Fforwm Cerrig Cymru Welsh Stone Forum

Number 13 March 2016 **Price £5.00**

AGM 2016

To comply with our constitution we need to elect (or re-elect) officers at the 2016 AGM. The key posts are listed below. Tim Palmer would like to stand down as Field Secretary, so we require nominations for this post. Other officers are willing to stand again but this does not preclude members from standing. If there are more than two candidates for any post we will hold an election at the AGM. Please let me know if you wish to stand or require any further information. The closing date for nominations is 8th April 2016. Please send them to (jana.horak@museumwales.ac.uk).

Current officers

Chair: Dr John Davies
Secretary: Dr Jana Horak
Treasurer: Andrew Haycock
Field Recorder: John Shipton
Field Secretary: vacant
Newsletter Editor: Steve Howe

Subscriptions

If you have not paid your subscription for 2016 please forward payment to Andrew Haycock (andrew.haycock@museumwales.ac.uk).

Programme 2016

April 9th - AGM

The 2016 AGM, will be held at Pontpridd Central Library (Library Road, Pontypridd, CF37 2DY), 10.45, tea and coffee available from 10.15.

The annual lecture will be will be given at 11.45 by by Dr Graham Lott (ex-British Geological Survey, Buildings Stone specialist) on the theme of 'Pennant Sandstone' After lunch in a local pub there will be an excursion to view examples of the use Pennant Sandstone (details to be confirmed). Come prepared with stout footwear and waterproofs. Please notify Jana Horák if you plan to attend this meeting and trip (details on last page).

May 21st - Alabaster from the Cardiff area

Leader: Mike Statham (with Jana Horák & Steve Howe).
Meet: 10.30 am, Cardiff Bay Barrage car park, Penarth Portway, CF64 1TT, grid ref. ST 190 724.
This is trip will explore the occurrence and use of alabaster deposits that Mike has been researching (see article). This is a joint meeting with the South Wales Geologists' Association.

June 18th. - Haverfordwest, Part II.

Leaders: Robin Sheldrake, John Shipton & Jana Horák.
Meet: 11.00 am in the small car park at the entrance to Fortunes Frolic, on the east bank of the Cleddau downstream (south) from the railway embankment. Coming from Carmarthen, this is the first exit left off the Salutation Square roundabout (County Hall is the second).
Continuation of the 2014 excursion (see Newsletter 11).

July 9th - Neath Abbey (postponed from 2015)

Leader: Tim Palmer
Meet: 11.00 at the entrance to the abbey. There is limited parking opposite the entrance and in Monastery Road.

September 9-11th September (provisional)

We are considering running a 3-4 day trip to study Belgium marbles (Carboniferous Limestone) including quarries, buildings, and the Belgium Marble Museum. Participants will need to arrange their own travel to Belgium and accommodation. The WSF will arrange the itinerary and transport in Belgium. Please let Jana Horák know as soon as possible if you are interested in participating in this trip. Limited numbers.

October 8th – Gloucester Cathedral, building & ornamental stones

Leader: Tim Palmer & Denis Jackson (Gloucester Cathedral) .
Meet: 11.15 am Cathedral entrance or at Hedley's Tea & Coffee Shop, Westgate Street prior to this.

Please contact Steve Howe (interim Field Secretary) if you intent to participate in trips, you will then be informed of changes to the arrangements. Where possible we will also update this information on the WSF web site.

Building stones in churches across Wales: a national map of vernaculars:

Part 3 – Ynys Môn (Anglesey) & Merionedd

John Davies

Previous parts of this survey of the building stones of the churches in the Welsh counties of Breconshire, Radnorshire, Montgomeryshire and Carmarthenshire, were published in The Welsh Stone Forum Newsletter (11 [2013], 12 [2014]). These parts present maps for the churches of Ynys Mon (Anglesey) and Merionedd.

Technique

The method employed during the previous surveys has been continued in this study with the external building stone being examined in order to record the nature and possible source of the materials used. Cadw's recommendation to whitewash many churches is being extensively taken up so it was vital to describe the building stones before they became obscured. The church interiors were not examined due to the time available, many of the buildings being locked, un-safe or converted into private accomodation. The length of time required to identify the stone in the walling and dressings was about fifteen minutes per building, which enabled up to twenty churches to be visited each day, with approximately ten digital images taken of each. Maps of the building stones are included in the same format as those for the previous surveys.

Initially in their construction, many churches used local rubble for walling and local, or comparatively local, dressings. A simple rule applies to these buildings; if a church lies near to the outcrop of a good freestone then the walls will frequently be composed of dressed stone for this source. Further from the freestone source all the dressings are of the freestone, with the remainder of the walls composed of local rubble. Further away again, the freestone is used only for special dressings or in more prosperous churches.

After the arrival of the railways and improved roads dressing stone became slightly more exotic but indigenus stone still predominates. Frequently a church may include three or more different dressings, depending on the history of availability, which results in a chronology of stone use in each building. In the future it may be possible to match these with different architectural styles. This creates a problem with regard to deciding which dressing to plot. Ideally all the dressings could be presented in some form, but at present only the two dominant stones have been plotted, on separate maps.

Anglesey

Different indigenous building stones are used in the different areas of the island and these form distinct areas on the maps. Imported dressings are uncommon, but from the C19th onwards, some Namurian and Triassic sandstones were imported by sea or, more likely, by railway.

The geology of Anglesey is more varied than those counties described so far in this study. However, there are just four main groups of indigenus building stones used in the island. These are:

Geological Age	Stratigrahic name	Rock type
Westphalian	Coal Measures	Red sandstones and conglomerates
Dinantian	Carboniferous Limestone	Carboniferous Limestone
		Anglesey Grit
Ordovician	Llanvirn	Sandstones
		Metamorphic rocks
Cambrian		Metamorphic rocks
Precambrian		Metamorphic rocks

The Precambrian Monian Composite Terrane rocks occur in four areas within the island and include three major units:

1. Monian Supergroup
2. Coedana Complex
3. Aethwy Terrane

These rocks, previously known as the Precambrian 'Mona Complex', are now believed to consist of a complex mixture of Precambrian, to possibly Cambrian age, rocks all of which demonstrate varying degrees of metamorphism. A wide variety of rock types are present, including granites, schists, phyllites, gneisses and quartzites. None of these occur as any sort of freestone and were, therefore, of little use as building stone, except for rubble-walling. When used they are generally rendered to protect them from weathering.

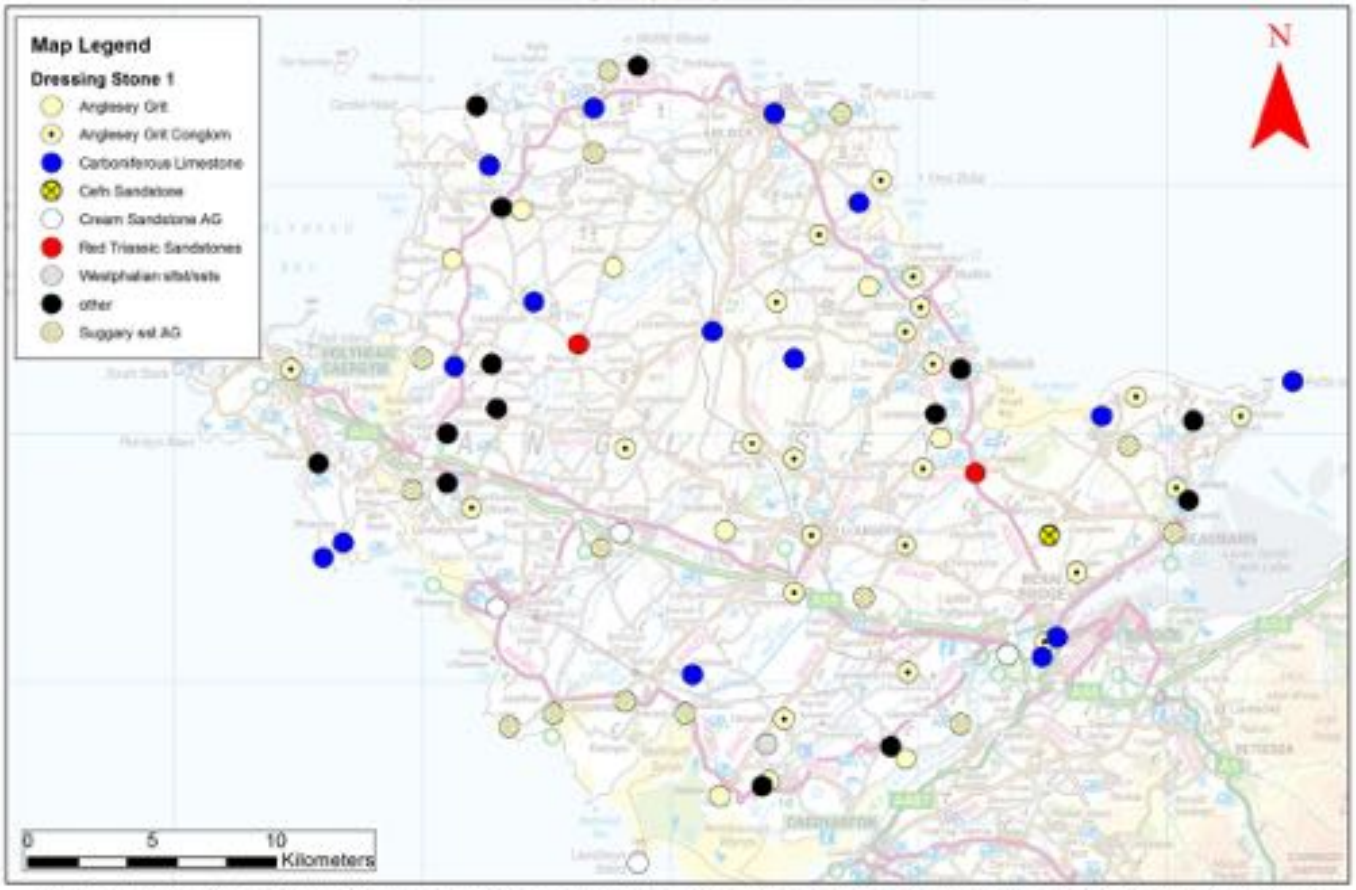
Devonian – Old Red Sandstone

Maroon sandstones, siltstones and mudstones of the Old Red Sandstone crop out in a narrow strip from City Dulas south-west towards Llangefni but do not appear in any of the churches investigated on Anglesey.

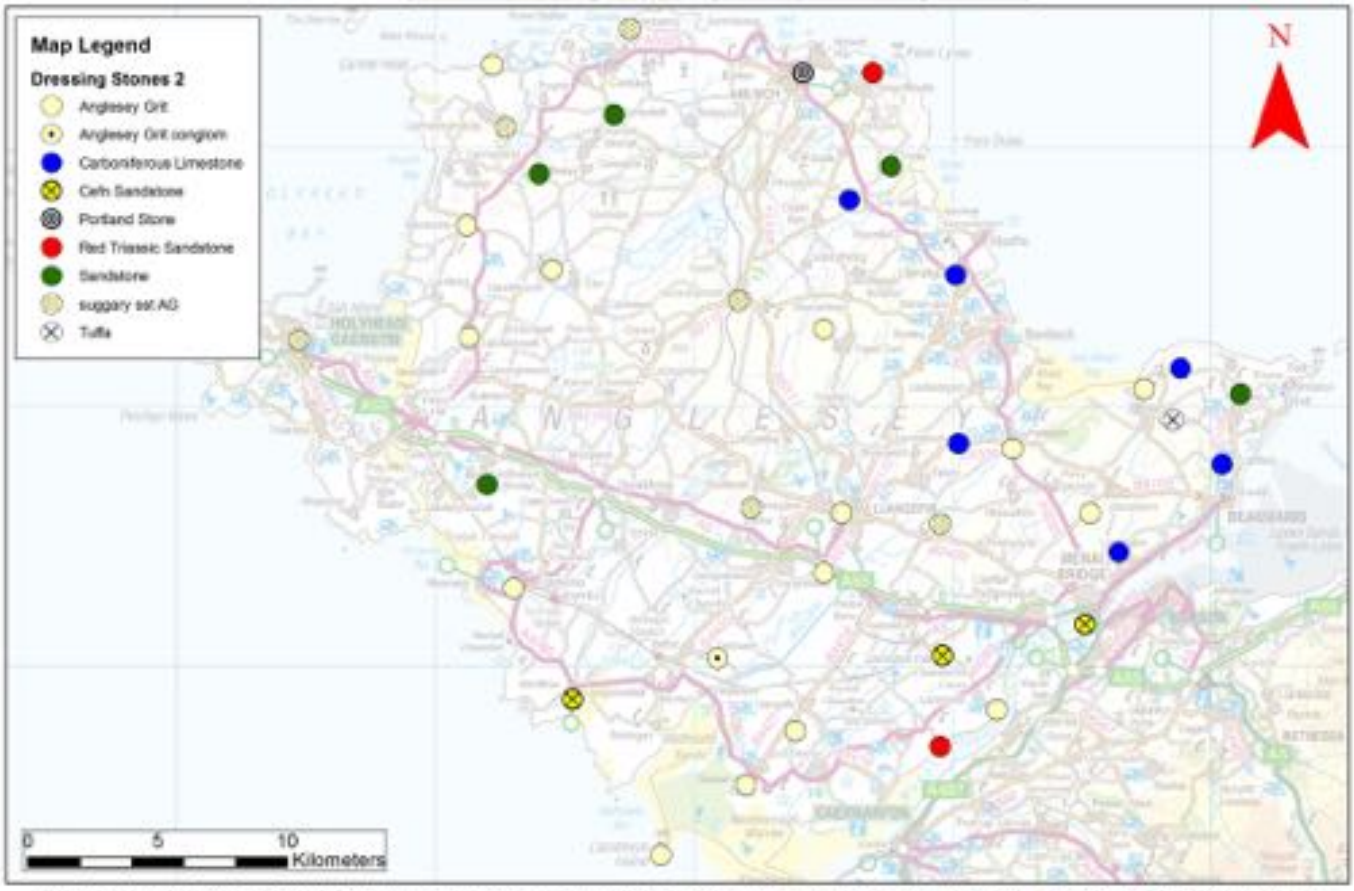
Dinantian – Carboniferous Limestone

Carboniferous Limestone occurs in three distinct areas of the island and in each consists mostly of pale-grey, massive limestones, frequently oolitic and fossiliferous

Churches of Anglesey (Ynys Mon): Dressing Stone 1



Churches of Anglesey (Ynys Mon): Dressing Stone 2



including corals, brachiopods and crinoid ossicles. These limestones were much more frequently sawn and used for dressings compared to similar aged limestone in south Wales. Their use frequently extends some distance beyond their outcrop, where they were used in rubble-walling as well as dressings (such as Llanfaes and Llaniestyn)

Carboniferous sandstones and conglomerates 'Anglesey Grits'

At the base of, and within the Carboniferous Limestone sequence, are a number of bands of conglomerate and sandstone. The sandstones are highly variable and consist of quartz-sandstones (arenite); hard, coarse, gritty quartz-sandstones; whitish-cream, coarse, suggary sandstones, and yellowish-cream, fine, dolomitic sandstones. Some contain scattered pebbles which produce a 'peaches and cream' reddish-orangish colour appearance. Each of these lithologies occurs in distinct areas of the island and their use has a strong corrrelation to the proximity of the natural outcrop.

Generally, the conglomerates can be matched to two areas; Penmon and Dinas Lligwy and the hard, grey, quartz-sandstones to the outcrops at Creigiau. Whitish-cream, coarse, suggary sandstones and yellowish-cream, fine, dolomitic sandstones tend to be distributed in the west and south-west of Anglesey, but the outcrops of these rocks have not yet been determined accurately. Some of the latter crop out in the cliffs around Foel in the east. The 'peaches and cream' variety can be easily matched with outcrops on the Menai Straits, around Moel-y-don, and appear to have been used farther afield, such as in Caernarfon Castle, Beddgelert Priory [with the conglomerates] and in Llanbadarn and Strata Florida in Ceredigion.

Westphalian sandstones and conglomerates

Locally, reddish-orange sandstones and conglomerates, with plant remains, occur within a limited area in the very southern part of the island, and one church near to the outcrop has used this stone. Even though it does not weather very well it does not appear to have been rendered, possibly due to its attractive colour.

Other stones

Imported stone forms a much smaller proportion of the building stones used on the island. They mainly consist of: Grinshill Stone (2/96), Cefn Sandstone (3/96) and red Triassic sandstones (3/96). Some concrete dressings and wooden windows also occur. There is one example of Portland Stone being used.

Description of the maps

As with the other counties two maps have been used to avoid congestion. Both show the distribution of the dominant dressing stones, but the first and second maps should be given equal status and used together. The keys will hopefully be self explanatory. It is hoped that these will provide useful information for understanding how building stones have been transported around Wales over the centuries. Developing a chronology of the use of stone is here left to architectural historians.

Meirionydd

The geology of Meirionydd is less varied than previously described counties. There are four dominant dressing stones, two of which were imported into the county (indicated by *):

Geological Age	Statigrahic name	Rock type
Triassic	Shropshire Sandstone	Grinshill Stone
Namurian	Cefn Sandstones	Red sandstones and conglomerates
Dinantian	Carboniferous Limestone	*Carboniferous Limestone
		*Anglesey Grit
Cambrian	Rhinog Grits	Egrin Freestone
	Llanbedr Slates	Slates

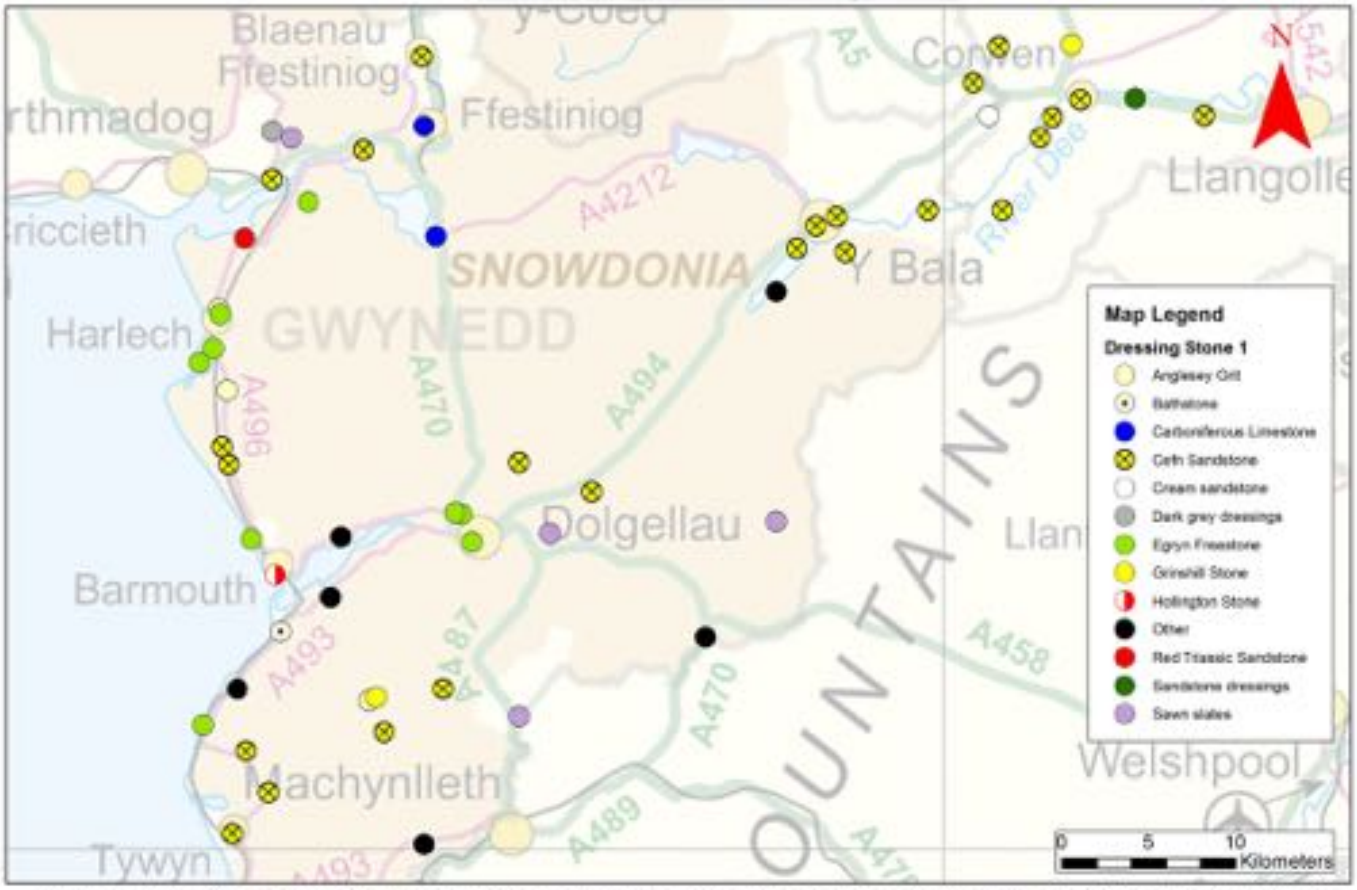
Summary of the geological sequence in Meirionydd from the Cambrian to the Triassic

Indigenous building stones used in the churches are generally only used in rubble walling and in close proximity to the areas of their outcrop. Thus, the indigenus dressings occur in distinct areas of the county, as shown on the maps. There are historical records of Edward I transporting Egryn freestone by sea from Egryn to Harlech for use in the castle. However, due to the general lack of indigenous freestone exotic dressings dominate. These were imported from the C19th onwards and include Namurian and Triassic sandstones that were brought into the area by railway, but also perhaps by sea.

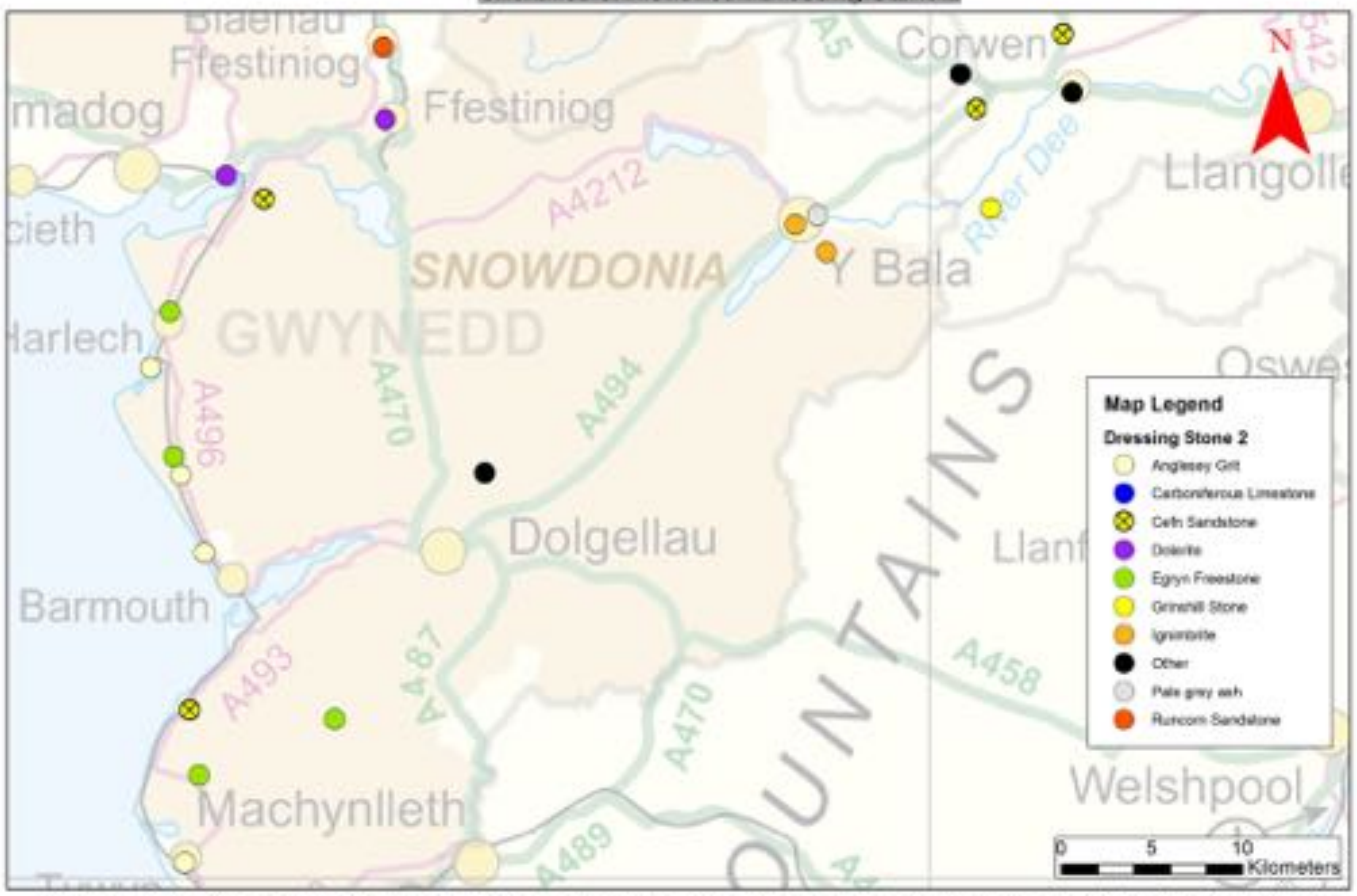
The Cambrian

Hard sandstones of the Dolwen Grits [Dolwen Formation], almost indistinguishable from the Rhinog Grits [Rhinog Formation], are overlain by a succession of mudstones, which were compressed to form the Llanbedr Slates. These were often sawn to form rectangular blocks for building but more frequently split to provide roofing slates. These are equivilent to the Cambrian Slates of the Arfon Slate Belt on the northern flanks of SnowdoniaA second series of hard quartz-sandstones, belonging to the Rhinog Grits, are readily usable for rubble walling but of no use for dressings as they are too hard to dress. These grits form the mountainous center of the Harlech Dome and have been used for walling around their area of outcrop.

Churches of Merioneth: Dressing Stone 1



Churches of Merioneth: Dressing Stone 2



The Egryn Freestone

The Egryn Freestone occurs in a band of strata which is transitional between the Llanbedr Slates and the Rhinog Grits. It is composed of muddy, yellow sandstones that reflect the transition from the muddy sediments of the Llanbedr Slates to the coarse Rhinog Grits, which show a foliation (orientation of grains to produce parallel fractures similar to slaty cleavage). This freestone was described by Tim Palmer (Palmer 2003). It has been used in a number of prestigous medieval buildings, such as Cymer Abbey and Harlech Castle, and also in churches, such as Llanaber in Ardudwy.

Ordovician

The Ordovician rocks consist of slates and a range of extrusive and intrusive igneous rocks. The extrusive volcanic ash deposits come in two main varieties; those formed by high-temperature volcanic ash avalanches, such as ignimbrites (pyroclastic ash-flow tuffs), in which the hot ash clasts welded themselves together on settling. The other varieties owe their distinctive character to whether the ash fell onto land or into water.

Apart from one exception, these rocks are generally of little use as freestones. The exception is the dolerite from Min-y-don quarries, which was used locally for rough window dressings and cornerstones.

Silurian

Silurian rocks in this area generally consist of cleaved mudstones and slates, none of which produce freestones. However, many of the Ordovician and Silurian cleaved mudstones were sawn into rectangular blocks to produce ashlar walling. They were quarried for roofing slates on the Llantyssilio Mountains, north-west of Llangollen.

Dinantian – Carboniferous Limestone

One important dressing stone, used particularely after the development of the ports and railways, is pale-grey Carboniferous Limestone. This is readily seen in the Ffestiniog area and appears to be predominantly derived from Anglesey, although many limestone quarries occur in the same general direction as the younger Namurian Cefn Sandstones. There are also extensive limestone quarries, providing a ready source of material, stretching through Denbighshire from Denbigh to the Great Orme at Llandudno. The limestones are generally pale-grey, often mottled, and include a range of fossils including corals and brachiopods.

Carboniferous sandstones and conglomerates: The Anglesey Grit

There are a few examples of white/yellow/cream Anglesey Grit sandstones that originate from within the Carboniferous Limestone succesion of Anglesey to be found in churches in Ardudwy. These are sometimes mixed with Egryn freestone, as at Llanaber and Tywyn, and would have been brought by sea to Ardudwy from their outcrops in Anglesey from medieval times onwards.

Namurian: Cefn Sandstones

The dominant dressings used over the largest part of the county are the yellowish Cefn Sandstones of Denbighshire and Fflintshire. These were all imported into the area, and their use in the county begins with the coming of the railways (1848), the network of railway lines connecting the rock outcrops in the east to much of the county. This can be readily seen in the building, or re-building, periods of the church architecture. For instance, there was a strong connection between the Oakley family, who built much of Blaenau Ffestiniog and Plas Tan-y-bwlch and the Cef Sandstone quarries.

Triassic - Grinshill Stone

A distinctive variety of Grinshill Stone from the area around Clive in Shropshire occurs at Gwyddelwern, north-west of Corwen. This stone was a common dressing in old churches in Montgomeryshire, an area accessable from olden times by trackways across the Berwyn Hills to the south of Corwen. Red sandstones from the Permo-Triassic include Runcorn Sandstone and possibly Hollington Stone from Cheshire and Derbyshire. Such sandstones are seen in churches, such as those in Blaenau Ffestiniog.

Other stones

Other imported stone forms a much smaller proportion of the building stones of this inland county but includes Jurassic limestones, such as, Bath Stone and Doulting Stone. Concrete, yellow brick dressings and some wooden windows also occur.

Description of the maps

Again two maps have been used to avoid congestion with both showing the distribution of the dominant dressing stones. Both should be given equal status and used together. Developing a chronology of the use of stone is left to architectural historians.

Further Reading:

Davies, J.H. 2003. The use of Carboniferous sandstones and grits from Arfon and Môn as a freestone over a wide area from Llandudno to northern Ceredigion. *Welsh Stone Forum Newsletter,* **1**, 6.

Davies, J.H. 2003. Strata Fflorida Abbey. *Welsh Stone Forum Newsletter,* **1**, 11.

Davies, J.H., 2008, Building Stone Reports No.1 St Tanwg's Church, Llandanwg, Meirionydd, [SH 5728]. *Welsh Stone Forum Newsletter,* **8**, 25-26.

Lott, G. 2009. The petrography of some Carboniferous sandstones from north-east Wales. *Welsh Stone Forum Newsletter,* **6,** 10-12

Palmer, T., 2003, Egryn Sandstone: A lost and rediscovered Welsh freestone. *Welsh Stone Forum Newsletter***, 1**, 7-9.

Palmer, T., 2007, Updates on articles in earlier Newsletters. *Welsh Stone Forum Newsletter*, **4,** 7-9.

Roberts R., 2009, Upper Carboniferous sandstones of north-east Wales. *Welsh Stone Forum Newsletter,* **6**, 6-10

Shipton, J. 2009. Field meeting reports, Anglesey, 9th-10th May 2008. *Welsh Stone Forum Newsletter,* **6**,1 2-15**.**





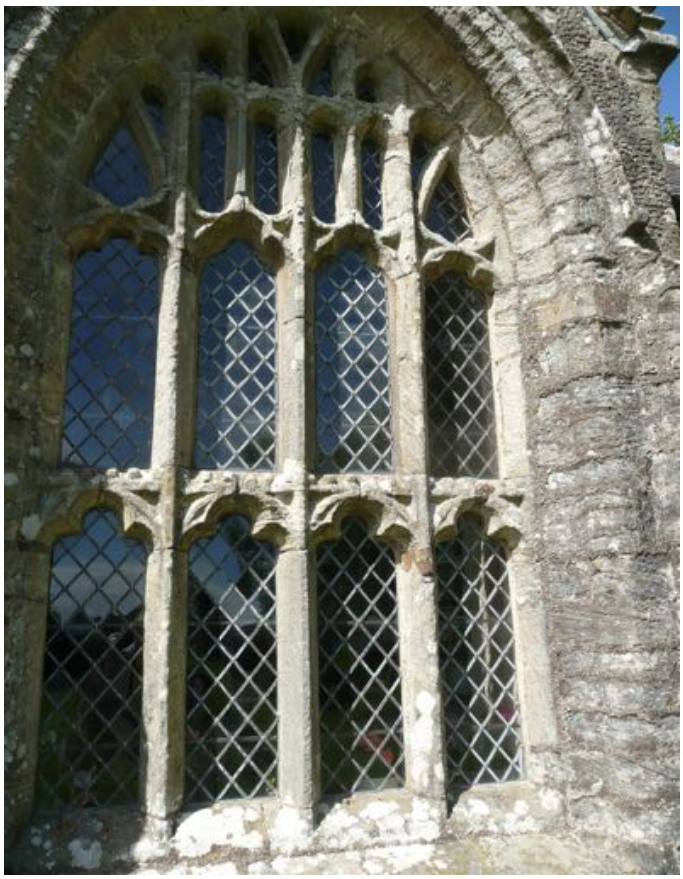
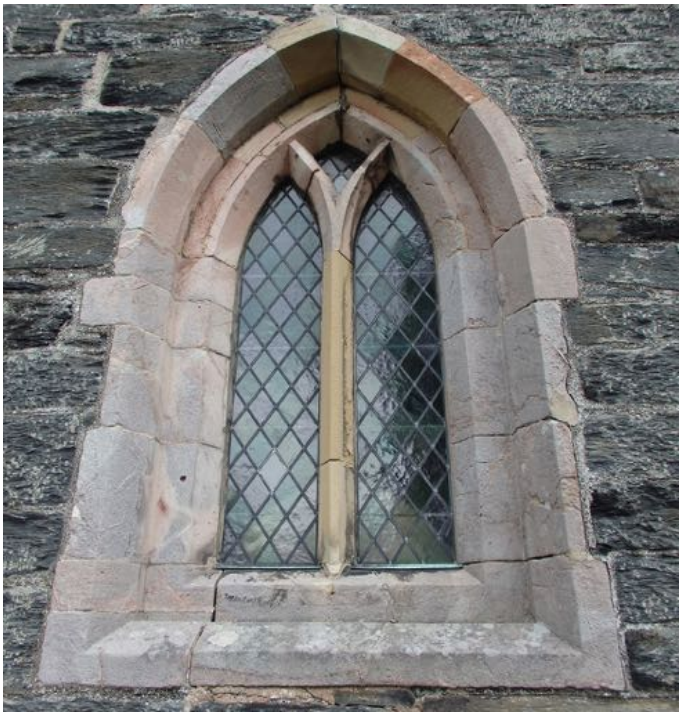
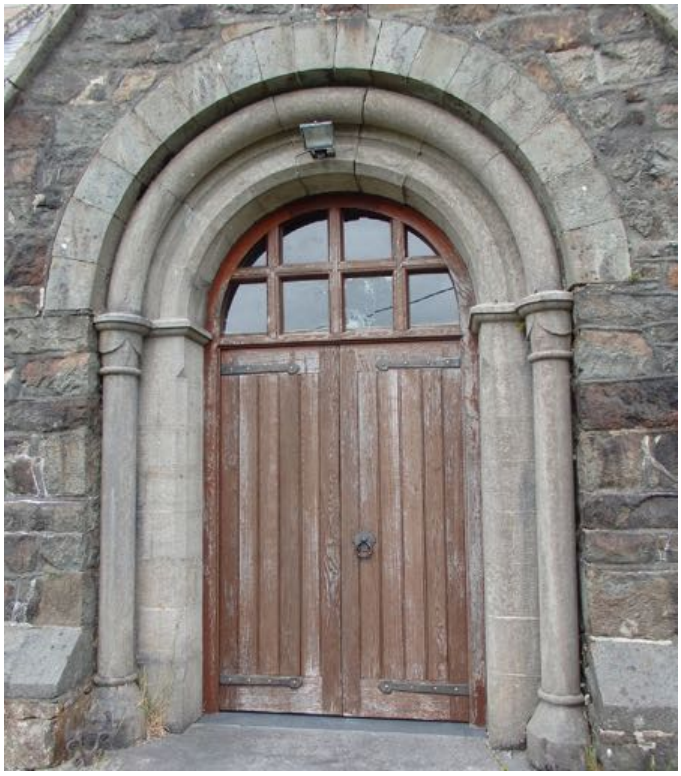



Fig. 1 (top left). Aberffraw (Cefn Sandstone). Fig. 2 (top right). Llanbedr Goch (Anglesey Grit conglomerate). Fig. 3 (middle left). Llanfihangel-tre'r-beirdd (Dressed Carboniferous Limestone with brachiopods). Fig. 4 (middle right). Llanffinan (Anglesey Grit conglomerate). Fig. 5 (bottom left). Llangadwalard (Anglesey Grit, cream suggary sandstones). Fig. 6 (bottom right). Llanfair-ynghornwy (Anglesey Grit, cream suggary sandstones).

Fig. 7. (left). Ynys Llanddwyn, Anglesey, orange/reddish and yellow pebbly suggary sandstones possibly from the Anglesey Grit. Fig. 8. (right). Llantrisant, probable Triassic red sandstone.





Merionydd localities

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Fig. 9. (middle left). Blaenau Ffestiniog, sawn slates with Runcorn Sandstone dressings.

Fig. 10. (middle right). Llangar, rubble walls of local stone with Cefn Sandstone dressings.

Fig. 12. (bottom left). Gwyddelwern, Old Grinshill [Clive] Stone dressings showing characteristic veins.

Fig. 13. (bottom right). Gwyddelwern, Old Grinshill [Clive] Stone corner stones.

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Fig. 14. (top left). Tywyn, Anglesey Grit dressings.

Fig. 15. (top right). Llanffestiniog, Ordovician pyroclastic rubble and Carboniferous Limestone dressings.

Fig. 16. (bottom left). Y Bala, Pyroclastic rubble walls and pale volcanic ash dressings.

Fig. 17. (bottom right) Llandderfel. Cefn Sandstone dressings.

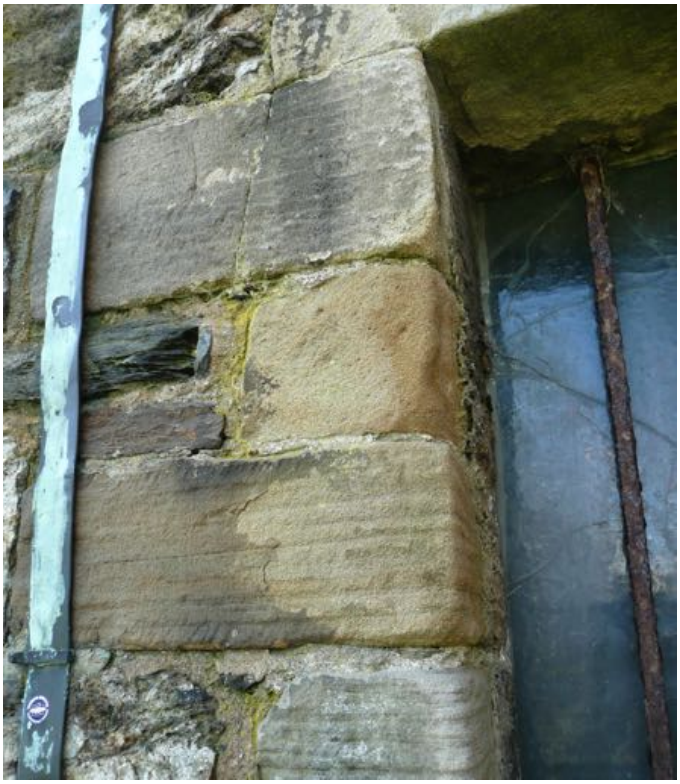

Fig. 18. (top). Tywyn, Egryn Freestone dressings.
Fig. 19. (middle). Harlech, Egryn Freestone dressings.
Fig. 20. (bottom). Friog, local sawn slates and Bath Stone dressings.

A History of the Use of Alabaster Deposits of South Wales & South West England

Mike Statham

A brief account of Penarth alabaster was previously published in the Welsh Stone Forum Newsletter (Horák & Kerbey 2004), which was augmented by further research published by Statham in Morgannwg in 2013. The research area has now been broadened to include similar deposits found at Watchet in Somerset. This article presents a brief summary of what is known to date about the use of these deposits for decorative stonework and sculpture while the full detailed account will be made available on the Welsh Stone Forum web site.

It is generally, though not always, possible to distinguish between alabaster from south Wales and Somerset from those from Staffordshire and Derbyshire by their visual characteristics. However, it is less easy or impossible to distinguish between the deposits found at Watchet and those from Penarth. Material from all of these sources can be more or less pure white, in which case locality identification is impossible. Grey colouration, be it spotty or streaked, is characteristic of the Watchet area, although it can found to a lesser extent around Penarth as well. At both localities characteristic translucent pink and greenish spotted or greenish-grey veined materials are to be found, which are easily distinguished from the deposits from the Midlands.

Both Watchet and Penarth alabaster are on record as having been dug in the C17th. Watchet alabaster was extensively used in the West of England throughout the C17th, principally, but not exclusively, for wall and tomb monuments and memorials. There are up to almost 100 known examples spread through the counties of Devon, Somerset, Gloucestershire, Cornwall and Dorset, although at least a few of these may be of Welsh origin since it can be impossible to distinguish between material from the two sources. At least one example of Watchet alabaster in south Wales has been found in Michaelston-y-Fedw church, and the wall monuments in Margam church may present another example. On the Welsh side of the Bristol Channel, Penarth alabaster was used in the C17th for church monuments and memorials, but only a handful have so far been found. By the end of the century the use of local alabaster for such items seems to have petered out on both sides of the channel. Although Watchet alabaster continued to be extracted until the 1920s, principally for plaster manufacture, it was no longer used to any significant extent for decorative purposes. Penarth alabaster continued to be dug, and until the mid C19th was mostly used for plaster manufacture.

From the mid C19th until the 1930s, Penarth alabaster was widely used as a decorative stone in prestigious mansions, private houses and in many churches and church memorials. Many architects, including John Prichard, William Burges, J. D. Sedding, J. B. Fowler, F. R. Kempson & C. B. Fowler,

Fig. 1. (top left) Pulpit, St. John and St. Andrew Church, Kemberton, Shropshire.
Fig. 2. (top right) Early C17th Wall Memorial, Watchet and Penarth alabasters, Michaelston-y-Fedw Church.
Fig. 3. (bottom left) WW1 Memorial Tablet, St. Mathias' Church. Trelewis.
Fig. 4. (bottom right) Reredos, St John the Divine Church, Cwmbach Lechrhydr, Builth Wells.

G. E. Halliday, W. D. Caröe, G. F. Bodley and T. Gardner (architects acting for the Earl of Plymouth for his house at Hewell Grange, Worcestershire) and F. B. Wade (the Earl of Plymouth's architect for his house in Mount Street, London), and T. G. Clarke (of William Clarke, Llandaff), all employed it. Although most of the examples occur in the old county of Glamorganshire, others are to be found in the old counties of Carmarthenshire, Monmouthshire, Breconshire, Radnorshire, Shropshire, Worcestershire and also in London. In south Wales, much of the work was undertaken by the firm of William Clarke of Llandaff, and from 1894 detailed records can be found in the firm's archives together with a few earlier drawings. The records contain a couple of accounts of trips to Penarth to collect alabaster.

The 2016 programme includes a trip to examine Penarth alabaster.

'Pwntan' stone and relocation of the Drefach Ceredigion War Memorial

John Davies

As reported in earlier editions of the Newsletter (Palmer 2004, 2010, Davies & Palmer 2014, Horak 2014, Palmer & Shipton 2014), there are a number of Ordovician, weakly foliated, yellow sandstones which crop out in narrow strips in north-western Carmarthenshire, north-eastern Pembrokeshire and, predominantly, in southern Ceredigion. To call them all Pwntan Stone, after Pwntan Quarry near Tregroes in Ceredigion, does not do justice to either their variety or possibly more local names, which we are not aware of at present. Tim Palmer referred to the stone from Bwlcy-y-fadfa [Gwar-allt-y-faerdre] Quarry (SN 437491) as being a local variety of Pwntan Stone.

In September 2015 a member of the Planning Department of Ceredigion County Council approached me to identify walling stone used around the War Memorial at Drefach, south-west of Lampeter (SN 501458) as the memorial was about to be moved to construct the entrance to a new school and new walls would need to be built. Examination of the wall showed it to be constructed of a yellow sandstone that could most readily be matched with the stone from the (at present mothballed) Alltgoch Quarry, 2.5km north of Cwrtnewydd, and also from the quarry at Gwar-allt-y-

faerdre, which is still being worked by Iwan Evans. It is likely that this quarry would be able to supply material for rebuilding the walls on the new site.

At present the pavement below the memorial is concrete and the suggestion was made that although the sandstones are massive, rather than flaggy, they might be sawn to create flags suitable for the new site. On investigating further, it appears that this is possibile and so may be a new use for this very attractive building stone.

Palmer, T., 2004. Talgarreg Stone and the Upper Ordovician sandstones of southern Ceredigion. *Welsh Stone Forum Newsletter,* **2**. 5-6.

Palmer, T., 2010. Pwntan and Bwlch-y-fadfa Sandstone in Central Ceredigion. *Welsh Stone Forum Newsletter,* **7**, 2-4.

Davies, J.H. & Palmer, T, 2013. Searching for Pwntan Stone. *Welsh Stone Forum Newsletter,* **10**, 2-3.

Palmer, C. & Shipton, J. 2014. Pwntan of South Ceredigion and North Carmarthenshire. 23rd March 2013. *Welsh Stone Forum Newsletter,* **11**, 12-15.

Horak, J. 2014. Petrology of Pwntan Stone. *Welsh Stone Forum Newsletter,* **11**, 15-17.

Old Grinshill Stone and its use in Wales

John Davies

During the survey of churches for the Pevsner Guide to Powys, a particular form of Grinshill Stone was recognised in dressings at a number of the churches in Montgomeryshire including: Berriew, Guildsfield, Old Llandysylio, Llangadfan, Llanllugan, Llansantffraid ym Mechain, Manafon, Meifod, and Penant Melangell. Another example was also discovered at Gwyddelwern in Meirionydd. It is possible that when the churches of Denbighshire are surveyed that further examples will be

found in the southern portion of the county. Wherever these grey sandstones occur they tend to be in the older dressings and are frequently replaced with standard Grinshill Stone or, more commonly, Cefn Sandstone from Denbighshire and Flintshire.

The stone used in the C19th appears to be from the eastern part of the escarpment. The Kilvert family opened the quarry at that end of the hill in the 1870's and it is from this area that stone is being extracted today. The C19th quarries were visited during a Forum field excursion in 2010 [Newsletter 8] and at the end of the first day of of the excursion Judy Loach and myself visited the Clive sections. The area was revisited in August 2015 when, as well as visiting the outcrops at the Clive end of the hills, the working quarry at Grinshill was also visited. At Grinshill, two layers of sandstone are being worked; a lower, more massive freestone and an upper, finer-grained, thinner-bedded sandstone.

Fig. 1. (top left). 19th century quarry at Clive with inset of outcrop. Fig. 2 (top right), example of stone from Clive Quarry used in Clive village, showing typical nodular testure and inset of the branching veins. Fig. 3. (bottom left) Quarry at Clive. Fig. 4. (bottom left) View of modern quarrry at Clive.

Old Grinshill Stone of Clive

The older form of sandstone was used in a majority of the buildings in the village of Clive itself where very good examples can be seen in buildings around the church. The village lies at the western end of the Grinshill escarpment and the old quarries and cliffs, at that end of the hill, contain stone with the same lithology, including similar veins and nodules. Numerous outcrops also occur in the floor and sides of the sunken lane, north and east of Clive church, and in the number of old quarries and the main cliff section to be found east of the church and south the village school.

The stone is greyish in colour, rather than the cream/yellow of standard Grinshill Stone, and is further characterised by branching 'veins' and small nodules, up to 15mm in diameter, which are composed of clusters of grains. By contrast, Grinshill Stone contains straighter, single veins and no nodules (see page 8, Fig. 13) This stone is easily recognised but requires dating by architectural associations in the present buildings in order to ascertain its main period of use. On architectural grounds, it also may be possible to date its replacement with typical Grinshill Stone. Along with the use of Permo-Triassic red sandstones in Montgomeryshire, the use of this stone shows a continual trade in building stones across the border from Shropshire into Mid Wales from the middle ages onwards.

Loach, J. & Horak, J. 2011. Grinshill Stone: Shrewsbury & Wem areas, June 12th & 13th 2010. *WSF Newsletter,* **8.** p.13.

Meifod and surrounding area 9th May 2016

Andrew Haycock

Our May field excursion was led by Dr John Davies to the border region around Llansantffraid-ym-Mechain, Meifod and Llanfair Caereinion, Powys. Good sources of local dressing stone are quite scarce in this region, so much of the stone imported for early buildings came from Cheshire and Shropshire (particularly Triassic sandstones from Clive – Grinshill). In later (C19th) buildings, Carboniferous Cefn Sandstone form northeast Wales was also used.

Meeting at the old train station in Welshpool (red brick dressed with Cefn Sandstone), a small and select group set off north to the first locality. Parking in a layby near Pool Quay just off the A483, we stopped to take in the surrounding geography and geology. Lying just to the east, on the bank of the River Severn, is the site of Strata Marcella Abbey, a medieval Cistercian monastery founded in 1170 by Owain Cyfeiliog, Prince of Powys. The monastery was heavily damaged during the Owain Glyndŵr rising in the C15th, if things could not get any worse, then came Henry VIII's Dissolution in 1536. Today, the ruins are no more than 'lumps and bumps' in a field, most of the stone probably having been floated downstream for use in Shrewsbury, or recycled and used in local churches.

Taking in the surrounding view, John gave us the geological overview. Looking east to Long Mountain, we were essentially looking at a syncline fold in Silurian Ludlow Siltstone Formation and Wenlock Mudstone. The Llandovery Mudstone below has been much exploited for brickmaking. The Buttington Brickworks can be seen in distance, it produced red/orange bricks that have been extensively used in the region.The geology gets older in a north-northeast direction towards Wrexham. At the massive Criggion Quarry on Breidden Hill, Ordovician meta-microgabbro (meta-dolerite) is quarried for aggregate. Further to the northeast, the flat Cheshire and Shropshire Plain is the source for much of the Permo-Triassic dressing stones that will be seen on this trip, as locally there is very little good stone for this use.

The next stop was St Ffraid's Church at Llansantffraid-ym-Mechain. The Carboniferous coping stones of the wall surrounding the church are very fossiliferous, containing productids and colonial corals such as *Lithostrotion, Lonsdalaeia* or *Syringopora.* Approaching the church, we noticed the variety of stone types used in the building. In the southeast corner, classic red and white coloured Grinshill (Sherwood Sandstone Group: Helsby Sandstone Formation) quoin stones can be seen (see inset: Fig.1), with distinct raised 'Grinshill-type' veining throughout. These stones were likely to be Victorian replacement, the more recently quarried 'new' Grinshill. Older Grinshill can be seen in many of the dressings in the south wall of the church (see main picture, Fig. 1). John went on to explain that 'old' Grinshill Sandstone was quarried from the C12th onwards around Clive, the 'white' variety is actually quite grey in colour, containing patches of the mineral baryte, and veining that is more branching than the 'new' Grinshill. New Grinshill, was quarried from the 1870s onwards, and is found further to the east (nearer Grinshill), the lighter coloured variety is more cream/yellow in colour, veins are straighter and less frequent. Red sandstones can be found in both the 'new' and 'old' sandstone succession.

Rubble work in the south wall of the church included a distinct red/orange coloured, friable sandstone (Fig. 1). This stone could be a red variety similar to that found near Clive-Grinshill, but is also very similar to the Ruyton Sandstone seen near Grug Hill, Ruyton XI Towns and Nescliffe. Like Grinshill, the Ruyton Sandstone (Nescliffe / Shelvock Stone) is part of the Helsby Sandstone Formation. Red and pale coloured varieties of sandstone have been used extensively as building stone in the region, sometimes a red, 'white' and mottled variety. Further work is evidently needed to help distinguish the very similar sandstones from one another. A very distinct dark red/brown sandstone (Fig. 1) with numerous fossil rootlets, plant debris and coal fragments was observed in the south wall. John thought this to be from the Westphalian age Salop or Etruria Formation, but further investigation is needed to determine a definitive source for this stone.

The Priests door in the south wall has been infilled with local Silurian sandstones. In the archway, a quite pale and pebbly sandstone was preliminarily identified as Grinshill Stone. This would be reasonable as Grinshill Stone has been used for much of the dressed stone in the church. Salmon pink and red sandstone, used extensively in the wall, may be from the Ruyton XI Towns area. Although more subtle, it also contains 'veining' similar to those seen in Grinshill Sandstone. On close inspection, these veins are actually prominent raised ridges of sandstone, the result of the sand grains here being more strongly cemented than the rest of the stone. Mottled varieties of Ruyton-like Stone can be seen in the east windows (Fig. 2), porch and columns inside the church. This stone matches those seen around Ruyton XI Towns very closely. This is also the stone that was observed on the WSF 2012 trip to Welshpool (Newsletter 10), but was misidentified as Hollington Stone (many thanks to WSF member Andrew Jenkinson for bringing this to our attention). Windows replaced in the 1700s have become quite badly weathered. A grey-green foliated sandstones used for the sills, jambs and mullion is thought to be a variety of local Lower Palaeozoic stone.

The font and some of the blocks observed in the wall outside (including quoin stones, see inset: Fig. 2) contain horizons of pebbly quartz. John thought these could be a variety of Grinshill too but these pebbly horizons are yet to be seen in geological outcrop. A block of Grinshill with

Fig. 1. (top left). St Ffraids, Llansantffraid. Pale 'Old' Grinshill Sandstone dressing in window arch, rubble work including local Silurian (dark grey), red Grinshill / Ruyton and Westphalian age Salop / Etruria Formation (dark brown). Inset: 'new' Grinshill replacement. Fig. 2. (bottom left). Mottled Ruyton / Grinshill Stone, east window - St Ffraids, Llansantffraid. Inset: details of pebbly (Grinshill Sandstone?) quoin. Fig. 3, (top right). West end of tower at St Tysilio & St Mary's Church, Meifod. Inset: detail of Grinshill quoins on south side. Fig. 4. (bottom right). Carved Celtic stone at St Tysilio & St Mary's Church, Meifod.

a crudely carved skull and cross bones, and the words *Memento Mori* can be seen in the porch. This reminder of one's mortality and death' was possibly part of an early gravestone.

After an excellent lunch, at The Stumble Inn at Bwlch-y-Cibau, it was on to nearby Christ Church at Bwlch-y-Cibau. Outside the church, a water fountain was built to refresh weary travellers in years gone by, now dry (thankfully the pub over the road wasn't!). Built predominantly in yellow Cefn Sandstone from the Wrexham area, salmon-pink coloured stone (Ruyton?) has been used for the carved water bowl. The church itself is built of Carboniferous Limestone with Cefn Sandstone dressings. The two stones are commonly used together in church buildings across the region. A sun-dial in the churchyard is fashioned from salmon pink Grinshill/Ruyton Stone and the local houses of Bwlch-y-Cibau have exploited the local Ordovician/ Silurian sandstone.

At the next stop, St Tysilio & St Mary's Church, Meifod, we were joined by the Rev. Jane James and some friends of the church, who were interested to learn more about the stones used in the building. This is one of the largest llans in Wales with links to the Princes of Powys and it stands on the site of three earlier churches. Examining the exterior, it was observed that the large quoin stones in the 15th century tower are of 'old' Grinshill Sandstone (Fig. 3), from the western end of the Clive-Grinshill exposure and these blocks could have been recycled from earlier buildings on the site. Red blocks around some of the window openings (see inset: Fig. 3) contain distinct patches and inclusions of lighter material. The Grinshill Sandstone here have little of the distinct veining seen in the newer stone. The rubble walls also contain local Silurian lithologies (possibly Graig Wen Sandstone Formation?), as well as occasional yellow Grinshill-like sandstone.The archway in the main (south) door appears to be pale Grinshill with a little veining from the Clive area. We were informed by the Reverend and friends that this was a Victorian doorway, but the carved stone looks much older and is likely to have been recycled from elsewhere on the site. A 19th century replacement window has been completed in Cefn Sandstone, more recent work at the base of the door looks like York Stone. Stonework in a pre C19th archway (now filled in) resembles the red variety of Grinshill Stone.

On the exterior of the church, we observed further window repair work in Cefn Sandstone and a doorway in old Grinshill Sandstone. Local siltstone and sandstone have been used in the rubble walls throughout (possibly Graig Wen Sandstone Formation?). Inside the church, flagstones on the floor may well be locally derived. The C15th font of Grinshill Sandstone sits on a more recent Cefn Sandstone base. The older columns of pink/ red sandstone with yellow sandstone capitals resemble the 'old' Grinshill Stone. Newer columns have been completed using the mottled variety of Ruyton Stone and Cefn Sandstone.

A carved, early medieval cross-slab in red and white sandstone (Fig. 4) On closer inspection John thought there were occasional feldspar and mica grains too. Quite damaged and repaired at the base, the stone is also quite reddened. In Edwards (2013) the stone is described as

> '..... quartz arenite (Triassic), medium grained, light pink /grey (5YR 7/1 Munsell colour chart), locally iron stained (2.5 YR 5/2), and is dominated by very well-sorted, with sub-rounded to rounded quartz grains. The red, iron staining has been leached by weathering'.

A small fragment of the cross and a thin section prepared from it reside in the National Museum Wales (AC-NMW) collection (NMW 78.58G.R.941 and 78.58G.T.47). Is this stone Grinshill like much of the carved work we have seen today? Further research of the AC-NMW collections may provide a close match in the future. This being usual for a WSF field trip, a closer look raises more questions than answers!

Our final stop of the day was at St Mary's, Llanfair Caereinion. Completely rebuilt to a design by Edward Haycock in 1868. The archway in the outer porch shows examples of the mottled Ruyton Stone and 'new' cream-coloured Grinshill Stone. The red Royton stone here is very friable, and has become quite weathered as a result. The inner doorway is a surviving relic from the earlier medieval building. Incorporated within the C13th Strata Marcella. John noted that the archway appears to be old Grinshill in red and cream.

Inside, the font was seen to be made from sandstone with iron inclusions, and although difficult to see in the poor light, two small patches of the lead ore, galena. It was thought this sandstone was possibly Namurian in age (possibly Cefn Stone). The alter stone included inlays of possible red Torquay Marble. The tomb of Dafydd ap Gruffyd Fychan, of the Owain Glyndyr family, was built in a very fine grained, pale stone, possibly imported Caen Stone. The internal arches,columns, and internal/external window dressings were again built in mottled Ruyton Stone. The walls of the church were constructed almost entirely in a local grey-buff sandstone (possibly Graig Wen Sandstone Formation of Llandovery age). Several quarries in this formation can be found on the Llanfair Caereinion to Meifod road. This brought to a close an excellent day exploring the churches of the area, thanks were given to John for once again organising such an interesting and informative trip.

Edwards, N. (with contributions by J. Horák, H. Jackson, H. McKee, D. N. Parsons and P. Sims-Williams), 2013. *A Corpus of Early Medieval Inscribed Stones and Stone Sculpture in Wales, Volume III, North Wales*, Cardiff, University of Wales Press, xx + 524 pages, numerous illus.

The Downton Castle Sandstone Formation near Builth Wells 13th June 2015

John Shipton

On a wet June morning members assembled at the Whitcliffe Forestry Commission car park where we met Dick Waters, of the National Museum of Wales, who was the leader for this field trip.

Our first stop of the day was Whitcliffe Quarry, on the south side of the River Teme (Fig. 1), where the Whitcliffe Flags outcrops. The Whitcliffe Flags are now called the Cae'r mynach Formation and underlies the Downton Castle Sandstone Formation. It comprises beds of sandstones, siltstones and mudstones and in some areas the individual beds have become mixed up by the burrowing action of worms (bioturbation). It is a common building stone but is not as good as the Downton Castle Sandstone. During the C19th many rubble-built houses in Ludlow were constructed using the Downton Castle Sandstone for quoins and dressings and the walls in-filled with stone from the Whitcliffe Flags. The quarry face was not stable enough to facilitate a close inspection but we were able to inspect fragments of stone that had recently fallen. The last face to be quarried produced flag stones no thicker than 150 mm. They were very calcareous and did not weather well. Further down the outcrop bioturbation increases and the material becomes less useful as a building stone.

The weather started to improve as we travelled to our next location, the Whitcliffe Road Section, previously known as Ludford Lane, at Ludford Corner, where the lower part of the Downton Castle Sandstone Formation and the underlying Cae'r mynach Formation are exposed. It was here, in 1835, that Dr J Lloyd and the Reverend T.T.Lewis discovered the internationally famous bone bed in the upper part of what is now the Caer'mynach Formation. This contains the fragmented remains of primitive fish and marks a change in the depositional environment in this region from open seas to land areas. Sir Roderick Murchison recorded the section in 1839 and traced the bone bed in the cliffs opposite Ludlow. Above the Cae'r mynach Formation, in the Downton Castle Sandstone Formation, hummocky cross-stratification is clearly visible.

On the opposite side of the B4361, Ludford House sits on top of a similar section. The walls of the house are of both Downton Castle Sandstone and Whitcliffe Flags, the latter being quite calcareous and holding together well (Fig. 2). The lower blocks, in the right hand side of an

Fig. 1. (top left) Whitcliffe Quarry. Fig. 2. (bottom left) Ludford House. Fig. 3. (top right) Downton Gorge Quarry. Fig. 4. (bottom right) Little Gwenilla Quarry.

arched opening in the roadside wall of the house, are of Old Red Sandstone but the mirrored blocks on the left hand side are of a different sandstone. This is possibly Grinshill Stone, as the veins commonly associated with this stone are present in the blocks.

Following lunch we drove to Downton Gorge, to look at two large quarries that had produced large quantities of Downton Castle Sandstone (Fig. 3). These quarries sit either side of the gorge and here the Downton Castle Sandstone is overlain by the pale green Temeside Mudstone in both. In the northern quarry the Cae'r mynach Formation is exposed below the Downton Castle Sandstone. These quarries were probably used by the Downton Estate as both Downton Castle and the old road bridge over the gorge are constructed of Downton Castle Sandstone. Unfortunately, the local stone had not been used in later repair work, replacement copings being of an unknown sandstone that could be a Namurian sandstone from Yorkshire.

The final visit of the day was to the Little Gwenilla Quarry, near Gladestry (Fig. 4). This is an active quarry producing both Downton Castle Sandstone and Cae'r mynach Formation stone for building works. The quarry produces three distinct types of stone; yellow weathered Downton Castle Sandstone, green un-weathered Downton Castle Sandstone and blue Cae'r mynach Formation. The quarry lies within the Church Stretton fault zone and the beds are much folded.

After inspecting the productive quarry faces we were able to trawl the spoil heaps around the site, where a lot of pieces of the Bone Bed were found. This is of little use as building stone and may well have ended up as hardcore. At 16:40, as the weather closed in once more, John Davies thanked Dick for arranging the trip and closed the meeting. However, many members remained excitedly sorting through the piles of Bone Bed material!

Hay Castle and Hay-on-Wye 4th July 2015

John Shipton

The Welsh historic town of Hay-on-Wye lies on the border with England. In the heart of the town sits the medieval stronghold of Hay Castle. Built by the Norman Lord William de Braose in the late C12th, it was sacked in 1233 by Llewelyn II but rebuilt by Henry III. Following centuries of turmoil a Jacobean house was built alongside the medieval tower in 1660 (Fig. 1). The C20th was not kind to the castle and in 1939 the Jacobean house was badly damaged by fire. It was purchased in 1960s by Richard Booth and some repair work carried out. However, fire once again ravaged the house in 1977 and over the years the castle and house has continued to fall into disrepair.

Fig. 1. The Jacobean House, Hay Castle

In 2011 the site was purchased by Hay Castle Trust and is currently the subject of a planned Restoration Project. The Forum is fortunate that one of its members, Martin McNamara, is involved with the project and that he was able to arrange a visit to view the castle and house in its current condition.

On a fine day we met in the town car park and then made our way up to the castle where we were met by Martin. Kindly, the Trust had provided refreshments, which were much appreciated by those of us who had travelled from the farthest corners of Wales. We congregated on the lawn within the castle walls whilst John Davies explained the local geology. The town of Hay lies along the line of the Swansea Valley Disturbance and sits on Old Red Sandstone rocks of the Moor Cliffs Formation. 'Hay Stone' (an informal term to denote the local creamy grey sandstones) comes from the Conigor Pit Sandstone Member, which is a subdivision of the St Maughan's Formation; much of Hay is built from this stone. Other building stone used in this area includes that from the Senni Formation, sandstone from the Rat Island Mudstone Member and Downton Castle Sandstone Formation. Limestone from the 'Psammosteus Limestone' was burnt to produce lime and some tufa is also available locally. Due to its hollow cellular structure tufa was much valued in medieval times for building vaulted ceilings due to its lightness,; an arch in the medieval section of Hay Castle is constructed from tufa.

Near the castle wall John Davies found a stone tile, which he thought was similar to those found on the Eppynt, that we had seen during an earlier field trip. However, it is possible that it could have come locally from a flaggy bed within the Conigar Pit Member. During inspection of the castle we obtained a close look at the local Hay Stone (Fig. 2), some of which is yellow in colour due to it containing only a little iron. Some blocks show evidence that sandstone had been deposited on top of a mudstone, the bed joint being uneven possibly due to earthquake activity. The mason had laid these blocks upside down to how they would be found naturally with the red mudstone bed on top of the grey/green sandstone. Within the walls

of the house some blocks of red mudstone containing clasts have been used but the majority is 'Hay Stone'. Following a tour around the Jacobean house John thanked the guides and we adjourned for lunch.

After lunch the afternoon was spent within the town. Starting once again from the gates to the castle grounds, we noted that a new wall nearby is built of Old Red Sandstone from Tredomon Quarry, near Llangorse, with copings possibly of Forrest Pennant Stone. Before setting off John illustrated the cross-bedding that is present in the sandstone blocks of the gate's piers. A roadside wall contains a pebbly coarse sandstone and a coarse version of 'Hay Stone' containing washed-out mud clasts.

Reaching the Salem Baptist Chapel, which was rebuilt in 1878, we were struck by the contrasting colours of the masonry. The pale sandstone of the Gothic arched door dressings were thought to be Grinshill Stone as the distinctive veins of this stone were prominent in several blocks. However, above the door dressings a pale grey sandstone has been used to cut vousoirs, which John thought was probably 'Hay Stone'. The remainder of the front elevation is of the local grey/green, mostly flaggy, thin sandstones apart from those used for the quoin stones. Passing the Market Hall we noted that this is also built of local sandstone. Nearby a wall of a house, that had undergone a number of rebuilds over the years, contains local sandstones in a variety of colours - grey, green, yellow, red and brown - showing just what local variety is available to builders (Fig. 3). Moving on we reached the clock tower which is built predominantly of local sandstone. However, the dressings, including those of the substantial buttress, are of a pale limestone. Tim Palmer thought that this could be Caen Stone, a light, creamy-yellow Jurassic limestone from near Caen in north western France. This has been used, especially in southern England, as far back as Norman times.

In a shop wall blocks of an unusual conglomerate were spotted, which was identified by John as a calcrete conglomerate (Fig. 4). It was formed immediately after the deposition of the Bishops Frome Limestone when a flood ripped up the top bed of the limestone and re-deposited it as a conglomerate. The dressings in the Powys Registry Office are also of a Jurassic limestone, this time Box Ground Stone from Bath. It is very shelly and exhibits plenty of oolites. Old Red Sandstone from Tredomon Quarry has been used on many of the new builds, and some of the repairs, around the town and we spotted it in some new houses at De Breos Court and in a large carved stone plaque at St Josephs Catholic church.

The final visit of the day was to St Mary's Church (Fig. 5). Rebuilt in 1833, on the site of the original medieval building, it is of local sandstones. Although it is typical of the period, and fairly simple externally, the interest to us was once more in the variety of colours available in the

Fig. 2. (top left). Members inspect Hay Stone in the castle. Fig. 3. (botton left). House wall with varied coloured local building stones. Fig. 4. (top right). Calcrete congomerate. Fig. 5. (bottom right) St Mary's Church.

local stone. Inside, Middle Jurassic limestone has been used in the columns and in alternating vousoirs in the Gothic arches, which provides an interesting colour effect. The font is Victorian and is of Caen Stone while alabaster, possibly from the English Midlands, has been used in the ornately carved pulpit. Dark columns in the pulpit base are possibly polished Cornish serpentinite. Following the inspection of St Mary's Church John called us to order, thanked Martin for an interesting and informative trip and closed the meeting.

Bala Town and the Craig y Fron, Frondderw Tuff Quarry 12th September 2015

John Shipton

September's trip was a two day event in Snowdonia; day one was lead by Andrew Haycock to look at the building stones in the town of Bala (which is predominantly built of the Frondderw Tuff Member) and day two was a trip to the Vale of Ffestiniog with Margaret Dunn from 'Dating Old Welsh Houses Group'. Margaret and Richard Suggett are joint authors of a recent book dating Welsh Houses in Snowdonia with the aid of dendrochronology. The following notes cover the first day's excursion as I was unable to attend day two.

In his introduction Andrew described how Bala is situated at a crossroads of the Roman road from Chester to the west of north Wales and the old mountain route between Montgomeryshire and Caernarvonshire with the High Street actually following the line of the old Roman road. Prior to the arrival of the railway, in 1868, the predominant building stone used in the town was obtained from the local Ordovician volcanic tuffs/ashes that were extracted from numerous hillside quarries that overlook the town. Three horizons have provided stone:

The Cefn Gwyn Tuff is dense and well cemented. It is light/grey to cream coloured, with a sporadic greenish tinge, with some iron stained speckling on weathered surfaces. It was rapidly deposited from an ash cloud in a subaerial environment. However, it sometimes contains mud fragments and flattened mud pellets that indicate deposition in an aquatic environment. It is described by the British Geological Survey (BGS) as a non-welded felsic ash flow tuff in its on-line lexicon (http://www.bgs.ac.uk/lexicon/home.cfm)

The Frondderw Tuff Member is described by BGS as a coarse to fine-grained rhyodacitic lithic tuff. The unit is predominantly a pyroclastic flow deposit consisting of pumice, lithic clasts and ash which was deposited under water. Grain size can vary quite considerably within the unit.

The Pont-y Ceunant Ash is only found east of Bala and Bala Lake. It varies from light grey to buff in colour and the bulk of the material comprises ash from a pyroclastic flow and is described by BGS as a course rhyolitic tuff.

All of these units are generally light-grey to cream/buff in colour with a varied grain size and, when observed away from the natural exposure, can be difficult to tell apart. They provided a more durable building stone than the Ordovician mudstones and siltstones that are also available locally.

On the High Street stands Neuadd y Cyfnod (Fig. 1), a Neo-Tudor Grammer School built 1850-51. It is predominantly built of Frondderw Tuff but the quoin stones are a darker tuff, possibly an acid ash flow tuff from the Aran Fawddwy Formation (now Craig Cau Formation) that is exposed to the west and southwest of Bala. String course dressings are of Cefn Sandstone but the windows are located high up and their dressings painted so positive identification was not possible. Moving to the northeast side of the building a lighter tuff is seen to be present. This may be Cefn Gwyn Tuff. A crudely carved head in Cefn Sandstone, incorporated within the northeast wall, may be Roman in origin. Red sandstone in the buttress and a carved coat of arms in a cream coloured stone remained unidentified.

On Mount Street walls are constructed of tuff, containing mud pellets as well as cobbles and glacial boulders. There is also a coarse, dark-coloured tuff and a coarse, light-coloured tuff containing ripples and fossils. At the rear of the English Presbyterian Church, the building contains local Ordovician sedimentary rock with an arch of light-grey tuff vousoirs. These contain brown iron speckling and are probably Cefn Gwyn Tuff. It was noted that before the arrival of the railways, most building was carried out using local tuff with the occasional dressings in Cefn Sandstone, whereas post-railway allowed some construction to be entirely in Cefn Sandstone such as, for example, Berwynfa House (Fig. 2), built in the 1870s. What is now the front of the house has been faced with randomly shaped blocks giving it the appearance of vertical crazy paving. Ornate columns at the front are cut from pale fine-bedded sandstone that Tim Palmer thought was probably from India. The opposite side of the house, originally the main entrance, is fashioned from regular coursed sandstone blocks. Around the bay windows, yellow brick (from the Flintshire coalfield) and ornate red Ruabon or Abenbury Brickwork tiles (in a floral style) from the Wrexham area are used. Ordovician mudstone

Fig. 1. (top left). Neuadd y Cyfnod. Fig. 2. (middle left). Facade of Berwynfa House. Fig. 3. (Above right). Egwlys Brebteriadd Fig 4. (above). Craig y Fron Quarry.

containing fossils has been used to build a garden wall at the rear of the building.

Eglwys Brebteriadd (Fig. 3) is constructed of local tuff while the dressings to the front elevation are mostly in a crinoidal limestone. However, new dressings in a window at the top of the tower appear to be of Triassic sandstone. At the side of the chapel jamb stones to the windows are of a mottled sandstone containing mineral veins. Some blocks of tuff in the side wall contain veins of iron carbonate. The Town Hall (built in late C18th), on the corner of High Street and Tegid Street, has arches of Cefn Gwyn Tuff to the ground floor, suggesting that this building was originally an open market. The infill is in Frondderw Tuff and local Ordovician sedimentary rock. Cefn Sandstone cills sit beneath windows set within the arches, one arch of which has replacement vousoirs in Cefn Sandstone.

After lunch we made a brief visit to Christ Church on Ffrydau Road. The church, built during the mid C19th, is predominantly built of a light-grey/buff tuff, most likely Frondderw Tuff as it contains carbonate veins, shows iron staining and evidence of ripples. The dark coloured quoins are tuff, probably from the Craig Cau Formation, while the external dressings are in Cefn Sandstone. The interior was dramatically altered in 2006-7, with much of the C19th fittings having been replaced with modern parish rooms and curving stair to the choir seating above, while the floor is a beige marble. The columns and arches are also of Cefn Sandstone, but the pulpit is of a very fine unidentified sandstone that is not Cefn.

It was time to walk off lunch and, suitably equipped with hard hats and boots, we set off up the steep bank to the Craig y Fron Quarry (Fig. 4). It was from here that the two metre thick bed of the Ffondderw Tuff Member was quarried to build Coleg-y-Bala, between 1865 and 1867, as well as the nearby house, Bodiwan. In the quarried gallery the large pillars left to support the roof contain thick calcite veins, as seen in the buildings of the town in the morning. The sandstone and siltstones above the tuff (the Allt Ddu Mudstones [Ceiswyn Formation]) are largely reworked volcanic material that rest on the rippled surface of the tuff. After spending some time inspecting the quarry and fragments of rock left on the floor we followed the outcrop up the hill to what remained of a few old buildings, possibly associated with the quarry when it was operational. After pointing out a few geological points of interest from this vantage point John Davies thanked Andrew Haycock for arranging the visit and closed the meeting. I would also like to thank Andrew for his help in producing this report as large sections of his excellent preparatory notes have been, at his suggestion, borrowed to beef up my flimsy notes.

Building stones along the southern edge of the Brecon Beacon's National Park 10th October 2015

John Shipton

The last meeting of the year was a joint meeting with the Geologist's Association, South Wales Group (SWGA) to look at building stones along the southern edge of the Brecon Beacons with John Davies. Unfortunately, it clashed with a rather special rugby match so that during the day we gradually lost participants as people headed home to watch the game!

However, on a fine October morning rather more people than normal assembled at the first location, Vaynor Church, north of Merthyr Tydfil. We began our visit at the site of the old church at the overgrown southern end of the graveyard. It is claimed that the first, wooden church, dates back to AD 874 with the later stone structure dating from 1295. As the remains show, the old church was built of locally derived stone, the rubble walls predominantly of Carboniferous Limestone with some blocks of maroon Old Red Sandstone. There were also a number of Old Red Sandstone slabs that John thought probably came from the Brownstones Formation.

We moved uphill to the 'new church' which was built in 1870 to replace the old church which, by then, was in danger of collapse (Fig. 1). A plaque on the wall said that the cost of the new building was met by Robert T. Crawshay (Iron Master) in return for the congregation's contribution to the building of St John's Church at Cefn

Fig 1. The 'new' church, Vaynor

Fig. 2. (top left) Robert Crawshay's Radyr Stone grave slab, Vaynor, Fig. 3. (top right) Abercribyn Farm Quarry. Fig. 4. (bottom left) The Italianate House, Vaynor. Fig. 5 (bottom right) Pennant Sandstone house, Ystradfellte.

Coed. The new church is mostly built of pale cream and red Old Red Sandstone plus a few blocks of Carboniferous Limestone, which gives a polychromatic effect. The ground floor dressings are of Bath Stone but dressings to the upper windows in the tower are in the same Old Red Sandstone as the walls with cast iron columns in place of stone mullions; the church had after all been paid for by an 'Iron Master'.

Close to the church and surrounded by iron railings is the grave of Robert Thompson Crawshay, covered by a huge slab of Radyr Stone (Fig. 2). One 'wag' suggested that such a large slab of rock had been used to ensure that he stayed in the ground! This slab of Radyr Stone, a Triassic age breccio-conglomerate from the Cardiff area, contains mainly clasts of Carboniferous Limestone and probably came from the main quarry at Radyr, in north Cardiff. This was served by the railway so that large blocks like this could be easily loaded and transported. Gathered around the grave participants discussed the possibility of the stone coming from other similar Triassic breccio-conglomerates that crop out in southwest Cardiff but these often contain a lot of clasts of Old Red Sandstone as well as Carboniferous Limestone.

We moved on to Abercriban Quarry, stopping briefly at Pontsticyll Reservoir, where John pointed out that the local geology and the effect of the Vale of Neath disturbance on the outcrop of the Old Red Sandstone. Reaching Abercriban farmhouse, that lies below the now unused quarry, we inspected the stone in the bungalow built by John Meredith, who owns the farm and had previously worked the quarry. The stone, all extracted from the quarry above the farm, is from the Old Red Sandstone and occurs in a variety of colours from pale cream to maroon. The walk up to the quarry provided views over the reservoir with John again being able to elucidate on the local geology. At the disused quarry (Fig. 3) face thick beds of cream-coloured quartzitic sandstones are well exposed. These belong to the Wern Watkin Formation, which lies unconformably above the Plateau Beds. At the top of the quarry the sandstones are succeeded by the Lower Limestone Shales (Avon Group) and then the Carboniferous Limestone, the workings of which can be seen higher up the hill.

John Davies had arranged lunch in the Red Cow at Pontstycyll and on the way we stopped at the Taf Fechan Water Treatment Works below the reservoir. In the earliest phase of building works local stone had been used but in the 1994 extension Old Red Sandstone from the Tredomen (Llangorse) Quarry had been used instead. Why this was used is unclear as it is understood that the Abercriban quarry was operational in 1994. Both buildings have quoins of grey Carboniferous Limestone.

After lunch we headed south and stopped to look at the Italianate house, just south of Vaynor (Fig. 4). This was built in 1912 but is now in a state of disrepair. It is apparently occupied infrequently and access to the grounds was not possible so our inspection had to be undertaken from the road. The main building stone appears to be of Bath Stone ashlers while a stone very similar in appearance to a red Triassic sandstone had been used in the columns. The window cills in parts of the building are of a grey/green sandstone that is probably Forest Pennant Stone.

We had a brief roadside stop at Vaynor Quarry, a large, disused quarry in the Carboniferous Limestone that had produced aggregate for use in the construction industry. Further down the road, at Cefn-coed-y-cwmmer, just north of Merthyr Tydfil we stopped to look at a roadside exposure of the Twrch Sandstone. This hard, cream/yellow coloured quartzite is used locally as a building stone and around Pontneddfechan was worked for the manufacture of silica bricks. It is Namurian in age and used to be known as Basal Grits of the Millstone Grit.

Heading west we reached Penderyn Church, which stands prominently on a hill top and offers extensive views across the surrounding countryside from the churchyard. Here John described the surrounding geology, pointing out Penderyn Hill to the southwest (Carboniferous Limestone), and the hills of Twrch Sandstone to the north and south. In the distance, to the south, is the high Pennant Sandstone (Upper Coal Measures) escarpment of the coalfield edge while in the distance to the north are the Brecon Beacons underlain by the Old Red Sandstone.

The church, built predominantly of Carboniferous Limestone and some blocks of Old Red Sandstone was, apart from the tower, rebuilt in Victorian times. There are odd blocks of conglomerate from the Twrch Sandstone, while the dressings are in a pale sandstone that is possibly Fo rest Pennant Stone. Leaving the church and returning to our cars members noted 'flowstone' on the walls of the old rectory; this interesting feature is re-deposited calcite on the face of the block that appeared to be caused by water running down the walls from broken gutters.

Heading north across country underlain by the Carboniferous Limestone and Twrch Sandstone we reach our last stop of the day, the village of Ystradfelte, which sits on the boundary of the Carboniferous Limestone and Old Red Sandstone. The walls of St Mary's Church are built predominantly of Old Red Sandstone with some blocks of Carboniferous Limestone and a few rounded river cobbles. Early window dressings are of Old Red Sandstone but recent replacements are probably Forest Pennant Stone.

A new house on the outskirts of the village (Fig. 5) has been built using Pennant Sandstone from the Gwrhyd Quarry near Swansea. Although not unattractive it looked somewhat incongruous in a built environment dominated by Carboniferous Limestone and Old Red Sandstone. To compound the issue a garden wall to the front of the property had been built of thin-bedded, salvaged Pennant Sandstone, which is typical of the stone used in field walls in the area around Gelligaer. Light was failing when John closed the meeting, the hardy souls remaining thanked John for this interesting and informative day and set of home.

SHORT NOTES

Two Purbeck Marble fonts in Wales

Purbeck Marble is a polishable shelly limestone from the Isle of Purbeck in east Dorset, and it was widely used during medieval times as an ornamental stone in churches, cathedrals and castles. It was shipped out all along the English south and east coast, and many examples can still be seen. It was used for columns, flooring, and monuments amongst other features. Particularly characteristic are square or eight-sided fonts, of which nearly 200 are known, dating from the C12th and C13th. Most consist of a bowl with an incised colonnade of arches around the faces, supported with a central cylindrical column and a ring of subsidiary smaller columns. The font at St David's Cathedral is a typical example, and has long been thought to be the only example of a Purbeck Marble font in Wales.

The supporting columns were susceptible to decay on the damp floor. In many of the English examples, they have been renewed at some time or replaced by other stonework, making the whole font less immediately recognisable as one of the Purbeck Stone type. This is what seems to have happened at Llanbadarn Fawr on the edge of Aberystwyth. This is one of the best studied churches in Wales and it is curious that the font bowl of typical Purbeck Marble type has not, to my knowledge, been recorded by many of the previous visitors who have written about the church. The large replacement supporting column is made with

Fig. 1. The Purbeck Marble font in St David's Cathedral. The base and the small columns are late replacements.

Fig. 2. The heavily-patched Purbeck Marble font in Llanbadarn Fawr church. The octagonal column is made of Anglesey Sandstone.

Anglesey Sandstone. This stone is also used in the dressings of the outside quoins and windows, and hence the construction of the font may date from the time when the stone church was originally built in the C12th. The bowl has been heavily patched with an unpleasant grey cement at some time during its history, probably in the C19th, but the shape and the petrological characteristics of the limestone are typical. A fuller account is given in a paper published in the latest issue of *Ceredigion* (Vol. 18, No. 2, 2014, pp. 29-40).

Tim Palmer

Castle Update

Newport

In February I made a brief visit to Newport Castle with Will Davies, Regional Inspector of Ancient Monument for Cadw, for a swift reconaissance look at the main building stone types. Will has been researching the evolution of the castle following a Cadw project there in 2009. In particular we examined Sudbrook Stone dressings. Will has identified six phases of construction and was keen to be able to link the use of Sudbrook Stone to specific phases of construction. WSF has visited Newport before but the castle was not included within this. The castle was of huge importance but the structure that survives is not open to visitors. This is mainly for the protection of the monument. I hope that we can persuade Will to lead a future trip to the site. A much underestimated castle with some impressive polychromatic stonework.

Kidwelly

In the course of undertaking a brief survey of Kidwelly Castle to inspect the building stones I also examined the gatehouse. An unusual find was the presence of granite cobbles within the main fabric of the walls. These are not of local origin, so therefore have an origin as ballast or are derived from glacial deposits. If permission can be obtained from Cadw a detailed study of the provenance and petrology will be undertaken and hopefully reported in Newsletter 14.

Jana Horák

Affiliation to the Geologists' Association

The Welsh Stone Forum is now affiliated to the Geologist' Association. This allows us to be covered by their indemnity insurance for field excursions (at a cost) and also to be listed in their compendium of geology -related affiliated societies.

New Publications

Gordon Walkden, 2015, *Devonshire Marbles: their geology, history and uses,* GA Guide 72, Geologists Association, 232 pages.
ISBN: 9780900717765
Price: £ 12.00/volume

This is an excellent two-volume work that all of us working on building and ornamental stone can aspire to! Devonshire marbles are spectacular and diverse decorative stones, including Devonshire Petitor, Ashburton, Rose Red Radford and Ogwell marble. Until the advert of this work they were also poorly known. They have been used is a diverse range of buildings in both the UK and worldwide.

Volume 1: *Understanding the marbles,* highlights the discovery, characteristics and uses of Devonshire marble, its formation in tropical seas and the geological processes that formed the textures we see today.

Volume 2: *Recognising the marbles*; this provides a guide to the best limestone outcrops and the 20 varieties of marble they produced, the fossils they contain, and the 30 best buildings in the UK using the stone.

Heritage Stone: Towards International Recognition of Building and Ornamental Stones, Special Publication No. **407,** Geological Society of London, 275 pages.
ISBN: 978-1-86239-685-2.
Pric: £90, Fellows of the Geological Soc

This volume comprises key papers presented at the GHSR meeting at EGU meeting in Vienna in 2013.

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54 Mount Street, London

Around 1898 Lord Windsor (Earl of Plymouth) built a spectacular house in Mount Street, London. Attention was focussed on this house by a Welsh newspaper account which stated that 'Penarth alabaster forms the columns and faces the walls of the square entrance hal'. This building is now the residence of the Brazilian Ambassador. On17th March, at the invitation of His Excellency Eduardo dos Santos, the current Ambassador, a visit was made by Mike Statham (WSF member) and Jana Horak to view the property. It is true to say that it is an architectural masterpiece and anyone visiting for the first time cannot fail to be particularly impressed by the superlative entrance hall with its marble floors, columns and arches and stunning Penarth alabaster wall tiles and decorative panels, not to mention the hospitality of the Ambassador and his staff.

Contact Details

Welsh Stone Forum
c/o Dr Jana Horák
Amgueddfa Cymru - National Museum, Wales
Cardiff CF10 3NP
jana.horak@museumwales.ac.uk

http://www.museumwales.ac.uk/en/welshstoneforum

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