Fforwm Cerrig Cymru Welsh Stone Forum

NEWSLETTER

Number 11 March 2014 **Price £4.50**

Programme 2014

12th April. AGM and Annual Address

The 2014 AGM will be held at the National Museum of Wales, Cathays Park, Cardiff, starting at 11.15 am. The AGM talk will be given by Dr Brian Marker, on 'The Global Heritage Stone Resource Initiative'.

Many types of natural stone have national or international architectural, historical, archaeological, artistic or cultural significance. But sources of these are sometimes threatened and need to be safeguarded. This initiative aims to raise the profile of important natural stones through an internationally recognised designation.

Brian Marker worked for over 30 years for Government on minerals and geological hazards in planning and development. A former Chairman of both the UK Minerals Forum and the English Stone Forum, he is currently a Councillor of the Geological Society and also Chairman of the Publications Committee, and Secretary General of the Commission on Geoscience for Environmental Management, of the International Union of Geological Sciences.

All welcome (members and non-members). Please notify Jana Horák if you intend coming to the AGM and talk (contact details on last page).

10th May
Building stones of Newport and Nevern
Leaders: Tim Palmer and John Shipton.
Meet at 11.00am in the public car-park in Newport. We will look at Newport stone buildings (including a visit to the private Newport Castle) in the morning, and Nevern in the afternoon. These two villages show a range of unusual stone fabrics, many of them derived ultimately from the ancient volcanoes of the Preseli Hills. Other stones have come from further afield. What is probably the earliest description of local building stones in Wales covers this part of North Pembrokeshire, in George Owen's study of the region that was written in the late fifteen hundreds.

28th June
East Gower and Mumbles marble
Leaders: Ron Austin & Jana Horák.
Meet at Clyne Chapel [SS 610900] at 11.00 am. The final itinerary is to be confirmed but after the first stop we aim to also visit All Saints Oystermouth, Oystermouth Castle and Christ Church Swansea. Lunch will be at West Cross. The trip will provide an opportunity to look at Mumbles Marbles, one of our indigenous ornamental stones

26th July
Brecon and Llanfaes
Leaders: John Davies and Jana Horak.
Meet 11.00 in the Coffee shop at the Cathedral. Parking in the Cathedral car park (Priory Hill, Brecon). We will look at the range of building stone is Brecon and Llanfaes.

6th September
The Tilestones Formation between Llandeilo and Builth Wells.
Leader: Dick Waters.
Meet 10.30am in the main pay & display car park, Crescent Road, Llandeilo at 10.30am.The Tilestones is a sandstone formation of late Silurian age that crops out between Llandeilo and Builth Wells. To the east it passes into the Downton Castle Sandstone. It was worked predominantly for roofing tiles in the C19th (and probably earlier). The formation has recently been mapped by the BGS and the sedimentology studied.
NB: Some of the localities are on high exposed moorland with no tracks. Suitable footwear for walking over rough moorland is essential as is waterproof clothing.

11th October
Vaynor/Pontsticill and Abercriban
Leader John Davies.
Meet at 11.00am at Vaynor Church, Vaynor, north of Merthyr Tydfil (SO 049 103). This is a joint meeting with the Geologists' Association South Wales Group. Bring a packed lunch.

Please inform Dr Tim Palmer if you plan to attend these trips (tjp@abet.ac.uk or tel. 01970 627107).

Jurassic Limestone in Cardigan Castle

John Shipton

On 24th June 2013 John Davies, Jana Horak, Tim Palmer, Dyfed Elis Gruffydd and myself arrived for an unscheduled visit to Cardigan Castle to look at the possibilities that Dundry Stone may have been used in the medieval castle. Outside the castle we inspected the new Carboniferous sandstone slabs, which were probably from the Gwrhyd Quarry near Swansea. A carved slab in the centre of this new paving was also a Carboniferous age sandstone but was probably Forest Pennant Sandtone.

John explained that despite all the sandstone many small pieces of Jurassic limestone have been found in the soil around the castle. The Dundry Stone used at Strata Florida Abbey was thought to date to the 1184 build. Cardigan Castle was built between 1175 and 1176 and it was John's belief that, at that time, the Lord Rees did not have the contacts in England to obtain Dundry Stone, hence the apparent lack of it in the castle.

As we wrestled with our high vis' jackets and donned our hard hats for the site visit John went off to arrange access. He returned some minutes later bearing some bad news. Although we were not accessing working areas of the site, safety rules forbade access without proper foot protection and, unfortunately, we had not been told to bring boots with reinforced toe caps. However, the contractors were able to provide some safety boots but none larger than a size 9, which was fine for Jana and John but not for Tim, Dyfed and myself. It was, therefore, decided that Jana and John would go onto the site and collect samples while the rest of us retired to the café across the road.

Fig.1. (Above) Dundry and Sutton Stone cills, Cardigan Castle.

Fig.2. (Top right) A medieval dressed block of Dundry Stone, Cardigan castle

Fig.3. (Bottom right) Block of welded Quaternary scree, St Dogmael's Abbey.

Eventually, Jana, John and the local archaeologist returned with a good selection of rocks. These were laid out on the footpath near the visitors' centre where Tim and Dyfed set about inspecting them. First to be identified was a section of Dundry Stone window dressing that was probably Victorian in age followed by another piece, this time a section of a cill complete with black ash mortar. A further piece of cill, with the same profile as the other, was much older and was thought to be Sutton Stone, a Jurassic conglomeratic limestone from Southerndown near Ogmore by Sea, Mid Glamorgan (Fig.1). Next up was a sizable piece of old Bath Stone before Tim confirmed that a large piece of dressed limestone was ancient Dundry Stone, the tool marks on which suggested a medieval age (Fig.2). Although this stone could have come from ruined medieval buildings within the castle walls, it is entirely possible that it may have been transported from St Dogmael's Abbey during the C19th, when Castle House was built, the ground levels raised and the gardens laid out. We may never know the exact history of this pieces of stone.

Although the morning had started with disappointment as lunch time approached it looked as though our goal had been achieved. Much work still needed to be done but ancient, probably medieval Dundry Stone had been found in Cardigan Castle.

Several members decided to spend the afternoon at St Dogmael's Abbey where we walked around the exhibition. We looked at a tomb lid with carved cadaver, that was thought to be cut from Sutton Stone, a door arch in Dundry Stone, thought to be C13th and a standing stone listed as a spotted dolerite which Jana had her doubts about. Although the Forum had visited St Dogmael's in 2006, being such a lovely sunny June day, we walked around the ruins where we found large pieces of dressed Dundry Stone built into the walls of the abbey and other dressings of a welded scree deposit thought to be of Quaternary age (Fig.3). Following a pleasant hour in the sun we went our separate ways please with the morning's results.

Update from John Davies

On 4th March, the Cardigan Castle website published an account of the discovery of a medieval archway which had been buried in the foundations of Castle Green House. Their archaeologists described it as the most exciting discovery yet at the Castle. It was discovered in the main hallway and possibly links to the medieval cellar beneath the house.

Remains of Lord Rhys's C12th stone castle on this site are rare so consequently this is a really exciting discovery. The top of the archway was exposed when the Georgian floorboards were taken up as part of the £11m Castle restoration and its importance quickly recognized by the resident archaeologists who suggested that it was possible the original entrance to the north tower. They confirmed that the castle stood on the footprint of the earlier one.

The mediaeval castle was damaged during the English civil war and in the C18th y the site was filled in to make a bowling green for the town. The present house belongs to the early C19th. The castle is expected to open to visitors in spring of 2015.

Mapping building stones in churches across Wales: a national map of vernaculars

John Davies

The idea of surveying building stones over a large area developed during the survey of building stones in the Brecon Beacons National Park, carried out for the National Park Authority in 2009-11 by Jana Horak and John Davies and commenced in Denbighshire and Pembrokeshire in the 1990's (Newsletter 7).

During the preparation of the Carmarthenshire – Cardiganshire Pevsner architectural guide [1], Tim Palmer and I were asked to write the introductory chapter on geology and building stones. However, this request came after the descriptions of the individual buildings had already taken place. When I was asked to do the same for the revised Powys Pevsner guide [2] it was still possible to add the results of a survey of the external building stone features of each church in the three old counties of Powys – Montgomery, Radnor and Brecon. This survey was carried out over the summer of 2012 and the results plotted on a series of maps by Andrew Haycock.

Separately, I had undertaken to map the use of Anglesey Grit in north-west Wales, and with a scattering of visits to churches across the remainder of the country, the prospect of mapping the whole of Wales became possible. Throughout the summer of 2013, I mapped the Carmarthenshire churches and by the beginning of 2014, almost all of Anglesey and Carmarthenshire have been completed, alongwith half of Meirionydd, a third of Caernarfonshire and a fifth of Gwent.

The external building stone examination was undertaken in order to inform architectural historians of the nature and possible source of the materials used. In an age when the policy of Cadw to recommend whitewashing many churches is well under way, it was vital to describe the building stones before they became obscured. The prospect of also mapping church interiors was more daunting due to many of the buildings being locked, un-safe or converted into private accommodation. Thus, due to the time available, it was decided not to deal with the interiors.

The length of time required to identify the stone in the walling and dressings was about fifteen minutes, which enabled as many as twenty churches to be visited each day and an average of ten digital images taken at each site. It is intended to publish maps of building stone, county by county as they are completed, the first three being Breconshire, Radnorshire and Montgomeryshire [Pevsner Powys].

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

After the arrival of the railways and improved roads, dressings became more variable. Frequently, a particular church may include three or more different dressings depending on the history of availability, which results in a chronology of stone use in each building. In the future this could be matched with architectural style. This has caused a problem with regard to deciding which dressings to plot. Ideally all the dressings could be presented in some form, but at present only the two dominant stones have been plotted on separate maps.

Powys

The geology of the county is very variable and within the three old counties, different indigenous building stones are used in different areas of each county. In addition, improved transport routes had an influence on what was used. For instance, in Breconshire Bath Stone appears in the south and Grinshill sandstone in the north, both of which were imported in the C19th. The further north you travel the more Cefn Stone is used for dressings.

Breconshire

Out of the 81 churches in Breconshire the following numbers of churches show examples of each dressing stone as follows:

Breconshire Indigenous	81 churches surveyed
St Maughan's (Bwlch Stone)	18
Hay Stone	17
Senni Beds	12

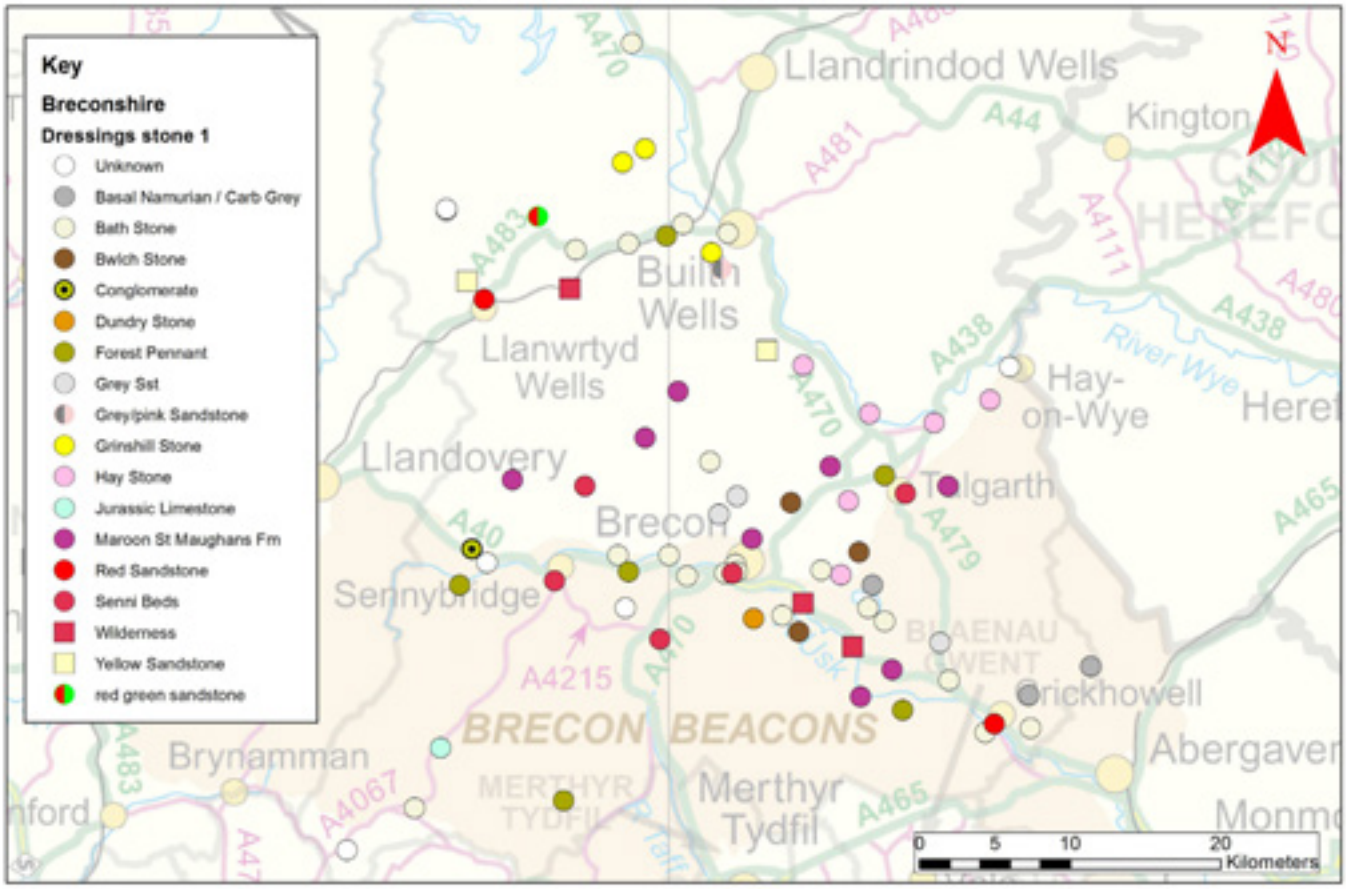
Breconshire Imported	81 churches surveyed
Bath Stone	2
Cefn (?) Sst	6
Dundry Stone	3
Forest Penannt	19
Grinshill Sst	6
Wilderness Sst	10

Hay Sandstone is a pale creamy grey sandstone containing prominent, small, orange (iron-stained) quartz grains. In numerous places these were burrowed by worms and on the animal's death the burrows filled with maroon silts. On compaction the resultant rock is cream-grey with maroon spots and is highly distinctive in door-posts and window dressings. In numerous churches cream Hay Sandstone windows are repaired with Senni Beds, and more recently Senni Beds or Hay sandstone windows with Forest Pennant sandstone. Unfortunately, particularely in the Usk valley, maroon and purple St Maughans Formation dressings are replaced with Wilderness 'Brownstones', which are red. These patches stand out and will never merge.

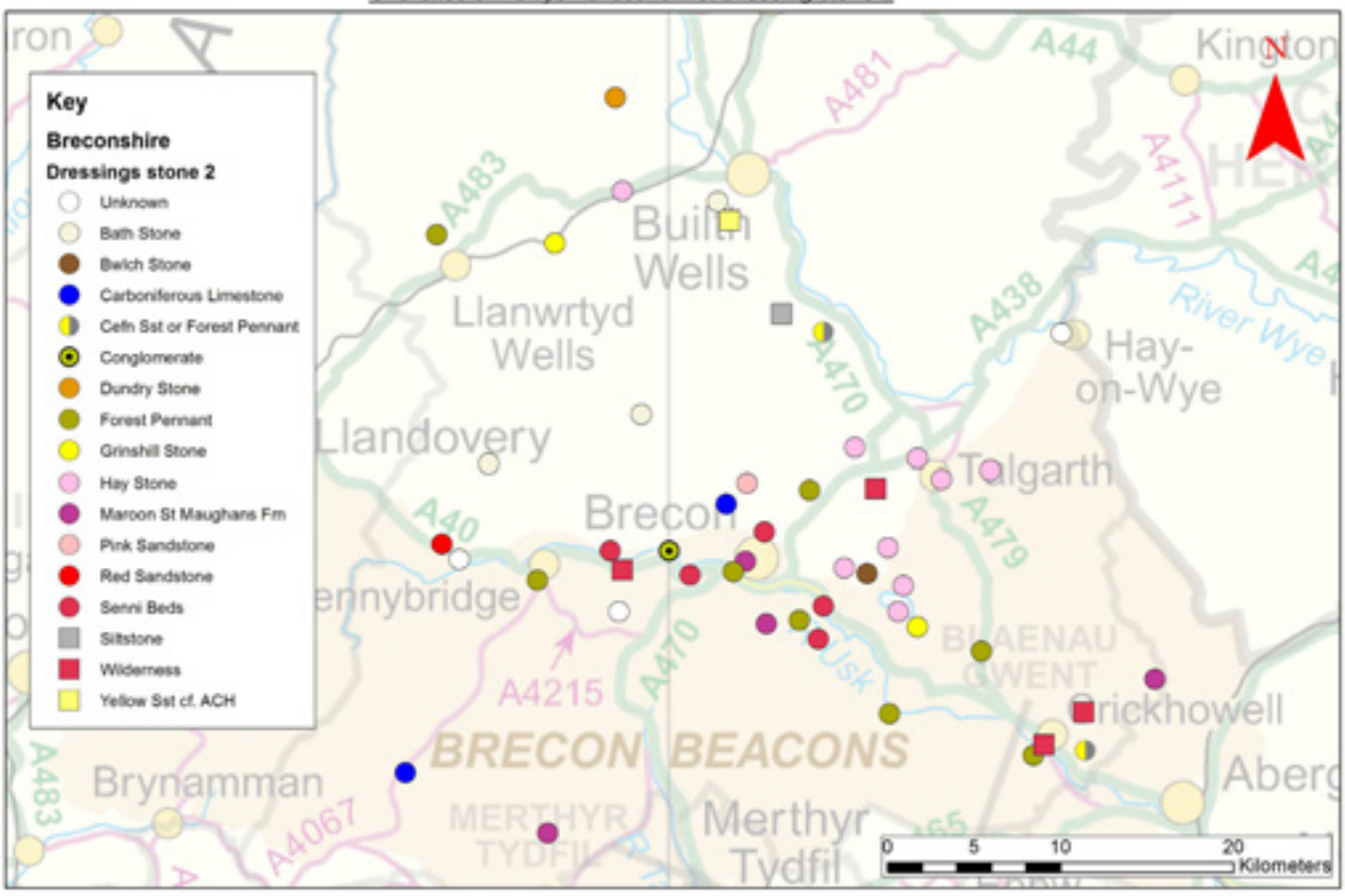
The Maroon and greenish mottled sandstones of the mid Usk valley of Breconshire have been intricately carved in places, such as Brecon Cathedral. In the western upper Usk valley, as at Llywel, many of the Brownstone dressings are maroon and gritty and resemble the pebbly Brownstones of Carmarthenshire.

South of the Brecon Beacons, the building stones consist of Upper Old Red Sandstone quartz sandstones, and quartz sandstones of the Millstone Grit. Carboniferous Limestone, which also occurs in the area, has only a local use, but all three are frequently seen in the south-west of the county. In

Churches of Powys - Breconshire: Dressing stone 1



Churches of Powys - Breconshire: Dressing stone 2



the Black Mountains of Breconshire-Gwent and the Usk valley, the grey basal Millstone Grit from Pen Cerrig Calch has been extensively used for window and door dressings.

Radnorshire

One of the distinctive local building stones of the Wye valley around Builth Wells, is Newmead Sandstone, which contains fragments of volcanic debris. On cursory glance it has been mistaken for Pennant Sandstone from south Wales, but its volcanic origin is visible in thin section. Dolerite, the local igneous rock, is extensively used in Llandrindod Wells.

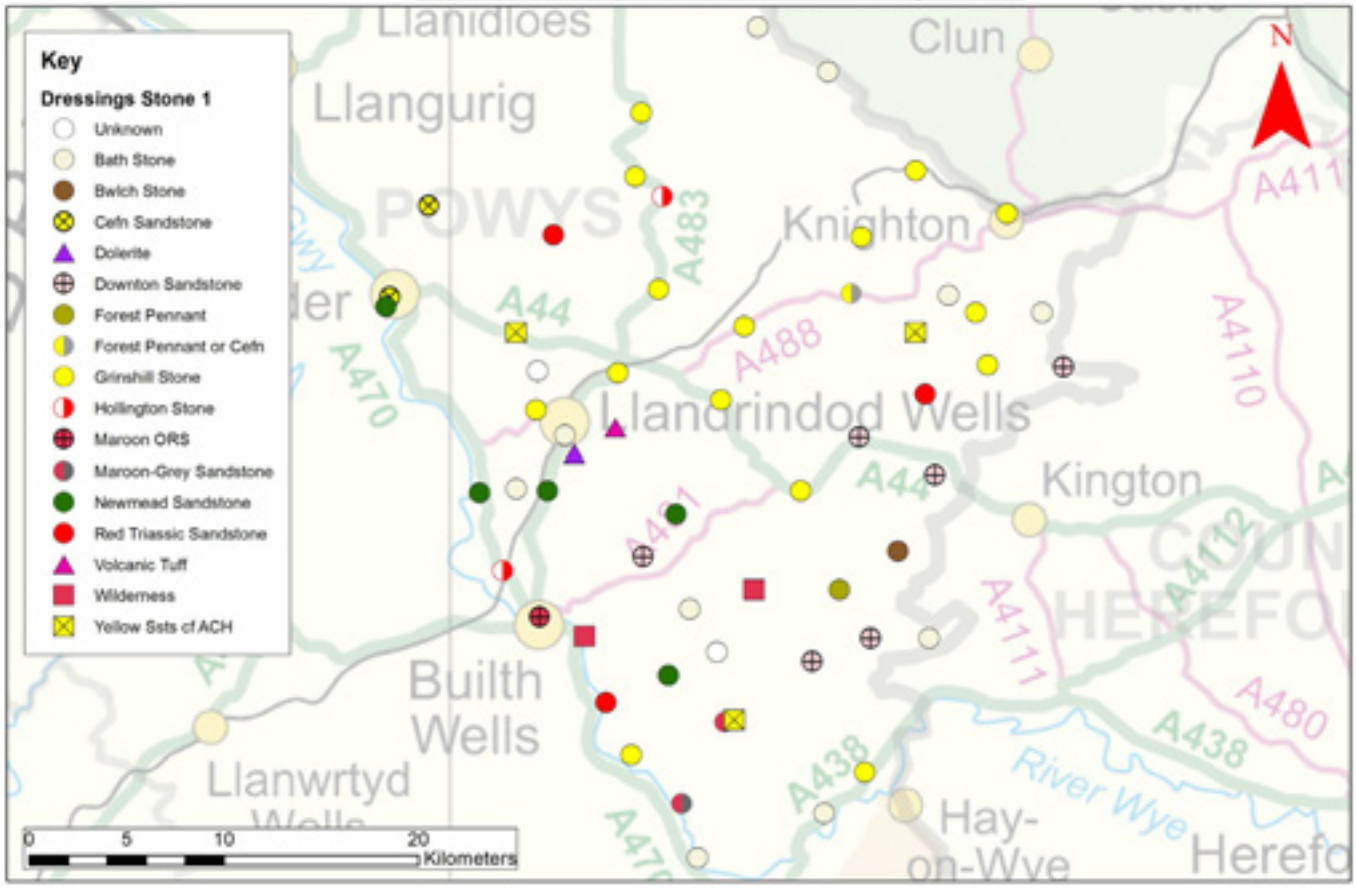
Radnorshire Indigenous	62 churches surveyed
Downton Sst	10
Yellow Sst (ACH)	7
Newmead Sst	7

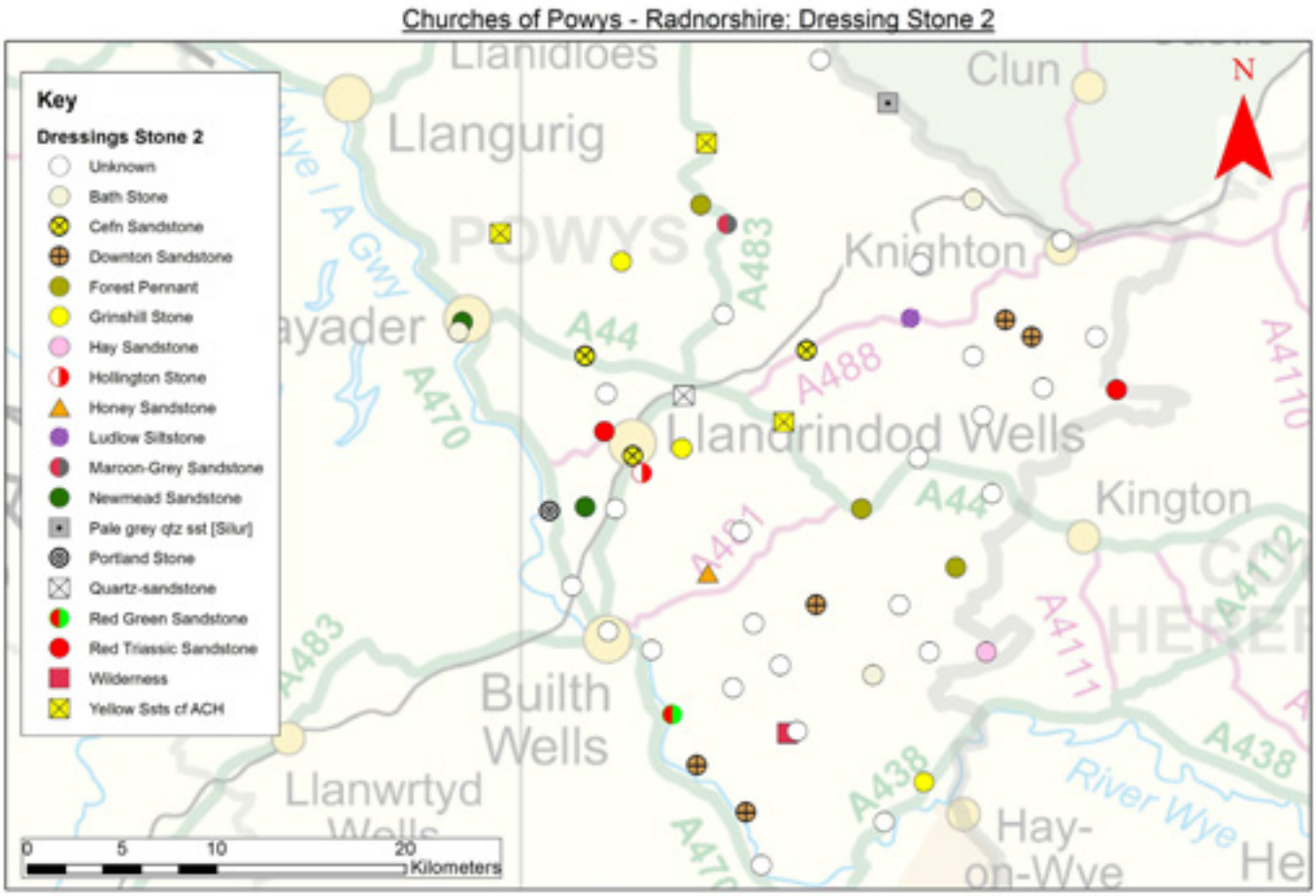
The main point of discussion with regard to Radnorshire and southern Montgomeryshire concerns the dressings at Abbey Cwm Hir. The sandstones at the abbey, and all the buildings which have historically derived their stone from it – the churches in Llanidloes

Radnorshire Imported	62 churches surveyed
Bath Stone	15
Forest Pennant	5
Grinshill (red) sst	2
Grinshill Sst	16
Hollington Sst	2
Old Grinshill (Clive)	1
Triassic (red) Sst	4
Wilderness	4
Yellow Cefn Sst	5

[Montgomeryshire], Llanbadarn Fynydd, Llanbister, Llanddewi Ystradenni, and Llanddewi Hall - have been identified to date as Grinshill sandstone [3]. Although all the stones derived from Abbey Cwm Hir are consistently the same lithology, they appear not to be Grinshill sandstone but a cream-yellow, micaceous sandstone, with a similar mineralogy to the "Tilestones" of Epynt, that possibly extends eastwards into Radnorshire. The exact outcrop of this lithology has yet to be located.

Churches of Powys - Radnorshire: Dressing Stone 1





Around New and Old Radnor and Gladestree, in eastern Radnorshire, a fine creamish sandstone is commonly used for dressings. This is the Downton Castle Sandstone, or its local equivalents and it is possible that a variety of this was the stone used in Abbey Cwm Hir. Grinshill sandstone, with 'veins', is extensively used in C19th churches and houses, and is easily distinguished from the stone of Abbey Cwm Hir - by its lack of mica flakes and its distinctive quartz 'veins'.

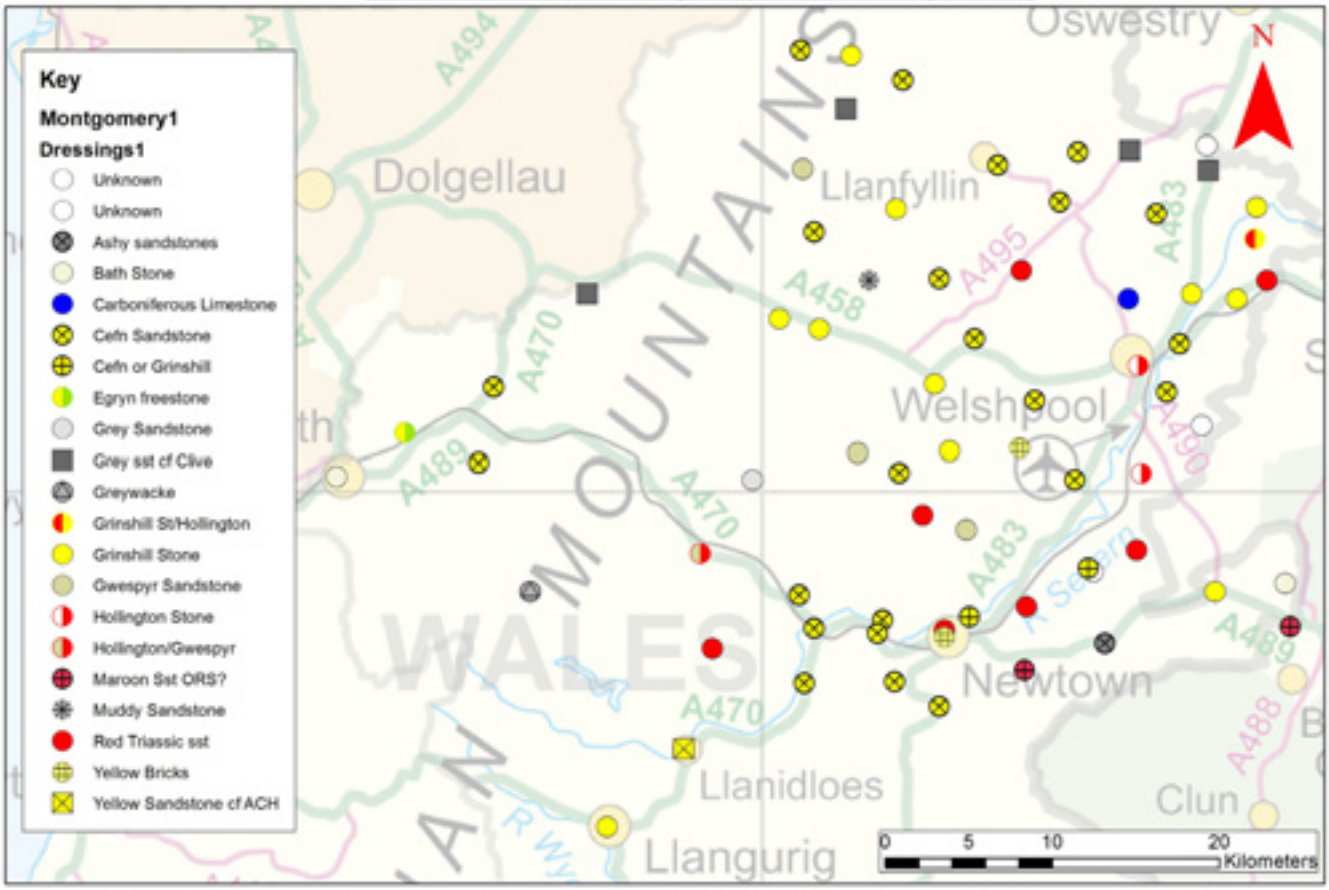
Montgomeryshire

A number of churches in Newtown and the Caersws area contain a massive red sandstone, which it has been suggested is re-cycled from the Roman fort at Caersws. This seems likely since they are ultimately derived from the Shropshire plain and undoubtedly carried to the upper Severn valley by the Romans. It is very similar in colour to the red sandstone of Shrewsbury Castle.

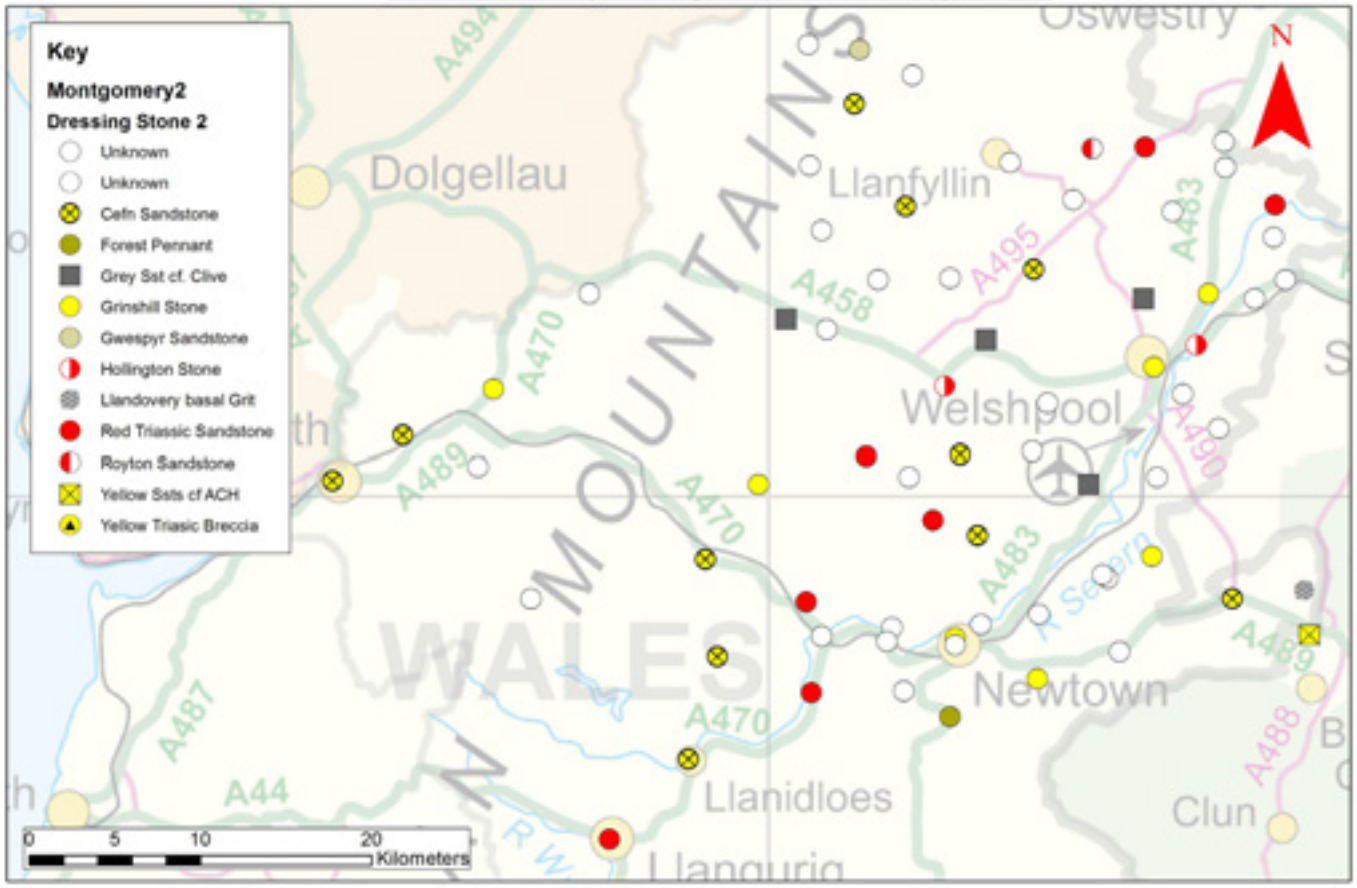
To a limited extent in Radnorshire, and more so in Montgomeryshire, there is extensive use of Grinshill sandstone for dressings. Three varieties are recognisable; a red sandstone with quartz 'veins'; a cream-coloured sandstone with 'veins' from the eastern end of the main outcrop at Grinshill and a much greyer-cream sandstone that contains many 'veins' and sheets of coagulated quartz-grains plus small nodular bodies which also appear to be coagulated grains. The latter outcrops at the western end of Grinshill around the village of Clive. This I have referred to as 'Old Grinshill'. It appears in many of the older church window dressings of Montgomeryshire and Radnorshire, and as far south as one church in Breconshire. This form of Grinshill

Montgomeryshire Indigenous	73 churches surveyed
Cefn Sst	40
Bath Stone	2
Forest Pennant	2
Grinshill (red) sst	5
Grinshill Sst	17
Hollington Sst	5
Old Grinshill (Clive)	14
Old Grinshill Sst	14
Triassic (red) Sst	8

Churches of Powys - Montgomeryshire: Dressing Stone 1



Churches of Powys - Mongomeryshire: Dressing Stone 2



stone would have been the variety available from C12th to C13th, when Abbey Cwm Hir was probably built, but is not seen there at all.

The other major building stone suite are the cream and yellow Namurian sandstones of the Flintshire Coalfield. The most distinctive of these is the yellow-orange Cefn Stone, which frequently includes concentric orange iron bands, referred to as Lishgangue rings. This stone is widely distributed from its home area in Flintshire, into Montgomeryshire and along the northern coast and is similar to the classic Millstone Grit of the Pennines of northern England. Another variety of this group of rocks is the paler, and often courser, Gwespyr sandstone, which is not so extensively used as the Cefn Stone but appears in a significant number of churches.

Throughout there is a close correlation, between architects preferences and stone use, and a more detailed matching of building stones and architecture will refine the identification of phases of building work. Thus, it is hoped that this initial survey will lead to others refining and giving more detrails of stone use in the three counties and the remainder of Wales. It is hoped to put the data collected, with the images on the Stone Forum Archive.

Description of the map

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

References:

[1] Lloyd T, Orbach J & Scourfield R. 2006. The Buildings of Wales – Carmarthenshire and Ceredigion, Yale, pps 661.

[2] Scourfield R. & Haslam R. 2013. The Buildings of Wales – Powys, Yale, p 656.

[3] Davies JH 2002. The stones of Abbey Cwm Hir, in Coulson MR ed. Stone in Wales – Materials, Heritage and Conservation. Cadw.p104.

The Afterlife of Stone Monuments

Steven Gray

Stone is really useful; if you leave it lying around for long enough someone will find a use for it. The subject of this article is the re-use of early mediaeval inscribed stones (EMIS), though given that they were erected originally to mark a Christian burial, the concept of "left lying around" is tenuous. Dating from the C4th to the C14th, they range from plain river boulders with an incised cross to tall, elaborately carved "Celtic" crosses. Their re-use is occasionally the same as their initial use as grave markers, this time as grave covers (P83), though not in the cases of MN2, re-used roman masonry from the walls of Caerwent, and G92, a roman milestone of the C4th inverted and re-carved to commemorate the C6th Cantusus. CM29, at Clos Teg Farm, was a re-used Neolithic / early bronze age standing stone with cup marks. Ancient stones can be a palimpsest of re-carvings from such early times, through the mediaeval period, and into more the recent, as is the case of B3, which was re-cut with an epitaph for the 2nd Baron Glan Usk, who died on 11th January 1928.

Following the roman custom, these interments were often along the sides of the roads so as the roads fell into disrepair it was the stones that marked the way. For instance, Croes Antoni cross-base (G118), indicates the location of the mediaeval road. However, they were also enlisted to repair and improve the routes themselves, for example as footbridges/clapper bridges; (MR1) across a small brook at Ceilwart Isa Farm and most famously the C10th/C11th Ilqui and Ilci Crosses (G84 and 85) that form the clapper bridge at Cwrt-y-defaid. CN14, once a footbridge across Glan-mor Stream, was subsequently used to support milk pails at Llyn-y-gele Farm while P56 at St. Kennox Farm, Llawhaden, was a footbridge in the farmyard.

Indeed, it is on farms that we find a range of uses for EMIS, most mundanely in walls but some more ambiguously in field boundaries where they may have been considered to have some intrinsic authority, for instance B21 Cae Gwynlliw. At Llangyfelach, G52 had been intended as a gate post, but too much was knocked off the top, so it became a mounting block for horsemen. MR16 at Blaen-y-cwm farm was utilised for a similar purpose. CM25 at Capel Mair was in three fragments, each with a different use, which included as masonry in a cow house wall and as a drain cover. In the farmyard of Sychbant,

at Llangynwyd, G53 is part of an C11th cross-shaft, hollowed-out for use as a trough with added drainage hole. At Tyddyn Hollard, CN21 was part of the pigsty wall; at Llannor, CN32 was over the stable door while CN33 formed the lintel over the cow house door and CM21 stood in a field as a cow-scratcher. Perhaps there was a perceived blessing in such uses.

They also became landmarks. P59 at Martin's Haven, Marloes, functioned as a waymarker and prayer station for those landing or sailing from there. Perhaps there are such pilgrimage connections with those stones which are incised with the names of saints. P16 stood on the pilgrimage route to St. Davids, while the Stone of the Two Ox-eyes (G7), sited between two barrows, dominated the Hirfynydd Ridge, which linked the roman forts at Neath and Coelbren. AN11 at Llanfaelog was located with reference to an ancient route. Occasionally, EMIS were set on cairns, as with CM24 and CD28.

Given their "religious" nature, it is not surprising to find their re-use by, and in association with, churches. The great majority of surviving examples are built into the fabric of the buildings, seemingly just for construction purposes, as in the lower string course of the tower at Defynnog (B5), and as a lintel of the doorway into the ringing chamber (B6). Given apposite size and dimensions, re-use as lintels and window sills is quite common, for example, at Corwen (MR3), Llangadwaladr (AN26), Llanfaglan (CN24) and Llandanwg (MR10). At Neath Abbey (G9), a C8th stone, already re-used in the C9th as a memorial, was utilised in the C15th in a buttress supporting the monks' reredorter. At Merthyr Old Church (G114), the stone was "dressed down and fitted" into a quoin. Similar "dressing" at Heneglwys (AN6), where the stone was trimmed on all four sides, suggests re-use just as masonry. At Llanmadog (G56) the C7th/C9th stone was part of a stone bench running along the south chancel wall, whilst B45 was utilised as a footstool for bell ringers. It had previously been moved in the 1860s by the vicar of St. Davids, Trallwng, to his grounds for convenient examination by the Cambrian Archaeological Society. CN7 was used as a kerb stone in the Deanery garden of Bangor Cathedral.

However, when the stone is "interred" or built into the foundation, as at St. Cyngors Church, Llangefni (AN39), or as a threshold stone like Euddogwy (CM15), one is tempted to surmise on a more symbolic use. A re-used stone forms part of the upper step under the altar at Llanfihangel Ysceifiog (AN22 and AN23) while another at Llanfrynach (P29) was recorded in 1708 as lying under the altar in the chancel of the church. This practice is reminiscent of the burial of relics in church foundations and under altars. At the Church of St. James and St. Elidyr, Stackpole (P137), the stone was trimmed on all four sides for re-use as an altar slab and then whitewashed. Elsewhere, like St. David's Cathedral (P96 and P97), they are found as altar fronts. P114 was built into the footings of the C13th chapter house of St. Dogmael's Abbey while G14, the Stone of Baptism, was re-used as a font.

Re-use continues outside of the church building itself. At Lannor (CN29) the stone sits in the western jamb of the churchyard gate, at Llangaffo (AN30) as a paving slab on approach to north door of the "new" C19th church, and in 1746 one is recorded as part of a stile in Llanddewi Brefi churchyard.

By extension, EMIS have been used in association with holy wells as at Ffynnon Llonwen (P23), where the C7th/C9th stone that is built into the dry-stone wall superstructure of the well has had a fish symbol carved upon it. There are also strong associations with healing and baptism, as with rituals, at St. Canna's, Llangan. At Llanrhidian, the Leper Stone is associated with healing - lepers seeking a cure would rub against it - whilst sitting upon it supposedly cured headaches. As healing places, they were also a good place to collect your herbs. At Llandaf, G36, a C10th/C11th stone featured in the end wall of the dairy well in the Bishop's Palace, whilst G47b, on the green at Llangenith, formed the cap stone of the village well. F.Jones in The Holy Wells of Wales records its associations with feasts and pilgrimages. At Pen Arthur Farm (P103-6) and Cwm Gwenffrwd (G6) the "holy well" stones were subsequently moved for re-use, the latter travelling to the colliery manager's house at Bryn Cefneithan and then on to the garden of Miss Parsons at Neath.

This use in gardens and as collections housed in grottos is exemplified by G7 and G10, which were moved to the Gnoll by Lady Mackworth who had all such curious stones brought to her grotto. In 1771, at Towyn, MR25 was being used as a gate post before being moved to the grotto of a neighbouring gentleman. Although B35 may have a dubious claim to having been used as a garden roller it was itself a re-used roman pillar. Normally such stones were displayed as garden features, as at Llanllyr (CD20), Goldengrove (CM24), Court Herbert (G8), Pool Park, Llanfwrnog (D1) and Cefnamlwch (CN2). Others have more complex histories. At Ty'n Rhosydd Farm, AN46 was a field gate post, then became a chopping

block for sticks, then a garden feature at Trawscawen Park, and is now a museum object in Gwynedd Museum, Bangor. B51 at Penymynydd, an Ogham-incised stone was, to quote T.H.Thomas, "removed from its ancient position and used as a gatepost or some such purpose." He moved it to his lawn! At Crickhowell, B2 had been a foot stone across a ditch, then became a feature in Glan Usk Park, but now sits in Brecon Museum.

Occasionally, stones become features inside people's homes, such as AN48, built into the conservatory wall at Maen Hir while in Carmarthen, CM1 was by Pantdeuddwr Cottage door being used as a whetstone. More recently and controversially, R2, which had been at the old vicarage in Clyro, travelled to The Mason's Arms in Hay, and sometime after 1985 was moved again and set as a lintel for the fireplace in the State Room of Hay Castle by Mr. Booth. In an industrial setting, G117 was built into the back of a lime kiln at Ogmore Castle.

F1, having been a gate post, was collected by the Pennant family to become a garden feature and then a collection piece at Whitford House. Following the clear-out of Whitford, the stones have found sanctuary amongst the pews at the back of St. Mary and St. Beuno's Church. Others moved to "safety" include G114 at St. Leonard's Church, Newcastle, which was being attacked by "mischievous" boys and G28 at Capel Brithdir, a C5th/C6th stone, was rescued after being used as a cock-shy. The C6th Pumpeius Stone at Eglwys Nyrnid, Margam (G86), was used as a target for stone-throwing boys and was "mutilated in other ways". More exotically, at Llangian (CN25), St. Clydai (P14) and possibly Ramsey Island (P99), the stones were adapted for use as sundials. At Ynysmaengwyn Mansion, MR27 shows evidence of having been built into an outhouse, used as gate-hanger, re-used as a milestone AND used as a sundial.

Artistically, stones such as B39, Neuadd Siarman, Maesynys, have a certain "wow factor". One might see these intricate and beautiful "Celtic" crosses with their mysterious interlace patterns as suitable pictorial material for postcards and as a key ingredient in the tourism industry. But on a more sublime level they have been used as an inspiration by artists working in a variety of media. The letters carved upon them can add to this sense of mystery especially where Ogham has been used – the fairy language.

Was there an extra dimension in some uses of stones or an added significance in some situations? Some stones acquire their own names and supposed characteristics such as, Crux Salvatoris at Llanilltud Fawr, Crux Christi at Margam and Maen Maddock (B50) at Ystradfellte. Sometimes they are the origin of field names, farms or settlements. In the case of the Pillar of Eliseg, the valley, district and Cistercian Abbey at Valle Crucis, all owe their names to it. Folklore and superstition also attach stories, such as St. Mellig's Church Cross (R5). The Goblin Stone (G99) at Merthyr Mawr, was in a field haunted by a ghost who compelled passers-by to insert their hands and feet into the holes of the monument and make them pray. G27, at Gelli-gaer, plays a role in the stories of people's lives, including drunken stonemasons, vandalistic colliers and the ghosts of golden warriors. Exemplifying these, and other featured characteristics of re-use, is the Bodvoc Stone (G77) on Margam Mountain (copy in place while the original is in the museum having been used as a target for firing revolvers). This C6th stone stood beside a well-defined trackway, was a clear landmark (it bears an OS benchmark) and was a mediaeval boundary marker. Carrying a list of names, it acts as a genealogy and an authoritative claim of "ownership". It has been used as a source for folk-lore tales, and even carries a curse; whoever reads the inscription correctly will die! (A warning for all linguistics scholars.)

These stones have been used socially, legally and politically both in their initial use and subsequent re-use. Individuals have appropriated them to enhance their personal status or claim some authority. They record gifts of land, as in the case of Llech Idris (MR23), the 1209 Grave of Bishops, which confirms lands from Llywelyn ap Iorweth to Cymer Abbey. Similarly, CD20 at Llanllyr House, formerly the site of a C12th Cistercian nunnery, is a C8th/C9th stone which records a donation of land to the church, which is possibly re-carved onto an earlier inscription which references a hermit in a deserted place. Whilst, "in situ", some mark boundaries and others have been venues for the making of contracts, such as P16 at Penwaun, mentioned in a deed of 1483. With its genealogies and symbols of land ownership, the Pillar of Eliseg near Llangollen is probably the most politically dramatic and historically significant stone during several historic periods. Despite being thrown down and re-erected on more than one occasion, it is strategically sited and became a place of assembly and possible royal inauguration.

The Llywel Stone (B42), an Ogham and Latin incised stone, was rescued by a Reverend Price as farm workers were about to chisel holes into it for

use as a gate post. Unfortunately, by the time he returned, it had been sold to the British Museum for £10. Thus, by this and other means, individual stones become parts of collections in museums, galleries or private collections, that are sometimes referred to as lapidaries. Today, these venues include Margam Stones Museum and Abbey, Ewenny Priory, Merthyr Mawr Church, Llanilltud Fawr Church and Amgueddfa Cymru-National Museum Wales in Cardiff. Their nature and subsequent re-use undergoes a subtle change. They are now seen as a whole, as a collection of artefacts, subject to academic study both as physical assemblages and in published collections, such as Lapidarium Walliae 1876-9.

Whilst before they were able to be studied individually in many cases, they can now be more closely curated, catalogued, compared and contrasted. Their re-use by the academic world as objects of study is both extensive and diverse. Historically and archaeologically some are the only evidence of now lost settlements, as well as offering us genealogies and making connections with known historical figures. The complex messages they bear, both epigraphical and pictorial, are still the subject of much debate. Their sculpture, iconography and ornament feature in artistic and art history studies. Culturally further afield, MN3 and MN5 show Irish and Scandinavian, Scottish and Manx influences respectively and in comparative studies, parallels with Armenian khatch-kars have been made. Theologically, MN5 at St. Arvan's has iconography that throws light on belief and doctrine, whilst others shed light on prayers for the dead and Bible story knowledge (CD27). For linguists EMIS are a rich resource for studies in Ogham and Latin and more general questions about literacy, whilst others focus on the geography of personal names. For geologists and lithologists it is the very fabric of the monument itself.

These stones are also "heritage objects". In any television programme that deals with Welsh history a sequence showing EMIS seems compulsory. They are used as a visual shorthand for a certain kind of Wales. There has been, and continues to be, much political debate about the nature of Wales past, present and future. These stones have been conscripted into that debate, probably because of their association with both the Age of Saints and the mediaeval period. This wholly unforeseen re-use means that they have become some sort of body that contains messages about nationality: EMIS as a meme. By extension, if one is Welsh, these stones are part of what it means to be Welsh, they are part of our heritage.

To conclude, these stones were a tactile material initially "worked" for a primary use as grave markers. They were re-used in a simple utilitarian sense of a material fit for purpose, such as in construction and repairs, but some became objects of veneration, artefacts and resources for academic study. As collections they fulfilled those roles, but being in national collections, or still in the national landscape, they became something more abstract, perhaps more powerful. Ironically, these inert materials originally used to mark the burial site of someone who hoped for an after-life, have had an after-life of their own.

This article draws heavily on material from the following works and the reference numbers in the text refer to these volumes:

A Corpus of Early Medieval Inscribed Stones and Stone Sculpture in Wales v.I, Glamorgan, Brecknockshire, Monmouthshire, Radnorshire and Geographically Contiguous 2007. Mark Redknap & John Lewis. pp., 432.

A Corpus of Medieval Inscribed Stones and Stone Sculpture in Wales: v.II South-West Wales, 2007, Nancy Edwards, pp. 432

A Corpus of Early Medieval Inscribed Stones and Stone Sculptures in Wales v.III, North Wales. 2013. Nancy Edwards.

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Pwntan Stone and the sandstones of South Ceredigion and North Carmarthenshire. 23rd March 2013

Caroline Palmer & John Shipton

Saturday 23rd March was not a day when many people willingly ventured out. It was the third of three days on which a blisteringly cold wind from the Russian steppes seared its way across Ceredigion and, although unlike north and east Wales we had no snow, the chill factor made the eyes water and the marrow shrink. Notwithstanding this, a small group of members, supported by a couple of specialists, converged on Tanygroes from all over Wales to explore the building stones of south Ceredigion. Our topic for the day was a locally occurring Ordovician sandstone – Pwntan Stone.

The rocks of Ceredigion were laid down during the Silurian and Ordovician periods. In the north are the Cwmystwyth and Aberystwyth Grits but

Fig.1. (Top) Tanygroes Calvanistic Methodist Chapel and Vestry.

Fig.2. (Middle left) Carefully shaped blocks of Pwntan Stone, St Michael's, Tremain.

Fig.3. (Above) Lead pollution exposing the stone in St Michael's Church, Tremain

Fig.4. (Bottom left) Dundry Stone medieval font, St Michael's, Penbryn

Fig.5. Pwntan Stone gate post, Bwlchbychan.

southwards, towards Cardigan, you pass through graywackes and shales into the Ordovician age fine grey silts and shales, which contain thicker beds of pale sandstone. These sandstones were historically worked at Pwntan Quarry near Tan y Groes but no outcrops are currently visible.

On the south side of the main road running through Tanygroes is a Calvinistic Methodist chapel with adjoining vestry building (Fig.1), which has recently been modified for residential use. The gable end facade has recently been cleaned but the surface of the stone has already started to darken, possibly due to recolonisation by lichen. Many different styles of ornamental tooling can be seen; the main construction blocks have been pecked and pock-marked with many short chisel blows, whereas the edges of narrow ornamental dressings are transversely grooved across the shorter axis of each stone. The voussoirs of the window arches are similarly ornamented and, where large stones are used, a false division has been carved to create the appearance of two or even three smaller voussoirs instead of a single block. The building was commenced in 1849, a year after the completion of the nearby St Michael's Church at Tremain, which was our next stop. Before moving on we looked at other buildings in the village, most of which are plainer and built of rubbly blocks of the same sandstone.

Tremain is a parish spread on either side of the main road, a little north of Cardigan. There is no distinct village, just an erratic scatter of houses. It is very easy to overlook St Michael's Church which is out of sight, just off the main road to the south, on a single track lane with high banks and no parking. To turn around once having found it involves a muddy drive to the point where a concrete track leads on into a farmyard. It is little wonder then that the diocese eventually concluded that St Michael's was superfluous to requirement, although that is not to say that it is not without merit. It is tremendous news that, thanks to the representations of local and national experts, the church has been adopted by that estimable charity, The Friends of Friendless Churches, and scaffolding has already gone up in anticipation of its restoration. One of the reasons for our visit was to view a mediaeval font, but due to the repair work in progress this was all boxed up for protection and not available for viewing.

St Michael's is a replacement church, built on an ancient site in 1846-8, and its architect was the famous Welsh bard John Jones 'Talhaiarn'. The architectural style is 'ecclesialogically correct' (which we believe means conforming to the architectural rules devised by The Cambridge Camden Society). The decor is extremely plain with plastered walls and ceiling in an open- rafter roof. There is a schoolroom vestry on one side of the nave fitted out with child-sized pews. But the most remarkable feature of the church is its masonry. Built of the local Pwntan Stone, each block has been carefully shaped to create an intricate fit with their neighbours. So close is the fit that mortar looks to have been almost superfluous, and rather than being a structure of coursed blocks, the whole external surface of the church resembles a complex jigsaw puzzle in which no two pieces are even similar (Fig.2). The identity of the Tremain mason is unknown and, if it were a personal whim of his, it is not a building style that seems to have been employed in other local buildings. Oddly, the best echo of this construction is in the work of C13th to C15th Inca masons in Peru! Here too blocks were individually fitted together, with neat edges and corners to complement the adjoining stones. Often Inca building involved massive stones in defensive walls on a far larger scale than in the church.

The surface of the external masonry is the perfect habitat for the creamy- white crustose lichen *Ochrolechia parella*. On the west end the lichen is so extensive that the building is almost white. The toxicity of lead to lichens is nicely illustrated by the two strips of stonework below the lancet windows. When rain drives against the leaded windows and runs down to trickle off the sill it poisons the lichens and the stonework remains clean (Fig.3).

No such problems exist for the lichens in the churchyard at St Michael's, Penbryn. Here, a charming long, low, whitewashed church is set in a circular graveyard on a hill above the sea. Many of the C18th stones are completely white with lichen, but remarkably the inscriptions can still be discerned

because the lichen follows the carved indentations beneath. We were fortunate to have Arthur Chater in our company as Arthur has written two papers on Early Cardiganshire Gravestones, which have been published by the Cambrian Archaeological Association. He explained that in the late C18th and early C19th local monumental masons used Pwntan Stone to create two distinct styles. One, fairly simple, has a characteristic shape; curved at the top with square shoulders beneath. The wording on these invariably starts with the Welsh word 'yma' (here lies). The second is a grander style in which the same round-topped, shouldered shape is formed in cut blocks of Pwntan Stone which frames an inscribed slab of slate or sandstone. They date from 1780-1820 and stand like theatrical doorways on the sloping plot. At first sight you might think them whitewashed, so extensive is the lichen cover.

Moving inside we found two fonts of note. In the porch is a mediaeval Romanesque-style font cut from Dundry Stone (Fig.4), which originally came from Cenarth, via Sarnau (Pevsner 2006). The second, also Romanesque, was thought to be Pwntan Stone possibly from the C12th or C13th. There are various places east of the main A487 where this sandstone was formerly extracted but most are long neglected and overgrown.

Following lunch the group visited Gwarallt quarry, Bwlchyfadfa, near Talgarreg, where farmer Iwan Evans has had the initiative to re-open the quarry which supplied high quality Pwntan Stone like that quarried C19th. In a trade magazine of the 1880s this stone was vaunted as being stronger and cheaper than Portland Stone. The stables at nearby Alltyrodin Mansion were certainly built from Pwntan Stone from this quarry, but whether it was exported over a larger area is lost to history. The quarry exposes thick beds of sandstone dipping at 45° to the field above. Big, blocky stones are quarried from the face and can be cut for paving slabs or shaped for building or restoration work. Some extremely thick beds yield several-ton blocks that are too large for the saws on site and there are some monstrous blocks waiting by the road to catch the eye of a sculptor. Pwntan Stone holds the sharp detail of its carving for hundreds of years. It would be a good choice for a new work of art.

Leaving the Quarry we moved on to Alltyrodin to view the handsome stable block adjoining the Georgian house. The central doorway is set in large ashlar blocks of sandstone from the nearby Gwarallt estate quarry at Bwlchyfadfa. Above the door is a carved plaque with lion rampant which reads:

J LL Esq.
AD 1840
AM 8541

J LL represents John Lloyd, who inherited Alltyrodin on the death of his older brother David in 1822 while AM 5841 represents the date as Anno Mundi; years since the alleged creation of the earth.

Not far away at Bwlchbychan a handsome gateway with three posts and connecting walls frames the drive down to the house. Here the mason is identified in the inscription as D James mason. The sandstone blocks are neatly stippled with chisel marks like those seen at the chapel in Tanygroes (Fig.5). On one post the inscribed plaque reads Erected 5861 and the other bears the same information, Cyfodwyd (was raised) in Welsh and the year 5861. Assuming the same convention, these gateposts went up in autumn 1860, which looks consistent with their architectural style. At Bwlchbychan the dating is uncorroborated Anno Mundi, whereas at Alltyrodin the more familiar Anno Domini date appears larger and above. It is not clear whether these Anno Mundi dates indicate membership of the Freemasons on the part of the squires of Alltyrodin and Bwlchbychan, or whether instead they represent the beliefs of the actual masons who worked the stone on their behalf.

This was our last stop of the day and members thanked John and Tim for arranging the trip prior to returning to, hopefully, heated homes. Thanks also to the Curious Scribbler whose notes on points of interest around Ceredigion appear regularly at www.letterfromaberystwyth.co.uk, which have been heavily plagiarised to complete this report.

* The Friends (http://www.friendsoffriendlesschurches.org.uk) own twenty architecturally and historically important churches in Wales, where their restoration is funded by Cadw and the Church in Wales. The local expert on Tremain church is Brenda Howells: e mail: brenda@owlscote.com

Petrology of Pwntan Stone

Jana Hórak

Building Stone : Pwntan Stone
Stratigraphy: Yr Allt Formation
Geological Age: Ordovician, Ashgill

The description provided here is derived from samples from the only working quarry (as of 2013) in the Yr Allt Formation. Pwntan Stone is composed of a framework dominated by moderately to well-sorted, fine grained (typically < 150μm) quartz grains. The rock also contains subordinate mica, chlorite and

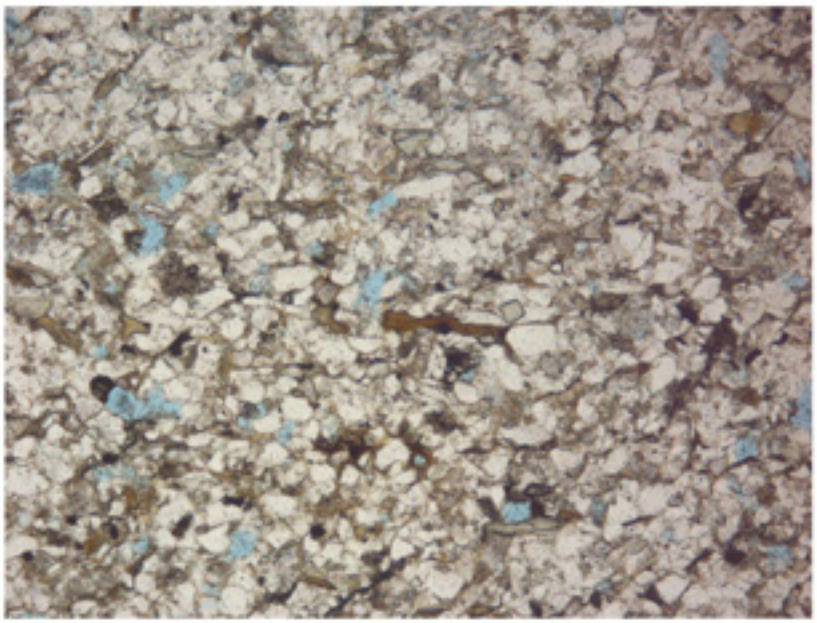

Fig. 1. General view of Pwntan Stone in plane polarized light. Blue areas represent voids injected with dye to show porosity. Note pressure solution fabric trending from top right to bottom left across image. Field of view 5.3 mm

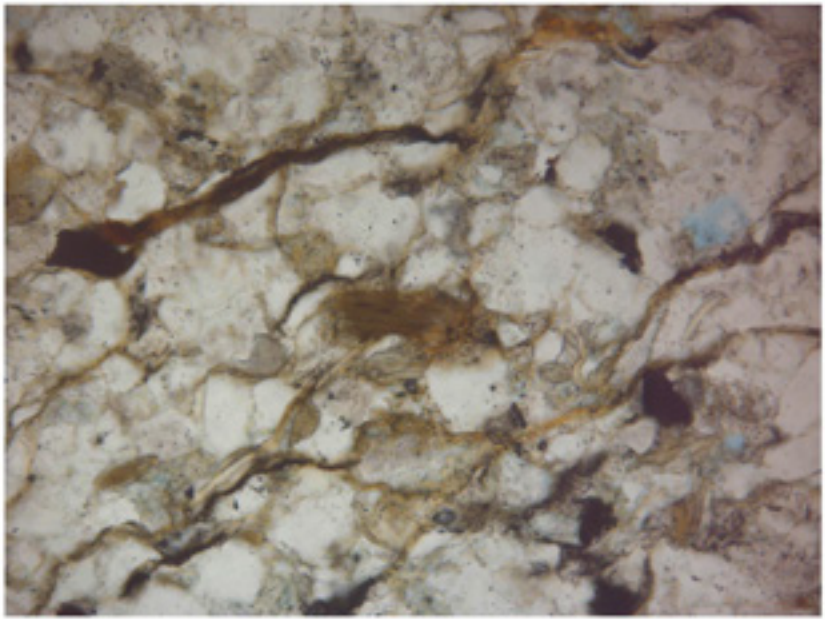

Fig. 2. Enlarged view of Pwntan Stone texture showing detrital biotite (brown crystal, center) and green chloritised mica flakes. The orientation of the the mica within the rock roughly approximates to depositional layering. Plane polarized light, field of view 2.12 mm.

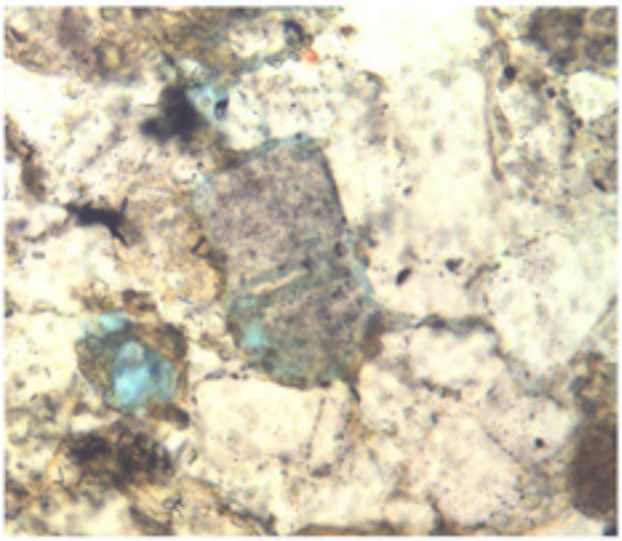

Fig. 3. Close up view of feldspar crystals showing alteration and eroded areas along cleavage, which are filled with dye. Field of view 0.25 mm.

feldspar and minor tourmaline and zircon (Fig 1a). Plates of both muscovite and biotite mica are present, the former being up to 200µm in length; the latter may be slightly longer, up to 500µm, and commonly showing foxy-red pleochroism. Chlorite flakes, typically up to 150µm but with some larger plates, are present in parts and appear to be replacing biotite and elsewhere as a muscovite-chlorite association.
Both plagioclase feldspar and potassium feldspar are present, with the former generally less altered than the latter. Crystal fragments, or rounded grains, of blue-green pleochroic tourmaline of similar dimensions to the quartz are a minor component in most samples as are both elongate crystals and rounded grains of zircon.

The sandstone shows a crude alignment of the mica content attributable to the original sedimentary bedding (Fig 1b). An anastomosing, impersistent pressure solution fabric, emphasised by iron oxide, is also present and is the product of burial and digenesis of the sediment. The effects of the pressure solution are also seen in the close packing of the quartz grains, such that they impinge on one another, reducing any primary porosity that the rock may have possessed. The term pressure solution is in fact a misnomer here as it is the increased temperature during burial that increases the solubility and dissolution of the quartz grains.

As mentioned above the sandstone has a negligible primary porosity. The blue areas in the photomicrograph represent blue-stained dye which occupied voids in the rock. This represents secondary porosity which, although varying slightly from sample to sample and from the margins of weathered blocks to the more pristine interiors of others, never exceeds 10% and is more typically 5-7% by area. The pores are unconnected suggesting that it has formed as a result of alteration and weathering of specific grains, possibly enhanced by the selective plucking of some grains during slide preparation. In a few places, where alteration is less advanced, it is possible to see blue alteration zones in potassium feldspar (Fig1c.). Further work is required to confirm if this process is the sole one operating to produce the observed porosity.

Thin rims of iron oxide around quartz grains provide both cement to the rock and also impart the yellow colouration. A combination of a well-developed pressure solution fabric, combined with the light iron oxide cement, imparts the required properties to Pwntan Stone that allows it to be worked and used for dressings and carving, although in other instances pressure solution is accompanied by re-precipitation of the dissolved quartz, to form a quartz cement, which yields a rock that is too hard to be worked (e.g. Holyhead Quartzite). This is not the case with Pwntan Stone.

The samples used to generate the above description are derived from Gwardy Alltyfaedre Quarry, which is situated within the upper part of the Formation. Samples were also examined from Brynhelyg Quarry [SN 361 466], which is lower in the sequence. In general the lithology remains homogeneous, the most noticeable difference between the two samples being the absence of chlorite-mica plates in the Brynhelyg sample.

The Building Stones of Penarth 13th April 2103

John Shipton

Following a the AGM, Dr Andy King and his colleague gave a most informative presentation on opening disused quarries for building stone extraction. This highlighted that a major problem with obtaining small amounts of new stone for remedial and conservation work, is that it is seldom possible or worthwhile to obtain standard planning permission for small-scale extraction jobs from old quarries. Dr King has worked extensively on the building stones of Somerset, where a wide variety of different stone types have been traditionally used on a village-by-village scale.

After lunch Dr Christian Barrs (Amgueddfa Cymru-National Museum Wales) led us on a short tour to look at the building stones of Penarth. As we walked John Davies explained that the available stone around Penarth was Jurassic limestone and beneath that Triassic sandstone. The uppermost Triassic strata were no good for building and most stone buildings in Penarth are of Blue Lias limestone but some prestigious buildings have been built with coursed Pennant Sandstone brought in by rail from the Coalfield valleys.

Following a dry morning it was not long before it started raining quite heavily. Our first stop was at the Library, built in the 1860's, where the builders had used Blue Lias limestone in the plinth and Pennant Sandstone above, while the dressings were in a younger, oolitic Jurassic limestone, possibly a Bath Stone. Christian mentioned that local masons referred to the Lias as a 'mudstone'.

Walking out of town into a residential area we found a high limestone garden wall with many fossilised shells exposed. Nearby, large family houses had been built with coursed Lias limestone blocks with yellow bricks around the doors, upper windows and as decorative string courses (Fig.1). John explained that these bricks were made locally with the clay overburden found on top of the limestone. He said that the red bricks in the terrace across the road probably came from Cogan. A little further, Clive House has a garden wall built of blocks of granite. John explained that they could have come to Penarth as ballast in ships coming from the Baltic or even India as a lot of Welsh 'Steam' coal was exported there. The granite wall had a coping of Radyr Stone, a local red Triassic breccio-conglomerate, much used in and around Llandaff and north- west Cardiff. Blocks of this had also been used in the wall around the gateway.

We walked up to Penarth Head where, on a good day, it is possible to view the Glamorgan, Gwent and Somerset coasts. Today, however, as the rain increased and our numbers dwindled we struggled to even make out Lavernock Point. Christian explained that on a clear day it is possible to see the succession of Triassic rocks along the coast from the red Mercia Mudstones, through the Blue Anchor, Westbury and Penarth Group to the basal Jurassic Blue Lias at Lavernock Point. The rocks visible comprise red mudstones and siltstones, overlain by a more varied mixture of grey and green mudstones, siltstones and limestones.

Our next stop was St Augustine's Church. Designed by William Butterfield it was built between 1865 and 1866 to replace a small medieval church that was in poor condition and not large enough for the growing population thereabouts. Its walls are built of Lias limestones and the dressings of oolitic limestone. On both sides of the east door are decorative Radyr Stone columns, the soft stone of which has eroded badly over the past 150 years and the limestone clasts stand proud of the surface (Fig.2). These columns were one of the few decorative details to what is quite a plain exterior, especially compared to the highly decorated interior.

Unfortunately, the church was locked and the interior remained unseen. The rain continued to fall so it was decided to call it a day. John thanked Christian for organising the visits and persevering despite the weather. Returning to our cars we passed the Albert Road Methodist Church. This is built of Pennant Sandstone with Jurassic oolitic limestone dressings. Some of these had been recently replaced with what looked like Box Ground Stone from Bath but in the absence of Tim this observation remained only a

Fig.1. A house of coursed Blue Lias limestone and bricks, Penarth.

Fig.2. Weathered columns of Radyr Stone, St Augustine's Church, Penarth

possibility. Whereas St Augustine's had been built to accommodate the expanding populations' religious needs, Albert Road Methodist Church was being converted into flats to cater for the populations' physical needs, a sign of the times maybe.

The Building stones of Pembroke and Haverfordwest 18th May

John Shipton

Compared with the ice cold wind of the Pwntan excursion and the torrential rain encountered in Penarth following this year's AGM members found the weather in Pembroke on 18th May for the third meeting of the year quite benign. We met in the town car park where John Davies explained that Pembroke was built on top of a ridge of hard Carboniferous Limestone, which is much fractured as a result of folding. It dips steeply to the south and is near vertical in places. To the north is the mill pond where softer Devonian sandstones lie.

Heading into the town the low retaining walls near the Visitors Centre are built of local Carboniferous limestones that exhibit styolites, whereas the modern Centre is built of Carboniferous sandstone. Beyond the high retaining walls and batters contain dressed Carboniferous Limestone ashlars. Lower, more recent walls, contain pieces of recycled Carboniferous Limestone blocks, with dressed margins and sparrow-pecked faces, the odd granite block and a few small blocks of muddy red sandstone.

Turning the corner onto Westgate Hill, Pembroke Castle towered above us. Solidly built in blocks of local limestone it dominates the town from its position on the western end of the ridge. Below, on the opposite side of the road to the castle, stands Westgate Chapel. It is also built of Carboniferous Limestone blocks but the window dressings are in sandstone, thought to be Cefn Stone, with a few decorative red brick voussoirs inserted. The sandstone dressings are badly eroded, the process probably accelerated by the use of cementatious mortar for repointing and stone repairs (Fig. 1).

Walking up Westgate Hill the beds of limestone on which the town are built are evident on both sides of the road. John stopped to point out striations (scratches) at a fault line. In the town we found another church, St Mary's, built of Carboniferous limestones but here the builders had used a Jurassic limestone for the window dressings. Builders of the C19th Town Hall had utilized a variety of different Carboniferous limestones, in some of which different coloured sedimentary bands were evident. In others fault lines were clearly visible where the lime had migrated to fill the cracks. Also visible were burrows, stylolites and fossil brachiopods.

Continuing eastwards through the town we passed many interesting features including fault lines in a large slab of Carboniferous Limestone, which had been used in the front step of a town house. Another step was of slate which John thought might have come from Cilgerran. Also seen were 'snail trails' in Bath Stone cappings of a gate post. At the junction of Main Street and East Back, in St Michaels Square, stands an impressive Wesleyan Chapel (Fig.2). This has fine Carboniferous Limestone gate posts and a pair of Jurassic limestone columns, which may have been C19th Dundry Stone from Somerset. The chapel had been rebuilt in 1872 but is currently used as an Antique shop.

Nearby stands St Michael's Church. Originally built in the late C13th it was extensively rebuilt in 1832 but is now once more falling into disrepair. The building is mostly of Carboniferous Limestone rubble but the tower, which has been built in several stages, has a top of Carboniferous Limestone ashlars. These were probably inserted during the 1832 rebuild as in 1828 the tower was described as squat. The C19th dressings to the windows and doors are of Jurassic limestones, which have Gothic arches above in alternate Jurassic and Carboniferous limestone voussoirs for decorative effect (Fig.3). The slates on the roof were thought to have been quarried in Llangolman.

At the southern end of the church stands the remains of an un-roofed ruin. There is no recorded use of this structure but it was quite ancient and did not appear to have been repaired during the C19th rebuild. The walls contain a number of interesting rocks including gabbros, which are not naturally found in Pembrokeshire, and red/brown coloured blocks of Devonian Ridgeway Conglomerate. The gabbros were possibly brought here as ballast in ancient trading.

St Michael's was the last site to be visited in Pembroke and after lunch we all assembled on the site of Haverfordwest Priory on the banks of the Western Cleddau. Founded by Augustinian Cannons around 1200 A.D. the process of demolition was begun in 1536, which resulted in the ruinous state that we now find the site.

Fig.1. *(Top left) Badly eroded Stone window dressings, Westgate Chapel, Pembroke.*

Fig.2. (Top right) St Michael's Wesleyan Chapel, Pembroke.

Fig.3. (Bottom left) Decorative use of limestones in the porch of St Michael's Church, Pembroke.

Fig.4. (Bottom right) Original and replacement bridges over a shallow drain, Haverfordwest Priory.

Robin Sheldrake explained that historically the Carboniferous Limestone in Haverfordwest was brought up the river from quarries down-stream, while sandstone came from further down-stream around Hook. We looked at the remains of the priory, the walls of which are built mostly of grey or creamy coloured Coal Measure sandstones. However, there are also some blocks of Carboniferous Limestone and some quartzitic sandstone. Also spotted were some slate (thought to have come from Rosebush), flaggy sandstone containing mica and a muddy Old Red Sandstone.

A Jurassic limestone had been used to carve the string courses and column bases, which Tim thought were probably Dundry Stone, but it was not possible to get close enough to the string course to confirm this without risking life and limb. Following a number of questions Tim gave a short and simple tutorial on how to tell the difference between the three main types of Jurassic limestone for the non-geologists in the group. Around the cloister a shallow open drain was bridged using Jurassic limestone paving supported by carved blocks of Caerbwdi Sandstone from the area around St David's (Fig.4). Cadw had replicated this historic arrangement of stone in a recent replacement.

We had spent more time at the Priory than intended and now found that there was no time to visit the historic town, so we returned via Quay Street and stopped near outcrops of shale, thought to be of Silurian age, on the western side of the road. John thanked Jana and Robin for organising the day and the visit ended with a promise to revisit the town in the future.

Visit to the National Roman Legion Museum, Caerleon and the Parish Church of St Mary's.Usk 22nd June

John Shipton

The Second Augustan Roman Legion arrived in Caerleon in A.D. 74/75 to start a period of occupation, which was to last several hundred years. During that time they built a large fort at Caerleon and a town a few miles to the south east, at Caerwent. The National Roman Legion Museum at Caerleon was built in 1850 and became part of Amgueddfa Cymru-National Museum Wales in 1930. It is the second largest museum in Wales and it is here that many of the artefacts from the period of the Roman occupation of Caerleon, Caerwent and Usk are held for preservation, research and public display. It was here, on 22nd June, that a large group of Forum members met and were privileged to have access to some of the artefacts held by the museum not normally on display.

At the museum we were met by Dr Mark Lewis and, following introductions, were taken down to the basement to view the collection, which is stored in environmentally controlled rooms below the main museum building. Spread out on tables for inspection were a large number of labelled artefacts (Fig.1), prominent among which was a large block of Old Red Sandstone with a carved Latin inscription. It had been found in a building, thought to be a store, near the amphitheatre and due to its tapered shape members thought that it could have been a re-used voussoir, but this was only speculation.

There was an image of a 'native' carved in a sandstone block, possibly Sudbrook Sandstone, and a small carving in a shelly Bath Stone that was thought to have come from the Altar Salus. There were a number of rotary lava quern stones, pieces of Purbeck Marble (which had lined the walls of the baths) and random lumps of tufa. A river pebble showing the imprint of tree bark had been found at Usk but John Davies thought that it must have originated from somewhere else in south Wales. There were pieces of tesserae - small cubes of stone used in the manufacture of mosaics - and small pieces of an inscribed slab of Jurassic age Painswick Limestone.

Stored on metal racks on one side of the room were larger artefacts of Bath Stone, Painswick and tufa limestones. Following inspection of these members returned to the ground floor public area to view the items on display. Here we found a number of inscribed tablets and gravestones in Old Red Sandstone, Bath Stone and Lias limestones plus a large Bath Stone coffin. Although there was more of interest to see in the museum we had a full day ahead so we left and crossed the road to inspect the lytch gate at St Cadoc's Church, the oak frame of which is roofed over with Old Red Sandstone tiles and is flanked on both sides by modern Forest Pennant sandstone buttresses.

Walking south-east down High Street, towards the river, we passed buildings constructed of Old Red Sandstone, including the Priory Hotel (Fig.2), the earliest parts of which date back to 1180 when

it was a Cistercian Monastery. However, it has been much altered over time. The ancient window dressings are of limestone, possibly Dundry Stone, but the application of surface treatments made it impossible to get a clear view of the stone. On the front of building the first couple of masonry courses above footpath level are also limestone, but once more positive visual identification was impossible although it was thought that they looked like local tufa.

At Porth y Mynd the Old Red Sandstone is supplemented with Lias limestone, Bath Stone and re-used Dundry Stone blocks, while the string course just above modern ground level is of a micaceous sandstone, possibly Pennant Sandstone. We walked down to the site of the original Roman bridge which collapsed into the River Usk during the C18th. This lies approximately 100 metres upstream from the existing bridge and close to the last remaining tower of Caerleon Castle. This tower is built mostly of Old Red Sandstone but there are blocks of Sudbrook Sandstone and Jurassic limestone in the build. The dressings are of Sudbrook Sandstone.

The afternoon was to be spent in Usk and, after a substantial lunch in the Kings Head, we met at the priory gatehouse outside of the Parish Church of St Mary's (Fig. 3). Before inspecting the church we looked at the stone used in the graveyard. Here, a C13th effigy was carved in a very pale sandstone, possibly from the bottom of the St Maughan's Formation (Old Red Sandstone), while a similar stone was observed in an early cross base near the priory gate. Other possibilities were suggested, one being Sudbrook Sandstone but Jana Horak was doubtful of this.

The church was originally part of the Benedictine Priory and Maddie Gray told us that although the formal formation of the religious community was unknown it was thought to be late C12th or early C13th, and that it was the only known Benedictine community for women. The church is unusual in as much as it has two parallel naves, one for the monastic community and one for the townsfolk. However, following the dissolution of the nunnery in 1536 the monastic nave was incorporated as part of the parish church. Although some of the original C12th fabric of St Mary's still stands, including the C12th crossing, much of the visible structure was built in the C14th. Rebuilding was also required in the early C15th following the Glyndwr rising and the burning of Usk in 1405, while two large porches, built of Dundry Stone, were added in the late C15th. Tim Palmer suggested that this was close to the end of the time that Dundry Stone was available. The church was partly rebuilt and extended in the mid C19th and further extended at the end of the C19th/ beginning of the C20th.

Much of the fabric of St Mary's is like many of the local buildings, being of local Old Red Sandstone with medieval dressings of Dundry Stone. Some sections of a Dundry Stone string course had had the projecting section knocked off, probably deliberately for small scale lime burning, as we could not conceive how the extent and erratic pattern of the destruction could have happened accidently. In one of the Dundry Stone porches veins of weaker material were clearly visible and some of the late medieval dressings had been replaced with Bath Stone. Making our way towards the east end Maddie Gray pointed out a re-cut gravestone of a very fine-grained, non-micaceous sandstone, which was thought to have probably come from the non-coalfield formations to the west. This area of the graveyard also contains gravestones cut from many different sandstones.

At the east end of the church is an ancient arched opening which has been recently in-filled. The wall itself is once again of Old Red Sandstone rubble but this time the stone blocks are smaller than those in the main body of the church. Also, in the in-filled opening, new limestone window dressings were simple in style and thought to be of Doulting Stone, an oolitic limestone of Middle Jurassic age. Dressings to the medieval arched opening are a mixture of tufa and gritty Sudbrook Sandstone, around which an application of render, which looked to be lime based, had been applied to what was probably core work that had been exposed by demolition or erosion, or both.

Inside the church most of the exposed masonry, including the columns and arches, are of Old Red Sandstone, probably from the St Maughan's Formation once again. The colours vary from maroon to greenish cream. The font was thought to be Norman but sat on a later base. Unfortunately layers of paint made it impossible to ascertain the stone type from which it was carved. We had hoped to visit the castle but it was closed for a wedding and some members had a long way to travel so John Davies thanked Jeremy Knight and Tim for organising the day and closed the meeting at 4pm.

Fig.1. (Top) Members inspecting artefacts in the store of the National Roman Legion Museum, Caerleon.
Fig.2. (Above left) The Priory Hotel, Caerleon.
Fig.3. (Above right) St Mary's Church, Usk.

The building Stones of Flintshire and the Vale of Clwyd

John Shipton

September's field trip was a two day visit to St Asaph, Denbigh and Ruthin, beginning at St Asaph Cathedral where we met the trip leader, Fiona Gayle, who is the Denbighshire County Archaeologist.

St Asaph lies at the northern end of the Vale of Clwyd and is built on a promontory of glacial till between the rivers Elwy and Clwyd. A distinct purple sandstone (Elwy Sandstone) of Westphalian age was thought to have been quarried on the river near H.M. Stanley Hospital for use in the cathedral. In October, after this trip, Andrew Haycock undertook further investigative work in the area to help match some of the stone we saw over the weekend to a local source (see article p. 30). He discovered that the Elwy Sandstone quarry had long been in-filled and overgrown, but digging did reveal some of the distinct purple stone. Elwy Sandstone was also thought to have come from the river Elwy near Pont yr Allt-goch and Glanllyn. Another local outcrop of stone suitable for building is the red-coloured Kinnerton Sandstone Formation (previously Lower Mottled Sandstone) exposed in a disused quarry on the west bank of the river Clwyd near Bryn Polyn Bach.

Although the cathedral is the smallest in the UK it dominates the city. The first reported church on this site was founded by St Kentigern around the mid C6th and, when he returned to his native Scotland, he was succeeded as bishop by his pupil St. Asaph. There is no physical evidence of this early church and later barrel-vaulted tombs, constructed below the current building, destroyed any evidence there might have been of the earlier building. The oldest part of the cathedral dates from the late C13th when a new church was built after Edward 1's troops torched the earlier building in 1282. The current church was largely built during the late C15th after significant damage was sustained during the Owen Glyndwr uprising. Storm damage to the top of the tower in the C18th resulted in a fairly obvious repair in dark sandstone and the whole building was remodelled by Gilbert Scott between 1867 and 1875.

The cathedral is predominantly built of smooth and nodular Carboniferous limestones, but considerable quantities of Carboniferous Westphalian [Coal Measures] and Namurian [Millstone Grit] sandstones are also present. From the car park the C18th tower repair in red and brown sandstone (Gwespyr and local red Triassic stone) is very conspicuous against the pale grey limestone (Fig.1). We entered the cathedral grounds through a gateway in a wall built of Carboniferous limestones with a sandstone coping that was thought to be Cefn Sandstone.

We spent some time inspecting the Carboniferous Limestone blocks in the walls on the south side of the building, where those of us used to seeing only the smooth variety of limestone found the nodular form a bit of a novelty. Pale green Carboniferous sandstone, thought to be Gwespyr Sandstone, has been used for cut blocks in the buttresses and for quoin stones, many of which contain iron spots and rings. To our right stood a square, box-like structure, without windows built of Bath Stone with a flat roof, which was probably built around 1830.

The wall at the east end of the cathedral contains blocks of an intraformational conglomerate while the dressings to a large window are of what was thought to be a pale Namurian sandstone. Retracing our steps towards the west we passed the rebuilt south aisle, where a similar sandstone has been used for dressings but the limestone was a local grainstone composed of broken up shell material.

The west front contains blocks of a purple Elwy Sandstone, which was thought to be obtained from a local quarry owned by the cathedral during the medieval period. Over the years there have been many replacements (Fig.2a & b), some in brick-red sandstone while other, more recent replacements, had the look of Hollington Sandstone from Staffordshire. To the right of the west door grey sandstone replacements in a string course, which contain visible coal spots, were thought to be Forest Pennant sandstone. Sandstone used in the base of the buttress (varying red to yellow in colour) had veins similar to those found in Grinshill Stone. However, after further field investigation, Andrew Haycock believes that this is a veined variety of stone from the local Kinnerton Sandstone Formation (Triassic).

Inside the cathedral Tim Palmer and Jana Horak inspected the ancient grave slabs laid in the transept floor and decided that they were probably cut from Namurian age Gwespyr Sandstone. Many of the old slabs in the transept and Translators Chapel had been replaced with what Andrew thought was Forest Pennant sandstone. Much of the inside fabric is Carboniferous Limestone but some Bath Stone has been used in work carried out between the wars. We were told by a helpful official that this came from Plas Dyffren Aled at Llansannan when the house was demolished.

Having arranged to meet Jim Hall at the Town Bridge spanning the River Elwy we moved on. Jim is the Engineer responsible for overseeing the repair and strengthening work to this C18th bridge. A combination of very heavy traffic, ingress of water laden with road salt and hard cementatious mortar used in earlier re-pointing and repairs has caused damage to the bridge that requires urgent attention. Many of the voussoir-shaped stone blocks have eroded to such an extent that the bridge arches are in danger of collapse so the repair entails selectively replacing these eroded elements with new.

Traditionally an arch is built from the bottom up so inserting self-supporting wedge shaped stones from the underside is close to impossible. Therefore, ashlars had to be drilled and pinned to the underside with anchors, pointed up and grouted with lime-based materials. A further complication was that work could not be carried out during the winter months as the flood water might carry the access scaffold away so the work has to be carried out over several years. However, this did provide us with an unobstructed view of the underside of the bridge arches without the scaffold in place (Fig.3a & b).

The original stone was similar to the red/yellow stone found in the cathedral that had a lot of the Grinshill-

like veins. However, the amount of this stone we were now finding suggested that it does outcrop locally and is very likely to be Triassic in age. The replacement ashlars are of mottled Hollington Formation stone, which comes from Staffordshire and is part of the Sherwood Sandstone Group. They are very similar to the recent replacement stone seen in the cathedral. It was thought that the Carboniferous Limestone in the bridge might have come from Anglesey although Tim thought that it was similar to the grainstone found in the cathedral.

Walking to our last stop of the day, the double-naved Church of St Kentigern and St Asaph (Fig.4), we passed a large fountain built of Carboniferous Limestone in the adjacent park and stopped to inspect the fossil corals it contained. The original nave, on the south side of the church, was built in the C13th of sandstone but was then rebuilt on the existing foundations in the early C16th. The second nave was constructed in a nodular Carboniferous Limestone later that century. The lower levels of the walls of both are of coursed rubble but higher up the build becomes random. The coursed rubble sandstone is mostly the same purple-coloured Westphalian sandstone found in the west front of the cathedral but the random work contains brick-red sandstone with very rounded grains, Gwespyr Sandstone and some blocks of Carboniferous Limestone. The window dressings in the south nave are of a mottled variety of the local Triassic stone.

At this point some members decided to return to their hotels to prepare for our evening meal but John, Jana, Andrew and myself decided to travel the short distance to Eryl Hall to look for the ancient quarry that produced the purple Elwy Sandstone that we had seen so much of that day. The house is now a country club and after speaking to members of staff, who were not aware of any quarry, we had a look around the static caravan site that now occupies much of the area. Unfortunately, our trip was in vain as the outcrop was either hidden away in the dense undergrowth that surrounds the site or, more likely, had been buried to create flat areas on which to site caravans.

Sunday morning began in Denbigh, where we assembled outside the old Market Hall, now converted to a library, before walking up to the Burgess Gate. Built on a limestone hill at the same time as the castle (1282-95) the gate was the principal entrance to medieval Denbigh. It is built predominantly of Carboniferous Limestone but the front elevation has mottled yellow/green – purple/red sandstone cladding (Fig. 5 & 6). In recent years large blocks of eroded sandstone have been replaced with new, which are a mixture of Carboniferous age Woodkirk Sandstone from Yorkshire and Bolsover Sandstone from Derbyshire, although the latter could possibly be Peak Moor Stone. The new blocks have been replaced to the line of what was thought to be the original face and some had been cut to rather complicated shapes. It is accepted that the stone had been replaced for structural reasons and cut to the profiles of the original blocks but the author felt that a more subtle approach, possibly using low temperature fired tiles and lime mortar, might have created a more sympathetic appearance.

Leaving Burgess Gate we set off along the town walls, which are mainly built of local Carboniferous Limestone that contain many fossils but, near the Countess Tower, a number of glacial erratics have been incorporated into the build. Nearby, a limestone outcrop in the hill clearly showed the jointing that provided easily available blocks for the castle builders. Quite large areas of calcite were visible in exposed veins.

We left the wall walk and made our way to Denbigh Castle. Looking at the front of the castle it was apparent that the masonry blocks in the base of the gatehouse towers were small compared to those towards the top (Fig.7). Some of us thought this was an odd method of construction but John Davies explained why - the first blocks of masonry out of a new quarry are often the smaller ones from the top beds, and it is these that would arrive on the construction site first. As the quarry was worked down the beds would generally get thicker and the blocks bigger. Castles were often built in a hurry and the builders could not wait until all the stone had been quarried so work started with what was to hand as it arrived on site; smallest first, larger later. Like the Burgess Gate the stone is predominantly Carboniferous Limestone with most dressings in a mottled yellow to grey/green sandstone. Sandstones of many different hues had been used in the core work.

Nearby stands the tower of St Hilary's Chapel. Built in the early C14th the chapel was demolished in 1923 leaving only the tower and a bit of the west wall. It is constructed of Carboniferous Limestone with a door and window dressings in green sandstone. Red sandstone has been used in what remains of the west

Fig. 1. (Top left) St Asaph cathedral showing the tower repairs. Fig. 2a. (Top right) Close up of stone variety. Gwespyr Sandstone, purple Elwy Sandstone, Kinnerton Sandstone, red Hollington replacement and Carboniferous Limestone (right). Fig.2b. (Above) The west front of St Asaph cathedral.

Fig. 3a. (Top left) Weathered sandstone blocks under the C18th Town Bridge.

Fig 3b. (Middle left) Close-up view of replacement blocks.

Fig.4. (Bottom left) The church of St Kentigern and St Asaph.

Fig. 5. (Top right) View of the Burgess Gate.

Fig. 6. (Middle right) Close up view of mottled Carboniferous Basement Beds sandstone blocks.

Fig. 7. (Bottom right) The gate house at Denbigh Castle.

Fig. 8. (Middle right) The entrance to the County Hall, Ruthin.

Fig. 9. (Bottom right) The original castle ditch, now a tunnel, at the Ruthin Castle Hotel.

wall but apart from the obvious colour difference it was very similar to the green stone. John suggested that both might have come from the same source and the colour difference being due to either the red colour leeching out of the green or more oxidization taking place in the red stone. Further fieldwork investigation in the area has confirmed that the mottled yellow-green to red-purple sandstones come from the Dinantian age Basement Beds that lie stratigraphically below the Carboniferous Limestone.

Before returning to the town we made a brief visit to the remains of Leicester's Church, begun in 1578 by Robert Dudley Earl of Leicester and never completed. Work stopped in 1584 reputedly because of financial problems but, according to local legend, it was never finished because work completed each day was taken down and moved to another location during the hours of darkness by unseen hands. Some believed it to be the Devil's work but I will leave it to the readers' imagination. Now only a Carboniferous Limestone skeleton survives.

Returning to the Library we inspected the sandstone columns on the south side of the building. In the C16th the ground floor had open sides and the columns would have supported the floor above. They are possibly Gwespyr Sandstone but might not be original. The walls are of Carboniferous Limestone blocks which may have originally been rendered but have been repointed in recent years with a prominent cementatious mortar.

Making our way to our next stop we passed a C19th brick-built house with limestone dressings. On inspection we found the stone to be a pale grainstone whose fragments are made entirely of lime. The Welsh Presbyterian Chapel nearby is built of Carboniferous Limestone ashlars and the window cills, cut from the same stone, exhibit cross bedding. In the limestone piers fossil corals appear alongside what looked like a sponge.

Our last visit of the morning was to the parish church of St Marcella, St Marcella the Virgin possibly having established a hermitage on the site in the C7th. A church is recorded in the mid C13th but the current double-nave church dates from the late C15th and only the tower and a couple of doors remain of the C13th building. The church is also known as Eglwys Wen or Whitchurch after its white-washed exterior. The door and window dressings are currently not lime-washed but traces of the protective coating are present revealing their white-washed past. The majority of dressings are of green sandstone with some having red banding. The surface of some window dressings has suffered considerable erosion and clasts were visible in the exposed stone. At the base of the tower are two Carboniferous Limestone buttresses which contain pieces of chert. On the south-west corner, adjacent to the tower, an old doorway has been in-filled with masonry. During this process the dressings had been left in place and, when the church was lime-washed, these had been left uncoated. It is possible that this was one of the

C13th doors. The jambs and voussoirs are of a brick-red colour sandstone, very similar to the Kinnerton Sandstone Formation (previously Lower Mottles Sandstone) used extensively near Ruthin.

Inside the church are a number of grand monuments. We first inspected the painted alabaster alter tomb of Sir John Salusbury who died in 1578. His effigy lies on top of the tomb alongside that of his wife Dame Jane, while on the sides of the tomb are carved figures representing his nine sons and four daughters. We also inspected the monument commemorating the life of Humphrey Llwyd (1527-1568), the Welsh cartographer, author and Member of Parliament. This wall-hung monument is unusual in as much as it is cut from a combination of sandstone and alabaster.

We drove to Ruthin and following lunch walked into the town. Constructed with sawn blocks of nodular Carboniferous Limestone the County Hall has an entrance of red sandstone ashlars flanked by large columns of Larvikite from Norway (Fig.8). This dark igneous rock (augite-syenite) contains crystals of labradorite feldspar and is very popular on British high streets. The red sandstone has a regular colour and can be seen to have rounded grains, suggesting that it was aeolian (wind-blown) in origin rather than fluvial (laid down in water). Moving on, the Town Hall is predominantly constructed of three different stones; around the windows, doors and in miscellaneous dressings Cefn Stone has been used while much of the ground floor is of sawn blocks of Carboniferous Limestone but in the plinth below, and for the external elevation of upper floors, the builders have used a red/pink to grey sandstone, although some of the stone was veined, its appearance was different to the stone in St Asaph.

In St Peter's Square stands the Edward Pierce monument, the bottom section of which is cut from Carboniferous Limestone blocks containing productid brachiopods. The limestone extends up a couple of metres and has three separate decorative bands of red sandstone. Above this there is approximately four metres of yellow/green sandstone, possibly Cefn Stone, and a number of irregularly spaced bands of the same or similar red sandstone found lower down. Around the monument Carboniferous Limestone kerb stones contain many fossil crinoids. These are not common in the local limestone so were thought to have been imported from further afield.

Leaving St Peter's Square we walked up Castle Street, towards the Ruthin Castle Hotel. Once the site of a medieval castle it was rebuilt in 1830 and is now a large hotel surrounded by romantic ruins. The gate house has been rebuilt with Carboniferous Limestone blocks and sandstone dressings, which look more like the red sandstones seen earlier in St Asaph Cathedral and local churches and which it was thought might indicate a local source. The romantic ruin that is the hotel garden contains much work that is not medieval. The limestone blocks and red sandstone dressings from the medieval castle have been rebuilt, possibly at the whim of the owners, and it is unlikely that the result reflects the medieval layout. Many of the rebuilt limestone walls contain scattered blocks of sandstone which creates a spotted polychromatic effect, whereas the extant medieval limestone walls use the sandstone only in dressings.

We managed to gain access to a tower in a section of the medieval castle at the bottom of which we found the bedrock on which the castle was built. This is the red Kinnerton Sandstone Formation and similar to that used in the dressings. Nearby, a medieval gate gives access to a lower area, now lawned, below the hotel. Making our way down to this level we found a tunnel cut into the sandstone (Fig.9) and it was apparent that this was probably the original castle ditch. The sandstone used in the medieval castle, and possibly the C19th rebuild of the hotel and gate house, was probably excavated to create the ditch. This was a bit of a revelation to most of us but there was still work to be done by the professionals, stone matching this and others that we had identified on this trip.

It had been a long day and many of us had a considerable distance to travel home so Tim thanked Fiona for organising an interesting and informative trip and closed the last field trip of the year.

The sandstone building stone quarries of Northeast Wales:
Part One - St Asaph, Ruthin and Denbigh

Andrew Haycock

This short article is intended as an introduction to work I will elaborate on in future articles.While attending the September field trip to St Asaph, Denbigh and Ruthin, it became apparent that further work could be done to help match some of the building stone we saw in the local churches, castles, St Asaph Cathedral and other buildings to local outcrops and quarries. Neaverson provides an excellent starting point in his paper Medieval quarrying in North-Eastern

Wales' (Neaverson, 1954), and I used this paper and the British Geological Survey (BGS) memoirs and 1:50,000 map sheets (Denbigh 107, Flint 108) as a base for much of my research and fieldwork in early October 2013.

The Elwy Sandstone of St Asaph

Neaverson (1954) notes the 'distinctive purple sandstone for which only one adequate source is visible. This sandstone is exposed on the right bank of River Elwy just above Pont yr allt goch, 2 miles SSW of St Asaph'. I was unable to make contact with the landowners to gain access to this site, but in trying to seek access I found that the nearby Glanllyn Farm was built from the same purple sandstone as seen in the walls of St Asaph Cathedral. Neaverson thought the stone was quarried from the riverbed in the summer months when the water was low. He also notes the stone was used at Rhuddlan Castle and the Red Tower in the NW corner of Denbigh Castle.

The sandstone (Elwy Sandstone) is Westphalian in age and part of the Carboniferous Upper Coal Measures. Although the Coal Measures can be found below the drift all around St Asaph, the Elwy Sandstone is restricted to two thin N-S trending bands (no more than 2km in length) to the south-southwest of the city. Therefore, the opportunity for stone extraction was very limited both by its extent and the glacial drift that covers much of the area. The British Geological Survey Rhyl and Denbigh Memoir (Warren, 1985) mentions an old quarry on the west bank of River Clwyd (SJ 0478 7402), 0.4km northeast of the hospital, which was also thought to have yielded sandstone for the cathedral. On a recent visit, the quarry was found to be completely overgrown but shallow digging revealed the purple sandstone. This stone was a very good match for that seen in the cathedral.

In hand specimen, this calcareous sandstone is moderately to well-sorted, and pale red-purple in colour (Munsell colour 5RP 6/2) on a fresh surface. These samples will be thin sectioned and reported on in more detail in the future.

Kinnerton Sandstone Formation (Lower Mottled Sandstone)

This Triassic sandstone is part of the Sherwood Sandstone Group and is generally red-brown to yellow in colour. It extends over a wide area in the Vale of Clwyd, but is generally obscured by glacial drift.

St Asaph

Neaverson notes a quarry, which still exists, on the west bank of the River Clwyd near Bryn-Polyn-Bach, a mile southeast of the cathedral (SJ 0504 7335) in which a good section of false bedded sandstone is exposed.

In hand specimens, the sandstone is red-brown in colour (approximate Munsell colour 10R 5/4 – 4/4), and composed predominately of fine to medium-grained, well-rounded to rounded quartz grains. The sandstone is aeolian (wind-blown) in origin, and its friable nature suggests the grains are quite poorly cemented. The red colour is the result of iron staining and granules of the iron mineral, hematite, can be seen throughout the rock. Due to its friable nature, as noted by Neaverson, much of the stone in the cathedral has been replaced by red Hollington Stone but much evidence of the original red sandstone can still be seen throughout the walls, particularly in repairs to the upper part of the tower.

The 'Grinshill-like' veining and red/yellow banding, seen in some of the stone at the cathedral and River Elwy bridge, was not observed in the quarry outcrop. These features are very likely to be a local variation within the stone that may have been quarried out or quarried elsewhere but was not found during field investigation. Its extensive use along with other local stone does suggest that it is of a local origin.

Ruthin

The sandstone quarried around Ruthin has been extensively used in the area. It is red-brown in colour (10R 5/4) and several road cuttings through the Formation provide good sections through these dune cross-bedded sandstones. Ruthin Castle sits on a good exposure and the original castle is likely to have been built in part using stone from the site. More recently, stone was quarried for building the C19th part of the castle from Hirwaen (SJ 1418 6134) to the northeast. The sections in Hirwaen Quarry are still very well-exposed (Fig. 1). Neaverson notes that this stone was also used in C15th for Llangwyfan, Llangynhafal and Llandrynog churches, but as a result of its friable nature the walls of the churches were covered in render.

A ruined C15th church at Llanbedr Dyffryn Clwyd (Fig. 2) appears to be built from the same red sandstone and Neaverson notes that a degraded quarry, 275m south of church, may have been the source. This quarry was not visited during fieldwork as it is now within the garden of a modern house.

At Llanfwrog, near Ruthin, a quarry can be found 200 metres west of the church (SJ 11116 57801) and a lot of this stone would have undoubtedly been used in Ruthin Castle. Red sandstone was collected from this site where some of the stone has a mottled red and white appearance. Whilst this mottled stone was not seen in the castle, a very similar mottled stone was observed in the windows and doorway at the Church of St Kentigern's in St Asaph.

Denbigh

The Kinnerton Sandstone can be found in the Red Tower, Burgess Gate and walls of the castle, but I struggled to find any good outcrop or local quarry still accessible today. The Kinnerton Formation occupies a wide area to the east of the town, but this is largely obscured by glacial drift. An old quarry in the town (SJ 0557 6638), mentioned in the BGS memoir for the area, is now the site of a Lidl supermarket. Unfortunately, all evidence of quarrying at the site has completely vanished.

Carboniferous Limestone: Basement Beds

The Basements Beds occur at the base of the Dinantian Carboniferous Limestone Series and consist of mottled variations of red, yellow, green and purple sandstones and conglomerates.

St Asaph

These beds occur in NW – SE trending exposures to the west, southwest and south of the city. Small

Fig. 1 (Bottom) Kinnerton Sandstone Formation exposure in Hirwaen quarry, nr Ruthin.
Fig. 2 (Top). Kinnerton Sandstone Formation in the ruined C15th Llanbedr Dyffryn Clwyd church.

exposures were observed during fieldwork, but no evidence of quarrying was found. It remains to be seen whether or not building stone used in the city was quarried locally from these beds. During the Forum excursion occasional conglomeratic building stone was seen that in the future may be matched to the Basement Beds.

Ruthin

No evidence of the quarrying of the Basement Beds in this area has been found during fieldwork to date. However, I have further work to undertake in this area, so may find evidence in due course.

Denbigh

The Basement Beds have been used extensively in and around Denbigh. Mottled yellow-green to purple-red sandstone has been used as facing and dressing stone in the Burgess Gate, Goblin Tower and around the north front of the castle. Neaverson notes 'the mottled greenish-purple stone was probably obtained from Pont Lawnt to the SW of the town (SJ 043 651), but the quarry has become obscured by debris'. During fieldwork I was unable to find any evidence of the former quarry.

The nearest exposure of note is in an old quarry 2.6km northwest of Denbigh Castle near Foxhall and Foxhall Newydd (SJ 0302 6734). Here, very fine-grained, mottled pale green to yellow stone (Munsell SY7/2 – 6/2 light grey – light olive grey, 10 YR 7/6 yellow) occurs, which was very likely to have been used in both nearby buildings.

Future work

The specimens collected during fieldwork will be prepared for thin section and looked at in more detail over the coming months and the results will be reported back in future editions of the Newsletter. The specimens will also be added to the Amgueddfa Cymru – National Museum Wales building stone collection, where they will be accessible for future reference, particularly for stone matching work.

While some of the building stones of northeast Wales are quite easy to identify, many of the sandstones have a very similar appearance. It is hoped that studying and identifying subtle differences in the stone types, (e.g. thin section textures, porosity, weathering) will help us identify the different stones and match stone used in buildings to specific local sources.

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ISSN 1759-7609

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