Fforwm Cerrig Cymru  Welsh Stone Forum

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Welcome to the 16th edition of the Welsh Stone Forum *Newsletter*. Many thanks to everyone who contributed to this edition of the Newsletter, to the 2018 field programme, and the planning of the 2019 programme.

Subscriptions

If you have not paid your subscription for 2019, please forward payment to Andrew Haycock (andrew.haycock@museumwales.ac.uk). If you are able to do this via a bank transfer then this is very helpful.

Data Protection

Last year we asked you to complete a form to update the information that we hold about you. This is so we comply with data protection legislation (GDPR, General Data Protection Regulations). If any of your details (e.g. address or e-mail) have changed please contact us so we can update our files.

PROGRAMME 2019

2019 AGM & Anual Lecture

The 2019 AGM will be held on Saturday 27th April, at 11.00 am at the National Museum Cardiff in the Augustus & Gwen John Room (Level 0, behind the restaurant). Coffee will be available from 10.30. Any items for the AGM agenda should be sent to the Chairman, Dr John Davies (sion_cwm_hir@hotmail.com). The Museum car park will be open and tokens can be purchased in the Museum shop.

The AGM will be followed at 11.45am by the Annual Lecture. This will be given by Professor Maurice Tucker, Visiting Professor, Bristol University. He will talk about his research into identification of specific sources of Roman Bath Stone.

Non-members are welcome to attend the lecture. Please make sure that the Secretary (jana.horak@museumwales.ac.uk) is notified of all who will be attending.

May 11th: C12th-C19th stonework of the lower Teifi Valley

Leader: Tim Palmer

Meet: Meet 11.00am, Llandygwydd. (SN 240 436), off the A484 between Newcastle Emlyn and Cardigan

We will examine a variety of local and foreign stones, not all of which are understood. The first stop will be the demolished church (with standing font) at the meeting point. We will then move to the Friends of Friendless Churches church at Manordeifi (SN 229 432), assuming repairs following this winter's flooding have been completed. Lunch will be at St Dogmael's cafe and Museum (SN 164 459), including a trip to a nearby farm to see the substantial collection of medieval stonework from the mid C20th excavations which have not previously been on show. The final stop will be the C19th church with incorporated medieval doorway at Meline (SN 118 387), a new Friends of Friendless Churches listing.

June 15th: Building stone resources along the Montgomery canal

Leader: Andrew Jenkinson

Meet: 11.00 am, Llyn Coed y Dinas Nature Reserve Car Park, Welshpool. The car park entrance is at OS grid ref SJ 223 052; post code SY21 8RP; off the east side of the A458 (into Welshpool town centre), 130 yds north of the roundabout at the south end of the Welshpool Bypass (A483). We can park cars here before sharing if possible for the rest of the day.

We will look at buildings and quarries, including Powis Castle and several in Welshpool, that take us northwards to Llanymynech with its well exposed Carboniferous Limestone quarries and visitor centre, then, time permitting, the southern part of the Oswestry coalfield, which relied for transport on the Montgomery Canal. Although today regarded as an 'agricultural canal', the most important trade was carrying limestone and coal to canal-side kilns for the limestone-burning industry to supply the "industry" of farming. Time permitting we will return to Welshpool on the eastern side of the Severn Valley, looking at quarries on the Breidden Hills and at Buttington from which stone was taken down to the

canal for use further afield. We will stop in the vicinity of a suitable hostelry at lunchtime for those who prefer it. Otherwise bring a picnic for a stop on a canal-side wharf. We aim to return to the starting point at 4.30pm

July 13th: Grosmont & surrounding area
Leaders: Eric Evans & John Shipton
Meet: 11.00 at Saint Nicholas' church, Grosmont (SO 395 243, sat nav NP7 8EP)

We will begin this short tour of miscellaneous buildings in the north-east of Monmouthshire at Saint Nicholas', an exceptionally grand cruciform church, mainly to look at the contrast between the C13th nave and the C19th reconstructed crossing and rebuilt chancel of Seddon's restoration, but also to inspect some of the monuments. A more recent restoration (early C21st) has also been undertaken. This church, as with the following buildings, is mainly constructed with the local Old Red Sandstone. We will then move on for a brief stop to look at the Cross Ash Well House, recently restored by a local Building Preservation Trust (one of two projects we will look at undertaken by the Village Alive Trust, in this area, www.villagealivetrust.org.uk) before lunch.

We will also visit Saint Teilo's church at Llantilio Crossenny, another impressively large cruciform church (C13th) with interesting architectural details, and from there to White Castle (known as Llantilio Castle in C12th), the largest and most solitary of the Three Castles. Originally an early Norman earthwork castle, it was extended and strengthened in stone probably in the face of threat posed by Llewelyn ap Gruffudd, who attacked Abergavenny in 1263. (The castle is under the care of Cadw, so bring your membershiup card). From the castle we move downhill to Croft Barn, (the second of our Village Alive Trust buildings). This is a remarkable C16th original corn barn, previously part of the Great Tre-Rhiw farm estate, immediately west. Great Tre-Rhiw has been researched and is probably be the farm (mill, granary, etc.) sustaining the garrison at the castle at that time. **S**

September 21st & 22nd: Slate & building stone of NW Wales
Leader: Jana Horak
Meet: details to follow

The details of this trip are yet to be confirmed. If you are interested in joining the trip please let the Field Secretary (Mike Statham) know. If you are interested in examining particular building stones in the area, then please contact Jana. We can then attempt to accommodate requests prior to organising the final itinerary. It is likely that we will stay in Criccieth, and venture eastward to look at slate and westwards along the south coast of Llŷn.

October 5th or 12th t.b.c.
At the time of printing this fieldtrip is yet to be confirmed. If anyone has any suggestions for the October trip, please contact Mike Statham (Field Secretary)

Insurance
The Forum holds indemnity insurance for members attending field meetings. To ensure that everyone present is covered, it is essential that you inform the Field Secretary (Michael Statham, stathammichael@hotmail.com) in advance that you plan to attend any of the meetings. Members may bring guests to the meeting provided we have prior notification, there is a fee for guest to cover insurance. You will be asked to sign the attendance list on the day.

Obituary
Richard (Rick) Turner

It was with great sadness that we learned of the death of Rick Turner in June 2018. Rick was a retired Cadw Inspector of Ancient Monuments but was probably best known as the archaeologist who recovered Lindow Man in 1984. His work with Cadw in the conservation of ancient monuments led to an interest in building stone, how and where it was quarried and how it degraded, all things that helped inform him on the best conservation methods to employ. He was a man of many talents but he gave time to listen to the views of others and he valued the conservation skills of craftsmen.

Rick was a good friend of the Welsh Stone Forum and in April 2010 was instrumental in persuading Cadw management to host the forum's AGM at Caerphilly Castle. Following the AGM he gave a brief history of the castle and an informative talk on recent activity there. In 2016 he was writing a paper with Stephen Priestley on the building of the great gatehouse at Kidwelly and he contacted the Forum to ask for assistance in matching the stone described within historic documents (written in 1402) with possible sources that might exist around Kidwelly. The information gained at the ensuing visits was of great benefit to both Rick and the Forum. Those of us that knew Rick will miss his dry wit and the great knowledge that he possessed and was happy to share with others.

John Shipton

Building stones in churches across Wales: Part 7 – Vale of Glamorgan

John Davies

The methodology of collecting the data for this series of county church surveys has been described in previous issues of the Newsletter. Due to the size and number of communities in Glamorgan, it was practical to divide the county into its two main medieval units; Upland Glamorgan [Morgannwg], which was published in Newsletter No.6, and the Vale of Glamorgan [Glamorgan], which is published here. A survey of the churches of Gower and Swansea is published elsewhere in this issue, whilst that coverng Cardiff and Newport [Gwent] will appear in a later issue.

The churches of the Vale of Glamorgan are mostly pre-C19th buildings but within the larger communities, such as Bridgend, Barry and Penarth, there are more C19th and earliest C20th structures. The pre-C19th churches usually contain the largest variety of building stones resulting from the availability of stone for walling and dressings from the local rock outcrops. Those that have been re-built in the C19th also contain stone usually seen in the later group of town churches with Bath Stone dressings dominant.

Walling materials

There is a great variety of stone useful for walling within the Vale of Glamorgan. Stratigraphically these range upwards from the Llanishen Conglomerate and Brownstones of the Old Red Sandstone to the Lower Jurassic, Liassic limestones. In addition some Quaternary cemented screes and glacial gravels have been used locally for specialised building.

The oldest rock found in the Vale of Glamorgan is the Llanishen Conglomerate (Lower Old Red Sandstone). It looks very similar to, and is easily confused with, the Permo-Triassic age Radyr Stone, which rests unconformably on the Llanishen Conglomerate in places and frequently includes pebbles derived from it. The Brownstones comprise the remaining Lower Old Red Sandstone succession. These consist of maroon sandstones, which are used as building stones and which appear very locally in buildings in the middle Ely valley and south-eastwards to Michaelstone-le-Pit. Yellow sandstones from the Upper Old Red Sandstone occur in the same general area, whilst the overlying Quartz Conglomerates are found in drystone walls and some buildings from Stalling Down and Aberthin in the west to Radyr, Cardiff, in the east.

The overlying Carboniferous Limestone outcrops around the rim of an E/W trending anticline. Its southern limb forms the high ground from Wenvoe in the east to St Brides and Porthcawl in the west, and northern limb, the southern edge of the South Wales Coalfield in the north. These limestones have been extensively used for rubble walling (Fig.1) but are of no use for dressing due to their irregular pattern of joints. They are also generally too hard and brittle to dress and fracture irregularly.

Upper Carboniferous rocks only occur along the north edge of the Vale and although Pennant Sandstone stepped coarse-work is seen in the walls of Victorian town churches in Barry and Penarth (usually with Bath Stone dressings) it is otherwise rarely seen in the Vale.

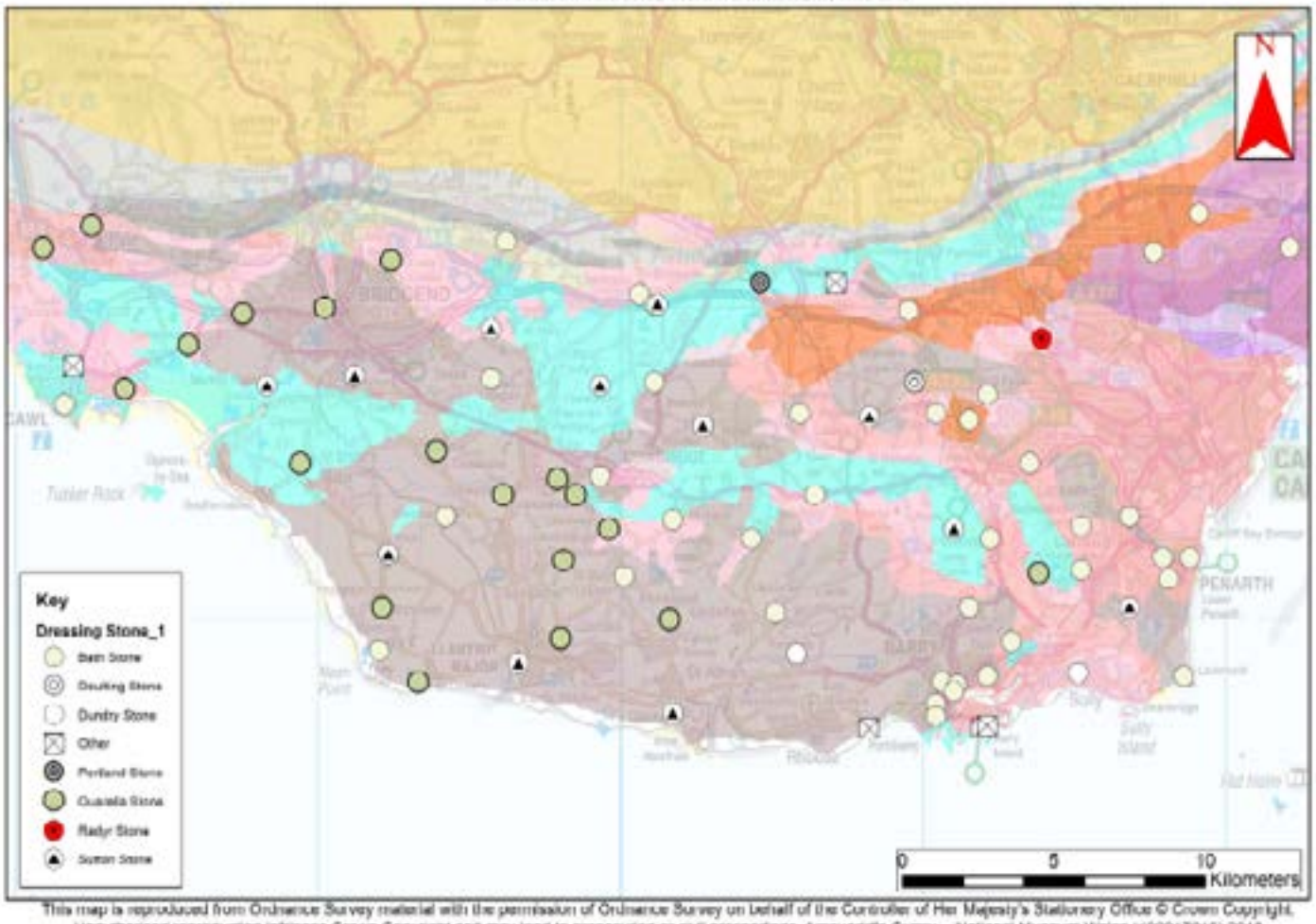
Where exposed, the Old Red Sandstone in the core of the anticinal structure was eroded and filled with younger Triassic and Lower Jurassic sediments, many of which are also red and occur in patches. On the flanks of these Palaeozoic structures a great variety of Mesozoic strata occur that range in age from the Triassic to the lower Jurassic. These strata can vary considerably laterally producing a variety of different types of building stones.

Apart from an area between Sully and Cold Knapp, Barry, much of the southern half of the Vale of Glamorgan is floored by alternating beds of Liassic limestone, muddy limestone and shales of Lower Jurassic age. It is these . strata that form the distinctive plateau that stretches from

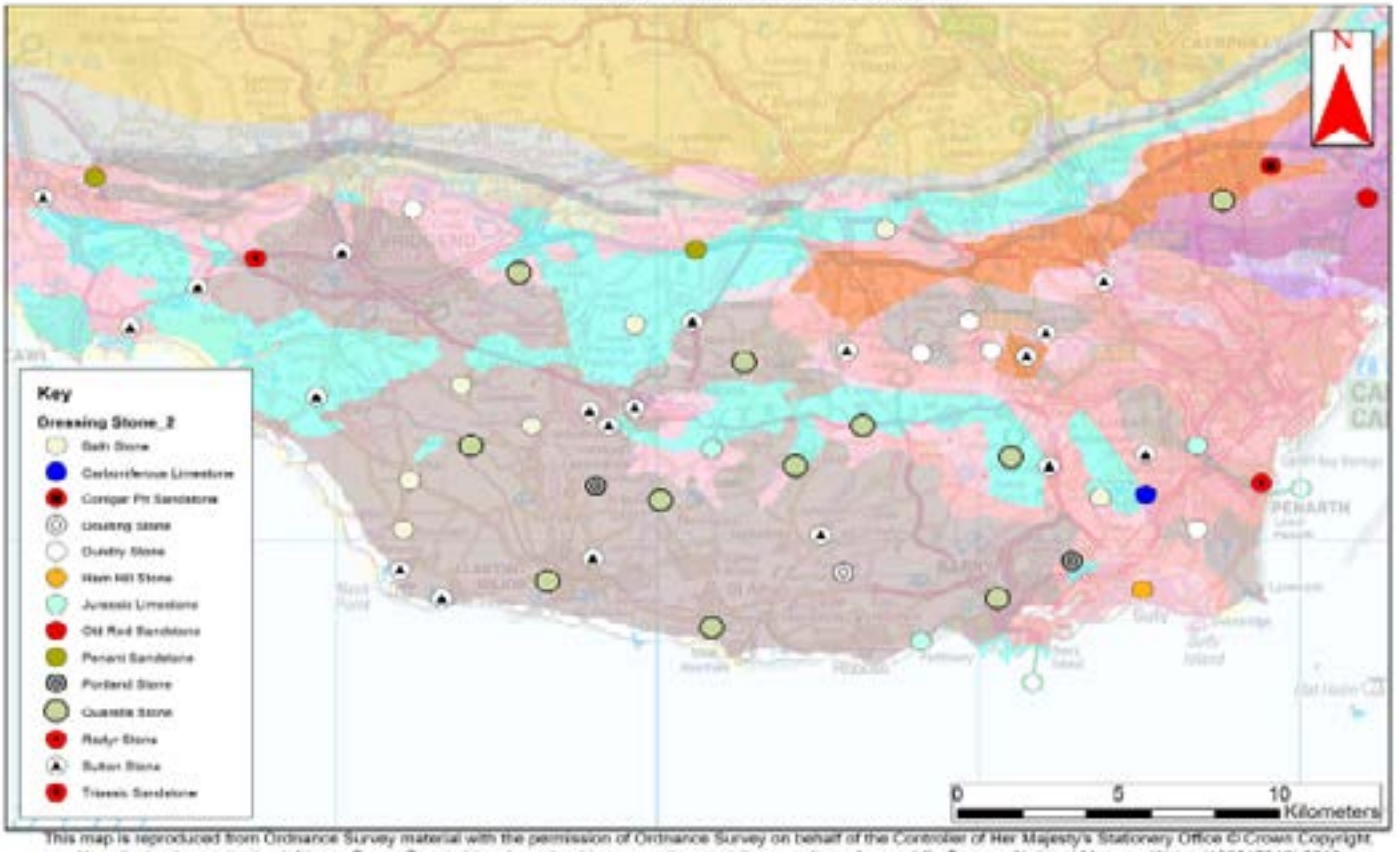
Fig. 1. Dressed Carboniferous Limestone, Pendoylan (©John Davies).

Fig. 2. Normal Liassic limestone walling, Llandoche (© John Davies).

Vale of Glamorgan- Dressing Stone 1



Vale of Glamorgan- Dressing Stone 2



Lavernock Point in the east to St Brides and Southerndown in the west. The limestones have been used extensively for walling because of their characteristic thinly-bedded nature and regular natural joints, formed at right angles to the bedding, which results in them being easly quarried as natural rectangular blocks ready to place straight into a wall (Fig.2). Although these limestones are often difficult to distinguish from some of the paler Carboniferous limestones they generally have a more uniform colour, are fine grained and 'ring' when hit with a hammer. If fossils can be seen the rocks can be distinguished more readily; the Carboniferous limestones containing brachiopods, corals and crinoids, while those from the Lias are rich in bivalves and ammonites.Within or near river valleys, such as those of the Ogmore and Ely, rounded river cobbles appear in church walls. These are usually mixed with other indiginous stone, such as Old Red Sandstone, Carboniferous Limestone or Liassic Limestone.

Dressings

There are two indigenous freestones used for dressings in Glamorgan; Quarella Stone and Sutton Stone. Both outcrop in the west of the Vale with the Quarella Stone being of Upper Triassic age and Sutton Stone of Lower Jurassic [Liassic] age. Quarella Stone [from the Welsh name Chwarelau – meaning 'Quarries'] gave its name to a district of Bridgend which lies within its type area. The outcrop is narrow but extends from Pyle in the west to Coity in the east. Quarella Stone is a medium to coarse-grained, quartz rich sandstone that varies in colour from cream to greenish-white to yellow and brown (Fig. 3). Sutton Stone was quarried in the area stretching from Ogmore Castle to Southerndown with production being concentrated around the village of Sutton – as the name suggests. Sutton Stone varies from being a uniform, cream coloured limestone to a coarse limestone conglomerate containing rounded pebbles of older rocks, notably of Carboniferous Limestone and chert but also of Old Red Sandstone (ORS) and rocks from the Coalfield (Fig. 4). The occurence of Quarella Stone appears to be more concentrated in the west of the Vale but Sutton Stone is scattered across the whole area.

Some of the Lower Liassic limestones are rich in bivalves, referred to in the geological literature as mussel-bands. One of these has been named the Bull Cliff Marble [after Bull Cliff at Porthkerry near Barry] and has been well-described by Mike Statham and others in previous issues of this newsletter.

The Triassic age Radyr Stone is generally used in later buildings for decorative purposes, particularly in Cardiff. It is especially used indoors due to its poor weathering properties. It is generally maroon coloured and contains clasts of many different rock types from the Old Red Sandstone, Carboniferous Limestone and Coal Measures sandstones.

Fig. 3. Quarella Stone and Bath Stone, Newton (©John Davies).

Fig. 4. Sutton Stone, Colwinston (©John Davies)

Fig. 5. Quarella Stone ashlars, Pyle (©John Davies)

Imported dressings

The oldest imported stone was brought across the Bristol Channel from Dundry Hill, south-west of Bristol, as early as the C13th, and was used extensively to replace Sutton Stone whose limited supply had run out. Later, Dundry Stone was replaced by Bath Stone and Doulting Stone, also from the west of England Jurassic outcrops, particularly after canal and rail transport developed in the Avon valley between Bath and Bristol docks. Upper Jurassic age Portland Stone was only used for very special features. These are usually as late as the early C20th but it has most frequently been used for repair work. There are one or two examples of Ham Hill Stone (Lower Jurassic) used in churches. This is a course-grained, often cross-bedded, dark cream coloured Jurassic Limestone from Ham Hill, near Yeovil, Somerset.

Dundry Stone and, since Victorian times, Bath Stone is fairly uniformly scattered across the Vale. However, Bath Stone dressings more commonnly occur in Penarth and Barry where, like the churches of upland Glamorgan, they were extensivley used during Victorian times as the towns expanded. Doulting stone, from Somerset, is similar to Dundry Stone consisting of fossil echinoid fragments, but is courser grained, and more orange coloured.

Repair Work

The comonest stone used for repair work is Bath Stone, presumably because it is almost the same colour as both Dundry and Doulting Stones which it often replaces. A small amount of Forest Pennant Sandstone has been used in later repairs as elsewhere in south Wales.

Conclusions

Throughout the Vale of Glamorgan the village churches are generally medieval in age but with a range of modifications applied over the centuries. The main rubble walls are either Carboniferous or Liassic limestones but occasionally with the addition of river cobbles. In the west, around their outcrops, Sutton Stone ashlar is common, as at Margam and Ewenny, and Quarella Sandstone ashlar occurs at Pyle [medieval] (Fig. 5) and Pen-y-fal [Victorian], where the churches sit on, or almost directly on, the outcrop of the sandstone.

There is a chronology to the use of dressings. As in other places along the south Wales coast. Sutton Stone is the earliest, which appers to be followed by Dundry Stone and Quarella Stone up to the late C18th. The coming of railways brought Bath Stone, followed by Doulting Stone and Portland Stone and eventually stone from far and wide.

Bibliography

Davies, J.H. 2018. Building stones in churches across Wales: a national map of vernaculars: Part 6 – Upland Glamorgan. *Welsh Stone Forum Newsletter* **15**, 11-14.

Grey, M., 2010. Llanulltud Fawr (Llantwit Major) St Illtud's Church and Grange. *Welsh Stone Forum Newsletter* **7**, 11-15.

Howe, S., 2008. Sutton, Ogmore, Ewenny and Beaupre, Vale of Glamorgan. *Welsh Stone Forum Newsletter* **5,** 7-12.

Shipton, J., 2012. AGM 9th April 2011, Llantwit Major. *Welsh Stone Forum Newsletter* **9**, 13-15.

Shipton, J., 2014 Building Stones of Penarth 13th April 2011, Llantwit Major. *Welsh Stone Forum Newsletter* **11**, 17-19.

Shipton, J., 2017 Penarth 21st May 2016. *Welsh Stone Forum Newsletter* **1**4, 28-30.

Shipton, J., 2018 Vale of Glamorgan 8th July 2017. *Welsh Stone Forum Newsletter* **15**, 23-25.

Statham, M., 2017. Bull Cliff Marble *Welsh Stone Forum Newsletter* **14**, 2-25.

Willie, D., 2008. Quarella Stone. *Welsh Stone Forum Newsletter* **5**, 7-9.

Building stones in churches across Wales: Part 8 – Gower and Swansea (Glamorgan)

John Davies

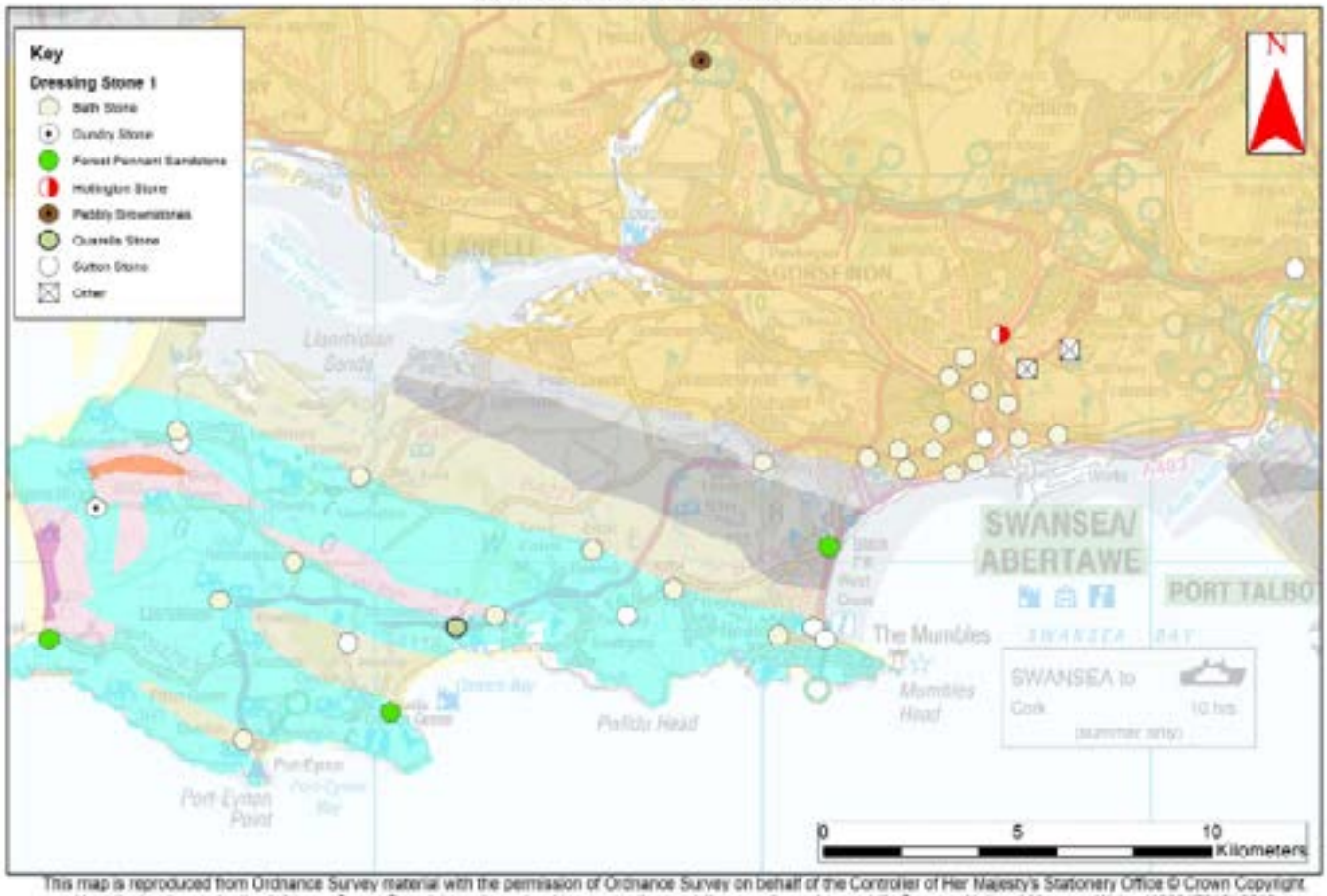
This 8th part of the survey of building stones of churches across Wales covers those of Gower and Swansea. The techniques and criteria used are the same as described in the previous acticles in the Newsletter.

Walling materials

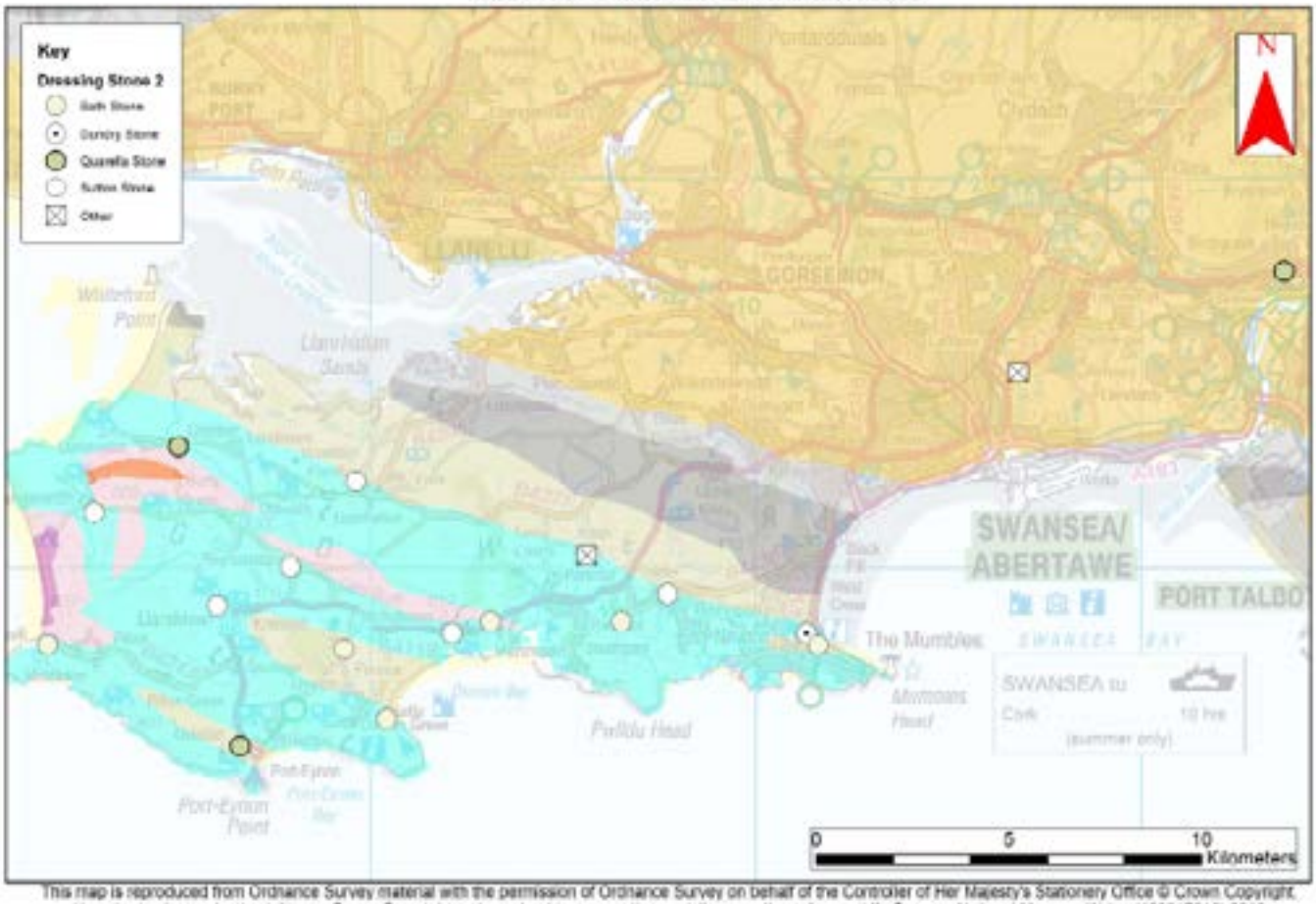
The area of the Lordship of Gower, which was separate to the rest of Glamorgan until 1536, extended up to the border with Breconshire, east of Brynaman, and certainly included the area of Swansea city. Geologically it can be divided into two distinct areas by a line which extends obliquely NW/SE across the peninsula from Norton, just north of Oystermouth Castle, in Swansea Bay in the east to Whitford Burrows in the west. This line marks the boundary between the Carboniferous Limestone and the Namurian [Bishopstone Shales].

South of this line, much of the strata are exposed in a series of folds, mostly trending parallel to the line itself although one, Rhossili Down, strikes N/S almost at right-angles to it. The core of the anticlines that form Cefn Bryn, Harding's Down, Llanmadoc Hill and Rhossili Down, expose Lower Old Red Sandstone maroon sandstones overlain by hard, Upper Old Red Sandstone quartz-conglomerates. These latter consist of coarse conglomerates with large white quartz pebbles and are an easily recognised building stone in the area (Fig.1). The remainder of the higher plateau between these hills is composed of mostly, pale-grey, but also some darker-grey, Carboniferous limestones which overlie the Old Red Sandstone. These form the other main building stone of Gower south of the dividing line. Oxwich lies in the core of a syncline floored by the Bishopstone Mudstone which produces no rocks suitable for building.

Gower and Swansea - Dressing Stone 1



Gower and Swansea - Dressing Stone 2



Figs 4 & 5. Distribution of building stones in Swansea and Gower

Fig. 1. Upper ORS conglomerate, Nicholaston (©John Davies).

Fig 2. Pennant Sandstone and Bath Stone, Christ Church, Oystermouth (©John Davies).

Fig. 3. Sutton Stone, east window of the old church, Oystermouth (©John Davies).

North of the dividing line lie the shales and sandstones of the Namurian [Millstone Grit] and Westphalian [Coal Measures], the latter containing some sandstone units that are useful for building. The Upper Coal Measures are represented by the Pennant Sandstone, which forms the prominent Kilvey Hill, east of the Tawe valley, and also the continuous ridge from Townhill and May Hill, in the southeast, through Three Crosses to Crofty in the Llwchwr Estuary. This ridge, particularly at the eastern end, has been extensively quarried to provide stone for walling in Swansea. It was also quarried along the side of the Tawe valley for building in the valley towns (Fig. 2). The other important rough walling stone in Swansea, as in Cardiff, is ballast brought to the city from around the world. Unlike Cardiff there is less evidence of it being used in significant buildings.

Dressings in Gower south of the Carboniferous Limestone – Namurian boundary

There are no major indigenous freestones in Gower and almost all of the stone used for dressings has been imported, the only exception being a Quarternary deposit discussed later. The earliest dressings, that date from the C12th, are of Sutton Stone imported from the Vale of Glamorgan (Fig.3). There was a family connection between the lords of Swansea and Ogmore and this enabled the stone, that was quarried at Ogmore and Sutton, to be transported by sea across Swansea Bay. Later, in the C15th and C16th, the same route was taken by Quarella Stone from the Pyle and Bridgend area, This was used as dressings over the whole of Gower.

Fig. 6. Red Hollington Stone in nave dressings, Llangyfelach (©John Davies).

As in the Vale of Glamorgan, the third main dressing stone, used from medieval times to the C18th, is Dundry Stone from Bristol. This was imported directly down the river Avon from Bristol and used in both castles and churches. In the C19th Dundry Stone was replaced by Bath Stone in both rural Gower and in Swansea.

In Gower Quarternary fossil raised beach deposits have also been used for building. These deposits often contain abundant *Patella* (a fossil limpet) but where these are absent the resulting stone is very similar in appearance to Sutton Stone. It has been used in fonts as in Penrice church.

Distribution of dressings

Figures 4 and 5 show the distribution of the main dressing stones within this area. Sixteen out of the twenty large churches in Swansea, and the valley districts of the city, have Bath Stone dressings but a number of churches, as at Llangyfelach and Landore, have dressings of red, probably Hollington Stone. Even on Gower nine of the churches have Bath Stone dressings. A very small number have brick dressings.

St Mary's Church, in the centre of Swansea, was completely re-built with Pennant Sandstone and Bath Stone after WWII, but the medieval Priory Church still contains Dundry Stone and Sutton Stone and matches the castle and Cross Keys Inn. Only two churches, one at Clyne, between Oystermouth and Swansea, and one at Rhosili have Forest Pennant Sandstone dressings, from the Forest of Dean.Twelve churches on Gower have Sutton Stone dressings and five have dessings of Quarternary *Patella* Beach deposits.

Conclusions

The building materials used in Swansea and upland Gower match exactly those of the remainder of upland Glamorgan, whilst the older churches of Gower match the usage of stone seen in the Vale. The political connections that existed between the western part of the Vale of Glamorgan and Swansea and Gower were strong throughout their history, which facilitated easy access for materials across Swansea Bay.

In all post Victorian buildings, and repairs to existing fabrics, the dominant dressing material is Bath Stone. Sutton Stone, Quarella Stone and Dundry Stone are only seen north of the line from Norton to Whiteford and in Swansea Priory and Llangyfelach church, both of which are mediaeval in origin.

References

Howe, S. 2007. The Geology of some Gower Churches. 7th October 2006. *Welsh Stone Forum Newsletter,* **4,** 4-6

Howe, S. 2008. Sutton, Ogmore, Ewenny and Beaupre, Vale of Glamorgan. *Welsh Stone Forum Newsletter*, **5**, 9-11

Howe, S. 2012. AGM 9th April, 2011, St Illtud's Church & Grange. *Welsh Stone Forum Newsletter,* **9**, 13-15

Shipton, J. 2015. East Gower and Mumbles, 28th June 2014. *Welsh Stone Forum Newsletter*, **12**, 13-15

A reinvestigation of the Carboniferous sandstones of north east Wales (Flintshire)

Andrew Haycock

The predominant building stone used in the northern part of Flintshire is the Carboniferous age, Millstone Grit Group, Gwespyr Sandstone (e.g. in the villages of Gwespyr and Llanasa). The sandstones of the Pennine Coal Measures Group (e.g. Hollin and Yard Rock, and unnamed units associated with the Premier Coal Seam) have also been used local to their outcrop in the southern part of Flintshire, around Northop Hall, Buckley and Flint Mountain. Some Triassic sandstones of the Kinnerton Sandstone Formation have been used in the Flintshire region (e.g. at Basingwerk Abbey) but these were discussed in an earlier article (Haycock, 2014), and would have been quarried in Denbighshire and the Wirral. The Cefn y fedw Sandstone Formation of the Millstone Grit Group has been used in the south of the district around Hope and Caergwrle.

Cefn y fedw Sandstone Formation
Age: Brigantian to Marsdenian Substage

These are described by the British Geological Survey (BGS) as 'white and pale grey, fine- to medium-grained, planar-bedded and cross-bedded, quartzose sandstones, pebbly sandstones and thin beds of quartz conglomerate; with units of calcareous sandstone, sandy limestone and chert. Lithologies are commonly arranged in coarsening upwards cycles'.

The sandstones are generally very quartz rich and quartz cemented (quartz arenite >95% quartz). Due to their hardness, they have not been used extensively as a building stone in Flintshire, as other more workable sandstones are available locally. One notable exception is Caergwrle Castle built in the C13th where the sandstone used is very pebbly and conglomeratic. Now in ruins, much of the lower course of dressed stone has been 'robbed-out' and reused locally (Fig. 1).

Gwespyr Sandstone
Age: Yeadonian to Langsettian Substage
Other names: Talacre Stone,

The Gwespyr Sandstone is described by the British Geological Survey (BGS) as 'Fine-grained, feldspathic and micaceous, cross-stratified on a variety of scales, with conglomerate-lined scours and intercalated siltstone and mudstone beds. Greenish-grey in colour, fine-grained and laminated in the lower part. Grey-brown, medium-grained, feldspathic and cross-stratified in upper part, moderately to well cemented'. Wedd (1923) described the sandstone as 'light greyish-buff, massive, compact, fine-grained and homogenous, quartzose and slightly micaceous. Used extensively for building work in north

of England and North Wales, and regarded eminently suitable for ecclesiastical and monument work. Talacre Hall was built of the stone in 1824. From No. 1 Quarry is obtained a durable variety suitable for steps, sills, curbs, and channels'.

Some good examples of the homogenous sandstone can be seen at St Marys Church, Halkyn, and in Talacre Hall. There is good evidence of cross-laminated and rippled sandstone use in the buildings of Gwespyr and Llanasa village (Fig. 2) and the same stone can be observed in a disused quarry at Gwespyr (SJ 11026 82998).

When observed in the field, the sandstone is pale yellow in colour (approx. Munsell 2.5Y 8/2 to 2.5Y 8/4) when fresh, often with a greenish tinge (2.5Y 7/3) in fine-grained varieties (e.g. Talacre Stone). Iron discolouration is common throughout as banding, liesegang rings, 'nodules' and a distinct orange / brown weathered crust on some stone. The grain size can vary from very-fine to coarse-grained and is occasionally quite granular or pebbly (e.g. Windmill quarry, Cornist Hill (SJ 2194 7224). The presence of clay (kaolinite), particularly in medium to coarser-grained stone (when not weathered) is quite obvious, giving the stone a cream colour. Where the clay has been weathered away the sandstone can have a 'sugary' texture, with pronounced quartz-cemented quartz grains. This is particularly evident in some of the older buildings like the C12th Basingwerk Abbey.

The clay can be found in pore spaces between the quartz-cemented quartz grains (confirmed by thin section analysis), and is the product of weathering of pre-existing feldspar grains. Lithic fragments are rare in the Gwespyr Sandstone.

Use: Talacre Hall; St Marys Church, Halkyn; Gwespyr and Llanasa villages; Basingwerk Abbey; St Winifred's Well, Holywell.

Quarried: There are numerous quarries across Flintshire including: Gwespyr, Moor Quarry, Holywell; Talacre; Big Wood, Soughton and Plas Isaf Quarry, Llong.

Lower and Middle Pennine Coal Measure Group Sandstone (inc. Hollin and Yard Rock)

Age: Langsettian to Bolsovian Substage, Westphalian

Opposite: Fig. 1 (top left) – Numerous ashlar blocks have been robbed-out from the walls at Caergwrle Castle for local use. Inset: nearby exposure of pebbly conglomerate (Cefn y fedw Sandstone Formation) used to build castle. © Andrew Haycock. Fig. 2 (top right) Good quality blocks of Gwespyr Sandstone at St Marys Church Halkyn (exhibiting liesegang rings / banding). Inset: cross-laminated sandstone exposed in disused quarry at Gwespyr. © Andrew Haycock. Fig. 3 (bottom left) Ewloe Castle. Inset: reddened sandstone (Hollin Rock?) in quarry outcrop north of castle. © Andrew Haycock. Fig. 4 (bottom right) Unnamed sandstone quarried below Premier Coal in use at St Thomas' Church, Flint Mountain. Inset: exposure at Bryn y garreg quarry. © Andrew Haycock.

There is no Cefn Sandstone in this region of north Wales, but several Pennine Coal Measure sandstones have been used local to their outcrop. Most of these are fine to medium-grained, commonly iron-stained with banding and liesegang rings. They can be found in southern Flintshire, between Flint and Treuddyn.

Gwespyr Sandstone was quarried directly from the hill where Ewloe Castle (built by Llywelyn ap Gruffudd in 1257) sits for use in the structure. However, a distinctly reddened sandstone has been used in the castle for 'window-casings and door jambs' (Neaverson, 1953). This can be found in two quarries in the Werpe Brook valley nearby (SJ 29016 67657 / 29106 67802), and was previously assigned to the Hollin Rock. Wedd (1924) notes about Werpe Brook 'a purple-grey sandstone, doubtless the Hollin Rock, 80ft think, it appears in stream banks and quarries above. It consists of quartzose rock sparsely banded and blotched with red, and containing courses seams with quartz pebbles and pellets of red clay'. During field investigation, the sandstone in these quarries undoubtedly matches Wedd's description, but the more recent BGS map (Sheet 109, Flint, 1999) has assigned the sandstone to one of the units closely associated with the Premier Coal. The BGS lexicon describes the sandstone as 'pale-grey', Pennine Middle Coal Measures, Duckmantian to Bolsovian Substage in age, and the Hollin Rock as 'Fine to coarse or pebbly, commonly feldspathic, cross laminated and channel bedded sandstone. The base often channels into the beds below. The sandstone is locally interbedded with thin mudstones', and Bolsovian in age. There may well be localised reddening in both sandstone units, while faulting complicates the geology of the area. These sandstone outcrops deserve more attention and Ewloe Castle would make an interesting stop on a future Forum fieldtrip (Fig. 3).

At Coed Llys quarry, Middle Mill, Northop (SJ 23191 69209), the sandstone unit below the Premier Coal has been quarried. It is fine-grained and yellow-green in colour and contains coal and plant fragments.

At Bryn y garreg Quarry, near Flint Mountain (SJ 2342 7020), further sandstones below the Premier Coal were quarried. I have on good authority from a local Bryn y garreg resident that another nearby quarry (SJ 23677 70262 - now filled in) was the source of the stone used at St Thomas' Church, Flint Mountain. This church has numerous, distinctly iron-stained (liesegang rings / bands), laminated and cross-laminated blocks (Fig. 4). Whilst some of these features are similar to those seen in the Gwespyr Sandstone, the Coal Measure sandstones used to build this church are far more drab and iron-stained than any Gwespyr Sandstone use I have seen.

The St Eurgain and St Peter's Church at Northop lies 2km to the southeast. It would seem quite reasonable to

suggest that this church has been built from stone sourced at either quarry or another nearby Coal Measures quarry, but I am yet to establish this for certain. The stone is a drab buff-brown colour, iron stained and often quite finely laminated.

At Bryn y bâl Quarry, Mynydd Isa, Buckley (SJ 2590 6477), the Yard Rock has been quarried for local use. Pale yellow in fresh outcrop and fine-grained, when seen in local, buildings this sandstone has weathered to a drab buff-brown and is heavily iron stained. At Coed Ffoulkes Quarry, Black Brook, Soughton (SJ 2355 6560), an un-named unit of the uppermost Lower Coal Measures (above the Premier and Ruabon Yard Coal) has been worked, which is also pale yellow in colour and fine-grained.

All of these sandstones have considerably more lithic grains and less feldspar/clay content than the Gwespyr Sandstone (confirmed by thin section). Like the Cefn and Coed yr allt Sandstone of Wrexham, these sandstones seem more prone to industrial pollution (than Gwespyr Sandstone) with a dark weathered crust forming on the surface. These all have a very similar appearance on first inspection and will require further work to be able to distinguish them apart with accuracy.

An inspection of the sandstones of the Pennine Coal Measure Formation in the southern part of Flintshire would again make an excellent Forum trip.

References

Davies, J R, Wilson, D and Williamson, I T. 2004. *Geology of the country around Flint*. Memoir for 1:50 000 Geological Sheet 108.

Geological Survey of England and Wales, 1999. 1:50,000 geological map series, New Series. Flint 108. Solid edition.

Haycock, A. 2014. The sandstone building stone quarries of Northeast Wales: Part One – St Asaph, Ruthin and Denbigh. *Welsh Stone Forum Newsletter*, **11**, 29-32.

Neaverson, E. 1947. *Medieval castles in North Wales. A study of sites, water supply and building stone*. The University press of Liverpool Hodder and Soughton Ltd, London.

Neaverson, E. 1953. Medieval quarrying in North Eastern Wales. *Flintshire Historical Society Publication.* Vol. **14**.

Wedd, C.B., Bernard Smith, B.A., Simmons, W.C. & Wray, D.A. 1923. *Geology of the country around Liverpool, Wirral and part of Flintshire* Coalfield. Memoirs of the Geological Survey.

Wedd, C.B. & King, 1924. W.B.R. *Geology of the country around Flint, Hawarden and Caergwrle*. Memoirs of the Geological Survey.

Hidden from View: stone from the medieval church at Morfil, north Pembrokeshire

Peter Claughton

The fabric of medieval churches in Wales is not always visible today, having been hidden from view by C19th rebuilding. On occasions there is the opportunity to examine that fabric in the course of archaeological investigation, as was the case at Morfil (or Morvil), in north Pembrokeshire. Morfil church and its associated churchyard are probably of early medieval origin. In the latter are two inscribed stones of that period and, whilst at least one of those is not in its original location, they are unlikely to have originated far from the church site. Documentary evidence is however scant but the *Taxacio* of 1291 does list a church at 'Morvin' which may relate to this parish. In 1875 the church was described as 'a perfect ruin' without roof, windows or door, and was subsequently rebuilt in 1885.

As part of the investigation in advance of conversion to a dwelling (ongoing) the ground to the west, and along the western part of the north wall of the church, were stripped back to identify the best routes for a service trench and associated drains. Below the turf and soil horizon was a spread of rubble from the original church structure, mixed with fragments of human bone from disturbed burials. Amongst the former were numerous fragments of Dundry Stone (confirmed by John Davies, *pers comm)*, some quite substantial with evidence of dressing for use in window reveals (Fig. 1).

Excavation around the north-west corner of the church also revealed the foundations of the medieval church, re-used in the rebuilding of 1885, although they had a slight misalignment with the later structure (Fig. 2). The fabric of the foundations, as seen, was almost entirely of unworked abraded rock. This was probably of local origin, collected

Fig. 1. Fragment of Dundry Stone © Peter Claughton.

Fig. 2. Morfil church © Peter Claughton.

Fig. 3. 45mm core © Peter Claughton.

from the surface scatter of glacial debris in the immediate area around the church, now best seen as the fabric of field boundaries in the area. An opportunity to examine the origins of one of the stones within the foundations, at the northern end of the west wall, was provided when a hole was drilled through the medieval foundations for the power cables, which produced a 45mm core (Fig. 3). The stone was a spotted dolerite boulder, possibly of local origin as a number of intrusions of that rock type (Ordovician microgabbro) cut across the high ground to the north and south of the church site.

References

Edwards, N. 2008 *A Corpus of Early Medieval Inscribed Stones and Stone Sculptures in Wales, Vol. II, South-West Wales*, Cardiff: University of Wales Press.

Llyfrgell Genedlaethol Cymru / The National Library of Wales, SD/D/887, Benefice: Morvil, 1875.

Lloyd, T., Orbach, J. and Scourfield, R. 2004 *The Buildings of Wales: Pembrokeshire*, New Haven/ London: Yale University Press

Ordnance Survey of Great Britain (OS), 1:50,000 mapping, Edina (web page) URL http://digimap.edina.ac.uk/roam/geology (accessed 8 April 2017)

Royal Commission on the Ancient and Historical Monuments of Wales 1925 *An Inventory of the Ancient Monuments in Wales and Monmouthshire VII - County of Pembroke*, London: HMSO

London Pavement Geology: no longer just a building stone resource for Londoners

Ruth Siddall

I have had a long-standing interest in building materials. This really began when I came under the influence of Eric Robinson whilst I was a PhD student at UCL in the early 1990s. Subsequently, my career as a geologist took me in the direction of Classical archaeology. Initially I was tasked with cataloguing the stone collection at the American School of Classical Studies, Athens (ASCSA) and then working on building materials on the archaeological site at Ancient Corinth. However, throughout that time, I have always kept a weather-eye out for British building stones and learned to identify them. I never really knew what to do with all this data and there was little encouragement within my academic department to pursue this activity.

I used my knowledge for building stone tours and started writing building stone guides for London. This is how Dave Wallis found me. Dave had been looking at ways to update Eric's walking tour guidebooks of London and had been thinking about this for a number of years, during which time, technology evolved. His ideas for a book turned into a CD-ROM and eventually a website. He had the ideas for a platform and I had the data. It was a perfect match and London Pavement Geology came into being. We both decided to focus on London initially, as the vast bulk of my data and observations were in London. The website was set up in 2015 and a smart-phone App version came on the scene in August 2016. We now have close to 2000 locations for Greater London. We had always hoped to expand the website to cover the whole of the United Kingdom, and indeed this was a stipulation of one of our key funders, the Geologists' Association. The web-version of 'London' Pavement Geology went UK- wide at the beginning of 2018.

The whole idea of London Pavement Geology is about stones that can be seen from the pavement, i.e. from walking around the built environment (and not necessarily paving stones). It started out as an outreach programme to increase interest in building stones, and to be honest, as an archive for the data I had collected myself. However, it has since become much more than that. In London the website has been used by the Survey of London and English Heritage as a resource for building and restoration materials. It has been used to record information for building stone town trails (for example data in Saffron Walden, Essex has been added by A-Level geology students from the local school). The project has also taken on a life of its own on social media, with close to 3000 followers, World-wide on Twitter (@pavementgeology).

There has always been a strong north Wales connection to this project. Dave lives in Deganwy and although

Fig. 1 Screen-shot of the data points for Caernarfon. Pins are colour coded to represent rock types (igneous, sedimentary and metamorphic) or a spectacular fossil location. © Ruth Siddall

now based in London, I am from Caernarfon. Our web and app developers, Livetech, are based in Llandudno. We currently have around 150 data points for Wales, the majority of which are in Caernarfon for rather obvious reasons. We would love to see more information added for Wales and would like to invite members of the Welsh Stone Forum to add data to further populate the website.

How to use the website to add building stone locations

At present the UK wide database can only be accessed via the website (and not the App, which takes submissions for the Greater London area only).

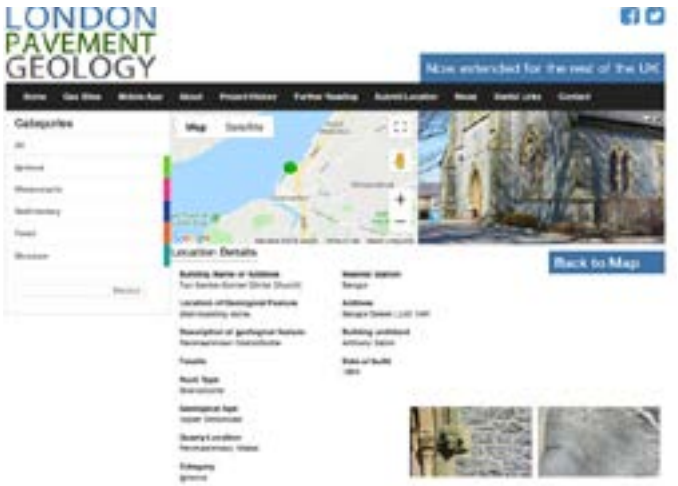


Fig.2 Clicking on a pin brings up building-specific information on the stones used© Ruth Siddall.

A building stone location can be submitted using the 'Submit Location' web form, accessed from the main menu of the website. Each location represent a single stone. Therefore, if you have a building which uses two types of stone you would input two locations for that building. Fill in the data in the boxes – information is self-explanatory (and a bluffer's guide is also available) and use the drag and drop pin to select the location on the map. As discussed above we keep the data as simple as possible, but if you wish to add further information, such as a reference or other source, then we can do that too – just add the text or hyper link to the 'Location of Geological Feature' box. I would also encourage contributors to name the person responsible for the stone identification.

Fig. 3. The main menu page of the London Pavement Geology website. Locations can be accessed via the 'Geosites' tab at the left and locations can be submitted via the 'Submit Location' tab (circled). © Ruth Siddall

You can then add up to four photographs of the buildings and details of the stonework.

The main rule is that this is geology that can be seen from the pavement or footpath, so it is about the exteriors of buildings (though we do include data on stone used inside shopping malls). For the sake of personal privacy, we do not include data on private houses or other private establishments, although exceptions are made if the homeowner gives explicit permission to be included or the outer wall of a private house is directly on a public street (with no intervening garden).

If you have a batch of data to submit, please feel free to contact me directly (email below) and I can send you an electronic spreadsheet which you can use to enter data for multiple locations. The website and information about downloading the App can be found at http://londonpavementgeology.co.uk

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St Gwynno's Church, Vaynor

Mike Statham

In October 2015 the Welsh Stone Forum, in conjunction with the South Wales Group of the Geologists' Association, held a field trip to the southern edge of the Brecon Beacons National Park. This included a visit to the church of St Gwynno, Vaynor near Merthyr Tydfil. The church is a replacement for an earlier medieval church, the ruins of which still stand nearby, and was designed by Cardiff architect G. E. Robinson c.1870. By the late 1960s the spire, which was originally stone roofed, was in danger of collapse and was replaced with a somewhat incongruous saddleback slated structure designed by George Pace. A photograph of the church, taken during this field trip (p.22 *Welsh Stone Forum Newsletter*.**13**), shows the church as it is today, whilst a photograph of the church with its original spire is shown in Fig.1.

Fig 1. St Gwynno's Church, Vaynor in 1970, prior to demolition. © W Clarke, Llandaff .

References

Newman, J. 1995. T*he Buildings of Wales – Glamorgan*. Penguin Books, London.

Another Tale of Stone Recycling

Mike Statham

In 1954 W.R.P.Clarke of Llandaff appealed for weathered old river cobbles and boulders from demolition works within a 10-mile radius of Llandaff. These were needed by Mr G.G.Pace, Llandaff Cathedral architect, for the construction of the Welch Regiment Memorial Chapel, which now links the cathedral to the adjacent Prebendal House.

Clarke had already obtained some material from the demolition of a row of cottages called Cambria Terrace on Ely Road, Llandaff. Fig.1 shows the cottages' location (1:2500 OS map,1st Edition) and Fig. 2 shows the demolition work in progress. More stones were obtained from the demolition of a building in Llandaff Fields and all of the material, amounting to about 150 tons, was piled up ready for use along the south wall of the cathedral, as illustrated by a photograph in The South Wales Echo of Monday September 20th 1954 (Fig 3). A further 150 tons was still required, hence the appeal**.**

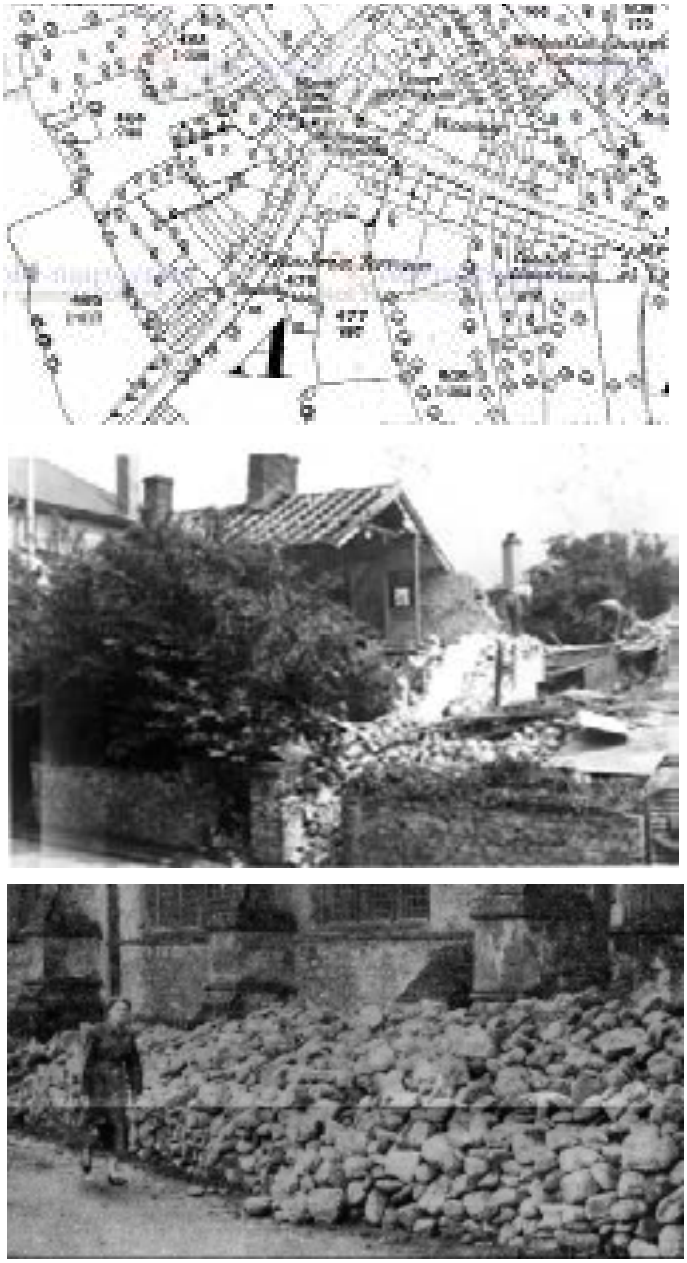

Fig. 1 (top) The 1st Edition OS 1:2500 map showing the location of Cambria Terrace. © old-maps.co.uk. Fig 2 .(middle) The demolition of Cambria Terrace in 1954. © W.Clarke, Llandaff. Fig. 3 (bottom) Piles of stone at Llandaff Cathedral, 1954. © South Wales Echo.

Locating the Source of the Stone Used to Build Cefn Cwnwr Almshouses, Llangeview, Monmouthshire

Mike Statham

Cwnwr Almshouses (ST 4110 9916), formerly Llangeview Parish and now Llantrisant Fawr Community, were originally built by Mr Roger Edwards (d.1624). They were rebuilt in 1825 in the late Georgian era to the design of Edward Haycock in Old Red Sandstone. Originally the L-shaped building comprised twelve cell-like dwellings and a chapel. By 1969 it had become derelict and fell into ruin. However, between 1996 and 2007, the Roger Edwards Charity refurbished the property with the aid of several grants, loans and gifts and converted it into five,

Fig. 1. Cwnwr almshouses, northeast elevation. © Mike Statham.

two bedroomed cottages. A view of the roughly northeast-facing elevation showing the former chapel entrance (red doorframe) can be seen in Fig. 1.

On page 4 of the Monmouthshire Merlin of 31 May 1862, there is an advertisement for the sale of three separate lots of land by Messrs Dowle and Stephens. Lot 2 is described as 'three closes of very useful pasture land, called Middle Carne, situate in the parish of Llangwm Ycha in the occupation of Mr Evan Jones as tenant' and goes on to say that it contained a quarry of very superior building and paving stone from which the stone used to build the Almshouses at Coedcwnnwr (sic) had all been procured.

Neither the tithe map (1848) nor the apportionment of Llangwm (1845) mention Middle Carne or Mr Evan Jones, but the Ordnance Survey maps from 1902 onwards, including the latest 1:25,000 Explorer map 152 for Newport and Pontypool, show Carna Cottage at ST 4164 9934, some 550m roughly east of the almshouses. Also, the latest British Geological Survey map for the area (Sheet 250) shows an outcrop in the St Maughans Group of the Old Red Sandstone dipping 10° roughly south east at ST 4178 9925, about 150m further east. All the historical Ordnance Survey maps show the locality to be an area of trees in the centre of a field and a recent colour aerial photograph on Google Earth shows the locality to be an area of trees in the centre of a ploughed field.

This is my best guess for the likely location of the quarry. Does anyone have any other ideas or confirmatory or conflicting information please?

References

http://www.llangwm.org.uk/church/almshouse.html

http://www.coflein.gov.uk/en/site/36696/details/coed-cwnwr-almshouses

Newman, J., 2002. The Buildings of Wales – Gwent/ Monmouthshire. Yale University Press.

Use of the Limestones of the Bull Cliff Member (Jurassic, Blue Lias)

Mike Statham & Chris Lee

In the 2017 Welsh Stone Forum Newsletter (Statham 2017) it was reported that the flaggy beds of limestone from the horizon known as the *Bull Cliff Member* (Waters *et al*.,1987) found at the base of the Blue Lias were used for ledger stones and wall memorials in many of the churches on the coastal fringe of east Glamorganshire, the material being known locally as 'Bull Cliff Marble'[1]. Those so far identified date from the C17th to the C19th.

This so called 'marble' is a tabular, very dark grey, fine-grained (calcilutite/bio-micrite/bio-lime mudstone) capable of taking a polish and robust enough for intricate carving and lettering. The white calcite of the epi-faunal oysters gives the bedding surfaces a characteristic appearance while the in-faunal bivalves (e.g. *Modiolus sp*.), disarticulated and convex valve up, give a characteristic texture in profile.

Limestones from this horizon were exploited for construction from early times. The Romans certainly utilised this material at The Knap near Barry [ST 099 665] where there are the remains of a late C3rd building, possibly a 'mansio', a place for the comfort of travellers (Fig. 1). It is also seen in the original Roman wall at Cardiff Castle where, anecdotally, the stone was derived from a cliff-top quarry at Penarth Head [ST 191 721].

Beds from this member showing a profusion of the oyster *Liostrea hisingeri* are also seen as indoor floors and outside pavements at Cosmeston Medieval village [ST 177 689] (Fig. 2), where they are dated in their correct archaeological context as C13th (Forward, 2013). The Bull Cliff Member occurs close to the surface at Cosmeston and are well exposed in the cliffs and on the beach at Lavernock Point [ST 189 681]. Fig. 3 shows the full sequence of the Bull Cliff Member in the cliffs and Fig. 4 slabs exposed on the beach.

During restoration work in the summer of 2018, similar Medieval flooring was revealed beneath Victorian timber floors at St Peter's church, Old Cogan (Fig. 5). The Bull Cliff Member outcrops close by at Cwrt-y-Vil [ST 176 705].

At St Cadoc's church, Cadoxton, Barry, where the whole Medieval church appears to be constructed from stone from the Bull Cliff Member, the same oyster-rich beds are seen exposed in the floor of the sanctuary and have also been found beneath the carpets in the nave (Fig. 7). The source of this building stone is not known but the church is immediately across the road from a Carboniferous Limestone quarry, which perhaps was thought unsuitable or didn't exist at the time of building.

In the garden of Dunster Cottage, Sully [ST 151 682] there are former pigsties which date to the C19th floored






Fig. 1. Roman remains, the Knapp, Barry © Mike Statham. Fig. 2. Paving stones, Cosmeston Medieval Village © Mike Statham. Fig. 3. The Bull Cliff Member, Lavernock Point © Mike Statham. Fig. 4. Slabs of Bull Cliff member limestones, Lavernock Point © Mike Statham. Fig. 5. Medieval floor, St Peter's Church, Cogan © Mike Statham. Fig. 6. Pigsties, Dunster Cottage © Mike Statham.

in similar material (Fig. 6). Sully is somewhat distant from the outcrop of the Bull Cliff Member and most of the stone used for building the late Georgian to early Victorian buildings in this area, including Dunster Cottage, are made of local dolomitic calc-arenites derived from the Triassic marginal facies. It is possible that here stone from the Bull Cliff member was obtained from St John's church opposite, as there were minor works undertaken there when it was re-roofed in 1895 (Newman, 1995). However, Sell, in his report on the excavations at Sully Castle (Sell, 1990), a building that had been systematically robbed for stone over the centuries, states that Lias slabs were found in the Inner Courtyard. Hence the pigsty flooring may have been sourced from the castle, which is immediately adjacent to the church and the cottage.

The large Cwrt-y-Vil quarry, in Lower Penarth, formerly worked the Bull Cliff Member and it was used extensively in the building of Victorian and Edwardian Penarth. The substantial quarries on either side of Lavernock Road, at Cosmeston, also exploited the Liassic limestones down to the base of the Bull Cliff Member but although some stone was used for building, here the production of

Fig. 6. Medieval flooring, Cadoxton Church © Mike Statham.

Portland Cement was the major activity. Records of both these quarries are held by Glamorgan Archives and may prove of interest in future research.

Footnote 1.
The earliest record of the extraction of 'marble' at the Bull Cliff near Porthkerry [ST 090 667] is found in the account of a tour through south-eastern Vale of Glamorgan made by Edward Williams (more often known as Iolo Morgannwg) in April 1780. National Library of Wales MS 21,413E.

References

Forward, A., 2013. *The ceramic evidence for economic life & networks from 12th -17th century settlement sites in South Glamorgan.* Ph.D. (unpub). Cardiff University.

Newman, John. 1995. *The Buildings of Wales – Glamorgan*. Penguin.

Sell, S.H. 1990, Excavations at Sully Castle 1963-69. *The Bulletin of the Board of Celtic Studies* Vol XXXVII.

Statham, Mike. Bull Cliff Marble. 2017. *Welsh Stone Forum Newsletter,* **14,** 2.

Waters, K.A. & Lawrence, D.J.D., 1987. *Geology of the South Wales Coalfield Part III. The country around Cardiff*. 3rd Ed. HMSO.

Alabaster Update

Michael Statham

A rediscovery

On page 31 of Penarth Alabaster (Statham, 2017) there is a description of alabaster work at St Luke's church, Pontnewydd. The name of the church is correct, but the location is a typographical error and should read Pontnewynydd. The reredos of this church is on record as having been made of Penarth and Derbyshire alabaster. On page 32 of the book is a coloured drawing of a pulpit said to have been for Pontnewydd (again a typo error) found in W. Clarke's archive in Llandaff. The two-tone colouring indicated that this also may have been constructed of both

Fig. 1. The font, St John the Baptist Roman Catholic church, Trowbridge, Wiltshire. ©Julian Orbach. Fig. 2. The pulpit, St John the Baptist Roman Catholic church, Trowbridge, Wiltshire. ©Julian Orbach. Fig. 3. The reredos, St John the Baptist Roman Catholic church, Trowbridge, Wiltshire. ©Julian Orbach.

Derbyshire and Penarth alabasters. However, the church was demolished in the early 1990s and, at the time of writing the book, the fate of the fittings in the church had not been determined. I asked the staff Torfaen Museum, Pontypool for information and they found some excellent quality colour photographs of the reredos, pulpit and font (Fig. 1) that had been donated to the museum . From these photographs it can plainly be seen that the reredos was indeed made of Penarth and Derbyshire alabaster but the alabaster work in the pulpit and the font was all of the Derbyshire type. Clarke's drawing of the pulpit was, therefore, obviously a working drawing and not as built.

The photographs were forwarded to Julian Orbach, who identified that the fittings are now in St John the Baptist Roman Catholic church in Trowbridge, Wiltshire. The font (Fig. 2) is unaltered, the pulpit (Fig. 3) has been cut down in height and, as St John's already had a reredos, parts of the Pontnewynydd reredos were used to form the front of the altar (Fig. 4). According to the former parish priest at St John's, the fittings were purchased through an agent based in Birmingham and were transferred from Pontnewynydd by a firm of stone masons based in Bath in 1991/2.Torfaen Museum has posted this item on Facebook, see:- https://www.facebook.com/224457627568466/photos/

A new discovery

Since the publication of the last *Newsletter* there has been one completely new discovery of work in Penarth alabaster. This is in the entrance hall of a house in Penarth. The house has been researched and the alabaster work probably dates to the 1890s. The owners have requested that the exact location is not publicised.

Sweldon Stone

Jana Horak

Sweldon Stone is a little known building stone, used locally in Cardiff in the late C19th. It is a variety of grey, to pink-tinged limestone from the local Carboniferous age Pembrokeshire Limestone Group succession. It is mentioned in Newman (1995) but is misspelt as Swelldon Stone.

The stone appears to have been extracted from a single quarry at Sweldon fâch (Strahan & Cantrill, 1902), in the Culverhouse Cross area of west Cardiff. The most recent geological map (BGS, 1986) marks this as being in the Barry Harbour Limestone Formation, the basal division of the Black Rock Limestone Subgroup. It is a grey skeletal packstone (a limestone with carbonate grains typically less than 2mm and with a grain supported texture) with partings of calcareous mudstone. It contains crinoidal lag deposits, where fossil material has been concentrated by currents, and also contains brachiopods and lenses of chert (Fig, 1.). The stone has a pinkish colour from hematite staining. This is probably linked to dolomitisation, which reduces the volume of the rock and provides a permeability for the ingress of iron rich-fluids. The pink colouration may be patchy and in general, unlike Creigiau Stone, is a subtle tinge not an intense colour.

Fig. 1. Composite image of Sweldon Stone. Left, walling St James', with Bath Stone dressings. Top right, grey and pink varieties of the stone with chert nodules. Bottom right, crinoidal lag material in grey limestone. Both close up images St German's.

Fig. 2. Pink Sweldon Stone. Walling St German's church, Splott.

The quarry from which this stone was worked at Culverhouse Cross was located at the A48 and A4232 link road junction. From the 1880s Ordinance Survey map a quarry in the limestone is seen to have a footprint of approximately 180m^2 but by 1900 this has increased to 670m^2. The 1920 map indicates that the quarry was abandoned (although the 1910 map was not accessed), and the footprint remains the same on subsequent versions of the maps. The quarry was filled in and develop by the 1970s and is now the site of a B&Q store.

There is little reference to the quarry in the archives, although the land on which the quarry is cited was sold off by auction, in 1882, as a lot (No 21) from the Llandaff House Estate. At the time of sale it was rented by William Smith who paid an annual rent of £37 10s. There is no indication that the quarrying was for building stone rather than lime at this time.

Several examples of the use of Sweldon Stone in buildings are documented in Newman (1995). Two of the earliest examples cited were built by the Gothic Revival architects Bodley and Garner; St German of Auxerre's (Metal Street, Splott) (Fig. 2), and St Saviour's (Splott Road) built in 1881-4 and 1887-8 respectively (Bodley also built the adjacent St Agnes' Clergy House, 1893-4). St Andrew & St Teilo's (Woodville Road, Cathays) is contemporary with these, but built by G. E. Halliday in 1883. All have snecked, rock-faced, coursed walling paired with Bath Stone dressings and slate roofing. The latest example is St James the Great (Newport Road) (Fig.1) , now deconsecrated, but built by E. M. Vaughan 1892-3. Newman (1986) indicates that the use of the stone in this church and the architecture were influenced by Bodely's work at St German. Sweldon Stone was also used by Kepson & Fowler, for the walling of two additional aisles and resurfacing of the west end and north aisle of St John the Baptist church (St John's Street) around 1889-1891 (Newman, 1995).

Similar pinked stained limestone is seen in other locations around Cardiff. Perkins (1984) notes that the Great Western Hotel, built in 1875, has walling ~~is~~ of this type, but concludes that the more intense pink colour suggests Creigiau Stone rather than Sweldon. Creigiau Stone will be dealt with in more detail, as will the petrology of the iron staining, in a future paper.

References

BGS, 1986. Sheet 263, 1:50,000 geological map of Cardiff, (solid).

Newman, J., 1995. The Buildings of Wales, Glamorgan, Penguin Books, London, 717pp.

Perkins, J,.W., 1984. *The Building Stones of Cardiff.* University College Cardiff Press, 96 pp.

Strahan, A. & Cantrill, T.C., 1902. T*he Geology of the South Wales Coal-field , The country around Cardiff* (Sheet 263 of the map), Geological Survey.

AGM Aberystwyth
April 2018

John Shipton

In July 2017 it was announced - a £10m National Lottery Grant had been awarded to restore the C19th Grade 1 listed University Old College Building in Aberystwyth. Prior to the work starting Tim Palmer suggested that it would be a good venue for the Stone Forum's 2018 AGM. He also agreed to give the lecture following the AGM.

In his lecture Tim informed us that the building had a chequered history. It had started life as Castle House but this building was replaced by John Nash at the end of the C18th with the Old College Building. The building was sold in 1864 to Thomas Savin who intended turning it into a hotel. However, he was beset with financial problems and the building was sold in 1872 at a knock down price to the University of Wales. In 1885 the building was badly damaged by fire and, as no public funds were available, the University Board had to fund the reconstruction. However, the Architect hired for the project, J.P. Seddon, was fired as his proposed scheme was deemed to be too expensive. The building was eventually finished and although the majority of teaching was moved to a new site in the 1960's the university's Administration Department remained in the Old College building. In 1961 the building was granted Grade 1 listing status.

The 1880s building is constructed of blocks of Cefn Sandstone with Box Ground Bath Stone dressings. The column-like mullions are of Hanham Blue, a Pennant Sandstone from the Avon valley near Bristol, but also have bands of Portland Stone. Above the bankruptcy levels (circa1887) Doulting Stone was used in the dressings and the walls are built of blocks of artificial stone (concrete). Internally the columns are fashioned from brown Devonshire Marble, a polished limestone from the Torquay-Plymouth area, and green serpentine from the Lizard in Cornwall. The 1895 Ferguson Block is built of Grinshill Sandstone but inside Ransome's Artificial stone was used for details in fireplace hoods etc. There is also some use of Ransome's Stone in the chimneys on the south end. At the end of the lecture some members spent a little time outside inspecting the degradation of the stone, much of which was felt to be beyond conserving and, for structural reasons, would need replacing.

Following lunch we made our way to a large country house near Llanilar. The house is currently used as a Care Home and, although originally having been quite grand, lack of maintenance had taken its toll and the Doulting Stone used in the porch is badly decayed due to a blocked gutter. However, we were here to view the inside where some exotic marbles have been used. One of the day rooms has a striking fireplace surround containing an

Fig.1 (right) Pink marble columns in the fireplace at Llanilar (©John Shipton). Fig.2 (left) Columns in the day room, Llanilar (©John Shipton).

unknown pink marble (Fig. 1), that was suggested might possibly be French. Columns in the same room are of three different stones; the shafts are a brown marble that is either French or Italian with bands of white Carrara Marble, while the bases are of grey Ashburton Stone from south Devon (Fig. 2). Before leaving we viewed a circular stone window containing seven smaller circular stained glass windows that detail the seven Lamps of Architecture. Unfortunately, the large centre window had lost its stained glass detail and was glazed in clear glass.

Leaving Llanilar we headed back towards Aberystwyth and the Parish Church of St Padan at Llanbadarn Fawr, which the Forum had previously visited in June 2009. Major reconstruction work was undertaken here by J.P. Seddon during the second half of the C19th. Starting around 1867 he took down the front walls to window cill height as they had developed a frightening lean of as much as 20 inches from the perpendicular. The rebuild used much of the original masonry and although many of the original window jambs, that Andrew thought were of Gwesper Sandstone, survived the heads and cills had C19th replacements. While viewing the rebuilt front wall an interesting cross-shaped gravestone was spotted to the right of the porch. There was a lengthy discussion about what the stone might be. Following detailed examination it was agreed that it was probably an artificial stone.

Fig.3 The entrance porch to the church of St Padarn, Llanbadarn Fawr (©John Shipton).

Fig. 4. The font, church of St Padarn, Llanbadarn Fawr (©John Shipton).

Entering the church through the C19th porch it was noted that the walls are of Llandewi Breffi Bluestone, the step of Radyr Stone and the arched entrance dressings of Dundry Stone (Fig. 3). The ancient font has a top of Purbeck Marble, a middle section of Gwesper Sandstone and the bottom of what was thought might be Esgryn Sandstone (Fig. 4). The nave and chancel floors are finished in mosaics and Luggwardine tiles with some Devon Marble edges. Finally, before leaving most members spent some time inspecting the modern Peter Lord work in the chapel before thanking Tim for providing the talk and organising the visits.

Field Meeting Reports

Radyr and Penarth
May 2018

John Shipton

In October 2016 the Forum visited Vaynor church, north of Merthyr Tydfil. In the churchyard we viewed the grave of the Iron Master, Robert Thompson Crawshay, which was capped with an enormous block of Radyr Stone, a Triassic age breccio-conglomerate from a quarry at Radyr in north Cardiff. Today we were to visit the quarry from where this huge grave slab was won.

Radyr Quarry was worked from the 1850s to 1908. Much of its production went to build Penarth Dock as well as railway bridges and other industrial structures, which were being built at the time. Because of the quarry's proximity to the railway line the stone could be easily transported around the rail system. Although officially closed some stone was removed post 1908 when, during WW1, stone was taken for use at Insole Court in Cardiff.

Members met near Radyr Station and walked south to the quarry that is hidden in woodland and half filled with household refuse. On the way we passed Junction Terrace, a row of cottages built for rail workers in 1862 using Radyr Stone and yellow brick (Fig. 1). Blocks of Radyr Stone in the cottage gables displayed typical degradation of the stone, aggravated by the use of an inappropriate hard cementatious mortar.

The woodland to the north of the quarry is now a well laid out nature area, which made for a pleasant walk before reaching the jumble of trees and undergrowth that surrounds the quarry. Although much overgrown it is clear from the exposed quarry faces why the stone was popular due to the thickness of the beds available. Drill holes from the quarrying work are still clearly visible in the quarry face. It became clear how much stone had been removed when Mike Statham informed us that the top

Fig. 1 Houses in Junction Terrace, Radyr, built of Radyr Stone (©John Shipton).

of the underlying Devonian mudstones was 60ft below where we stood. These mudstones had also been quarried for a short time to make bricks.

Steve Howe explained that at the end of the Carboniferous a period of mountain building folded the Palaeozoic rocks, which in south Wales led to the formation of the basin of the south Wales Coalfield and an anticlinal ridge running E/W through the Vale of Glamorgan. There followed a lengthy period of erosion under a hot and arid climate, during which the proto-Taff valley was formed. In late Triassic times occasional, heavy storms washed the eroded debris off the hills and down into the valleys (wadis) creating large alluvial fans. The stronger the flow of water the larger the pieces of debris that could be moved but as the flow decreased only finer material could be carried, which created beds of rock that fine in grain size upwards. Large pebbles, mainly of grey Carboniferous Limestone and red Old Red Sandstone, are clearly visible at the bottom of the beds in the quarry face (Fig. 2). These are set in a generally red matrix and calcite cement, which is derived from the Carboniferous Limestone. The beds fine upwards and some show evidence of more than one storm event. They are also thicker to the west and thin eastwards. A similar Triassic stone is found at Plymouth Woods near St Fagans.

Fig. 2 (top) Coarse Radyr Stone in Radyr Quarry face (©John Shipton). Fig. 3 (bottom) Red sandstones from the Wilderness Quarry, Gloucestershire. St Michael's and all Angels Theological College, Llandaff. (©John Shipton).

Having a lot of ground to cover we moved on to Rookwood Hospital. This was built in 1860 for Colonel Hill in Radyr Stone with yellow Bath Stone dressings. In an overgrown corner of the gardens there is a gazebo (possibly an ice house) that predates Rockwood House. Close inspection was not possible as it was fenced off but it was thought to be C18th and built of Liassic limestone, possibly reused from Llandaff House. Walking from Rookwood Hospital into Llandaff it was clear how much Radyr Stone had been used in the local buildings and in numerous ways; as pillar caps, dressed stone quoins, window cills, wall copings and as rubble in walls.

On Cardiff Road the Theological College of St Michael and all Angels, is built of a different red sandstone (Fig. 3) that was thought at the time to be either a Triassic sandstone from the English Midlands or a Devonian sandstone from the Wilderness Quarry at East of Micheldean, Gloucestershire. Subsequent research suggests that it is from the latter, a site which the Forum had visited in May 2010 when the quarry was still producing stone. Although the stone used in the College walls is predominantly red, some blocks contain grey-green banding. The red colour is due to oxidation of the iron to the ferric form while the green colour is due to oxidation to the ferrous form. At the rear of the college the walls are built of glacial erratics

Fig. 4 (top left) St Andrew's Church, Penarth (©John Shipton).

Fig. 5 (bottom left) Radyr Stone pillars, St Andrew's Church, Penarth (©John Shipton). Fig. 6 (top right) The font, St Andrew's Church, Penarth (©John Shipton).

and river cobbles with quoins of Radyr Stone. After lunch Mike Statham and I spotted a couple of very large blocks of re-used Radyr Stone on the corner of Chapel Street, that seemed to serve no other purpose than to stop pedestrians taking a short cut across the front of the property!

The afternoon was spent in Penarth and on the way we passed St Josephs Catholic Church where Radyr Stone had been used in external details. Our first stop was St Augustine's Church, perched high on a hill with extensive views across Cardiff Bay and inland to the Brecon Beacons, that the Forum had previously visited on a very wet day following the 2013 AGM (Fig. 4). The fabric of the church was built between 1865 and 1866 using coursed blocks of local Liassic limestone and dressings of a Jurassic limestone. At high level in the tower, and on either side of the east door, Radyr Stone has been used to form long, small diameter columns. These are not fairing well and are degrading badly.

On our previous visit the church was locked. Today, however, it was open and we were able to admire the impressive large columns of Radyr Stone, some round and some octagonal. Radyr Stone has also been used with a yellow Jurassic limestone to create a polychromatic effect in the gothic arches (Fig. 5). The Jurassic limestone is possibly Painswick Stone, an Inferior Oolite limestone from Gloucestershire, characterised by exhibiting surfaces on which many of the ooliths have fallen out, leaving a dimpled surface. The Rerodos was quite striking, containing marbles in strong colours cut in geometric shapes to create a fairly modern effect. Nearby is a font in a Jurassic oolitic limestone and conglomeratic Radyr Stone,that has short black painted columns (Fig. 6).

Our final visit was to the old Penarth Dock, built between 1859 and 1865 to rival the Cardiff docks and the Marques of Bute's coal exports, that is now a modern marina enclosed within the Cardiff Bay Barrage. Vast amounts of Radyr Stone were used to construct the dock walls and quay sides, some consisting of very large blocks. Some blocks contain very large pebbles, almost as large as half bricks. Cornish granite was used as curbs to the edge of dock.

Usk, June 2018

John Shipton

On a previous Stone Forum visit to Usk in June 2013 we were unable to gain access to the castle as on the day of our visit there was a wedding ceremony in the grounds, but not this time. We assembled in the castle car park where Jana explained the geology of the area. The castle sits on an anticline that runs roughly NE/SW, and the town on Devonian and Silurian strata that form the Usk Inlier. Within the Silurian strata are the Wenlock Limestone and Amestry Limestone formations. These rocks can vary greatly and around Usk are mostly grey/green coloured silts and mudstones, which are generally used for rubble

Fig. 1 (top) Banded sandstone in a fireplace, Usk Castle (©John Shipton). Fig. 2 (top right) Replacement sandstones in door jamb, possibly Red Wilderness Stone, Usk Castle (©John Shipton). Fig. 3 (bottom left) Tufa block in the wall of St Madoc's Church (©John Shipton). Fig. 4 (top opposite page) Large slabs of St Maughan's sandstone, St Madoc's Church (©John Shipton).

walling and lime burning. The Devonian rocks provide much better building stones and are widely used for building in the area.

We made our way up to the castle pausing briefly below the Great Keep before entering the castle. The keep had previously been a gatehouse and although Bath Stone was used in the C15th and in some recent repairs the stone work of the keep is dominantly of Devonian sandstones. Blocks of Devonian sandstone have also been used in the C12th doorjambs, a buff coloured sandstone around a C15th fire place and banded sandstone in another C15th fire place (Fig. 1). John Davies explained that deposition of the sandstones in the Devonian was cyclical, each cycle producing coarse pebble beds at first that then fine upwards. He also pointed out that most of the quarries marked on the 1:25,000 maps are located on the outcrop of the St Maughans Formation with a few on the Downton Castle Formation. There was so much pebbly Old Red Sandstone in the gatehouse that John suggested that these could well have come from a local source.

Pevsner reported that in the Garrison Tower Sudbrook Sandstone, that outcrops on the banks of the River Severn at Sudbrook, had been used for the dressings but we were unable to identify any. Blocks of Dundry Stone occur in the walls where rebuilding has taken place. In the walls adjacent to the Garrison Tower calcareous limestone nodules are present in the siltstones while brachiopods occur in the C13th Silurian limestone rubble walling.

The north end gable wall of the castle hall has been rebuilt using Silurian siltstone rubble but, being exposed to the elements, it is not fairing well and would probably have originally been rendered. Stone from the hall, built around 1320, has been robbed for use elsewhere and the room has fallen into disrepair. The stone jambs and vousoirs to the door at the west end have been replaced in recent times with new blocks of sandstone, thought to be Red Wilderness Stone from the Forest of Dean (Fig. 2). A fireplace in the northwest wall, inserted during the C15th, has similar replacements but as it is situated at first floor level access for close inspection was not possible. To

the east of the hall, where the C13th chapel once stood, the C13th curtain wall contains many rounded boulders/ cobbles that would almost certainly have been collected from nearby.

Following lunch we set off for St Madoc's Church at Llanbadoc, just outside Usk. Jana explained that the church sits on the boundary between Silurian (Ludlow) and Devonian (Raglan Mudstone Formation) strata. Outside the church John pointed out the tiles on the roof, which he thought were probably from the St Maughans Formation. John and Jana then explained the difference between the terms stone tiles and Tilestones, explaining that stone tiles are natural tiles that can be of any suitable flaggy stone, whereas Tilestones refers to stone from the Tilestone Formation, which is a flaggy micaceous sandstone that occurs at the very bottom of the Old Red Sandstone and in the Silurian Downton Castle Formation. We also found a block of tufa in a buttress (Fig. 3) and a grey, gritty St Maughans sandstone, from the bottom of the sequence, which weathers to a maroon colour. Although much of the church is medieval and built from a mixture of Silurian and Devonian rocks, John Prichard added a north aisle and carried out extensive rebuilding internally employing different stone in the late C19th.

Moving inside the church we noted Bath Stone window jambs in the north aisle that appear to have been sandblasted in recent years. The columns and arches added by John Pritchard appear to be of a Yorkshire sandstone. The pulpit was thought to either be a non-fossiliferous Portland Stone or possibly Caen Stone from northern France, while the font is cut from a block of St Maughans sandstone.

Returning outside large blocks of St Maughans Formation sandstones (Fig. 4) have been used in the quoins and dressings to a window adjacent to porch. Replacement work to this window has been in a grey/green sandstone thought to be Forest of Dean Pennant. These replacements looked somewhat incongruous but it was probably chosen because of its availability.

Pembrokeshire slate
21st July 2018

John Shipton

Pembrokeshire slate derived from Ordovician sediments, which were metamorphosed during Silurian deformation and metamorphism. Although relatively unknown these days, it was available in a wide range of colours and was very much in demand throughout the UK in the second half of the C19th and early C20th. The slate is of variable quality with much of it only being suitable for building. Our visit was to two quarries in north Pembrokeshire that had produced large quantities of good quality roofing slates.

Despite it being one of the driest Pembrokeshire summers in recent years we met in a very damp, misty car park at Rosebush, where Peter Claughton explained that the local quarries were worked from the 1820s and the nearby 'Tafan Zinc' was built for the tourist trade but never really got of the ground. Led by Peter and Robin Shelldrake we set off to view the quarries, passing the quarry manager's house that has, in recent years, been used as a Post Office and a Bistro but is now closed and up for sale. Further along the track we passed a terrace containing about a dozen cottages originally built to house quarry workers.

Leaving the track we climbed the quarry waste dumps to inspect the tramway tunnel before carefully retracing our steps to the track and the main slate dressing sheds. Peter explained that from the 1880s the machinery in the dressing sheds had been powered by a water driven turbine. Making our way up a stone path we eventually arrived at a deep clear pond that was used as a header tank for the water driven turbine. Peter pointed out that there were originally two quarries at Rosebush, the main Rosebush Quarry and the Bellstone Quarry and suggested that anyone wishing to know more about Pembrokeshire slate production should read Gordon and Mary Tuckers History of Slate Quarrying in Pembrokeshire.

Continuing along the track we eventually reached the most extensive quarry pit at Rosebush, the back of which rose up in an impressive array of terraces from where the slate was quarried (Fig. 1). Tim Palmer explained that not all 'slate' has the fissile quality to technically be called slate, before explaining that slate was a metamorphic

rock in which the minerals in the original layers of mud changed when they were subjected to heat and pressure. This caused clay mineral flakes to grow in the rock perpendicular to the compression, which might not correspond to the original sedimentary layering. Peter and Robin discussed the ancient use of Pembrokeshire Slate, which has been found in many archaeological excavations throughout south Wales, including some grey-green samples in excavations at the Roman City of Caerwent.

Moving on to the adjacent Bellstone Quarry Peter explained that prior to the mid C19th Rosebush and Bellstone had been run as separate entities. Bellstone had its own shaping and splitting areas but in the 1880s Bellstone was abandoned and efforts were concentrated on the larger Rosebush Quarry. We retraced our steps back towards the Tafan Zinc where we were to take lunch. Inside Robin laid out examples of Rosebush, Llongolman and Caernarfon slate for comparison, all of which had been taken from local roofs and clearly demonstrated the variations in colour and texture. It is claimed that Llangolman slate was used to roof the Houses of Parliament during the 1830s rebuild.

After lunch we set off for the Gilfach quarry at Llangolman, stopping at Maenchlochog to view the dilapidated Castle Hotel, where slate from the Rosebush Quarry had been used in vertical tile hangings on the walls. Beneath the pale flaking paint the slates were almost black in colour (Fig. 2).

Fig. 1 (top left) Terraces in Rosebush Quarry (©John Shipton). Fig. 2 (bottom left) Sate tiles on the former Castle Hotel, Maenchlochog (©John Shipton). Fig. 3 (right) Llangolman slate (©John Shipton)

Reaching Llangolman we parked at the old garage, where a similarly dilapidated house nearby had been roofed with Llangolman tiles, some of which had fallen from the roof allowing us to get a close look. The slates had heavily chamfered shoulders, a detail typical of top fixing that allows the slates to sit more comfortably, these having been fixed using pegs on wooden laths (Fig. 3). Under brighter skies we made our way down to the Gilfach Quarry workings. The quarry was much overgrown and, unlike Rosebush Quarry where the terraces from where tbe worked before departing for our homes.

Flintshire & Denbighshire 8th & 9th September 2018

John Shipton

This two-day trip, led by Andrew Haycock and Tim Palmer, was a continuation of the north Wales trip from the previous year. Our first visit was to St Margaret's Church (the Marble Church) at Bodelwyddan. It was built at the expense of Lady Margaret Willougby de Broke in memory of her husband between 1856 – 60 in a limestone from the Clwyd Limestone Group (Carboniferous) from Lladdulas, possibly from a quarry at Tan y Gopa. Early arrivals were able to view the rows of Portland Stone war graves. A nearby information panel informed that although more than 30 of the headstones marked the graves of British soldiers, the majority marked the graves of Canadian service men who died during the influenza pandemic that reached the nearby Kinmel military camp in late 1918. Amongst the war graves stands a war memorial to the Canadian soldiers in a red/brown-coloured sandstone that Andrew said was from the Kinnerton Sandstone Formation.

Entering the church we noted the shafts of Peterhead Granite that flank the west door (Fig. 1). Inside, although the majority of dressings are of limestone, the walls are built of fine, green-grey Gwespyr ashlars. Some of these, near the entrance and windows, are degrading probably due to penetration of rain water from the outside. Passing through the tower arch we saw mottled Penmon Marble from Anglesey used in four columns, with large brachiopod fossils clearly visible in the brown-grey columns (Fig. 2). Tim explained that the mottling to Penmon Marble was created when 'scampi'- like creatures dug burrows in the mud that eventually solidified into limestone.

The nave columns are all of a Belgian red marble, probably Rance (Fig. 3). White calcite has filled cracks in the red sediment when the mud was still soft. Llanddulas limestone has been used for the nave column bases and capitals. In a corner, at the back of the church, stands an ornate font in the form of two young girls holding a large clam shell carved from white Carrara Marble that stands on a Belgian red marble base. Mike Statham said he believed it was a variation of the 'Angel Font'.

Moving up to the chancel French Languedoc (red) marble has been used in shafts of the arcades (Fig. 4). The shafts sit on bases of Purbeck Marble and the capitals are of Carrara Marble. Two English alabasters have been used for the arcade panels and the canopies were thought to be of Caen Stone. French Red Griotte Marble has been used for the chancel arch and vaulting shafts. The stone has a dark red matrix and Tim pointed out individual floating nodules containing fossil goniatites, while fillets of black Kilkenny Marble have been let into individual columns. The chancel floor is of Carrara, Kilkenny and Belgian Red marbles while the arcading to the reredos has shafts of Rouge Languedoc (French Devonian marble) but the canopies are of English Alabaster and the panels upon which the Ten Commandments were inscribed are of Grey Tuscan Bardiglio.

After lunch we drove to Rhuddlan Castle. After the riot of coloured limestones that we had been exposed to in the morning the day probably seemed duller than it actually was. Standing outside the castle, built between 1277 and 1282, Andrew explained that four main stones were used in its construction. These are: Carboniferous Limestone, possibly from Moel Hiraddug, Dyserth; red Cheshire sandstone, which lies above the productive Coal Measures; purple Elwy Sandstone and a yellow-green Gwespyr Sandstone. He explained that during medieval times sea levels were higher than today and transport of stone to the castle would have been easier by sea. Although Rhuddlan sits on Triassic rock it is covered by drift and alluvium.

We congregated at the west gatehouse (Fig. 5) and found that it was built predominately of Gwespyr Sandstone with some Carboniferous Limestone and Triassic sandstone banding. Externally the freestone was the Elwy Sandstone but the internal window dressings are of red Cheshire sandstone. It was noted that both sandstones were wearing differently with more surface flaking on the Carboniferous age sandstone leaving the grains standing proud. Within the curtain walls blocks of Carboniferous Limestone had been used to face the majority of the upper wall but lower down flaggy Gwespyr Sandstone had been used. It was suggested that this flaggy stone had come from the lower part of the Gwespyr Sandstone. Past removal of stone from the east tower had left it in danger of collapse but the modern insertion of a support wall, built of blocks of Carboniferous Limestone, had arrested its collapse.

We moved on to the village of Llanasa and the church of St Asaph and St Cyndeyrn. The village is built almost entirely of Gwespyr Sandstone and members soon spotted an ornate gate post, cut from fine grained Gwespyr Sandstone, opposite the church. The church is built of buff-yellow Gwespyr Sandstone and Carboniferous Limestone with some gritty boulders. These look like Anglesey Grit from the Carboniferous Limestone of Anglesey. They were initially thought to be a gritty-pebble conglomerate unit within the Gwespyr Sandstone, but closer inspection revealed crinoid fossils and a carbonate cement, so these blocks may well be an equivalent channel-fill deposit from the local Carboniferous Limestone. New dressings in the porch and windows of the south aisle are of Gwespyr Sandstone but an older window on the east elevation contains dressings in a mottled sandstone, possibly Triassic, but identification was uncertain. Some replacement stones in the same window are of a grey-green sandstone that looks very much like Forpotted more blocks of gritty limestone that contained crinoid fossils.

Fig. 1 (top left) Peterhead Granite shafts in the porch to St Margaret's church, Bodelwyddan (©John Shipton).Fig. 2 (bottom left) Penmon Marble shafts, St Margaret's church, Bodelwyddan (©John Shipton). Fig. 3 (top right) The nave, St Margaret's church, Bodelwyddan (©John Shipton). Fig. 4 (bottom right) The chancel, St Margaret's church, Bodelwyddan (©John Shipton).

Inside the church the columns between the south and north aisle are of a red-yellow mottled sandstone similar to that in the east elevation window (Fig. 6). Mud clasts were spotted in one of the column capitals.

A large amount of stone was quarried around the village of Gwespyr and the village is built on and with Gwespyr stone and many of the cottages housed the quarry workers. Walking through the village we spotted porches to the cottages made from huge slabs of Gwespyr Sandstone (Fig. 7) showing surface ripples held together with ferrous brackets and bolts, the rusting bolts causing the slabs to crack with potential disastrous consequences.

Before heading off to our overnight accommodation we visited an abandoned quarry that had been filled to create a children's play area. However, enough of the quarry face was still visible above the play area for members to inspect the Gwespyr Sandstone in situ, which was seen to be fine grained, cross-laminated but flaggy and fractured.

On Sunday morning we met at Basingwerk Abbey. It was founded in 1131 by Ranulf de Gernon and became part of

Fig. 5 (left) The gatehouse, Rhuddlan Castle (©John Shipton). Fig. 6 (right) Red-yellow mottled sandstone column, Llanasa Church (©John Shipton).

the Cistercian Order in 1147. Much of the existing fabric dates from the C13th when it was remodelled (Hubbard 1986). The Abbey was abandoned and its assets sold following the Dissolution of the Monasteries in 1536. Andrew explained that the abbey sits on the Coal Measures and here the Gwespyr is a bit coarser and lies higher up in the sequence. Those walls left standing are predominantly Gwespyr Sandstone but there are also some Triassic sandstones. Inspecting the wall of the refectory we saw blocks of Gwespyr Sandstone displaying iron staining and iron banding along with a block of stone that was probably Gwespyr but which showed signs of what are possibly 'climbing ripples'. Mud clasts are visible in the Gwespyr dressings to a C13th arch, the stone exhibiting mostly quartz grains as the clay in the matrix has eroded

Fig. 7 (left) Large Gwespyr slabs ro cottage p.orch, Gwespyr (©John Shipton). Fig. 8 (above) Leisgang rings in Gwespyr sandstone, Basingwerk (©John Shipton).

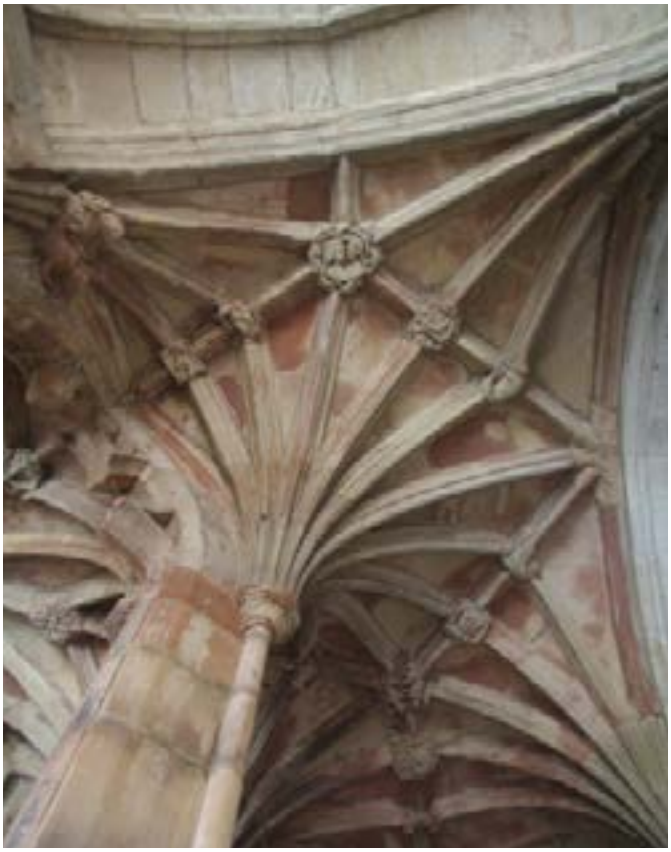

Fig. 9. Rib vaulting to St Winifred's Well (©John Shipton). Fig.10. Halkyn Marble font, St Mary's Church, Halkyn (©John Shipton).

out. Liesegang-rings (coloured bands of iron staining within the sedimentary rocks) were observed in blocks that were thought to be examples of both Triassic and Gwespyr sandstones (Fig. 8). A large dark igneous erratic boulder has been built into the monks Dormitory wall and cobbles were noted in core work that was probably modern. Nearby blocks of Gwespyr Sandstone in a door opening are badly eroded, the erosion aggravated by hard 'ministry' mortar pointing. Andrew explained that in the C12th and early C13th work large ashlar blocks of sandstone were used whereas later in C13th the stone used was thinner bedded, the two lithologies probably coming from different levels in the same succession, very likely from the nearby Moor Quarry.

Our next visit was to St Winifred's Well and St James Church. As time did not allow us to visit the church we concentrated on the well shrine, which is built on the site of a spring that legend tells sprang from the ground at the site of St Winifred's beheading. The building over the well is said to date from the late C15th and is built in Gwespyr Sandstone, possibly from the Moor Quarry, a red-brown Triassic sandstone and a red-cream mottled sandstone that is possibly Triassic and which had been used for the ornate ribbed ceiling of the well shrine (Fig. 9). Again some of the Gwespyr blocks displayed Liesegang Rings and others contained mud clasts. On the way back to our cars we passed the Visitor Centre where a newly built gable wall has been built in a mix of Coal Measures sandstones, some of it recycled. Andrew thought that some, but not all, looked like Cefn Sandstone and it was thought that the new door and window dressings were of a variety of York sandstone.

After taking lunch at Halkyn we walked to the nearby Grade 1 listed St Mary's Church. It was built in 1877-78 using the local fine-grained Gwespyr Sandstone to replace the old church that had fallen into disrepair and was demolished by the First Duke of Westminster. Inside the church we could immediately see Halkyn Marble used to great effect in round columns supporting the arches between the nave and north aisles. Andrew explained that this polished limestone was quarried locally and was rich in crinoid and large productid brachiopod fossils. A large round font, cut from Halkyn Marble, sits on columns of a dark polished limestone (Fig. 10). Halkyn Marble has also been used in inset columns and part of the wall of the chancel steps as well as in smaller shafts in the arcading behind the choir stalls. The previously observed dark polished limestone used in conjunction with Halkyn Marble was seen again in the base of the pulpit and in adjacent inset shafts. This limestone, with sparser and smaller crinoid fragments, is very likely a local variation closely associated with the Halkyn Marble. On the wall are memorial plaques in grey Dove Marble and white Carrara Marble. Before leaving we noticed floor slabs full of crinoid debris.

The final stop was undertaken by a few stalwart members who accompanied Andrew to the disused Bryn Blewog quarries north of the massive Pant-y-Pwll-Dwr Quarry

operated by Cemex. Leaving the cars on the roadside we set off across uneven, bracken covered ground, before coming to the disused west quarry where the top three to four meters of the quarry face are exposed. Historic evidence of stone extraction goes back to the first half of C19th and members observed plugholes in the quarry face where blocks had been split away. These looked quite fresh and may have been from quite recent work. The rock is packed with crinoid material and produces usable bed depths of between 450-500mm.

Barry, 6th Oct 2018

John Shipton

The last trip of 2018 was to view the Triassic sandstones, conglomerates and limestone that have been used in this area since medieval times. We met the leaders, Mike Statham and Steve Howe, on a grey wet morning at the Bendricks, Sully and made our way down on to the foreshore where the Triassic deposits outcrop in almost horizontal beds from here to Sully Island (Fig.1). The rocks consist of red-coloured siltstones and fine sandstones and grey-coloured coarser sandstones and conglomerates. These were deposited on a low-lying desert floor cut by a number of wadi channels that emanated from high ground to the north. During the late Triassic flash floods carried boulders, pebbles, sand and silt to lower ground where it was deposited. The larger fragments fell out of suspension first and, as the speed of the water subsided, finer and finer material was deposited leading to the beds fining upward. The Triassic beds sit unconformably on top of folded Carboniferous Limestone and iron staining from the Triassic strata affects the beds of Carboniferous Limestone close to the unconformity. Some of the Carboniferous limestones were seen to be crinoid rich.

Mike believed that manorial rights applied to mineral rights on the foreshore and there is documentary evidence that stone had been removed from the foreshore here from the mid C19th. We made our way east along the foreshore toward Hayes Point where it is believed that stone was removed for use in Barry Docks, on the way noting the regular blocky nature to the beds created by the prominent joints.

Fig. 1 Triassic strata on the foreshore, the Bendricks, Barry (©John Shipton).

Moving along the outcrop we were able to see a coarse conglomeratic horizon where most of the constituent pebbles were of grey Carboniferous limestones from the Cowbridge Cardiff anticline to the north. It was suggested that some of the conglomeratic stone found in Llandaff Cathedral had possibly come from this bed.

Geologically, the Bendricks coast is probably best known for being the richest Triassic dinosaur footprint site in Wales. It exhibits not only the prints from some of the earliest dinosaurs but also from other reptiles alive at the time. Although a number have been removed to the National Museum of Wales it didn't take us long to find some. Making our way back to the cars we came across beds of mudstone and siltstone displaying fossilised ripples on the top of the bed. Steve explained that ripples can be created either by wind or by currents in shallow water, wind creating ripples with symmetrical crests and water currents asymmetric crests. Both forms are exposed on the foreshore fairly close together.

Our next stop was Barry Dock No 1. This was built between 1884 and 1889 in Barry Sound between Barry Island and the mainland, in the estuary of the Cadoxton River. Mike explained that the dock had been built as an alternative to the congested docks at Cardiff and, at the time of completion, was the largest enclosed dock in the world. There was a boom in coal exports between 1890 and 1900 but trade went into decline after WW1, but it continued to be used until the end of the C20th.

Large blocks of limestone, possibly from Wenvoe, capped with Cornish granite are used in the dock walls but in the coal staithes (elevated platforms for discharging coal from railway carriages into collier ships) large blocks of conglomerate and Triassic sandstone have been used (Fig. 2). Smaller blocks of Lias limestone and Triassic sandstone have been used to clad the dock revetments. Mike pointed out that it was possible that some of the Triassic conglomerate could have come from Cadoxton as it was being worked in this area at the time that the docks were being built. The Royal Commission records also show that stone from Cadoxton was used in the construction of the docks.

After lunch we made a brief visit to Barry harbour before visiting the remains of a Roman Villa at the Knapp in Barry. Built at the end of the C3rd what remains of the villa is mostly of Lias limestone. The nearby Barry Castle is also predominantly built of Lias limestones but some blocks of Dundry Stone and tuffa can be seen in the dressings to the portcullis slot in the C14th gatehouse

Fig. 2 (top left) Large blocks of Radyr Stone in a coal staithe, Barry Old Harbour (©John Shipton). Fig. 3. (bottom left) Barry Castle predominantly of Liassic limestones (©John Shipton). Fig. 4 (top right) The font, Merthyr Dyfan church. (©John Shipton). Fig. 5 (bottom right) The font, St John the Baptist. Sully (©John Shipton).

(Fig.3). The stone dressings to the arch over the gatehouse entrance were too high to positively identify.

Our next stop was Merthyr Dyfan Church. The village of Merthyr Dyfan developed in medieval times but today the church is situated in a C20th suburb of north Barry. The church was built in the early C13th but fell into disrepair during the Reformation with restoration work being carried out in the late C19th and again mid C20th. The church is entered through a C19th porch built of Lias limestone and Bath Stone. A large stone altar found in the churchyard during the 1950s, had been brought into the church to replace the wooden holy table. It is reputably of a medieval age and appears to be of Sutton Stone. A C13th font near the front door was also thought to be of Sutton Stone. Its cylindrical bowl sits on modern square blocks to elevate it above the older octagonal base (Fig. 4). Although the interior of the church had been lime washed we were able to see some Jurassic limestone inserts in the chancel arch.

Our final visit was to the church of St John the Baptist, located on the eastern edge of Sully, which is built mostly of Triassic sandstone. It is recorded that the church was built in the C13th on foundations that date from the late C11th. The tower was built in C14th and a south aisle in C15th but this was demolished in the C19th. Approaching the church members noted Lias limestone blocks in a buttress located where the south aisle once stood. Nearby, other blocks of an unidentified Jurassic limestone contain a bryozoan colony (a marine animal mostly but not exclusively found in tropical waters).

Inside the church we found an intricately carved stone font sitting on a Triassic conglomerate base (Fig. 5). Members thought that the carved font was possibly Caen Stone from northern France. Leaving the church through a door in the C14th tower, Jana and Mike noted that the doorjambs are cut from a Jurassic limestone that was probably Dundry Stone. Armed with this information we noted other possible examples of Dundry Stone in window cills but close examination was not possible. Leaving the church most members crossed the road to Dunster Cottage where the lady who lived their provided much appreciated tea and cakes, an excellent way to end the last meeting of the year.

Book Review

Walia' Gwalia
ISBN: 978-1-84527-664-5
£12.50 soft-back
278x230mm.
Gwasg Carreg Gwalch, Llanrwst.

This is a glorious picture-book of 'Welsh Walls' – as the title states in Welsh. Walia' Gwalia is the first time that I know of, that a picture-book has been published in Welsh dealing with the great variety of walls that we have in Wales. It is very well illustrated and I believe that many of those who see it, whether they can read Welsh or not, will greatly enjoy the rich illustrations.

The author, Malcolm 'Slim' Williams, who is a television presenter, states on the back cover "We cannot live without walls, they form our homes, are essential to industry and agriculture and are an essential part of our history." During his career as a television presenter on programmes, such as Cefn Gwlad and History Hunters, he travelled to every part of Wales with his camera at hand. He was astounded by walls of every colour and shape, every one individual and with its own special history. From the solid walls of our castles and slate quarries to small house walls and 'Sinc' [corrugated iron] buildings, the volume is an interesting collection of what makes Wales special.

The volume commences with many illustrations of agricultural walls and then progresses to a series of walls of castles and official buildings. The third chapter deals with slate buildings and the fourth with 'Sinc' clad buildings from farm to pub, chapel and church. There is a section on industrial buildings and then pubs and cafes. There is a good section on pre-historic buildings, including stone circles and burial chambers, followed by a chapter on the buildings of the 'Valleys' and then a section on churches and chapels.

Buildings associated with water storage present some spectacular images, which are followed by illustrations of commercial buildings. There is a chapter on Liverpool, the A5 road, including the Menai bridges while the final chapter deals with iconic walls, including the pink pavilion of the National Eisteddfod.

This is very much the sort of book that the readers will enjoy looking through and is certainly the sort of book for museum and tourist information centre bookshops. It is not technical and is a pleasant experience to look through. It is available in bookshops and directly from Gwasg Carreg Gwalch, Llanrwst, Gwynedd.

John H. Davies

Index of Field Localities

Michael Statham (Field Secretary) has constructed an index of all the localities visited by the WSF during its field meetings. This includes the town/city/village and specific buildings or structures, along with the Newsletter and page number. As the index is 9 pages long, this is not included within this Newsletter, but will be published as a separate document. To access this plea go to:-

https://museum.wales/curatorial/geology/welsh-stone-forum/newsletters/

Many thanks to Mike for undertaking this task.

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