suggests that it has always been horizontal, with heavy pitting on the flat surfaces. The carving is in shallower relief than the other effigies, probably because the stone occurs in much thinner beds than Dundry Stone, so the slab the carvers had to work with would have been thinner. For this reason it is very unusual for Blue Lias to be used for effigies. However, the coffin-like shape of this carving suggests it was always intended as an effigy, though it has no integral inscription.

The effigy in the Lady Chapel is also of Blue Lias, carved again in low relief from a very shallow slab. The feet have been sheared off, possibly to fit the effigy in a different alcove. The stone is slightly different from that in the south choir, but contains typical small oysters and is well jointed so could simply have come from a different bed. It was clearly intended as an effigy: it is coffin-shaped and has an inscription round the head with the name and title of the deceased: WILLELM' DE BREWS A EP'S LA'D. It is much less worn than the other, and the bishop's ring is still clearly visible on his left hand. There has, however, been hand wear to the head and to the stone rail on the south side. Blue Lias weathers badly so if the carving had been outside for a lengthy period of time it would probably have delaminated

If the three Dundry Stone carvings were originally on the exterior of the cathedral, where were they? We have two similar bishops carved in C13th style in Dundry Stone ('Dyfrig' and 'Euddogwy') and one slightly larger bishop also in Dundry Stone and the same style, which has traditionally been identified as Teilo. The most likely place for carvings in Dundry Stone to occur is on the west front, which was rebuilt in Dundry Stone in the early C13th. The third tier of the west front has a pattern of three niches in echelon either side of a larger lancet window. The drawing of the west front in Browne Willis shows seven niches of equal width, the central niche clearly solid and not a window. The three effigies now identified as Dyfrig, Teilo and Euddogwy would fit neatly into the central three niches. However, John Newman has suggested (*in litt*.) that Browne Willis's drawings are not architecturally accurate and has drawn attention to the early C19th drawing of the cathedral in ruins reproduced in his *Buildings of Glamorgan*., which shows the central niche as wider than the others.

We are, therefore, still some way away from a conjectural reconstruction of the west front complete with statues. However, what this study suggests is that there is a great deal to be learned from these rather neglected carvings. The cathedral has a number of other interesting pieces of carved stone including some iconographically fascinating alabaster tombs. The complex building history of the cathedral simply makes the interpretative puzzle more challenging.

Llandewibrefi Bluestone

Tim Palmer

Across most of west central Wales, including most of Cardiganshire and much of western Powys, the country stone consists of grey, inpure sandstones (greywackes) that were laid down on the seafloor of the Welsh Basin during Lower Palaeozoic time. The story of how these rocks slid northwestwards from shallower to deeper water as avalanches of muddy sediment (turbidites) is well-known, and there is a non-technical description as well as several attractive photographs in David James' *Ceredigion: its Natural History* (ISBN 0-9517470-1-0).

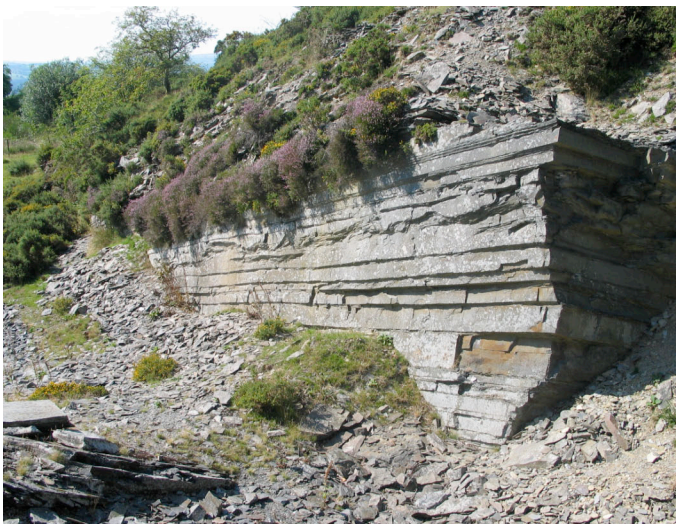

Fig 1. The face c of the old quarry above Llandewibrefi, showing the famous Bluestone used widely in west Wales during the Victorian times for dressed facing stone, lintels, gateposts and milestones

These rocks consist of alternating layers of slabby hard greywacke and soft shale. The slabs in many quarries are the ideal thickness for rubble building and the shales trim off easily to leave a clean stone with straight and parallel top and bottom faces. Because of the folding and tilting of the rocks in their later geological history, the beds are often broken across, perpendicular to their natural bed. Thus they needed hardly any further breaking or trimming before they could be used as neat rectangular building stones, and across the region countless small quarries can still be seen that provided the stone for villages and farms. They weather hardly at all, and can still be seen much as they were extracted from the ground in mediaeval buildings such as Aberystwyth Castle from the late 13th C. In the nineteenth century the practice arose of rock-dressing the outer faces of the stones on the fronts of buildings to give them a slightly tidier appearance.

Because there were so many quarries producing this type of stone, almost wherever a hole was dug, there was no great need to develop large quarries and to ship the stone over long distances. Only occasionally did a variety come to light that exhibited some additional and particularly desirable property that led to its being transported further away from its immediate neighbourhood. One such variety was Llandewibrefi Bluestone, which had its heyday during Victorian times but which was still being produced well into the 20th C.

Figs 2 . Early C20th house in LLandewibrefi showing Llandewibrefi Bluestone rock-dressed facing

The appeal of Llandewibrefi Bluestone was twofold: part in its colour and part in its engineering properties. The colour is a uniform, deep steely blue-grey, largely unaffected by the rusty browns and the white quartzite veins that affect many of the other Cardiganshire greywackes. This uniformity of colour endowed the stone with a portentiousness that makes it very suitable for religious, industrial, and other institutional buildings. It could be argued that the lack of other colour tones made it less homely for humbler domestic architecture, but for grander work it was the choicest of the Cardiganshire building materials. Its other appeal lay in its strength, almost as strong as granite in its resistance to breakage when placed in tension. This, and its availability in long pieces, put it into high demand for lintels (even for barn doors) and gateposts. Lengths of over ten feet were readily available, as can readily be seen in the local hinterland. The gatepost of the village school at St Fagan's (originally from Aberystwyth) is a fine (unlabelled) example.

Fig 3. Close up of Llandewibrefir Bluestone rock-dressed facing.

In many parts of England that have a reputation for vernacular stone building, small operators are bringing beauty to local landscapes and work to their inhabitants by reopening small quarries to provide traditional stone for local new build projects. A building-stone quarry is a very low-impact operation, and modern machinery (particularly hydraulic guillotines) permits a one or two man operation to produce a substantial amount of trimmed stone of precise dimensions for modern cavity-wall building. The Cardiganshire greywackes are ideally suited to this approach. Maybe soon an enterprising inhabitant of Llandewibrefi Brefi will again be providing a market that cares about regional architectural style with this wonderful and unappreciated building material.

More about 'ballast'

Eric Robinson

The use of ships' ballast in buildings has always been a theme to explore in south Wales both for the diversity of stone brought in via the coal ports, and for the other natural reasons which might explain their presence (e.g. glacial debris and erratics). I was first introduced to their occurrence by John Perkins at a time when he was using the streets, and particularly the backstreets of Cardiff in his Extra-Mural class teachings. Since then, they have figured in many accounts including a recent broadcast on Radio 4, which focussed upon the Ebeneser Chapel on Charles Street, Cardiff (1854-55). This drew attention to the fact that ballast wasn't just used in back street walls, but also sometimes in buildings if an architect wished to exploit their multi-colour and textural effects following good Ruskinian teachings.

Fig 1. Two gneisses, William Street, Swansea

Usually, demonstration of ballast walls has been in the Splott, Cathays, or Roath, areas of Cardiff, where the speculative builders were quickly putting up terraces to house the growing population of the city. However, in August there came a call from Richard Porch in Swansea, a man who is fascinated by the city's buildings as they reflect the industrial and economic history of Swansea. His book, *Swansea; History You Can See* (Tempus, 2005) balances what might be regarded as urban decline with a fair promotion of new buildings on the quays, and modern sculpture, of which there is a fair display in the city.

In his surveys of streets, Richard inevitably came upon ballast walls, and, in the company of Ron Austin, had rocks pointed out to him as 'metamorphic' and so, 'exotic' to Swansea. Ron was quite right of course, but to take matters further, Richard met up with John Davies, Dyfed Elis-Gruffydd and I in the terrace streets close to The Vetch Field football ground and HM Prison on the Mumbles Road. What we looked at were low garden walls capped by angular blocks of stone intermixed with obvious beach boulders, smooth and well-rounded, but equally, not local in derivation. There are excellent examples of banded gneiss, some spotted with blood-red garnets to testify to a grade of metamorphism not far short of the Highlands. There are also several dark gabbros or diorites, and some dull red granites. In contrast, there are quartzites (often the well-rounded beach boulders). Altogether an interesting assemblage but, where did they originate and could they really be ships' ballast?

Interest grew as we moved into William Street. As we studied the cappings to the garden walls, we attracted the attention of a lady passing by. What were we doing? Her answer was to ask whether we had asked the residents? On our hesitation, she took the initiative and knocked on the door of one house. From there, that lady in turn called out a gentleman who had an answer which we could not have anticipated. "I built these walls about fifty years ago" he said, "I went down on the beach and brought back interesting stones which I put into four of these gardens as decoration". Whether he did as much in nearby Argyle Street, or whether his example caught on with others, this was a breakthrough for us. The stones, however exotic, came from the modern beach.

Fig 2. The President examines wall cappings, William Street, Swansea

This, of course, only moves the question a step further. It could still be ships' ballast jettisoned by colliers making landfall on return to Swansea, but could it be stones washed from offshore Pleistocene banks? While the suite of stones might hint connection with the metamorphics of the Baltic Shield, as we often say in Cardiff, there are high grade gneisses in Brittany, and the dull red granites could be from the north coast of French Armorica between St Brieuc and Brest. Throw in the diorites and gabbros, the bluestones of the Channel Isles, and we might be dealing with a totally Breton source area. It has often been speculated that ice might have had south western origins. Could the beach stones start that hare? It remains to do what we did

not do on our visit, go down onto the foreshore at low tide from the esplanade opposite the cricket ground and do the equivalent of a field walk by our archaeologist colleagues. This kind of survey should confirm that small and less conspicuous cobbles and pebbles of the same suite of rocks are there for the taking. It is a field study of a simple aim, yet one which would add to our understanding of the story behind local ballast walling. Public curiosity has already come to our assistance in William Street. Who knows what might follow from future beach activities. We hope that Richard Porch has learnt of the mysterious ways of urban geologists and will throw in his lot with the Welsh Forum. We need him!

Repair or Rebuild? - The importance of British stone & the difficulties of supply

John Davies

The All-Party Parliamentary Group for Earth Sciences of the House of Commons held a meeting on *Repair or Rebuild? - The importance of British stone & the difficulties of supply* on the 15th November 2005. It consisted of two presentations by Chris Wood, Senior Architectural Conservator of English Heritage and Dr Alan Thompson, Associate Director and Head of Earth Sciences at Capita Symonds followed by a discussion.

The great interest generated by this meeting led to being moved a number of times to progressively larger rooms. Those attending included members of both Houses of Parliament and representatives of the Office of the Deputy Prime Minister. Other bodies represented included English Nature, English Heritage, the British Geological Survey, the Geologists' Association, Building Conservation Trusts, Scottish Nature, The Scottish Stone Liaison Group, the Countryside Council for Wales and the Welsh Building Stones Forum as well as other interested groups. The meeting was chaired by the Rt. Hon. Kevin Barrow MP and Professor Allan Rogers FGS.

The meeting arose from the publication of the Symonds report [*Planning for the Supply of Natural Building and Roofing Stone in England and Wales March 2004*], which had been commissioned by the office of the Deputy Prime Minister. The aim was to consider that: "New stone from local/original quarries is essential if historic buildings and areas are to be properly conserved. Without it, there will be increasing use of inappropriate imported stone and concrete substitutes as well the cannibalisation and theft from roofs, walls and pavements. Opening old quarries is often bitterly opposed. These talks will look at the problems and what is being done to try and rectify them."

Both presentations considered the desirability of repairing historical buildings with the correctly sourced original material. Only in this way can the glory of the original building be maintained although even this new stone will take some time to tone in with the surrounding older material. There are numerous examples of the wrong stone being used, which not only can cause aesthetic damage to the building but also physical damage due to differences in chemical and physical properties.

The difficulties faced in sourcing the correct stone are increased by changes to the source areas since the original quarries were being worked. Many such quarries have been filled in or built over, turned into nature reserves or SSSIs, or converted to extensive aggregate quarries. In addition, the neighbours of old quarries are inclined to oppose their re-opening on the grounds of dust, noise, or transport difficulties etc. However, importing stone from elsewhere can in effect export environmental problems as was emphasised by a slide of the environmental damage in Italy caused by the extraction of Carrara Marble for export.

Many of these issues are resolvable. Building stone quarries are generally smaller, less dusty, less noisy, and have a lower level of transport than aggregate quarries. They also tend to require higher levels of masonry skills, and provide employment in the local community but in particular preserve the local character of natural vernacular architecture and historical landscape.

As well as difficulties the speakers also discussed successes in trying to use vernacular materials in local new build and in the renovation of traditional housing. A case history was provided by Leashaws quarry where an attempt to re-open Elland Flags quarries, adjacent to the Peak District National Park, came into conflict with biological conservation interests. They recommended establishing a database of indigenous building materials, education of the public to realise the importance of this aspect of our heritage and the value of small, local quarries to satisfy the local need.

During the discussions, a number of industry representatives made contributions and a number of industry-based initiatives mentioned and there were many comments from conservation bodies in support of the recommendations of the report. It was recognised by all present that much of the work being recommended by the Report is already being put into action in Scotland by the Stone Liaison Group and by us in Wales through the Welsh Stone Forum. Towards the end of the meeting, Allan Rogers announced that Wales will be hosting a meeting in the National Assembly in Cardiff in the New Year to discuss the issues in Wales and we will be in the vanguard of that process.

Trefor Granite: a reply

Dave Willie (Celtic Rocks)

The article on Trefor granite in the October 2004 newsletter (No. 2) by Dr Charlie Bendall refers to the stone as no longer being in the pristine state it was when first crystallized and not taking a polish as well as an unaltered granite

Both of these statements are the result of the petrological study of the granite at the microscopic level and imply a criticism of the use of Trefor Granite as a polished stone. However, from a stone suppliers' perspective this is not the case. The production of polished stone slab for the commercial market uses a variety of mechanised tools. These are usually powered by electricity or compressed air and revolve at speeds of thousands and often tens of thousands of r.p.m. while being pressed firmly by mechanical methods firmly against the surface being polished. They use abrasive grits of different mediums according to stone type and individual preference and are used in incremental stages of increasing fineness. However, the actual scientific mechanics of polishing stone is still poorly understood. It used to be considered a matter of fine grinding. But research suggests that frictional sliding causes local heating and/or by chemical action which actually produces an extremely thin fluid layer which then recrystallizes covering and hiding scratches and other abrasions.

One of the problems associated with polishing Granite is plucking. This occurs when the material being polished becomes pitted in the process by losing individual crystals (partially or complete). This is not uncommon with granites containing larger sized individual crystals with sharp dividing boundaries. When this problem occurs it is often rectified by injecting the pit(s) with resin and re-polishing the stone.

Trefor Granite has medium grain size with very few large crystals. The crystal boundaries are soft. This is probably due to the mild metamorphic event referred to by Dr Bendall. These properties may make the production of highly polished thin sections a couple of centimetres in area and 0.03 mm thick difficult but these same properties mean it does not suffer from the problems of plucking mentioned above. Because of this the rock takes a polish of exceptionally high quality and is excellent for a variety of applications including kitchen worktops, memorial stones, tiles and many more uses. A quick walk around some of the NW Wales cemeteries will confirm this.

It is a tribute to the properties of Trefor Granite that it is one of very few granites that is considered suitable for use as a curling stone. As well as being tough and durable curling stones need to be exceptionally highly polished in order to perform to required standard. I think this example should answer any doubts there may be regarding the standard to which Trefor Granite can be polished.

Short Notes

Welsh quarry list

Council Member Dai Willie has compiled a preliminary listing of Welsh stone quarries. This is viewable on Dai's website which is www.welshstonecentre.com

Building stones lecture and field trip

Graham Lott (British Geological Survey) is giving the a talk on *Petrography of the building stones of south Wales* to a joint meeting of the Geologists' Association, South Wales Group and Russell Society on Saturday !8th February 2006 in the Geography Department of Swansea University. The lecture begins at 11.00am with

tea and coffee from 10.30am. All welcome. In the afternoon John Davies will co-lead a field meeting to look at the building stones of parts of Swansea.

Training seminar

Council has decided that the Forum should establish a seminar within the next couple of years that would look at training in all aspects of the use of stone. Initial ideas have been discussed and it is hoped that the meeting can be arranged for 2007. Watch this space!

BGS map launch

In June this year BGS launched new 1:50,000 geological maps for Brecon (Sheet 213) and Builth Wells (Sheet 196). With Talgarth (Sheet 214) and Hay-on-Wye (Sheet 197) that were issued in 2004 there is now good coverage for this corner of southeast Wales. All four maps are available with an accompanying brief explanatory 'memoir' and can be purchased from the BGS Wales office in Cardiff.