

Urban Geology in Fitzrovia, London W1 | *Geologists' Association Field Trip, June 10<sup>th</sup> 2014*

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The name 'Fitzrovia', referring to the region of north-central London, bounded by Tottenham Court Road, Oxford Street, Regent Street and Portland Place and the Euston Road, was adopted around the time of World War II (Weinreb et al., 2008). The area was known as a place for writers and artists, and a number of blue plaques testifying to this adorn the walls of the Georgian Terraces of these streets. However more recently this area has become important for TV and other media companies as well as for advertisers, architects and a number of South American embassies. It has also become an important area for fine dining, with a large number of restaurants and gastropubs in the area. The area is named after Fitzroy Square which lies in the NE corner, which in turn is named after Henry Fitzroy, the illegitimate son of King Charles II and the Duchess of Cleveland. Fitzroy was married as a child to the 5 year old Isabella Arlington who inherited the manor of Tottenham Court. Fitzroy later became the Duke of Grafton. The couple's great grandson married Anne, the daughter of a Sir Peter Warren and it was this great grandson who laid out Fitzroy Square. From this complex family we obtain the names of Warren Street, Fitzroy Street, Grafton Way and indeed Cleveland Street just to the west. Prior to the mid 18<sup>th</sup> Century, this area was farmland, and the name of Goodge Street attests to a more bucolic time. John Goodge, a carpenter, owned the meadow (Crab Tree Fields; Woodford, 1997) upon which his nephews and property developer Jacob Leroux laid out the present street. Mortimer Street is named after Robert Harley, 1st Earl Mortimer (Woodford, 1997; Weinreb et al., 2008). Great Portland Street and Portland Place lie on the estate of the Dukes of Portland.

Fitzrovia straddles the area between Pevsner's architectural guides to North and North West London (Cherry & Pevsner, 1998 & 2002). Unless otherwise cited, architectural information is derived from these volumes (though avid fans of architecture should note that these streets have little of great architectural merit). The most iconic buildings we will visit are Broadcasting House (1931) and The University of Westminster (1911). Readers are also referred to the Marble Institute of America's useful glossary for architectural terms used with respect to stone working (MIA, 2011).

The nearest tube station for the start of this walk is Warren Street Station on the corner of Tottenham Court Road and Warren Street. The geology of the building stones on Tottenham Court Road has been previously described by Siddall (2012). We will walk from here along Tottenham Court Road onto Grafton Way and then turn left onto Whitfield Street. The walk takes from one and a half to two hours and ends at Oxford Circus Station.

### **McDonald's, Tottenham Court Road**

The stones of this building have previously been described in Siddall (2012), but it makes a good place to start off this walk and perhaps wait for latecomers. McDonald's have strict rules about the livery of their franchises and the stone used to clad their façade here is one of the few options that franchise holders can opt for. To some at least, it says 'McDonald's' as much as the red and yellow uniforms of its staff. This is **Rapolano Travertine**, also known as St John's (San Giovanni) Travertine from Serre di Rapolano near Siena in Italy. These are ridge forming travertines, which are still being actively deposited from the 38°C San Giovanni Spring (see Minissale & Sturchio, 2004; Brogi & Capezuoli, 2009). The quarried stones are ~ 20,000 years old, which is very young, geologically speaking. Rapolano Travertine is distinctive in that it contains a range of textures, including finely laminated microbial mats and layers of grey micritic mud. A recent paper by Gandin & Capezuoli (2014) describes the textures observed in thermal spring travertines such as those at Rapolano and many of these can be observed in the travertines used here at McDonald's. These include feather-like crystals of calcite, microbial laminates, mats and 'shrub' structures and lithified bubbles, the latter formed around CO<sub>2</sub> exsolved in the thermal waters.

### **Marie Stopes House, 108 Whitfield Street**

The first stopping point on this walk is not of obvious geological interest at first glance. This is Marie Stopes House on Whitfield Street. Marie Stopes (1880-1958) was a great reformer of women's health, and it is a lesser known fact that she is an alumni of (what was then) the Geology Department at UCL where she attained a double first in Geology and Botany. Her life is pretty astonishing for its time and has been described by several authors including Falcon-Lang (2008) and Copeland (2009). On leaving UCL, she studied for her doctorate at university in Munich and was the first woman to be awarded a PhD from this institution. Following this, she went on to lecture in palaeobotany at Manchester University.



*Marie Stopes at Manchester University in 1904<sup>1</sup>*

<sup>1</sup> Image from [http://upload.wikimedia.org/wikipedia/commons/2/2d/Marie\\_Stopes\\_in\\_her\\_laboratory%2C\\_1904.jpg](http://upload.wikimedia.org/wikipedia/commons/2/2d/Marie_Stopes_in_her_laboratory%2C_1904.jpg)  
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In 1907, she received a grant to study fossil plants in Japan, another first for a woman, returning after discovering and classifying the earliest known flower, via Canada where she carried out more fieldwork with the Canadian Geological Survey. She returned to Manchester in 1909, but the polluted air did not suit her and she returned to London and UCL the following year. Living on short term contracts for several years (and enduring a disastrous first marriage), she was recruited during the first World War to work on the properties of coal, and this forced a change in emphasis in her research and one of the outcomes was the standard classification of coal which is still used today (Falcon-Lang, 2008). However the direction of her studies changed dramatically following her marriage to Henry Verdon Roe in 1921 (Copeland, 2009). The couple set up a birth control clinic in Holloway, which moved here, to Whitfield Street in 1925, and in 1928, Stopes published her bestselling work *Married Love*.

*At the end of Whitfield Street, turn right at Maple Street and then onto Fitzroy Street.*

### **Sovereign House, 19-23 Fitzroy Street & 12-16 Fitzroy Street**

Sovereign House, on the corner of Fitzroy Street and Maple Street has its lower stories clad with a brecciated, red serpentinite. The same stone is also used across the road around the doorway of 12 -16 Fitzroy Street. Serpentinites are ultramafic rocks, originally composed of the minerals olivine and pyroxene and formed either in the lowest part of the Earth's oceanic crust or in the upper part of the sub-oceanic lithospheric mantle. Tectonic process ('obduction') have emplaced these rocks onto the continental crust and the accompanying reduction of temperature and pressure plus the addition of oxygen and water has altered them to the serpentine group minerals as well as other hydrous phases such as the amphibole variety tremolite. The stone used here has blocks of reddened serpentinite, with obvious porphyroblasts of bastite – a minerals that was once orthopyroxene but has now been replaced by an intimate mixture of talc and tremolite. This replacement has however replicated the appearance of the orthopyroxene, so that bastite crystals show the same morphology and cleavage as the original mineral. Bastites are diagnostic of the 'cumulate' layers of ultramafic rocks which represent the lowest part of the Earth's oceanic crust. As such, this is a bastite serpentinite breccia. Red coloration in serpentinites is general diagnostic of exposure of this rock on the ancient seafloor, prior to it being obducted onto continental crust. The main source of red serpentinites, including breccias, has until recently been the deposits near Levanto in NE Italy. Therefore this is probably **Rosso Levanto Breccia**, geologically the Framura Breccia which overly more massif, reddened serpentinites. This example, with clasts of red and green bastite serpentinite and also rich in aggregates of the green serpentine group antigorite, is supported in a fine grained, pink-red matrix. The doorway of Sovereign House shows good examples of 'book-matching' slabs of serpentinite to form a symmetrical pattern.



Left: antigorite-rich serpentinite on Sovereign House (right).

*After Howland Street, Fitzroy Street becomes Charlotte Street, after the wife of George III (Woodford, 1997).*

### 80 Charlotte Street (23 Howland Street)

The large office block, with entrances on both Howland Street and Charlotte Street and occupied by ad men Saatchi & Saatchi has rather worn vertical panels and door surrounds (on Howland Street) of **Ashburton Marble**. This British decorative stone is one of the Devonian-age Devonshire marbles and it is quarried at Linhay Quarry near Ashburton. Geologically this is the Chercombe Bridge Limestone Formation, a tectonised but richly fossiliferous, grey limestone with *Thamnopora* corals, abundant stromatoporoids and crinoids. It is cut through by white to pinkish veins, and fissures in-filled with bright red hematite, this colouring derived from overlying New Red Sandstone. This example is weathered and would benefit from surface polishing, but nevertheless stromatoporoids are particularly obvious as pale grey, pillow-shaped masses. The British Devonian is generally associated with red sandstones, however here in the type area, Devonian strata are shallow marine, interpreted as tropical reef structures forming around volcanic islands in shallow seas.

### Ariel House, 74a Charlotte Street

This office building, completed in 1991 and designed by architects Spencer Dacombe is clad with a spectacular, coarse grained, pink granite of the type that were fashionable in the late Eighties and early Nineties. This is **Dallas Pink** (also known as Itabela Pink) from the Pedra Azul-Medina Pluton, near Medina in Minas Gerais state, Brazil. It is a megacrystic granite with seriate alkali feldspar phenocrysts, ranging in size from 1 - 10 cm. These are euhedral to subhedral, and zoned with grey-pink cores and pink rims. Also present are smaller white plagioclase feldspars and a coarse grained matrix of grey quartz and biotite. The megacrysts show a foliation. This stone is one of several dimensional and decorative stones quarried from a suite of granites intruded during the Neoproterozoic Aracuaí Orogeny around 600 Ma. The Medina Pluton is one of the latest intrusions of this suite (see Pedrosa-Soares et al., 2011).



Ariel House: left large, zoned feldspar megacryst; Right: the Charlotte Street façade.

*Cross over and walk along Charlotte street until Pescatori, Charlotte Street's long-standing fish restaurant.*

### Pescatori Restaurant, Charlotte Street

Pescatori has little of geological note, but the planters outside are covered with chips of Welsh slate. This is the variety called **Penrhyn Heather**, because of the purple-grey colour. Although it is good to see this stone being used for something at least, it is a shame that the Welsh slate industry has gone into so much decline. Once a material that literally roofed the World, most of the quarries went into decline after the last war and many closed for good in the 1970s. A few still operate at Blaenau Ffestiniog and at Penrhyn near Bethesda and inventive uses of this beautiful stone in architecture and even in dining wares is keeping things ticking over. These chips are from the northern slate belt of North Wales, which runs from Nantlle through Llanberis (Dinorwic) to Penrhyn and comprises varicoloured slates, including grey-green, blue, heather, purple-red and the famous 'spotted and striped' varieties with reduction spots. Geologically this is the Llanberis Slate Formation of Lower Cambrian Age. The colour is imparted by iron and titanium oxides.

Although seen here at street level, there is a good chance that this and other varieties of North Welsh slates are used on the roofs of many of the buildings in this area.

### **Muslim World League Mosque, Charlotte Street**

Next door is the new frontage of the Muslim World League mosque, completed in 2013. This is clad with a cream-coloured, polished limestone, rich in fossil fragments. The origin of this stone has not been confirmed. However it is a Mesozoic oobiosparite, a shallow marine limestone with clearly observed ooids, oncoids and fossil fragments, including bryozoa, gastropods and ammonites cemented in a translucent, pale brown matrix of calcite spar. It is almost certainly **Gascogne Beige** a limestone of Callovian age from Leiria Province in Portugal, one of several world famous and widely exported limestones quarried in this area of the Lusitanian Basin.



A small courtyard in front of the mosque has seating of the same limestone around a rectangle paved with Sardinian granite. This contains more or less equal amounts of both pink orthoclase feldspar and white plagioclase. Also present are grey quartz and black biotite, technically making this a biotite monzogranite. This is probably the variety called **Rosa Beta**, extracted from several quarries in the 325 Ma Arzachena Pluton, situated in the north of the island of Sardinia.

*Goodge Street was mainly laid out in the 1760s and many of the Georgian terraces date for this time, built by property speculator and architect Jacob Leroux. Turn right into Goodge Street and continue along the north side of the road up to Goodge Place, a cobbled, largely residential street with Georgian brick terraces.*

### **Goodge Place**

Goodge place is still retains its original paving of Victorian cobblestones. The dominant materials used here are intrusive igneous rocks from Leicestershire and are the Neoproterozoic **Markfieldite**, one of the South Charnwood Diorites and the Ordovician **Mountsorrel Granodiorite** (see Lott, 2001). Markfieldite is a very distinctive stone; a medium-grained diorite with equal amounts of salmon pink orthoclase and dark green hornblende and grey-green plagioclase, with patches of apple-green epidote.

Mountsorrel Granodiorite is also medium grained and rich in red-pink orthoclase, some of which are zoned with white cores. Also present are plagioclase, hornblende, quartz and biotite. It is extracted from several quarries in the Charnwood district, but mainly from Budden and Mountsorrel. The Mountsorrel Granodiorite has been argued to be intruded at 400 Ma, but there is compelling evidence that it may belong to the older suite of 'Charnian' igneous rocks at c. 600 Ma, including the Markfieldite described above (see Lott, 2001; Horton & Harald, 2012).

Also present are a number of dark grey or black '**whinstones**'. This is a rather generic term describing fine grained doleritic rocks quarried from various intrusions in England and Scotland. These were quarried from the Permian-age Great Whin Sill and Midland Valley Sill Complex and the Tertiary Cleveland Dyke. Coarser grained, black and white gabbroic-looking rocks are probably **Guernsey Diorite**, a dark, bluish stone

intruded at 560 Ma as part of the North Guernsey Igneous Complex and quarried at the northern tip of the island at Les Vardes (Caroff et al., 2011).

Other stones are also here, including a spectacular phenocryst-rich basalt and other varieties of granites; the coarse grained, pinkish-coloured ones may well be from Jersey.

### Newman Street Tavern

The Newman Street Tavern is a classic Victorian pub, built in classic Victorian 'granites'. It is now an addition to many great eateries on Goodge Street, and has a speciality in seafood. Crabs and lobsters are often piled on crushed ice in the windows. In the 1880s, the railways came from Aberdeen to St Pancras Station and this made granites readily accessible to architects, both those from the Scottish highlands and those shipped in from Scandinavia. Aberdeen was a major centre for stone cutting and polishing. Two igneous rocks are used here on the Newman Street Tavern. The main grey 'granite' used is **Marina Pearl Larvikite**, in fact a monzonite containing no quartz and equal amounts of orthoclase and plagioclase combined in the schillerescient feldspar which are a feature of this rock. Marina Pearl is one of several varieties of larvikite quarried in the Westfold of southern Norway, around the town of Larvik, from whence the rock gets its name. It is 290 million years old and is part of the suite of intrusive and extrusive igneous rocks emplaced during the formation of the Oslo Graben during the Permian. Another variety, the darker **Emerald Pearl**, with distinctive flashes of coarse grained schillerescient feldspar has been used for repairs on the foundations of the pub, which may be hidden behind Summer dinners.

The pink granite used is **Peterhead Granite** from Stirlinghill, near Peterhead to the north of Aberdeen. It contains salmon pink feldspars, stained red by hematite (red iron oxide). Also present is grey quartz and the black mineral is hornblende.

### Fitzroy Place

Across Newman Street to the south and Cleveland Street to the North, Goodge Street becomes Mortimer Street. The first block is occupied by Fitzroy Place, a development of luxury flats which is, at the time of writing, are nearing completion and hoardings still surround the block at pavement level. However looking up, the façade on Mortimer Street is clad with a variety of Portland Stone called **Grove Whitbed**, supplied by Albion Stone. This is a white oolite, densely packed with grey oyster shells, *Liostrea expansa*. There are also casts and molds of weathered out aragonitic shells, predominantly *Trigonia*.



The geology, palaeontology and stratigraphy of the Late Jurassic Portland Stone oolite have been described in detail by Wimbledon & Cope (1978), Cope (2012), Townson (1975), Fürsich et al., (1994) and its

quarrying history and use as a building stone has been tackled by Stanier (2000) and Howe (1910). Interested readers are referred to these texts for further information. We will encounter more accessible varieties of Portland Stone at Broadcasting House towards the end of this walk.

### **Mortimer House, 37-41 Mortimer Street**

Mortimer House is built of red brick, trimmed with architectural details in Portland Stone. Of main geological interest here are the twin columns framing the doorway which are of a black fine to medium grained igneous rocks. These stones are particularly difficult to identify. They are derived from several sources, but in effect all look the same. Modern sources of 'black granites', actually dolerites, are predominantly in Zimbabwe, however, in older buildings it is more likely that black Scandinavian igneous rocks were used. This example is probably '**Ebony Black**' which may have been derived either from Proterozoic intrusions Hyvinkää in Finland or Osby in Sweden (see Selonen & Suominen, 2003).

### **The Muse of London Hair Salon, 24 Mortimer Street**

This hairdressers stands on the Corner of Wells Street. Its original late Victorian shop front retains its rectangular section columns of pink, fine to medium grained **Corrennie Granite**. This is one of the Aberdeen late Caledonian granites, intruded c. 450 Ma. The quarries are at Tillyfourie and are still active today. The dominant minerals present are pink orthoclase feldspar and grey quartz, with rather subordinate mica.

### **Radiant House, 34-38 Mortimer Street**

Radiant House, built between 1914-1915, is worth a look, despite stone not featuring as a building material. Its upper storeys are faced with striking and rather beautiful turquoise-green glazed 'faience' type tiles. According to the plaque on the wall, the building constructed by architect F. M. Elgood, was designed by one Francis Léon Pither and erected (paid for?) by Eugène Pither in memory of their mother, Sophia Elizabeth Pither née Bezier. Eugène (b. 1856) was an art dealer and supplier of stained glass windows and 'Radiant Stoves' to churches<sup>2</sup>, and this was his shop. Unfortunately I have not been able to trace any further information about this building, and it is not listed in Pevsner. Similarly I have not been able to identify manufacturer of these tiles, but the blue glaze would have been produced by copper oxides and silica. The white marble-like tiles are Doulton's Carraraware, so there is a good chance that the blue faience tiles are also by Doulton, who were major producers of architectural ceramics.



Left; Mosaics in the doorway of Radiant House, Right: the blue faience tiles.

### **60 Great Portland Street**

The office buildings which occupy the block on the corner of Mortimer Street and Great Portland Street are at first glance a mass of steel and glass. 60, Great Portland Street, housing Evans Cycles on the Mortimer

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<sup>2</sup> The plaque at Radiant House is described at London Remembers; <http://www.londonremembers.com/subjects/ernest-eugene-pither>

Street elevation is a refurbishment of a 1960s building, completed in 2008 by Archer Architects. Narrow panels of grey stone are used at the ends of the facades and around the main entrance on Great Portland Street. These are of geological interest being a grey pyroclastic rock marketed under the name of **Pietra Basaltina**. This stone is not a basalt, it is alkaline in composition and technically a trachy-phonolitic, non-welded ignimbrite. It contains phenocrysts of around 5 mm diameter of potassic feldspar, leucite and hornblende and many slabs show well defined millimetre-scale laminations, sometimes deformed around phenocrysts or lithic clasts. This stone comes from Bagnoregio, around 10 km to the south of Orvieto in Italy. Geologically it is known as the Orvieto-Bagnoregio Ignimbrite and it was erupted around 300 thousand years ago from the Bolsena Caldera, one of the northernmost eruptive centres of the Quaternary Roman Volcanic Province (see Acocella et al., 2012).

### 83 & 85, Mortimer Street

Two or three rectangular-section pilasters stand between the more recent (and rather uninspiring) shop fronts between 83 and 85 Mortimer Street. At either end of this parade are pillars of a very coarse grained, red, megacrystic granite. This has large pink orthoclase feldspars, some rimmed with white plagioclase in a matrix of dark grey quartz and ferromagnesium minerals. These textures suggest a rapakivi-type granite and this stone is therefore probably from the Baltic coast of Scandinavia. The **Virbo Granite** from near Oskarsham is a good match for this stone.

The middle pillar is also a Scandinavian stone, but this time more distinctive. It is **Swedish Green Marble**, an unusual find on a London exterior, although it is not uncommon in interior decoration. Louis de Geer opened the first Swedish Green quarries in Kolmården in Södermanland in the 17th Century, driven by a need to furnish the Royal Palace of Drottningholm. Modern quarrying methods were introduced in 1902 and the marble was subsequently widely exported. The pillar here probably dates from around that time and may be the remnant of a more spectacular frontage in Swedish granite and marble. The marble units occur as lenses interbedded within a 7 km thick Palaeoproterozoic volcanoclastic sequence. The marbles become more abundant towards the top of the volcanic pile. The sequence has been deformed and metamorphosed at greenschist - amphibolite facies; partly contact metamorphism driven by the intrusion of granitoids.



Left: Swedish Green Marble and Right: Scandinavian red granite, probably the Virbo Granite

### Mortimer Street Post Office

Mortimer Street Post Office, on the corner of Great Portland Street is a monumental pile of granite. At least three granites are used here to create this polished and moulded façade. They are a dark grey, weakly foliated granite, used for the main elements, a foliated pale brown granite used for the mouldings underneath the windows and finally a black and white granite with blotchy, white feldspar phenocrysts



which occurs on some of the plinths, as decorative inserts in the arches and as a frame around the whole structure. Unfortunately none of these granites are identified with certainty. However the dark grey granite is probably **Rubislaw Granite** from Aberdeen, the black and white granite is probably **Bessbrook** from Ireland. The pale-brown granite remains unidentified.

*Cross over Great Portland Street to the George pub, diametrically opposite the post office, which has a row of columns of Peterhead Granite as seen at the Newman Street Tavern.*

#### **Workshop Fitzrovia Coffee Bar, 80 Mortimer Street**

This small coffee shop has a bar fitted out in spectacular 'Madagascar Blue Granite'. This is a Neoproterozoic (630 Ma) anorthosite, a gabbroic rock composed predominantly of plagioclase feldspar, in this case the variety labradorite. This is a spectacular stone, a rival to Finnish Spectrolite and Norwegian larvikite, in which the extremely coarse, pegmatitic feldspars, 20+ cm in length, demonstrate a spectacular schillerescence, showing a play of rainbow colours, but predominantly blues, greens and yellows. Twinning can be seen, without magnification, in several examples. Large (5-10 cm), bronzy, pyroxenes are also present. This stone has been relatively recently discovered and only quarried in the last 5 or so years. It is expensive and marketed under the name of **Lemurian Blue** or Labradorite Peacock Blue. It comes from the Ampanihy District in Southern Madagascar.



The porch floor has a charming Art Nouveau mosaic executed in Irish Green Marble from Connemara as well as black and white marbles. A similar example exists for the porch of number 82 next door.

*Continue to the end of Mortimer Street and turn Right onto Langham Place.*

#### **Pizza Express, Henry Wood House & St Georges Hotel**

The façade of these buildings, directly north of All Souls, Regent Street is clad with 'bricks' of granite, with rough edges on the outer side. The granite has not been identified and located to source. However it is a medium grained, two-mica **leucogranite** with white feldspars and pale grey quartz. The black biotite mica and silvery muscovite are especially prominent of the rough sections. Once again, unfortunately, its origin is unknown.

### All Souls, Upper Regent Street

This church was built in 1822-24 by Royal architect John Nash, its strong circular elements acting as a pivot point on the great boulevard he designed for the Prince Regent which ran from Regents Park to Carlton House; land boundaries here necessitated a dog-leg at the top of Portland Place, at Langham Place, before the road could run straight again down the upper (northern) sections of Regent Street. The columns around the circular entrance have ionic capitals in a variety of architectural ceramic called Coade Stone, but otherwise the church is built of golden yellow, classic **Bath Stone**. This is an oolitic limestone, quarried in the environs of the city of Bath, from the Bath Member of the Chalfield Oolite Formation of Oxfordian (Jurassic) age. The paving around the rotunda is in reclaimed York Stone, laid at the time of the redevelopment of the BBC complex. Nash is commemorated by a bust in Portland Stone which stands under the portico of the rotunda. **Portland Stone Whitbed** is also used on the steps up to the rotunda, with, unusually, a few worn casts of 'Portland Screw' *Aptyxiella portlandica* gastropods, indicating that this bed was probably quarried from the upper part of the Whitbed.

### Broadcasting House

Broadcasting House in Langham Place has recently undergone major refurbishment and redevelopment, with a major extension mirroring and to the west of the original 1931 building. Between these two wings lies an embayed courtyard. Pevsner is excoriating about the original building, by architect G. Val Myers with sculpture by Eric Gill. '[it casts] a blight on the whole delightful Georgian neighbourhood'. The brief was to construct a building that fitted in with the surrounding area (Pevsner particularly hated the Georgian-style windows) and yet could house the state of the art technology, including sound proofed recording studios which was required for radio production and broadcast. Famously, Eric Gill's sculpture of Ariel above the doorway caused concern as the child Ariel was deemed too well-endowed, and Lord Reith felt that he had to have a word with Gill in order that it be toned down to acceptable standards. The choice of **Portland Stone** to build this building was not a surprise, it being the construction stone of many of London's premier buildings. However this made the BBC a gleaming target during WWII and the building was painted battleship grey. Nevertheless a bomb hit just after 9 pm on 15<sup>th</sup> October 1940 caused loss of seven lives and some considerable destruction, though the nine o'clock news continued to broadcast throughout this catastrophe (Weinreb et al, 2008). Within months of initial construction, Broadcasting House was becoming too small, but it took until the 2000s for expansion to take place. The new wing is by Shepard Robson and MacCormac Jamieson & Pritchard and was completed in 2008.

Albion Stone supplied **Portland Roach** from Bowers Quarry and Whitbed from Bowers and Independent Quarries on the Isle of Portland. The geology, palaeontology and stratigraphy of the Late Jurassic Portland Stone oolite have been described in detail by Wimbledon & Cope (1978), Cope (2012), Townson (1975), Fürsich et al., (1994) and its quarrying history and use as a building stone has been tackled by Stanier (2000) and Howe (1910). Interested readers are referred to these texts for further information. However this is a particularly good piece of Roach and many of the classic fossils of the Portland Stone (West, 2013) can be seen here. Most prominent are the casts and internal molds of Portland Screws, *Aptyxiella portlandica* and the grey oysters whose calcite shells have remained intact. Also present are other bivalves including casts of *Laevitrigonia gibbosa*, with ribbed and knobby shells, *Protocardia* sp, a cockle and *Plicatula* sp., a spondylid (spiny) bivalve. Internal molds, known to quarry men as 'osses 'eads (horse heads) are *Myorhorella incurva*.

The paved embayment between the two wings of Broadcasting House is also an art installation called *World* by Mark Pimlott. It is inlaid with brass letters which are place names from around the world as well as imagined place names from fiction. Steel lines of latitude and longitude are also inlaid into the paving along with light and audio installations, the whole ensemble evoking the World Service. The artist was inspired by flying over the earth at night. This work was completed in 2013. The lettering etc. is set in granite which was supplied by stone contractors Grants. However they describe the material simply as 'Portuguese' granite. Portugal is one of Europe's great granite producers and there are many varieties extracted from the Variscan Basement of the Central Iberian Zone. However many are either pink or

porphyritic and can therefore be discounted as sources of these stones. Homogenous, medium grained grey granites are quarried in the vicinity of Portalegre and are all used for paving (see Perrier, 1993). The **Alpalhão Granite** (Lisboa et al., 2013) is a strong contender for the source of this stone.

*Return back along Regent Street towards Oxford Circus.*

### **Morley House, 320 Regent Street**

The entrance to Morley House is set back from the street with a broad porch, between two shop fronts with curved glass windows. Of geological note is the paving in pale brown, Boulonnais Marble, probably the variety **Napoléon Rubané**. This is from the Calcaire Carbonifère exposed in the Ferques Inlier in the Pas de Calais of Northern France, which comprises Devonian and Carboniferous marine strata. The inlier is situated on the margins of the London-Brabant Massif and tectonically is known as the Basse-Normandie Duplex, exposing part of the NW Variscan thrust front (See Averbuch & Mansy, 1998). These limestones were deposited in a Carboniferous, warm-tropical shelf setting and are rich in algae, which gives it the characteristic '*pattes d'alouettes*' (lark's prints) marking seen here.

*Backtrack a few yards to the pedestrian crossing, and cross over and walk up to the University of Westminster, which is opposite Morley House.*

### **University of Westminster, 307-311 Regent Street**

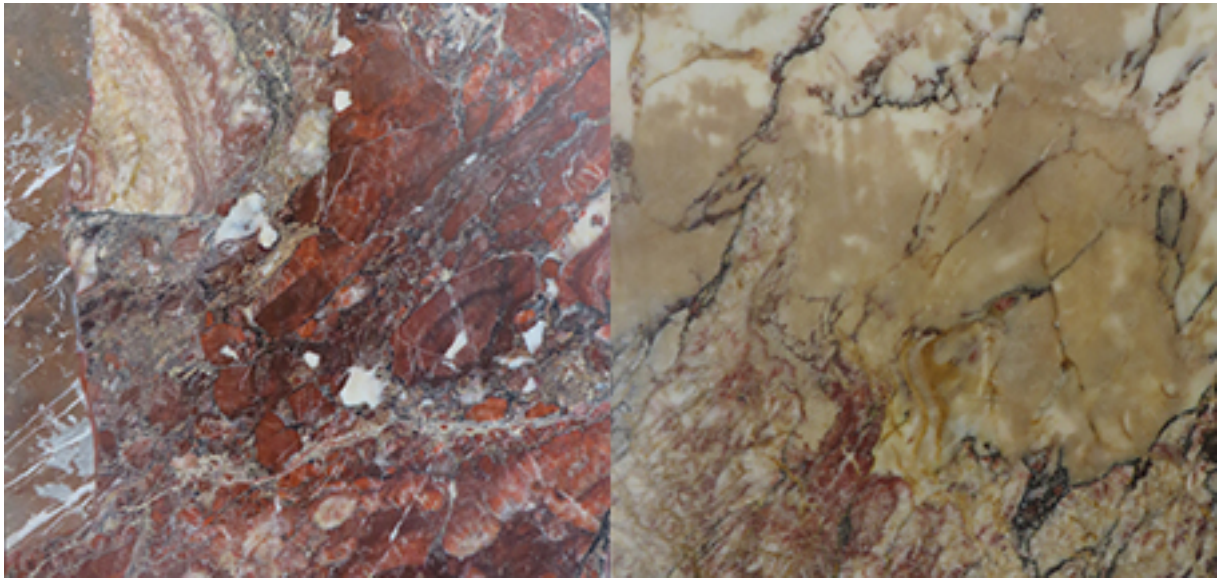
Formerly the Royal Polytechnic Institute, founded in 1882 as an educational establishment by Quintin Hogg, the University of Westminster's building at 309-311 Upper Regent Street was constructed in 1911 by architects George A. Mitchell in collaboration with F. T. Verity. Its main function today is as a lecture theatre and cinema, and indeed this building was the first to show a moving picture film screening in Britain, by the Lumiere Brothers on 21<sup>st</sup> February 1896 (Wyatt, 2014).

Verity's façade is constructed in **Cornish Granite**, almost certainly the variety from Carnsew Quarry, near Mabe in the Carnmenellis pluton. This is a two-mica granite; containing biotite, muscovite, quartz and orthoclase feldspar. Distinctively it contains so-called 'small' feldspar megacrysts, around 2-3 cm in length. The Carnmenellis Pluton, part of the large Cornubian Batholith, was emplaced c. 290 Ma (early Permian), in the closing stages of the Variscan Orogeny. Unlike the other Cornish granites, however, the Carnmenellis pluton has not undergone much metaliferous mineralization, which makes it a very good dimension stone.

The foyer, the Mbi Al Jaber Grand Hall is publicly accessible, however permission should be sought if large groups are to visit. Alternatively a good view of the spectacular marble interior can be seen through the large windows on the Upper Regent Street elevation. The walls are paneled with white and red marbles, with engaged pillars and supporting columns of a dark-red marble breccia. Unfortunately, I have not been able to find a listing of identifications of these marbles. However, the purple-red marble which is used to frame the panels is **Fior di Pesco Apuano** from the Serravezza marble basin in the Carrara region. This variety has characteristic dark pink to purple blotches in a white and greenish matrix. The marbles quarried at Serravezza are derived from Liassic plattenkalks overlying a Triassic dolomite, which underwent two phases of deformation and metamorphism (at greenschist facies) during collision of the Corso-Sardinian microplate with Adria (Italy) in the Upper Oligocene and Lower Miocene. The white marble, figured with black veins, probably also be from Carrara is likely to be a variety of **Pavonazzo**, with dark purple to black veins.

The marble used in the columns is striking in its inhomogeneity and is not familiar to me. It is mainly dark red in colour and appears to be a breccia with clasts of marble and also travertine in a blood red, streaky matrix. However on at least one column this grades into a yellowish-white marble. This may be a variety of Skyros marble from the Greek Aegean. Red travertines are certainly associated with these deposits, as karstic infills in fissures. The Skyros Marbles are thickly bedded with a wide variation in colour and textures present. However such an origin cannot be confirmed with further comparison from securely sourced

samples. A final 'marble' is used for the skirtings, a dark green variety of **Verde Alpi**, one of the serpentinites and serpentinite breccias from the Val d'Aosta in the Italian Alps.



Different facies in the red marble. NB the red marble has been patched with red Belgian marble (far left).



The Mbi Al Jaber Grand Hall, University of Westminster, Upper Regents Street

*This is the end of this walk and the University of Westminster's administrative buildings are only a short walk from Oxford Circus Station. However if time allows a short walk down Regent Street from Oxford Circus to the spectacular marble frontage of Church's shoe store (see Siddall, 2014).*

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