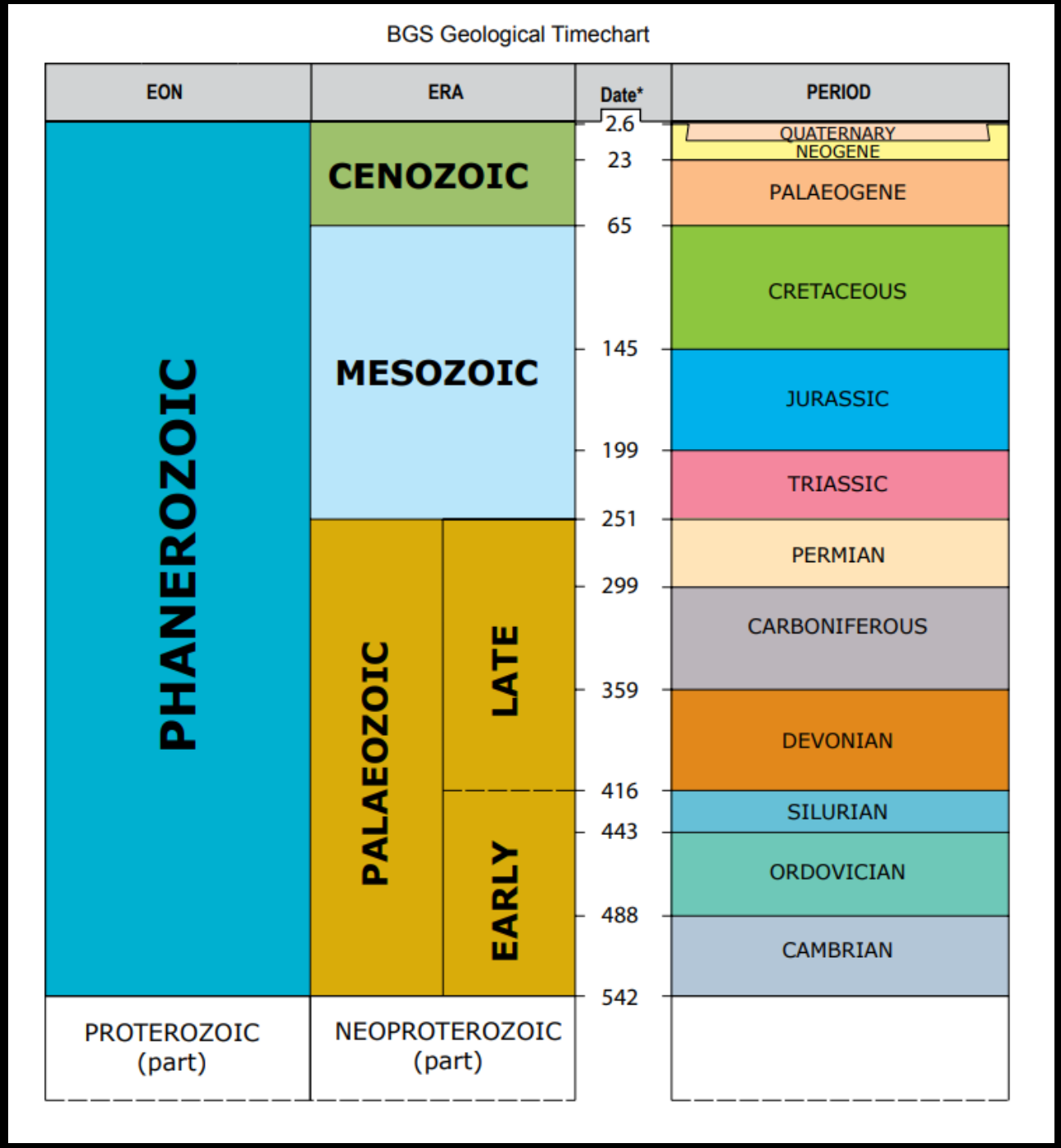
A Virtual Building Stones Walk in Central Harrow

Harrow and Hillingdon Geological Society

Before we start, some introductory slides…



This virtual walk takes in Station Road, St Ann's Road, College Road and the St Ann's and St George's Shopping Centres.

The above-mentioned roads are Harrow's three main shopping streets but since the 1980s expansion has occurred with the building of the Shopping Centres, offices and apartment blocks.

The building stones date from several periods shown on the timechart (produced by the British Geological Survey), and some are Precambrian in age.

*Dates are in millions of years ago (Ma). The age of the Earth is over 4.6 billion years.

Rock types that we will see along the way – 1

There are three major groups of rocks:

1. Igneous rocks are those that have formed by the cooling and crystallisation of magma, either at the Earth's surface or within the crust.

2. Sedimentary rocks are those that have formed when eroded particles of other rocks have been deposited (on the ocean floor, on river/lake beds, etc.) and compacted, or by the precipitation or evaporation of minerals from water.

3. Metamorphic rocks are those that have formed when existing rocks have undergone pressure and/or temperature changes so that their original mineralogy has been changed.

Rock types that we will see along the way – 2

Igneous rocks are formed by the solidification of magma, a silicate liquid generated by partial melting of the upper mantle or the lower crust. Different environments of formation, and the cooling rates associated with these, create very different textures and define the two major groupings within igneous rocks:

Volcanic rocks
Volcanic rocks form when magma rises to the surface and erupts, either as lava or pyroclastic material. The rate of cooling of the magma is rapid, and crystal growth is inhibited. Volcanic rocks are characteristically fine-grained. Volcanic rocks often exhibit structures caused by their eruption, e.g., flow banding (formed by shearing of the lava as it flows), and vesicles (open cavities left by escaping gases). Examples: basalt, andesite and rhyolite.

Plutonic rocks
Plutonic rocks form when magma cools within the Earth's crust. The rate of cooling of the magma is slow, allowing large crystals to grow. Plutonic rocks are characteristically coarse-grained.
Examples: granite, gabbro, diorite, monzonite and syenite.

Rock types that we will see along the way – 3

Sedimentary rocks are the product of the erosion of existing rocks. Eroded material accumulates as sediment, either in the sea or on land, and is then buried, compacted and cemented to produce sedimentary rock.

There are two major groupings of sedimentary rocks:

Clastic sedimentary rocks
The fragments of pre-existing rocks or minerals that make up a sedimentary rock are called clasts. Sedimentary rocks made up of clasts are called clastic (clastic indicates that particles have been broken and transported). Clastic sedimentary rocks are primarily classified on the size of their clasts (e.g., cemented from pebbles/boulders, sand and mud, and *bioclastic* from organic remains e.g., shell, skeletal, such as limestone). Volcano-sedimentary rocks are cemented volcanic ash.

Non-clastic sedimentary rocks
These sedimentary rocks occur when minerals are precipitated or evaporated directly from water or are concentrated by organic matter / life. Components have not been transported prior to deposition. No clasts are present (e.g., flint , rock salt, gypsum, chemically-formed limestone, coal).

Rock types that we will see along the way – 4

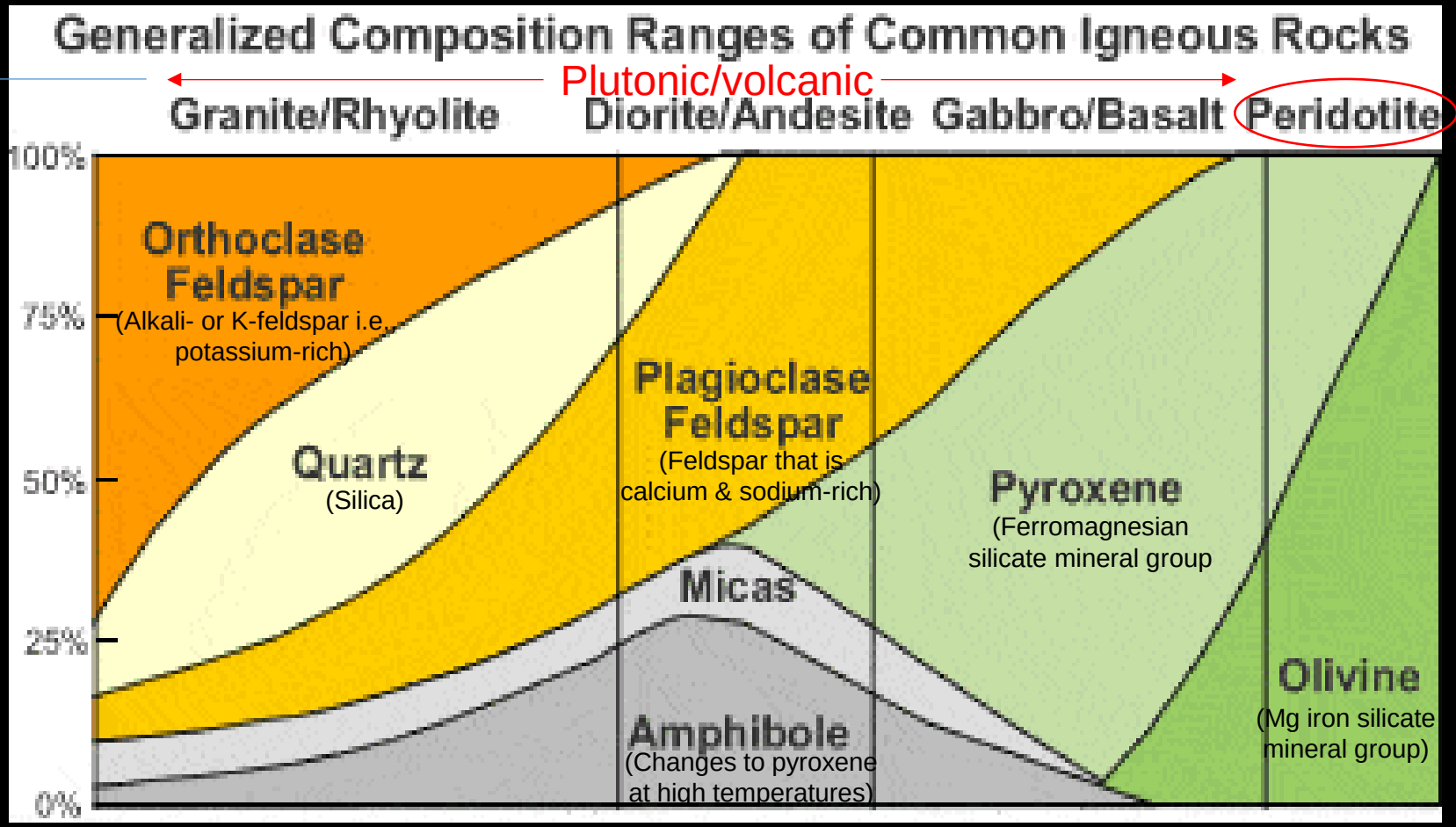
Metamorphic rocks

Metamorphism is the alteration of pre-existing rocks in the solid state due to changes in temperature and pressure. Under increasing temperature and/or pressure existing minerals become unstable and break down to form new minerals. In the case of regional metamorphism, the rocks are subjected to tectonic forces which provide the necessary mechanisms for metamorphism. Products include schist and slate. Contact metamorphism involves alteration through heating by an intruding plutonic body such as granite. Rocks can also be altered by superheated fluids.

Metamorphic rocks are of different grades depending on the amount of heat and pressure they have been subjected to e.g., low grade – slate; medium grade – schist; high grade – gneiss.

Rock types that we will see along the way – 5

There is a variety of igneous rocks on this walk, and they can be classified thus:



E.g., Rhyolite is the volcanic equivalent of Granite

A rock of the Earth's mantle; becomes Gabbro/Basalt when it melts

High in silica ← → Low in silica

Felsic (Rich in feldspar & silica) — Intermediate — Mafic — Ultramafic (Rich in magnesium & ferrous minerals)

Source: geology.com

Rock types that we will see along the way – 6

Further details of the igneous rocks you will see

Granite: This felsic igneous rock is the most abundant basement rock beneath the relatively thin sedimentary rock cover of the continents. Produced in volcanic island arcs (which formed the earliest continental masses) and more commonly in mountain building resulting from continental collision. Island arcs form where tectonic plates collide, when one plate is forced beneath the other (subduction). This leads to melting of the subducted slab, and forms magma which rises absorbing impurities. Granite is an intrusive rock. The volcanic equivalent is rhyolite, which is a gas-charged highly viscous lava associated with explosive eruptions.

Diorite: An intrusive igneous rock intermediate in composition between felsic granite and mafic gabbro. Produced in volcanic island arcs and in mountain building. The volcanic equivalent is andesite, which also produces explosive eruptions.

Gabbro: Gabbro is a dense mafic intrusive rock. It occurs in along mid-ocean ridges and oceanic crust, or in ancient mountains composed of compressed and uplifted oceanic crust. The volcanic equivalent is basalt, which produces effusive eruptions with low-viscosity lava producing fountains and flows. The eruptions can be explosive if the lava comes into contact with water.

Granodiorite: This intrusive rock is intermediate in composition between granite and diorite. Although often similar in appearance to diorite or granite, it has a higher quartz content than diorite, and a higher mafic mineral content than granite. It is commonly produced in volcanic arcs, and in mountain building where it emplaces as large masses in mountain roots. The volcanic equivalent is dacite which produces explosive eruptions.

‘Larvikite’: This is a local name given to a rock occurring at Larvik, near Oslo in Norway. It was intruded into much older rocks during the Permian at ~290 Ma. Known to geologists as monzonite, feldspar is its most important mineral, with less quartz than granite, and contains mafic minerals such as hornblende, biotite and augite. In larvikite, light reflects off internal planes within the feldspar crystals at different angles giving rise to an iridescent play of colour especially when polished.

The name of Harrow is known worldwide for its School, attended by famous names such as Palmerston, Byron and Churchill. The original settlement of Harrow grew up on one of the most prominent landmarks in the historic county of Middlesex, a wooded hill topped by the spire of St Mary's Church. Today, the vast modern suburb of what is now the London Borough of Harrow incorporates the old villages of Pinner and Stanmore, and Victorian Wealdstone, the product of the railway age. The coming of the Metropolitan Railway in the 1880s triggered the development of Central Harrow, the location of this walk, around the hamlet of Greenhill, which lay on the road between the Hill and Wealdstone.

St John's Church for the parish of Greenhill, Station Road*

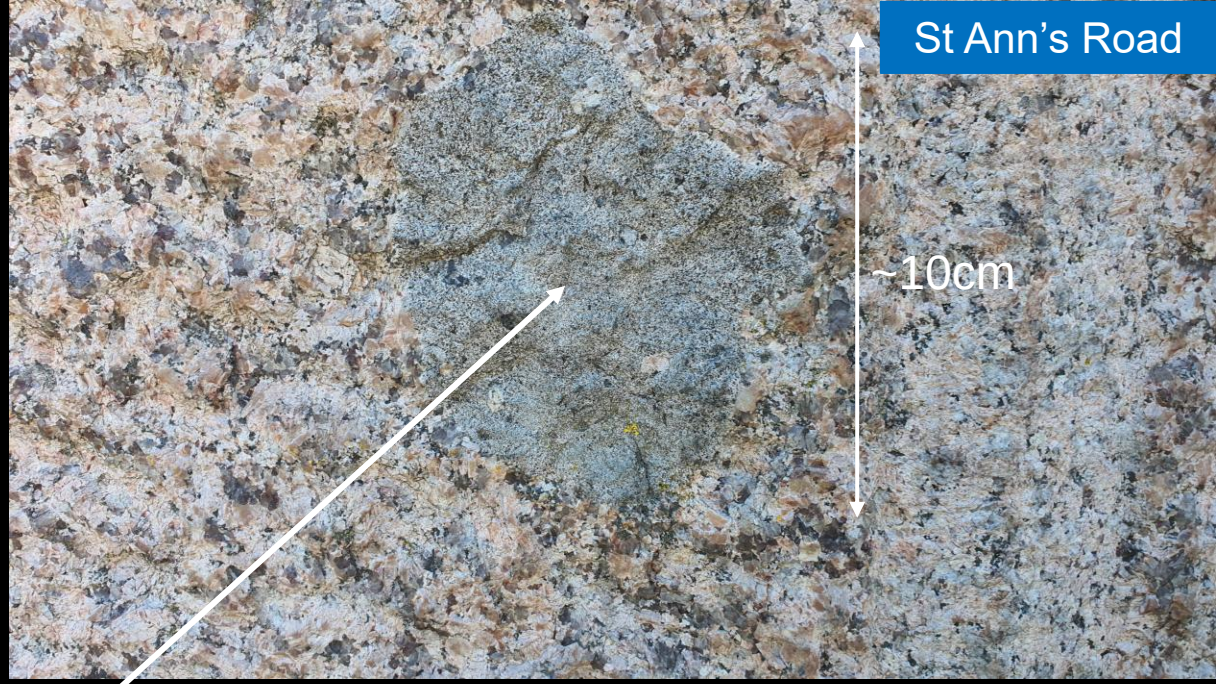
Shop parade on Station Road dating from c.1900

*Referring to Harrow & Wealdstone station, Harrow's first station (then called 'Harrow').


Built 1915 to designs by Banister Fletcher & Sons architects
We begin with the NatWest Bank on the corner of Station Road & St Ann's Road
NatWest
NatWest
TELEPHONE
Granite foundation course

Natwest Bank foundation course: Peterhead Granite from north of Aberdeen. It was formed during 445-410 Ma when continental collision forced up a mountain chain (an event called the Caledonian orogeny), causing melting at depth.

St Ann's Road

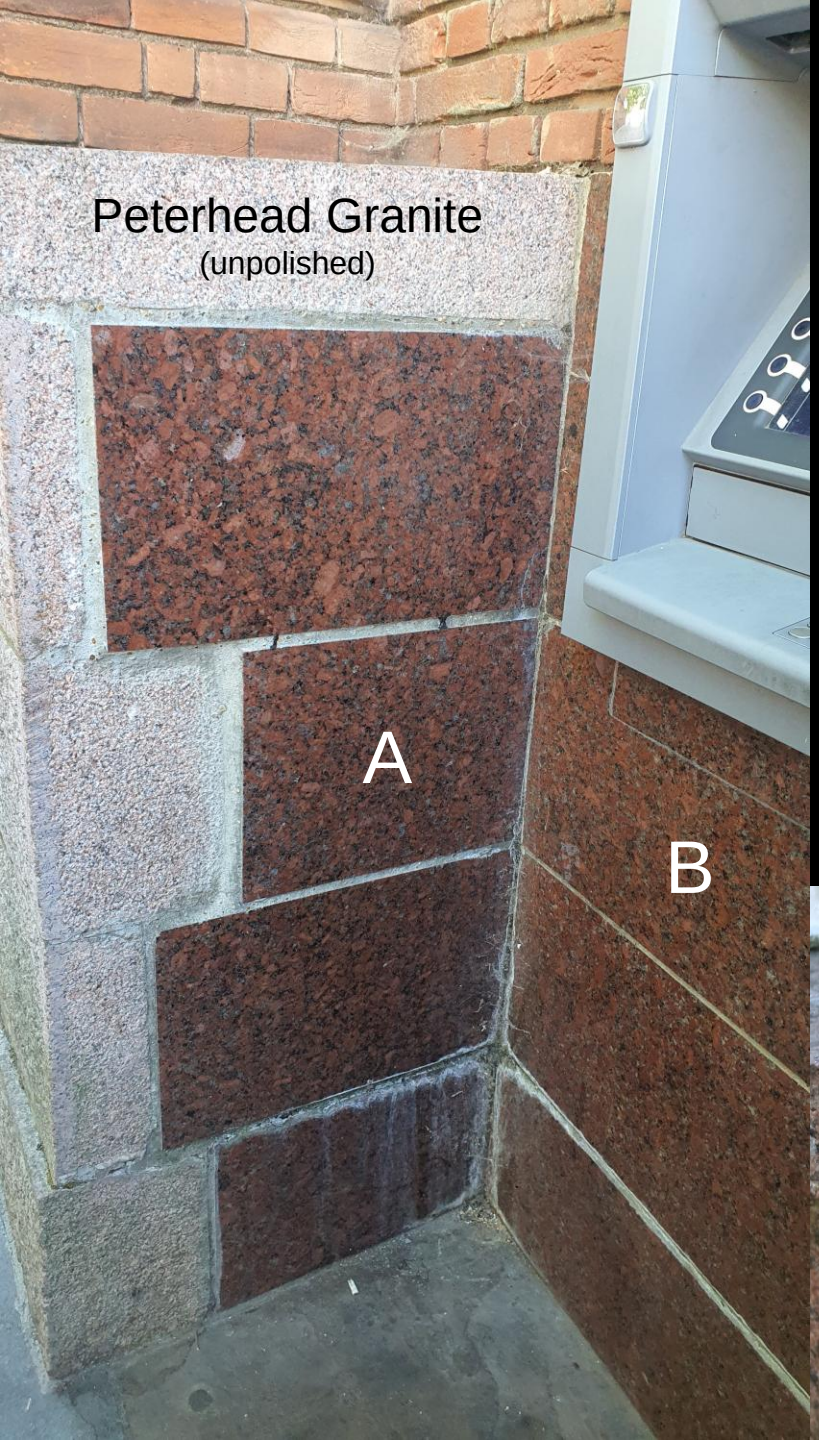


The molten magma cooled slowly allowing large crystals to form (pink feldspar, grey quartz, black biotite mica).

Xenolith – 'foreign stone': country rock incorporated into the molten magma as it intruded.

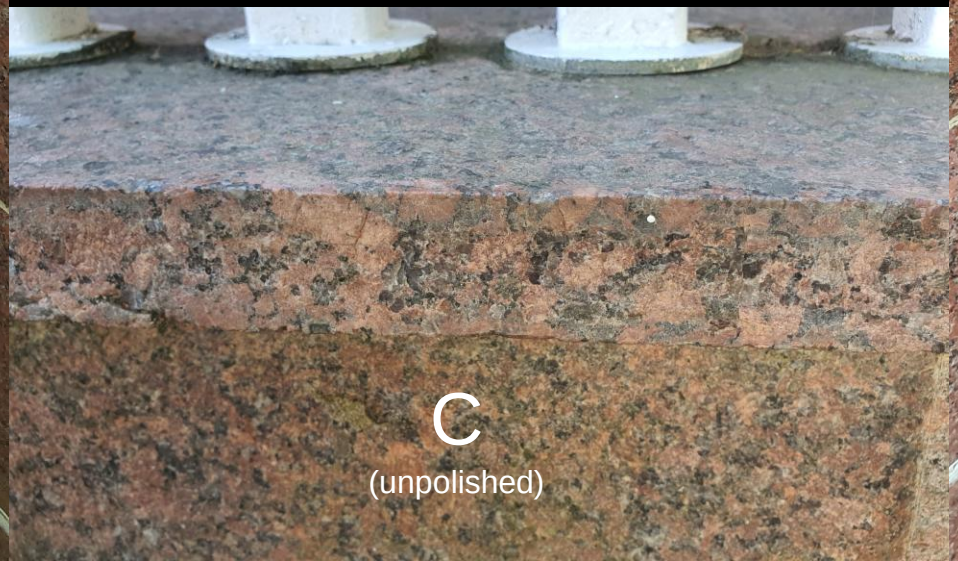
Quarrying peaked in the 19thC and took place between Boddam and Cruden Bay. The first quarry opened in 1815 and up to 20 were worked. One remains today.

Paving stones of ~300 Myr old granite from northern Portugal.



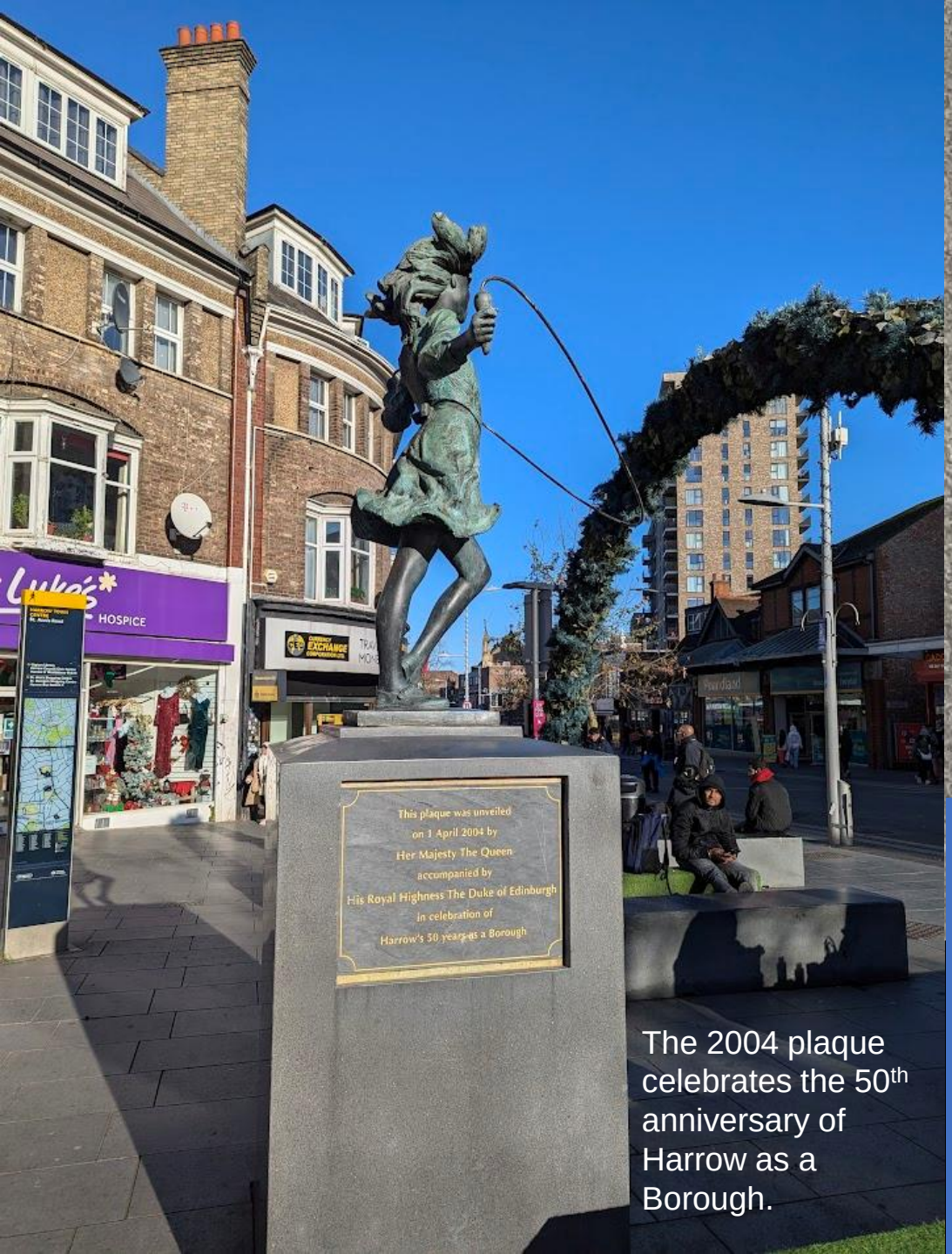
NatWest Bank – cash machine area (left and right); access ramp to bank (centre).

The identities of the granites A, B and C are uncertain, but they could be varieties of ‘Balmoral Red’ from Velmaa, SW Finland – age nearly 1600 Ma. Stone masons in Aberdeen (where it was imported) gave it the ‘Balmoral’ name to disguise its overseas origin. The dark red granite (A) could alternatively be ‘Imperial Red’ from the Baltic coast of Sweden; this is known for its bluish quartz crystals. Similar granites to these also come from further afield, e.g., China.




The NatWest bank is roofed with Lake District Green Slate of late Ordovician age.
The rock is volcanic ash (tuff) explosively erupted from island arc volcanoes above a subduction zone where oceanic crust was descending beneath an advancing continent. The ash settled on the sea floor and was later metamorphosed when the continents met. The mineral composition changed and the crystals aligned forming cleavage planes enabling the rock when worked to be split into slates and slabs.
Station Road
NatWest
AUMKAR
Traditional Authentic Indian Vegetarian Restaurant
CATERING FOR ALL OCCASIONS
EXPRESS CONVENIEO
OFF LICENCE
Lycamobile
Call the world for less
Ticket Stop

St Anns Road / Station Road



The 2004 plaque celebrates the 50th anniversary of Harrow as a Borough.

The plinth of this statue is of gabbro, the most abundant rock in the deep oceanic crust, and is the plutonic equivalent of basalt which has the same chemical composition. It is a mafic rock consisting of plagioclase feldspar and dark ferro-magnesian pyroxene minerals. It also occurs within thick lava flows of basaltic composition, where slow cooling allows larger crystals to form. It is also present in deep plutons that form when magma chambers that feed basaltic eruptions crystallise. The term gabbro was used originally by Italian geologist Tozzetti in 1768 and brought into geological terminology by a German geologist Leopold von Buch. The name comes from the town Gabbro, a village in the Rosignano Marittimo municipality of1 Tuscany (Italy).

This 1960s building is clad with Lake District Green Slate. The advancing continent mentioned in the last ‘Natwest’ slide included what is now England, Wales and S&E Ireland and was called *Avalonia.* Scotland and N&W Ireland were part of *Laurentia*, largely North America today. The two continents were joined by 400 Ma, until the N. Atlantic opened at ~60 Ma.

Foxton's (321) – interior floor.

Polished limestone, widely used for flooring and interior wall tiling. It is fossiliferous, and in these photos mainly sponges and algae are seen. One belemnite (an extinct member of the squid family) is visible.

Station Road

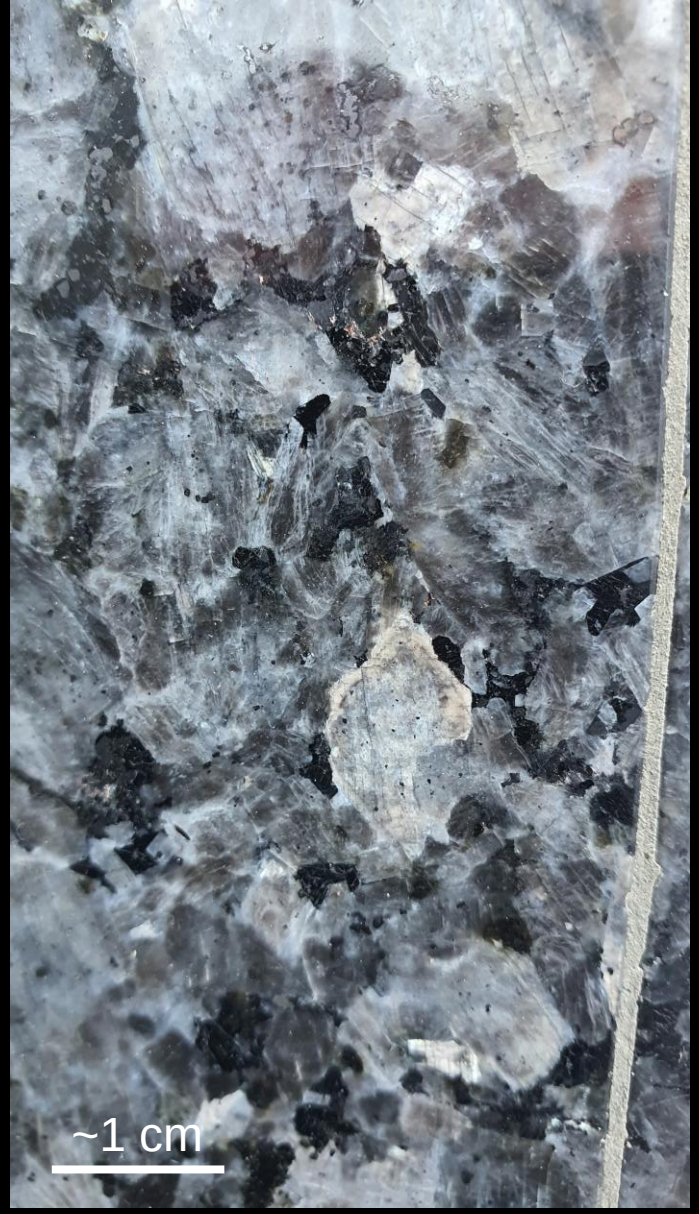
This is Jura limestone, 155 million years old (late Jurassic) from the Upper Bavarian Jura Region of southern Germany, commonly marketed as 'Jura Beige'. It was laid down in a warm shallow sea which covered parts of what is now Central Europe. The quarries are c. 150 km north of Munich.

The same rock is used for the flooring in the Chimes shopping mall in Uxbridge.

Fish & Meat (329/331)

Formerly The Energy Centre (1990s), Café Works, Warren Bakery & New York City Style.

Larvikite. Named after *Larvik* on the Oslo Fjord, Norway, c.100 km S of Oslo. Its geological name is monzonite, which differs from granite in containing no quartz. It comes from the c.290 Ma Permian plutonic complex. This was intruded when the Oslo Rift Valley formed, which is occupied by the Oslo Fjord.



Variety: ‘Blue Pearl’

Station Road

It is famous for the variety of feldspar *oligoclase perthite*, which has the play of colours known as *schillerescence*, owing to reflections of light at different angles off alternating layers of alkali and plagioclase feldspar in the crystal. Most of the quarried stone is used in construction and sea defences; the best quality is for decorative use.

Vapehut UK, Saks & Xtreme Dry Cleaning (363-367): Decorative columns between shops – dark red granite and carved limestone.

Four flat cladded columns with individually carved capitals and pediments at the top. The cladding is a brownish-red granite with bluish quartz crystals. This may be Swedish ‘Imperial Red’ from the Kalmar region on the Baltic coast, and probably from the 1.4 billion-years-old Götemar Granite.

These rocks were intruded into the Fennoscandinavian crust; those located close to the Swedish and Finnish coasts were quarried and shipped out by boat and were generically known as the ‘Coastal Reds’. They have large red feldspars, often appearing crushed, and often the quartz appears milky and sometimes bluish, as mentioned above.

The carved pediments are of Jurassic Bath limestone but are painted over.

Habib Bank AG Zürich

Unidentified granite on the façade dominated by white feldspar and colourless quartz crystals, with black biotite micas.

Station Road

Marble floor (metamorphosed limestone)

Probable impure limestone rich in organic matter – polishes black

Closer view

Station Road

Trinity Bar

Grey, pink and yellow brickwork just north of St Ann's Road (c. 1900). Slate roofing.

St John’s Church, Greenhill: Oolitic limestone of Jurassic age.

Station Road

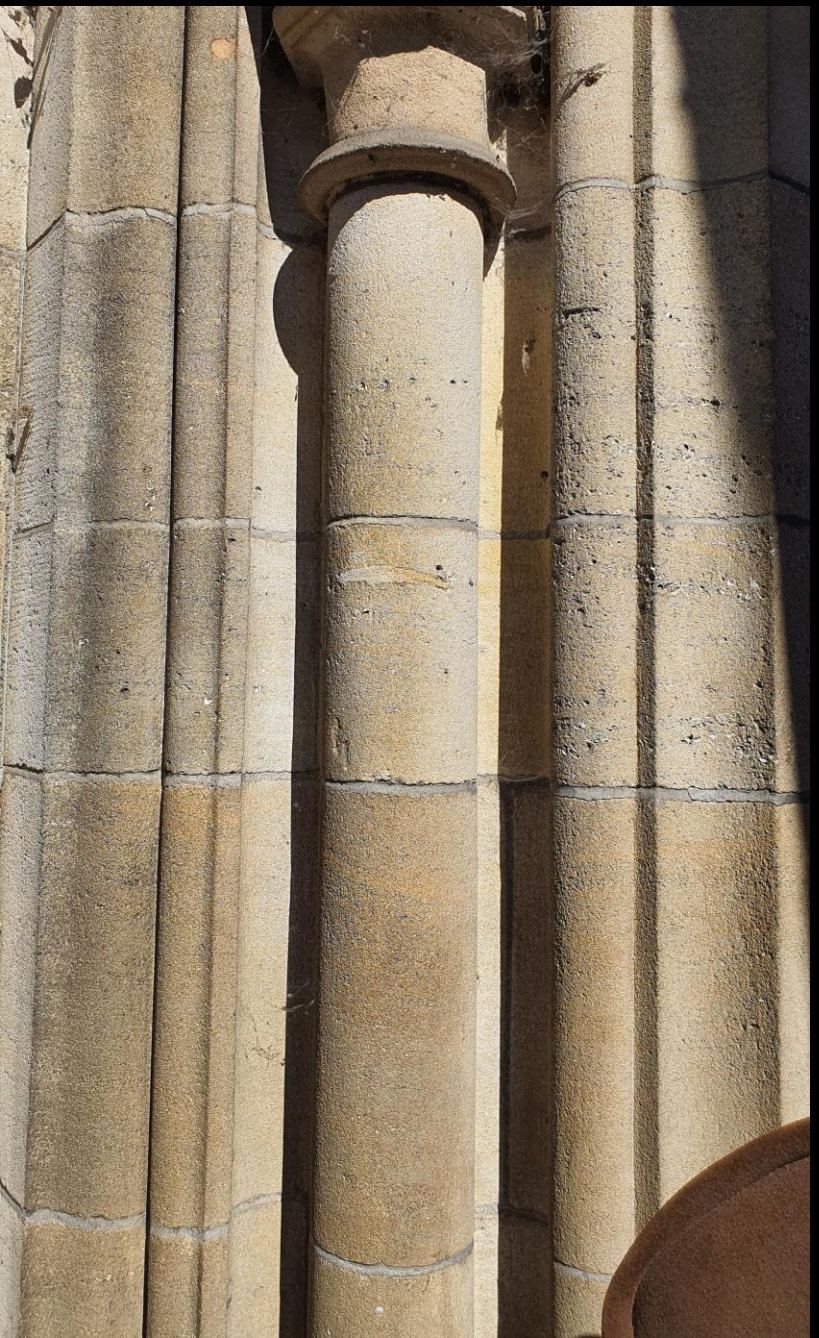
The limestone is Bath Stone, which has been much used in southern England for churches, houses and other public buildings, especially since the development of canals and railways eased transportation.

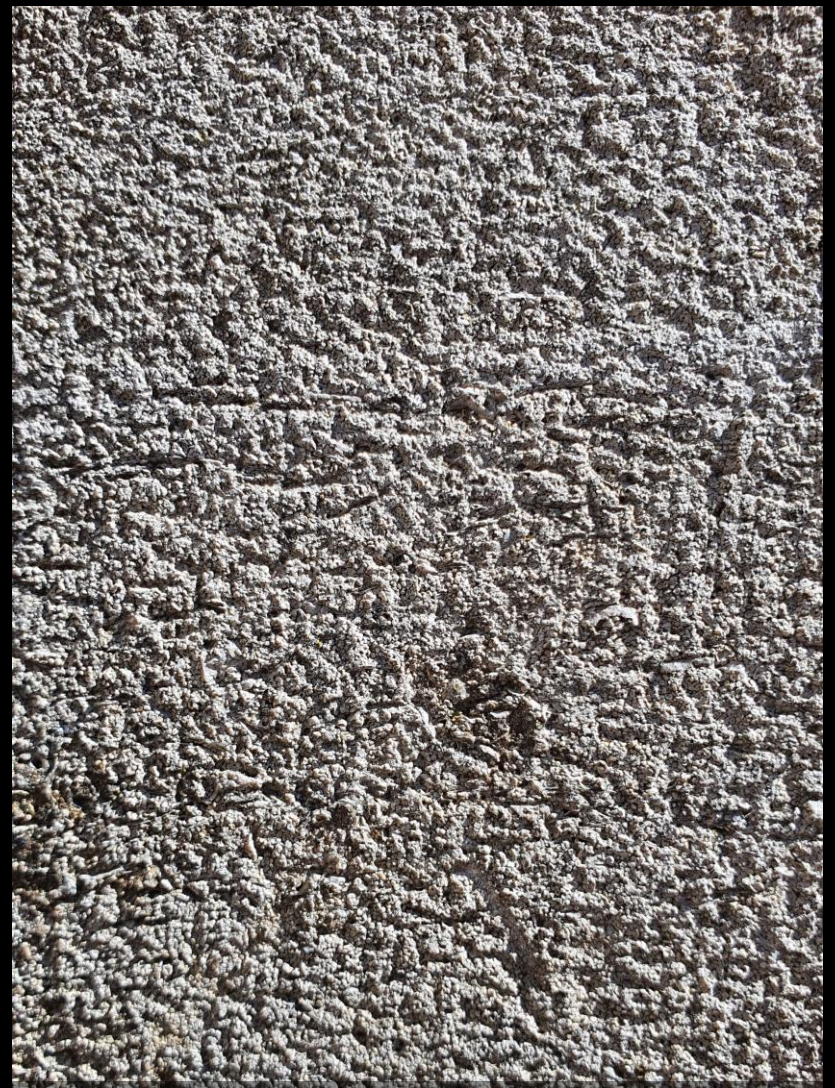
It was laid down in a shallow warm sea 168-166 million years ago.

It is a freestone, i.e., it can be cut in any direction without it splitting along thin layers.

It has been extensively mined around Bath and in north Wiltshire.

St John’s Church, Greenhill: Stone detail - 1



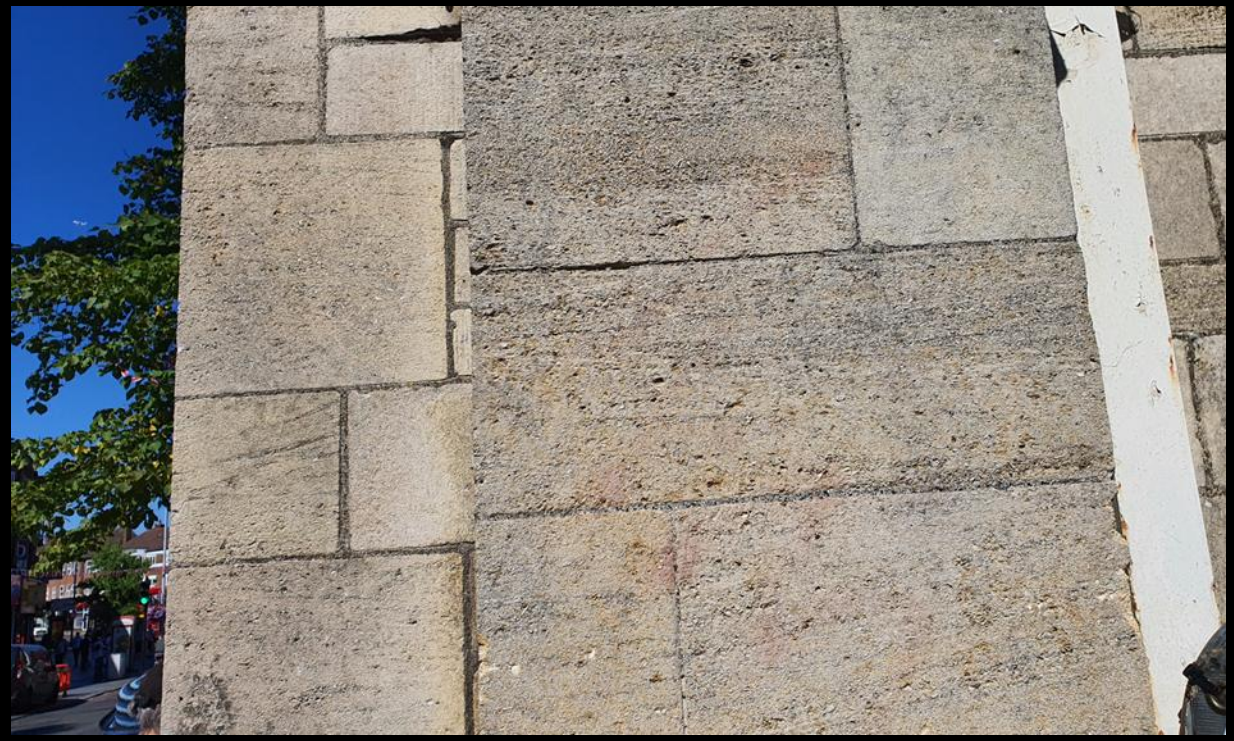


The stone is made up of shell debris and ooliths (small round grains that form when a particle is coated with concentric layers of calcite). Ooliths most often form in shallow, wave-agitated seawater. White when freshly quarried, the stone weathers yellow owing to small amounts of iron oxides forming on prolonged exposure to air.

St John’s Church, Greenhill: Stone detail - 2

Showing texture and shell debris

St John’s Church, Greenhill: Stone detail - 3



Current bedding textures

Boasted or droved finish: parallel lines cut with a wide-edged chisel called a ‘boaster’.

Spalling damage due to attack by a corrosive atmosphere caused by the wide use of domestic coal before the mid-1950s, causing sulphur dioxide pollution and acid rain. Weak sulphuric acid is formed which dissolves limestone. Coal contains sulphur in varying amounts.

Station Road, outside St John's Church

Gabbro paving. This igneous rock forms the lower oceanic crust and is the plutonic equivalent of the volcanic rock basalt which forms the upper oceanic crust. Gabbro mainly comprises dark pyroxene minerals and plagioclase feldspar. Continental gabbro was forced towards the surface by plate collision or formed in a magma chamber beneath a volcano but not erupted, allowing crystals to grow as it cooled very slowly.

Portland limestone – a Jurassic limestone from the Isles of Portland and Purbeck in Dorset. It was laid down in a shallow warm sea at about 150 Ma.

'York Stone' – a Carboniferous sandstone associated with the Coal Measures. It occurs in the coalfields of Yorkshire, Lancashire, Derbyshire and Nottinghamshire, and similar stone occurs in central Scotland. Laid down on river flood plains. Age ~320 Ma.

Granite from Portugal

Granite setts made from recycled kerbstones

Greenhill Place

The granite may be that traded as ‘Arche Granite’ and comes from the Tâmega Valley in northern Portugal. It was formed during the Variscan Orogeny as was the SW England granite (see the later ‘Halifax’ slide for details) at around 300 Ma.

Station Road – west side

Specsavers:

Granite columns with pink orthoclase feldspars, greyish quartz and black biotite mica.

Orthoclase feldspar is also known as potassium feldspar or K-feldspar.

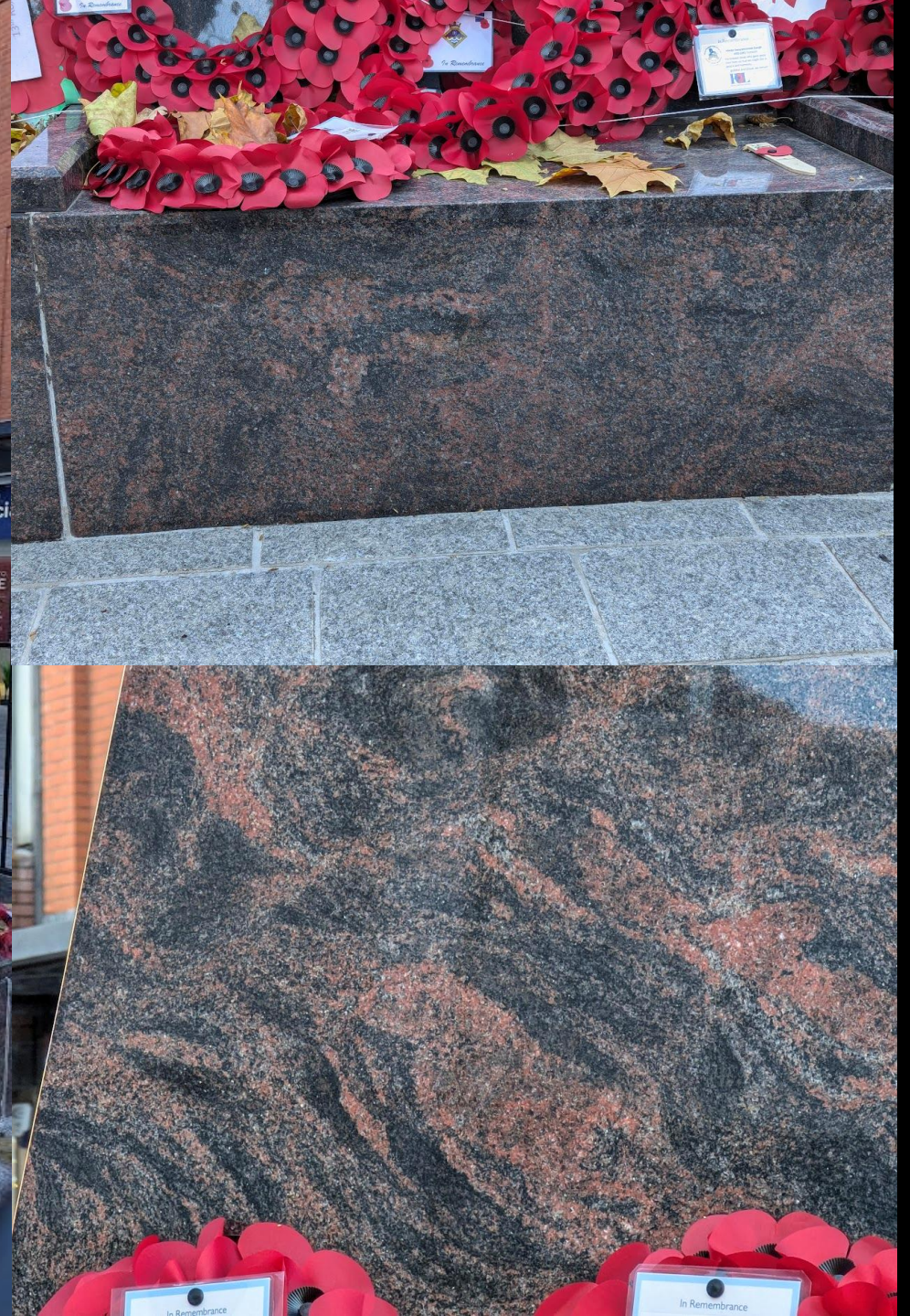
Provenance of granite uncertain.

Station Road – east side

Former Burton’s tailors building c.1920s, faced in black Larvikite. In the photo above, some of the feldspar crystals are glinting in the sunlight.

Many of the Burton’s buildings were clad in limestone. Another example clad in this variety of Larvikite is on Broad Street, Reading.

St Anns Road



Harrow War Memorial

The stonework resembles one of the varieties of ‘Paradiso Granite’ from India (state of Tamil Nadu), and ‘Japarana Etna Granite’ from Brazil. They are not granites but probably migmatites which are metamorphic rocks which have partially melted – the components with lower melting points have fused together to form granitic streaks mainly of pink K-feldspar and quartz in a dark groundmass of ferro-magnesian minerals such as amphibole. The rocks are Precambrian in age.

In April 2024, the War Memorial was relocated here from Harrow Civic Centre, where it had stood for two decades. This move was due to redevelopment plans for the Civic Centre, which are part of Harrow's regeneration programme.

St Anns Road

Granite – a variety rich in white plagioclase feldspars which contain various ratios of sodium and calcium, as opposed to potassium in pink orthoclase feldspar. The granite also contains greyish quartz and black biotite mica. The black patches may be the remains of xenoliths (pieces of country rock which broke off and sank into the magma body).

The darker rock in the photo at left is a coarse-grained gabbro.

Granite from Sardinia

St Anns Road

- The granite seen here is of similar age to SW England granite and was emplaced at ~290 Ma during the Permian period.
- Both granites formed during the Variscan orogeny, the result of the collision between the N. and S. hemisphere continents of Laurasia and Gondwana. This formed the supercontinent of Pangaea which lasted for about 100 million years before it began to break-up into the present-day continents.
- The granite contains pink and white feldspars, grey quartz and black biotite mica. It is quarried mainly in NE Sardinia.

College Road

Hygeia offices: Granite plinths, possibly ‘Balmoral Red’ (Vehmaa Granite) from SW Finland, age nearly 1600 Ma.

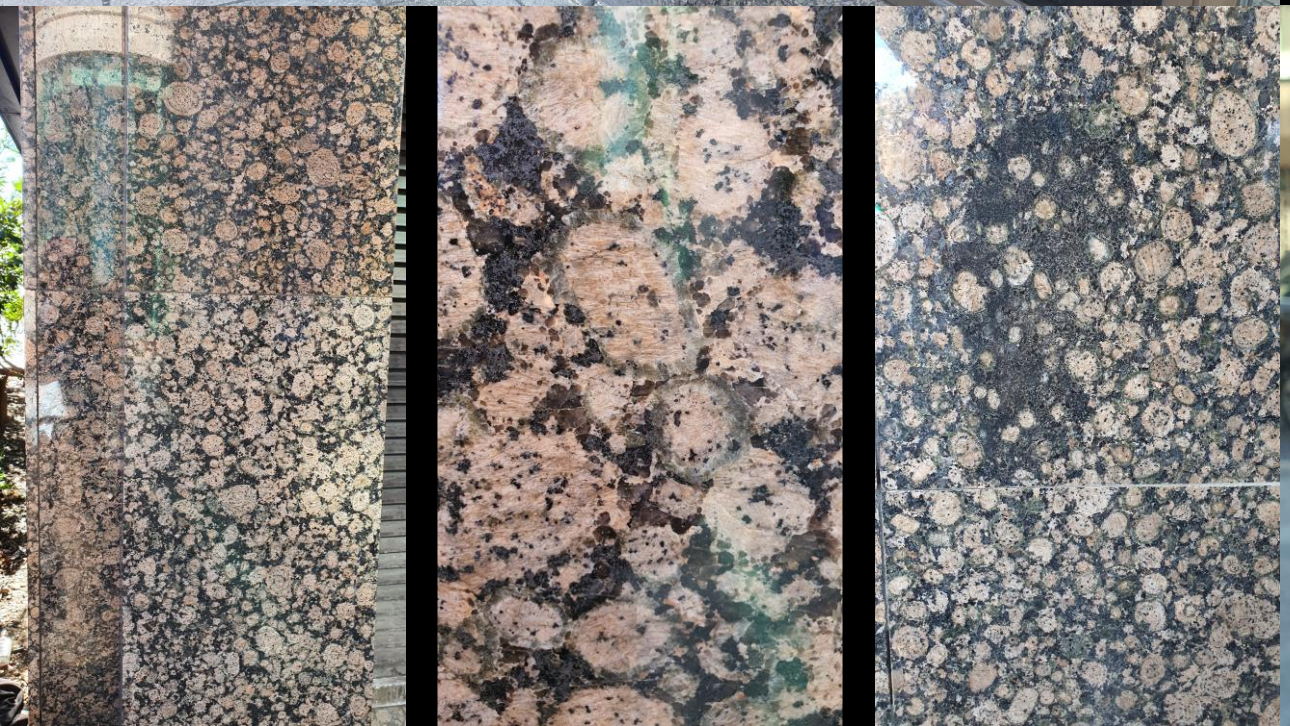
Dominant minerals are red K-feldspar & black biotite mica. The other minerals are plagioclase feldspar and quartz. Similar-looking granites occur elsewhere, but ‘Balmoral Red’ is a popular choice.

Rapakivi Granite (Wyborgite, traded as ‘Baltic Brown’), King’s House.

Rapakivi is a Finnish word describing how the granite weathers in the field.

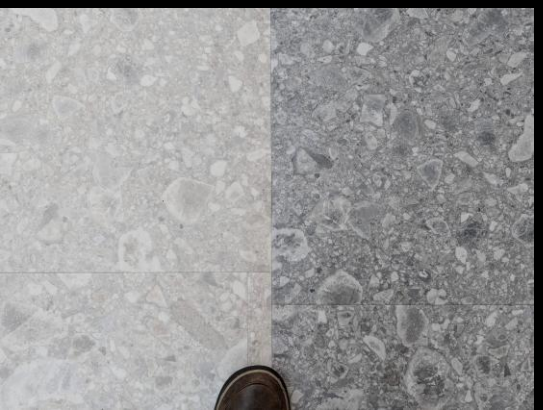
It is characterized by large, rounded crystals of orthoclase feldspar many with a rim of oligoclase (a variety of plagioclase). Other mineral components include hornblende and biotite. Exposed outcrops weather by crumbling into sand and gravel owing to the different heat expansion coefficients of the component minerals. Wyborgite (or vyborgite) is named for Vyborg, a town near St Petersburg.

Another variety is marketed as ‘Baltic Red’ or pyterlite, named for the municipality of Pyterlahti in SE Finland. Age (both varieties): ~1600 Ma.



St George's Shopping Centre

St George's opened in 1996, supplementing the St Anns Centre of 1987 which now has a new floor of what appears to be artificial stone. Igneous rocks comprise the floor, including red and grey granites, together with black and dark grey gabbros. The provenance of the stones is uncertain.



Ground floor, St Anns Centre, laid post-August 2022.