

## The War Memorials at Hyde Park Corner and Green Park

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*Hyde Park Corner circa 1937 from a postcard. The Royal Artillery monument is in the foreground. You can just see the steps of Rubislaw Granite for the Wellington Memorial in the trees to the left. The Wellington Arch stands at the entrance to Constitution Hill*

## Urban Geology: The War Memorials at Hyde Park Corner and Green Park

This is a short geological tour of the war memorials on or near the traffic 'island' of Hyde Park Corner. From Hyde Park Tube station, access the island from the NW corner opposite the entrance to the park. Turn left and walk over to the monument to Wellington.

### **Memorial to the Duke of Wellington**

A bronze equestrian statue of the Duke of Wellington stands on the north side of Hyde Park Corner. Wellington faces his old home, Apsley House (built from golden Bath Stone oolitic limestone). The monument was designed by Sir J. E. Boehm and constructed between 1884-8. The plinth on which the bronze stands is of pink Peterhead Granite.

The Peterhead Granite comes from Stirlinghill Quarry, near Boddam, Aberdeenshire, Scotland. Commercial-scale quarrying began in the 18th to 19th Centuries and the quarries continued in use until 16 June 1956, closing because they were unable to compete with granite sources from abroad. Nevertheless, Peterhead Granite was used throughout the 19th Century for monuments, architectural elements and facing stone throughout the world. It became particularly popular following the opening the east coast railway into St Pancras in 1868. The 'pink' variety of Peterhead Granite is coloured by orthoclase feldspar, together with smoky grey quartz and black hornblende. Look out for the 'heathens', blocks of country rock which were ripped up and incorporated into the rising magma before it solidified. Geologists call these features xenoliths. It is one of the Caledonian 'Newer Granites' intruded c. 400 Ma.



*Left, Wellington's monument and right, a close up of the Peterhead Granite of the plinth. The field of view is approximately 15 cm.*

The grey plinth is also made of 470 Ma Aberdeen granite. This is Rubislaw and here shows a slight foliation. Rubislaw Quarry is now a 150 m deep hole in the ground, filled nearly to the top with

water, the base of the hole lies below sea-level. The quarry lies within the City of Aberdeen and in the past supplied much of that city's building stone. From looking at the small exposures around the rim the quarry it is clear that the stone is quite variably foliated but it is typically dark grey in colour and also includes xenoliths of the local schistose country rock. It is hard to see the full textures in the Wellington Monument, but the grey colouration, imparted by an absence of pink feldspars and the presence of white feldspars, quartz and mica (both black biotite and white muscovite) is obvious.

*Walk south-west around the island to the Royal Artillery Monument.*

### **Royal Artillery Monument**

Designed by Charles Sergeant Jagger (who served with the Regiment) and Lionel Pearson and built between 1921-5 in commemoration of the casualties of the Royal Regiment of Artillery during World War One. The monument is topped by a model of a 9.2 inch howitzer on a podium with sides carved in relief showing battle scenes. Three bronze soldiers stand on the south, east and west sides, with a bronze figure of a dead soldier on the north side. It is constructed of Portland Stone Whitbed, much weathered and stained, but with the calcite oyster fossils weathering out.



*The Royal Artillery Monument with Apsley House in the background*



*Continue to your left to the Australian War Memorial.*

## Australian War Memorial

The Australian War Memorial on the south side of the park is a recent addition, dedicated in 2003. It is a wave-like curve of green granite designed by Tonkin Zulaikha Greer Architects and artist Janet Laurence. Across the back wall are inscribed the place names of the origins of Australian service men and women (including many places outside Australia) and these merge to form the names of battle sites where Australian troops served in the First and Second World Wars. The memorial is fittingly constructed of an Australian stone, a green granitic rock called Laguna Green (also called Laguna Verde) proudly provided by the town of Jerramungup in south Western Australia. The quarries are situated around 20 km SE of the town, at Wirrup Hill on the South Coast Highway.

This is a coarse grained intrusive rock with large (3-7 cm), elongated megacrysts of blue-green perthitic microcline (potassic feldspar), brownish plagioclase, quartz, hornblende and opaque minerals. Quartz is not abundant, which actually makes this rock a monzonite rather than a granite. Secondary carbonate and clays are also present. Texturally the rock is foliated, the feldspar megacrysts are aligned and this is seen to greater or lesser degree according to the orientation of the slabs with respect to the outcrop. Streaky, mafic amphibolite xenoliths are also present.

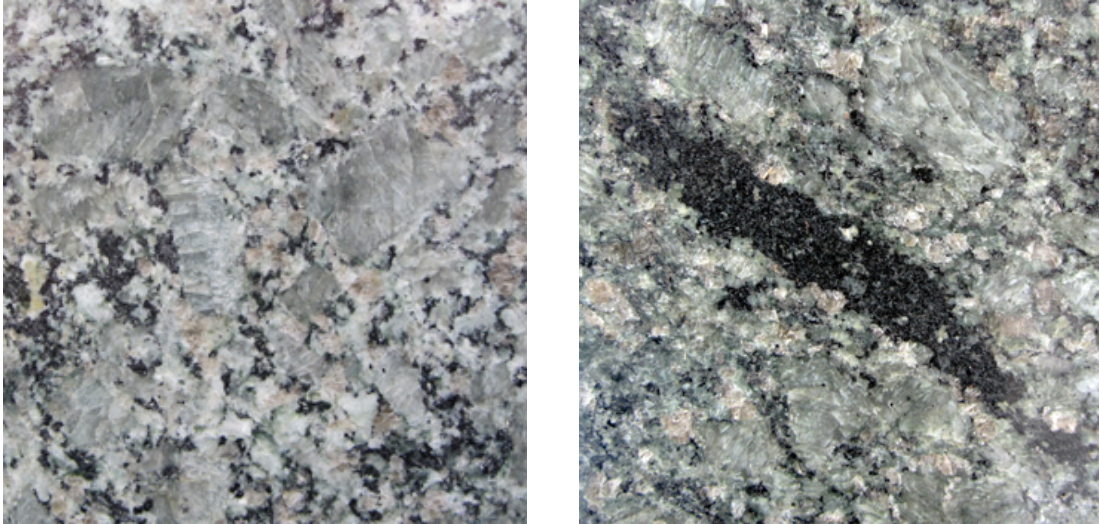


*Australian War Memorial*



Geologically the Laguna Green Monzonite is derived from the 'Wheat Belt' Batholith, Lake Grace Terrane, southern Yilgarn Craton which makes up most of western Australia. Most of the granitoids here are charnockites, but small bodies of monzonites and syenites occur within the batholith. These granites were emplaced c. 2640 Ma, towards the end of a phase of terrane accretion and granulite facies metamorphism (2640-2649 Ma). The xenoliths are relicts of greenstone belts, metamorphic basaltic rocks (2790 Ma). The Laguna Verde used in the Memorial was quarried in the early 2000s by Wales Quarries. This operation closed in 2004 and the quarry is currently under

care and maintenance. The granite is sparsely jointed so the extraction of large blocks is possible; the largest examples in this memorial weigh over two tonnes. The monument is also of interest to the geologist to observe the different appearances of the stone with different finishing techniques including polished, sandblasted, honed and both etched with lettering and etched by the water that flows over the face.



Left, Laguna Green 'Granite' with the megacrysts of microcline perthite; Right, a amphibolite xenolith. The field of view on both images is ~ 15 cm.

## Wellington Arch



The Wellington Arch, a neoclassical 'Corinthian' triumphal arch was built in 1826-9, designed by Decimus Burton. The bronze sculpture on the top, '*Peace descending on the Quadriga of War*' (by Adrian Jones) was a later addition, added in 1912. This replaced a statue of Wellington which was apparently unpopular and according to Pevsner 'much mocked'. Also it seems that Burton had always intended a bronze chariot to sit on the top.

The Arch is constructed from Portland Stone and it is a good building for looking at the effects of weathering. Some good examples of the sedimentology and palaeontology of the Portland Stone may also be observed. On the south-west side there is a good example of an algal mat. On the

south side there is a large *Thalassinoides* burrow. These burrows were made by crustaceans, in this case a Callianassid shrimp. The burrow has been infilled with shell fragments. It is to the right of the door and best viewed by standing back from the building. On the east side the surface is flaking, quite possibly as a result of the cleaning and restoration of the arch which took place in 1999-2001. The problem has been exacerbated by some ashlar being laid vertically.

*A short diversion behind Apsley House is worthwhile for a glimpse across the busy road to the roundabout at the south end of Park Lane, where the monument to Byron sits on a plinth of stone rarely seen in the British Isles.*

### **Byron Monument**

Here stands a monument to the poet and Hellenophile George Gordon, Lord Byron. Cast in bronze, he sits pensively with a dog. The monument is by R. C. Belt and P. Verhyden in 1878-80, almost sixty years after Byron's death in Messolonghi, Greece. Byron is considered a national hero in Greece and was a key mover in the liberation of Greece from Turkish rule during the War of Independence.



*Lord Byron, Park Lane.*

The plinth is of geological interest and was a gift of the Greek Government made especially for this monument. Pevsner (aptly) calls it 'streaky bacon marble' but it is in fact a variety of *Rosso Antico* marble from Cape Taenaros at the southern end of the Mani peninsula in the southern Peloponnese. Marble from this region, prized for its blood-red layers in antiquity was known as *Marmor Taenareum* to the Romans. In some localities it is striped red and white with red bands up to 30 cm thick. This material was most prized as slabs of deep red, homogenous marble could be extracted. In other localities, this less regular coloration as seen here is typical. The quarries of *Rosso Antico* are on the Mani Peninsula (Southern Peloponnese), and found in association with white and grey marbles of Late Cretaceous to Late Eocene age, metamorphosed during the Hellenic phase of the Alpine Orogeny. Warren (2012) quotes A. Cordella's work of 1902 which tells us that "*Taenaron and Kisternae [has produced] a handsome red marble, which furnished the red blocks for the memorial erected in England to Lord Byron*". In addition this generous gift of sixteen blocks of marble was reported in *The Times*. The area described by Cordella has been identified by Warren as that lying just to the east of the modern village of Kokkinogeia, which translates, aptly, as 'Red Land'.

Examples of the 'classic' red variety of *Rosso Antico* can be seen in London in the steps to the high

altar in Westminster Cathedral and in several of the chapels. It also makes an appearance in St Paul's Cathedral. Stones in these contexts were extracted when the quarries were reopened in the late nineteenth and early twentieth centuries. The use of this stone in the Byron Monument is doubly interesting because it was extracted prior to the renewed working of the quarries and must have been the result of a one-off quarrying expedition.

*Return to Hyde Park Corner and walk a short distance up Piccadilly on the Green Park side to the RAF Bomber Command Memorial.*

### **RAF Bomber Command Memorial**

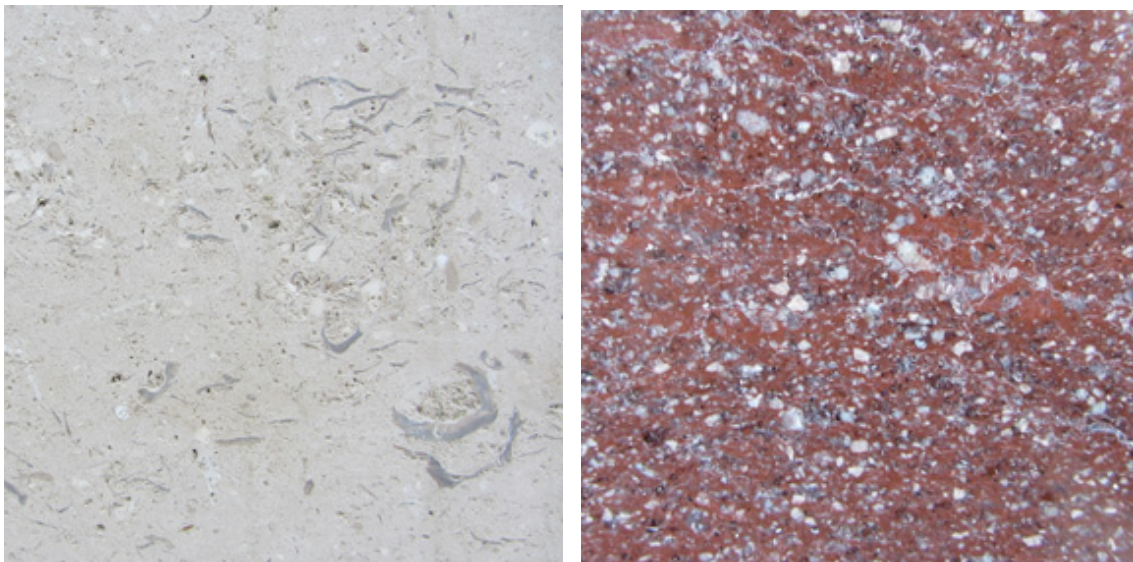
The RAF Bomber Command Memorial commemorates the 55,537 crew members who died during the Second World War. It was designed by architect Liam O'Connor and was completed in Spring 2012. At the time of writing this neoclassical-style monument provides a rare opportunity to observe fresh, unweathered Portland Stone in London. The Memorial is built on a foundation of Portland Whitbed. This is a creamy colour and rich with fossil oysters shells, which are grey. Oysters secrete calcite shells which means they have been preserved intact in the Portland Stone. Most of the other animals present secreted aragonite shells which have not survived. The main structure is built from the largely fossil-free Portland Basebed. It is an ivory-coloured freestone with ooids just visible to the naked eye. The stone was supplied by Albion Stone from the Isle of Portland, Dorset, and extracted from underground workings in Jordan's Mine. Underground mining of Portland Stone is a relatively new endeavour on the Isle of Portland and Jordan's was the second underground mining operation opened on the island, initiated in 2008. The stone is cut dry using diamond-tipped chainsaws and then 'hydrobags', a few millimetres thick, are inserted into the cut. These are inflated and the stone is detached from the face. The caverns are large enough to allow fork lift trucks to come in and remove the stone blocks.



The Basebed is the lowest unit of the Portland Stone and it is 2-3 m thick. It is overlain by the Curf or False Roach (~ 1 m) and then the Whitbed (also 2-3 m thick). The Whitbed becomes more shelly upwards and grades into the Roach famous for its empty casts of of once aragonitic fossils (the best place to see this is at the new Green Park Tube building further up Piccadilly). The rocks were laid down during the Upper Jurassic (Tithonian) in a tropical, lagoonal environment, rich in fauna and allowing the formation of ooids calcium carbonate and the occasional patch-reefs (which form above the Roach).

Inside the memorial a bronze sculpture by Phillip Jackson of a seven-man flight crew stands on a plinth of a purple porphyry. The word porphyry is derived from Latin and means 'purple', and indeed it is a rock very similar to the one here, derived from Egypt, that gave modern geologists the word 'porphyry' to describe a volcanic rock with a speckled texture; that is a fine grained groundmass with larger 'phenocrysts' set in it. Although never used by the ancient Egyptians, the purple porphyries of the Eastern Desert of Egypt were highly prized by the Romans for their colour and the quarries at *Mons Porphyrites* and *Mons Claudianus* were worked for around 500 years from the 1<sup>st</sup> Century BC (Klemm & Klemm, 2008). These quarries are now considered to be archaeological sites. However the rock unit that was extracted, the 'Imperial Porphyry', belongs to the Gebel Dokhan Volcanic Series. The sequence of lavas and pyroclastic rocks was erupted during the latest phases of the Pan-African Orogeny from 680-550 Ma, and there are outcrops of these units throughout the Eastern Desert and also in southern Sinai. A few modern quarries exist in the mountains to the west of the Red Sea coastal town of Hurghada (Harrell, 2003) and this block was sourced from one of these.

Close inspection reveals this to be a porphyritic dacite. It has phenocrysts of grey, glassy quartz and white feldspars. The darker flecks are hornblende and the fine grained purple groundmass is coloured red by the iron oxide mineral hematite.



Left; Portland Stone Jordan's Whitbed and right; Egyptian porphyry.

*Take a stroll across Green Park, eastwards towards the Canada Gate which opens onto the plaza in front of Buckingham Palace. Canada Gate is constructed from gilded wrought iron, with pillars of*



*Portland Stone, however now having become experts on the appearance of Portland Stone our interest lies not here but in the Canada Memorial, located in the trees just north of the gate.*

### Canada Memorial

The Canada Memorial commemorates members of the Canadian Forces who died in both World Wars. Designed by Pierre Granche, it was consecrated in 1994. It is a sloping square of granite, inset with bronze maple leaves (shown below), and with a slot cut through it which is directed towards Halifax, Nova Scotia, the port at which many of the troops embarked for Europe. Like the Australian Memorial, the Canada Memorial uses stones from 'back home'.



Most of the memorial is constructed from a warm mahogany-brown stone. Close inspection shows it to be a coarse grained meta-granite with a strong foliation marked by stretched out, orange K-feldspar in a darker groundmass of plagioclase, quartz and hornblende. Some detective work was required in identifying the origin of this granite. It is named by the Canadian War Memorials Trust as being built from Anticosti Granite. Anticosti is an Island in the St Lawrence river, which is composed entirely of sedimentary rocks and so cannot be the home to this stone. Anticosti Granite is in fact the trade name given to an ancient charnockitic rock from the north coast of the St Lawrence in Quebec. It comes from Magpie River Quarry and is just over a billion years old. It belongs to the Havre-Saint-Pierre Suite of granitic intrusions.



*Canada Memorial: the top image shows the memorial viewed from the front, looking along the slot pointing to Halifax*

On the south side the memorial is a compass rose made from inlaid stone. As well as Anticosti Granite, the compass is inlaid with a dark blue rock very similar to Norwegian larvikite with schillerent blue feldspars. However this is a Canadian rock from Labrador with labradorite feldspars which are, of course, named after that province. The other brown and white granite is from south of the St Lawrence River, from the northern Appalachians.



Canada Memorial: The compass rose made of a variety of Canadian stones.



Canada Memorial: the 'back' of the monument with the warm chocolate tones of the Anticosti Granite.

### Acknowledgements

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