Building Stones in Pinner

A Geological Trail

INTRODUCTION

Geologically, Pinner lies mainly on sediments of the **London Clay** and **Reading Formations**, which are both of Paleogene age (see Geological Timescale on back page). The London Clay Formation was laid down in the sea about 50 million years ago and the slightly older Reading Formation (clay, sands and gravels) was deposited in coastal swamps, estuaries and deltas. The latter underlies the entire walk, which starts at the **Parish Church**, then explores the **High Street** and **Bridge Street**, ending in **Pinner Memorial Park**.

Although most of the buildings in Pinner are of brick, there is a variety of rocks to be seen that are of interest to geologists.

Start at the top of the **HIGH STREET** *at the stone-built* **PARISH CHURCH OF ST JOHN THE BAPTIST**.

The church was re-consecrated in 1321 having replaced an earlier church first mentioned in the 1230s. It is difficult, however, to tell whether any part of the present church's fabric is of this earlier date, but some of the materials would almost certainly have been reused from the earlier building. The tower, south porch and the east window were added in the 15th century and a few alterations were made in the 17th century. In the 19th century, major work was done, particularly in 1810-11 when extensive repairs were carried out, 1859 when the Lady (South) Chapel was added, and 1879-80 when the whole building was renovated by J. L. Pearson.

The church walls are mainly **flint** with scattered blocks of other stone (Fig. 1, page 2). The flint most likely came from medieval **chalk** pits – the earliest reference to these occurs in 1388 in the Manor of Harrow Court Rolls. The pits were west of Waxwell Lane extending towards the Uxbridge Road, and were situated where a fold in the chalk brings it close to the surface. The closest workings to the church were at The Dell, so that Love Lane must have existed to transport the flint and chalk to the High Street.

Flint occurs as bands or nodules in the chalk, which at c. 80 million years old is of late Cretaceous age; in Pinner it underlies the London Clay and Reading Formations. Flint was widely used in the medieval churches of Middlesex but at Pinner, as was the norm, other stones have been used as well. Some of these came from further afield, and would have been brought in by river and cart. The flints in this church were knapped to produce a flatter surface for wall-facing.

The chalk, which was later mined in both Pinner and Northwood, was used in agriculture and as an ingredient in brickmaking to prevent cracking during firing. It was also burnt in kilns to produce lime for mortar and lime wash, a coating that let air through but kept moisture out.

Rocks are classified into three types. In the first type, hot molten material from inside the Earth solidifies to form **igneous rocks**. These rocks are broken down by weathering and erosion to form the particles that accumulate generally on the seabed and river flood plains, later hardening into the second type, the **sedimentary rocks**. The third group of rocks are **metamorphic**; these have been produced by heat and pressure altering other rocks. In a walk around Pinner it is possible to see examples of all three rock types.

FLINT

Underlying the **London Clay** and **Reading Formations** is **chalk**, hence the **Pinner Chalk Mine** and others that were worked north of the Uxbridge Road. Chalk is generally too easily weathered for it to be used as a building stone but in it there are bands of **flint**, a dark grey glassy form of silica derived from sponge skeletons. Flint is very hard and durable and has been used in buildings for generations, either as pebbles and nodules, or knapped to produce flat surfaces (and even cubes) to be used as building blocks. All these types of flint can be seen externally in local churches.

FERRICRETE

Wherever sands and gravels occur near the surface, iron oxide may be washed from the soil cover to redeposit lower down to form a hard 'iron pan'. This ferruginous material is called **ferricrete** and when dried out, makes a rock which is workable and durable enough for buildings. Having established this, medieval builders would have felt no need to look any further for their walling stone. Examination of the pebbles in the blocks seen in **St John the Baptist** indicates a possible source as the 2-3 million-year-old Stanmore Gravel Formation which caps the high ground north of here stretching from Pinner Hill eastwards. Iron-cemented sands and gravels also occur elsewhere in the Thames Valley as seen in other local medieval churches.

SARSENS

When the soft sands of the **Reading Formation** (once more extensive around Pinner) were eroded away, some of the sand, cemented with silica making it resistant to erosion, remained. These remaining rocks are informally called **sarsens** (technically **silcrete**).

These blocks of hard sandstone lay at or just below the surface, resulting from this patchy cementation. The warm climate of Paleogene and Neogene time drew water up through the sands around the top of the water-table by capillary action as evaporation occurred at the surface. This concentrated dissolved silica in the groundwater until it crystallised out, cementing the sand grains together. Subsequent erosion of the uncemented bulk of the sediments left these hardened patches behind to form the sarsen blocks.

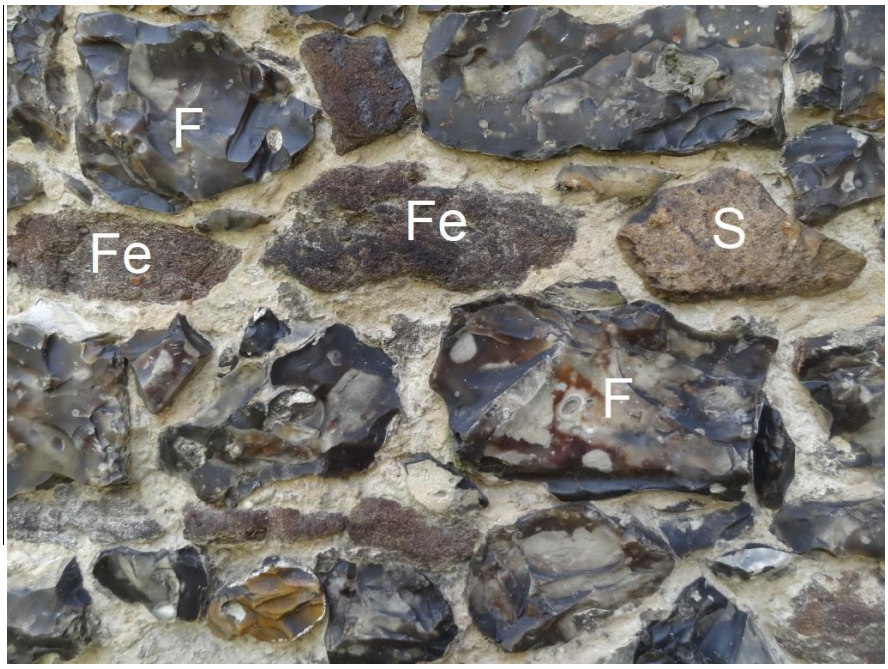

*Fig. 1. Church wall showing **flint (F), ferricrete (Fe)** and **sarsen (S)***

Look at the **tower***, referring to Figs. 2 and 3.*

With prominent corner buttresses, the tower's walling is **flint rubble** with scattered blocks of dark brown pebbly sandstone called **ferricrete**. The buttresses are also flint but have quoins (corner-stones) of **Kentish Ragstone**, a resistant **limestone** (see panel page 3) from the Cretaceous Lower Greensand. The quarrymen so named it because it would break along ragged edges. It outcrops in various places on the Greensand ridge above the Weald of Kent, and has been quarried in the Maidstone area since Roman times. In south-east England it has been a good source of hard stone which is otherwise scarce, and has been used in public buildings particularly since Norman times. Due to decay, a number of the quoins were replaced in Victorian times with Jurassic limestone from around Bath i.e. **Bath Stone**. These in turn are now showing some decay.

Large pale greenish-grey blocks in the angle between buttress and tower are of **Reigate Stone**. This is a marine calcite-cemented **sandstone** from the Cretaceous-age Upper Greensand on the North Downs. It is c. 110 million years old and underlies the Chalk. Also seen in other local medieval churches, it is fairly soft and is prone to flaking.

Four materials make up the continuous **plinth** around the buttresses and walls of the tower: **flint** at the base, **Kentish Ragstone** for the lower string course, **Magnesian Limestone** for the upper string course and **Reigate Stone** between the string courses. The **Magnesian Limestone** is so-called because it consists of calcium magnesium carbonate rather than calcium carbonate (see panel page 4). It may have come from South Yorkshire and is Permian in age, c. 250 million years. Some of the original limestone of the plinth's string courses and the Reigate

LIMESTONE

Limestone consists mainly of calcium carbonate and is a sedimentary rock formed from the shells and remains of sea creatures. Some limestones feature **ooliths** – small, rounded grains of precipitated calcite. Two common sources of limestone are **Bath Stone** and **Portland Stone** deposited during Jurassic time 150-170 million years ago. Limestone is easily weathered, particularly by acid rain, and then the surface becomes rough and uneven. Apart from broken shell fragments limestone often has larger fossils visible in it. Chalk is a type of limestone.

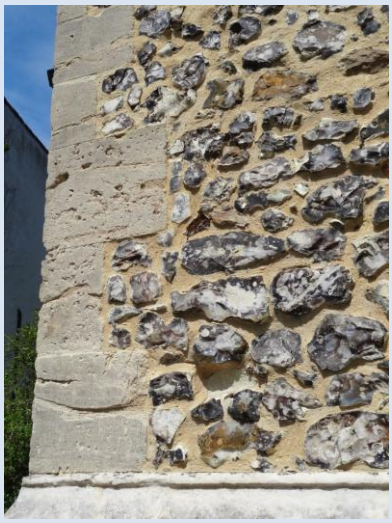

*Fig. 2. The quoins of the tower buttresses are of limestone known as **Kentish Ragstone** (Cretaceous age) from the Maidstone area. Some have been replaced by **Bath Stone**.*

*Fig. 4. **Reigate Stone**, west door.*

Stone separating them has been replaced fairly recently with an unidentified limestone.

*Fig. 3. Part of the tower and SW buttress. **F – flints** with scattered **ferricrete** blocks (dark brown) and **sarsens** (mid-light brown); **K – Kentish Ragstone**; **M – Magnesian Limestone**; **R – Reigate Stone**.*

The **West Door** (facing you) and its surrounds are carved in **Reigate Stone** which has suffered weathering (Fig. 4).

Go right to the entrance (south porch).

The windows and porch

Bath Stone is used for some of the windows and has weathered to a yellow to ginger colour from the original cream when freshly quarried. Other windows (e.g. the south transept) feature an unidentified cream-coloured limestone.

The porch entrance surround is mainly **Bath Stone** (Fig. 5). The outermost ribs of the arch are in grey-weathered **limestone** probably from **Lincolnshire**, also of Jurassic age.

*Fig. 5. Porch arch: mainly **Bath Stone***

A close look at the **Bath Stone** will reveal **ooliths** (spherical grains composed of concentric layers of calcium carbonate) and broken shells. Ooliths are usually formed in shallow, agitated, warm sea water rich in dissolved calcite in near-shore environments. The layers build up on a small grain of sediment such as a shell fragment. Strong currents wash the grains around on the seabed, where they accumulate layers of the calcite chemically precipitated from solution. *Continue to the….*

South transept.

Many of the quoins of the church are of **limestone** but the south transept (and the north) features some large blocks of the **ferricrete** already seen as scattered blocks elsewhere (Fig. 6). It was not until after the 14th century that the often better quality limestone was brought into the Thames Valley.

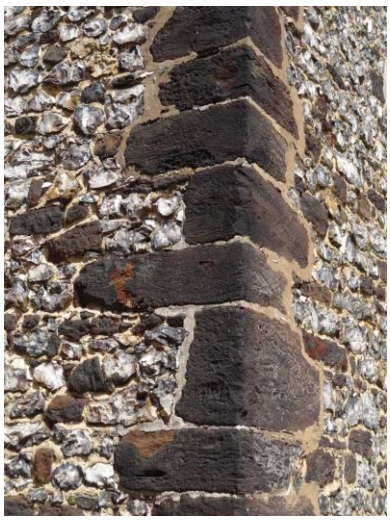

*Fig. 6. **Ferricrete** quoins, south transept*

Sarsen stones (Fig. 7) occur here and there; they, like the ferricrete, came from the Reading Formation as already mentioned.

The **MAGNESIAN LIMESTONE** is a suite of carbonate rocks in north-east England, forming a narrow outcrop from Co. Durham to Nottinghamshire. Much of it is **dolomite**, i.e. calcium magnesium carbonate, and has for many years been the main source of dolomite rock in Britain. It is thought that the original limestone was infiltrated by magnesium-rich waters from further out to sea where the waters were much more saline. Around what is now the British Isles in the Permian period had a hot semi-arid climate with large inland hypersaline seas.

SANDSTONE

Sandstone is a sedimentary rock consisting of individual sand grains which were deposited on the sea bed, by rivers on flood plains and in deltas and as blown sand. It was then compressed and cemented to form a hard rock. Sandstone is used as massive blocks for buildings and for paving slabs. The latter widely use grey-brown **York Stone** flagstones; this is sandstone from the Carboniferous-age Coal Measures deposited 300 million years ago. These traditional paving stones are of sandstone whose individual sand grains were deposited as river sediment on coastal plains occasionally inundated by the sea. In the rock are shiny flakes of mica which allows it to split easily along the bedding planes. With time the rock wears away along the thin bedding planes to make and maintain an uneven non-slip surface and also revealing the flakes of mica.

'Sarsen' is a Wiltshire dialect corruption of the French 'saracen' – meaning 'heathen' or 'pagan' in the old sense – origin 1640s. These stones (technically **silcrete** – panel p.2) are ginger-coloured.

Fig. 7. ***Sarsen stone*** *(lower left) c. 30cm long with probable root holes formed before the sand was cemented*

Fig. 8. ***Carboniferous limestone*** *grave slab with the Clitherow family crest*

The most interesting **gravestones** are the three laid flat to the left of the porch if facing the church (Figs. 8 and 9); they were originally set in the floor inside the church. Two of them bear the dates 1681 and 1683 and are those of brothers Thomas and Christopher Clitherow, the last surviving members of a prominent Pinner family. The third is to Sir Bartholomew Shower who died in 1701. The grey stone from which they are made is known as **Carboniferous Limestone**, named for the geological period during which it was formed. It occurs in the Pennines, and in parts of western England, Wales, Ireland, France and Belgium. This limestone is much older than the limestones we have seen so far as it was deposited in the sea over 330 million years ago. In the 17th century, before canals and railways, these slabs most likely would have been brought here by river, sea and cart.

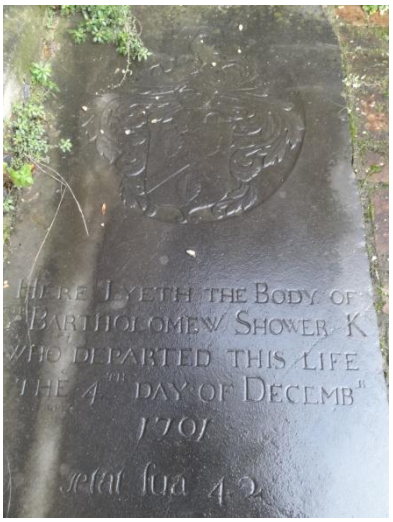

Fig. 9. ***Carboniferous Limestone*** *grave slab to lawyer and politician Sir Bartholomew Shower (1658-1701), who lived at Pinner Hill towards the end of his life.*

GRANITE

First met with on page 7, this **igneous** rock was formed from the crystallisation of molten rocks deep inside the Earth's crust millions of years ago. The melting is generally associated with continental collision and resultant mountain building. Look closely at the surface to see the various minerals which make up the rock. As the molten rock solidifies, crystals of **feldspar** (white or pink), **quartz** (glassy) and **mica** (black or brown) are formed. There are often large pieces of the dark grey country rock (invaded by the granite) now caught inside the granite. These are called **xenoliths** (or 'heathens' by quarrymen and stone masons).

When the feldspar crystals are large and white the granite has probably come from Cornwall, while the pink and red granites may have been quarried in Scotland or overseas.

Except for Exmoor the moorlands in Devon and Cornwall are underlain by granite, and there are numerous quarries mostly no longer working. Although granite is not easily quarried it is extremely hard and nowadays it is cut into relatively thin slabs, given a high polish and then used for the decorative cladding of many buildings. It is also used for paving, flooring, memorials, kerbs and aggregates. The high initial cost is offset by the durability of the stone since it is resistant to weathering.

This darker limestone contains some mud or organic matter, and will polish black.

The **paths** are of **York Stone** (Fig. 10), also of Carboniferous age, but somewhat younger than the limestone just seen. This sandstone was laid down as river sediment on coastal plains occasionally inundated by the sea. Some surfaces show ripple marks. The rock flakes along the bedding planes and so provides a safe, rough surface for walking on. It was, and still is, quarried in West Yorkshire.

Fig. 10. ***York Stone*** *paving slabs*

Go to the lych-gate.

The lych-gate was built as a memorial to those who served in the First World War (Fig. 11). The walls are of grey **Kentish Ragstone** with a capping of yellowish **Bath Stone.**

Fig. 11. Lych-gate

Fig. 13. War Memorial

Fig. 14. War Memorial granite plinth showing large feldspar crystals

Fig. 15. Setts around the Memorial

CHURCH LANE

From the lych-gate turn right for the first building on the right past the Church.

At first glance the round pebbles laid in the front garden of this red brick Georgian house (now offices) suggest that they are rounded flint from a beach in southern England. Looking closely, however, some of the pebbles to the right of the path are of pinkish quartzite (metamorphosed sandstone) from Triassic pebble beds that crop out in the Midlands and on the Devon coast near Budleigh Salterton. All these are beach or river pebbles and were transported by a major Triassic river a long way from their place of origin, thought to be Brittany.

Cross the road to the left-hand (south) corner of the green.

HIGH STREET

John Edward Clark commemorative stone (Fig. 12)**.** This is made of coarsely crystalline grey **granite**, an igneous rock (see panel, p. 6).

Fig. 12. Commemorative Stone to John Edward Clark

Igneous rocks are formed from molten material beneath the Earth's crust and can generally be recognised by the several different-coloured and variously shaped crystals that were formed as the rock cooled. On the rough sides of this block, individual crystals of grey, glassy quartz, white feldspar and glittery mica are clearly visible. Granite is often used for monuments because it is very hard wearing and resistant to weathering. It can be smoothed to a highly polished surface, but here the surfaces have been left rough.

War Memorial. Opposite, varieties of granite and other igneous rocks can be seen at the War Memorial (Fig. 13) which was erected in

DIORITE is generally light to dark grey depending on the proportions of white feldspar and greenish-black iron and magnesium (ferromagnesian) minerals. Some varieties have pink or red feldspars stained by iron oxide impurities. With increasing quartz, diorite grades into **granodiorite.** Diorites usually form over subduction zones where oceanic crust pushed beneath continental crust melts and resulting magma rises into the continental crust picking up impurities on the way.

SLATE

Slate is a dark grey fine grained rock which has been metamorphosed. Slate was originally a sedimentary mudstone which was subjected to intense pressure during mountain-building events, usually caused by continental collision.

Because the minerals formed during this process were orientated in the same direction, the rock now cleaves (splits) easily along fine parallel planes. Thus it can be easily split into thin slabs making it ideal for roofing. These were transported by rail from the quarries in North Wales.

Lake District Green Slate comes from the English Lake District. About 470 million years ago the Lake District was part of a chain of volcanic islands. Explosive eruptions blasted out volcanic ash which settled in the surrounding sea and was later strongly compressed and converted into slate.

1921. The column is made of **Darley Dale Sandstone** from Derbyshire with the plinth in grey **Cornish granite**. The sandstone belongs to the **Millstone Grit Group** (age c. 320 million years) of Carboniferous age and is rich in grains of feldspar. The grey crystals and the dark brown specks in the **granite** (Fig. 14) can be seen on close examination but the most obvious features are the large white crystals of feldspar. The granite is 290 million years old and was formed during the Permian period when two continents collided forming a major mountain chain.

The area around the Memorial is laid out in stone setts (Fig. 15). As is often the case they are made of igneous rock which is strong and durable enough to withstand heavy traffic. These setts are of **diorite**, **granodiorite** and **granite**. **Diorite** (see panel this page) contains feldspar and one or more iron/magnesium-rich minerals such as biotite, hornblende, augite and pyroxene, but far less quartz than granite. Here we have grey **diorite** from Guernsey, reddish **granodiorite** from Mountsorrel in Leicestershire (the nearest source of hard igneous rock to Pinner) and pink **granite** from Jersey. All these rocks are latest Precambrian to Ordovician in age i.e. c. 600-450 million years.

Paving. There are only a few other stone features to be seen along the High Street as the majority of the buildings are brick with a few in a stucco finish. However on both sides of the street paving stones with an uneven surface nearest some of the shops and outside the **Queen's Head** are again light brown flagstones of **York Stone** (Fig. 16). The edging outside the pub is in the same stone. The main footways are in concrete pavers (at lower left in Fig. 16).

*Fig. 16. **York Stone** paving outside the Queen's Head*

Roofing materials. The buildings opposite Carluccio's have retained their original **slate** roofs e.g. above the passage to

Sainsbury's. The slates would have been sent by rail and sea from the great Welsh mines and quarries in the 19th century. Slate is a metamorphic rock. About 400 million years ago during a collision between two tectonic plates of the Earth's crust, the original marine mudstone laid down up to 100 million years before was hardened and deformed under heat and pressure. This led to the reorientation of platy minerals until the rock developed the cleavage planes that allow it to be split into the thin slabs light enough for roofing.

Angie's Chemist. Near the bottom of the High Street, another **slate** can be seen as floor paving in the shop entrance (Fig. 17). This is a greenish slate from the Lake District and is of Ordovician age (about 470 million years). It was deposited on the sea floor as ash produced by explosive volcanic eruptions and was again hardened and deformed like the Welsh Slate during continental collision.

Fig. 17. ***Lake District green slate****, Angie's Chemist*

MARBLE

Marble is a metamorphosed limestone. Marbles derived from pure limestone (calcium carbonate) consist simply of recrystallised calcite, but impurities such as dolomite (magnesium carbonate), iron compounds, silica and clay minerals etc. may give rise to other minerals which give certain marbles their characteristic appearance.

Polished limestone marketed by the stone trade as 'marble' is *not* true marble.

Robson's Estate Agents next door to Angie's has interesting stone cladding on the right-hand side of the shop doorway (Fig. 18); this is a greenish Swedish **marble** which was very fashionable in Art Nouveau buildings around the end of the 19th century.

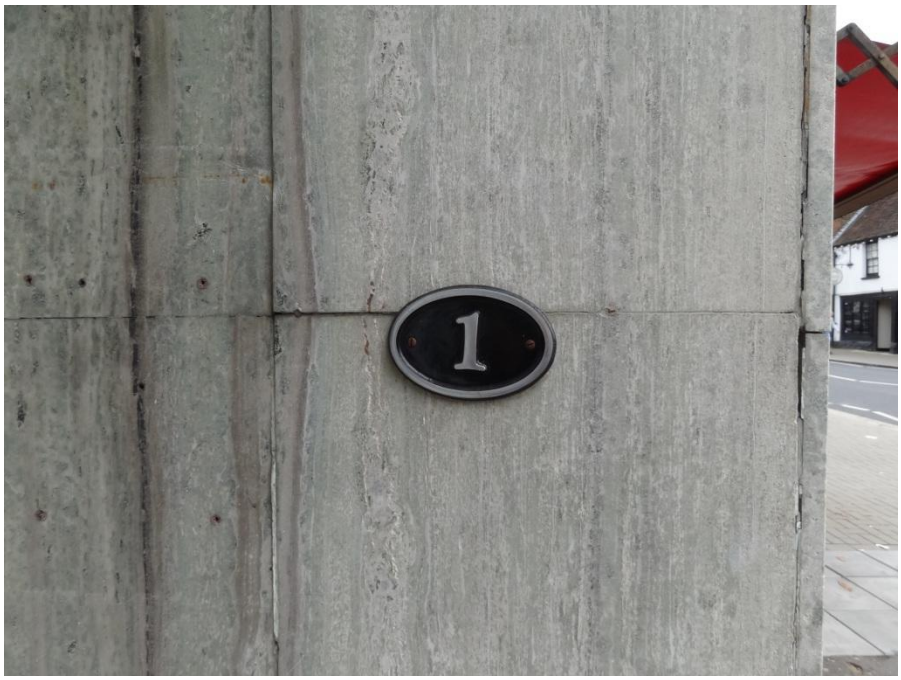

Fig. 18. Swedish ***marble,*** *Robson's Estate Agents*

Turn right into….

BRIDGE STREET

This has the best selection of building stones in Pinner. In order to give shops an identity, a cladding of slabs of stone or tiles is often attached to the fronts of the building. Of course banks, building societies and chain stores are good places to see interesting and varied stone cladding; sometimes they use one type of stone for all their branches, thus creating a corporate image for their premises.

LARVIKITE

Larvikite is a popular cladding stone often called *Blue Pearl* or *Emerald Pearl* (depending on the colour of the rock) by the stone trade. The rock, a distinct variety of **monzonite**, is a coarse-grained igneous rock with roughly equal amounts of plagioclase and potassium feldspars and less than 5% by weight of quartz.

As its name implies it comes from Larvik near Oslo in Norway. The feldspar crystals when polished give the coloured 'butterfly wing' look (like a blue butterfly) which is called the *Schiller effect* and makes this stone easy to recognise. Light is reflected at different angles from the thin films within the crystals to produce the distinctive blue glitter.

Walk up the right hand side of Bridge Street as far as Waxwell Lane at the top of the hill. There are several stops on the way.

Unique Nails just before the corner of Love Lane has **granite** cladding on both sides of the shop front (Fig. 19). The granite has pale pink feldspar crystals, and may be **Grigio Perla** from Sardinia.

Fig. 19. ***Granite****, Unique Nails*

The grey crystals are quartz and the dark ones are of biotite mica.

Boots Opticians by the zebra crossing about 50 metres past Love Lane features **larvikite** cladding down each side of the shop front (Fig. 20). From Larvik near Oslo in Norway, this cladding is popular on shop fronts, offices, pubs and occasionally counter tops. To geologists this rock is a **monzonite** (see panel).

Fig. 20. ***'Blue Pearl' Larvikite****, Boots Opticians*

SERPENTINITE

The name originates from the similarity of the rock texture to the skin of a snake.

Serpentinite is a metamorphic rock that is mostly composed of serpentine group minerals. Members of this group include **antigorite, lizardite, and chrysotile** (asbestos). They are produced by the hydrous alteration of rocks very rich in magnesium and iron (i.e. **ultramafic***) as found in the **Earth's mantle** (and account for the dark green colour). The rock and water temperature would be c. 250°C. The rocks before alteration were igneous rocks composed of **olivine** and **pyroxene** (**peridotite** and **pyroxenite**) and which make up most of the mantle.

Alteration occurs at mid-ocean ridges where molten rock is being brought up by convection currents in the mantle to form new ocean crust. The crust moves away from this boundary between two tectonic plates in opposite directions towards the continents bordering the ocean. When the ocean crust meets the continental margin it would normally be **subducted** underneath it. Occasionally however, the ocean crust, and slices of the mantle beneath, can be forced up on to the margin, often forming mountains (a process known as **obduction**).

Serpentinite takes a good polish but it soon loses the shine on exposure to the elements. This splendid rock has been quarried as a decorative rock since Roman times, particularly along the northern side of the Mediterranean. A major exposure of serpentinite in Britain is on the Lizard Peninsula in Cornwall.

What we see here is a coarse-grained rock cooled from molten magma in early Permian times over 290 million years ago. The variety of larvikite used here is called **'Blue Pearl'** in the stone trade. The large crystals of feldspar give the multi-coloured 'butterfly wing' (Schiller) effect due to light reflected at different angles from thin films within the feldspar crystals.

The **Halifax Bank** has to the left of the doorway polished slabs of **granite** similar to that at Unique Nails and is confirmed to be **Grigio Perla**. This rock, used on other Halifax branches, has crystals of grey quartz and specks of dark mica (biotite) while the colour of the stone comes from the pale pink feldspar crystals. Not only is granite a beautiful rock but it takes a high polish and is rarely affected by weathering during a building's lifetime.

The brick former **NatWest Bank** (Fig. 21) has **Portland Stone** window surrounds, foundations and over the doorway. It is possible to see weathered-out fossil shell fragments in this cream-white limestone formed in warm shallow seas in Upper Jurassic times about 150 million years ago. The carved door lintels feature the best quality stone in which fossils are almost absent.

*Fig. 21. Carved **Portland Stone**, former NatWest Bank*

St Luke's Hospice Charity Shop. The green cladding on both sides of the façade is brecciated **serpentinite** (Fig. 22).

*Fig. 22. **Serpentinite**, St Luke's Hospice Charity Shop*

CHARNOCKITE is a coarse granular rock containing mainly quartz, feldspar and hypersthene plus other minerals. (Hypersthene is a silicate of iron and magnesium and is a variety of pyroxene, a constituent of the Earth's mantle; it gives the rock its dark colour). Most forms were produced by the metamorphism of granitic rocks at very high temperature and pressure, deep in the crust. It occurs in India, Sri Lanka, Madagascar, Africa, Brazil and also parts of NW Europe and North America.

Fig. 23. ***Granite*** *(left),* ***charnockite*** *(right) and* ***black gabbro*** *at footway level, Brook's bookshop*

Fig. 24. Oddfellows Arms

Fig. 25. The Police Station

It has a silvery sheen with fractured dark green blocks in a pale green matrix. The calcite veins of this fairly soft rock have been stained orange by weathering of the surrounding rock. Serpentinite is altered peridotite (formed of the iron and magnesium-rich minerals olivine and pyroxene) which is the main rock of the upper mantle. Here we are looking at rock which was once below the ocean crust. The peridotite was altered to serpentinite by superheated sea water; when it was thrust up by tectonic movements to form land the rock was shattered and then cemented together again by calcite. Many countries on the north side of the Mediterranean have outcrops of this splendid rock which has been quarried as a decorative stone since Roman times.

Brook's bookshop next door (Figs. 23, 26) features a most unusual facing of a dark green metamorphic rock containing pale feldspars and streaks of dark coloured mineral including what appear to be garnet crystals. The identity is uncertain, but may be a **charnockite.** It is named for Job Charnock, founder of the Indian city of Calcutta (now Kolkata); his tombstone is made of it**.** Lower right of the window displaying the opening times is a panel of **'Green Pearl' Larvikite**. Below the windows are panels of pink **granite**, with **black gabbro** all the way along at footway level.

Fig. 26. Probable ***charnockite****, Brook's*

Brickwork on Bridge Street. Older London bricks were yellow, weathering brown to grey, but by the mid-19th century, rail transport was being used to bring the reddish bricks from the Bedfordshire and Buckinghamshire Oxford Clay belt to London, this clay being of Jurassic age. Post World War I 20th century housing in London is mainly built of Oxford Clay bricks, as are many other buildings.

RUTILE

Rutile is a high-pressure, high-temperature mineral that is the most common form of titanium oxide (TiO_2), and is commonly found in metamorphic rocks. It often forms as thin, needle-like crystals, which are commonly found as inclusions in minerals such as quartz and corundum (of which ruby and sapphire are forms).

Fig. 27. Nationwide

The **Oddfellow's Arms** – corner of Waxwell Lane (Fig. 24) has these yellow bricks called **London Stocks** and the roof is in **Welsh slate**. London Stock bricks are also seen in the façades above the section between Barnes & Partners and the Osteria Modigliani Restaurant (which you have just passed), along with probable locally-made red bricks. London Stock bricks would have been made in this area by pressing the local **clay** into wooden moulds and firing them in a clamp for four or five days. A problem with these hand-made bricks is that they are softer and more porous because of the less effective method of pressing the clay into the moulds. However some people prefer these hand-made bricks for their more interesting character.

The imposing **Police Station** (Fig. 25) at the top of Bridge Street has window surrounds and sills of **Portland Stone** which is also used around the entrance.

Cross Bridge Street and walk down the other side.

The **Nationwide** (Fig. 27) has a cladding of reddish-brown **granite** (Fig. 28); this variety is a Precambrian rock from South Dakota in the USA called **Dakota Mahogany** in the trade. It is the oldest rock to be seen on this walk at 2.7 billion years. The granite has been metamorphosed and this produces the big streaky patterns seen in the rock. The quartz crystals are milky-blue from minute **rutile** crystals, far too small to be seen even with a hand lens or a magnifying glass.

Fig. 28. ***Dakota Mahogany Granite*** *from South Dakota, Nationwide*

Hilton & Family Butchers has the typical butcher's shop façade of pretty **'Blue Pearl' Larvikite** (Fig. 29).

Fig. 29. ***'Blue Pearl' Larvikite****, Hilton & Family Butchers*

Pinner Village Store. The pillars on both sides are of **Bath Limestone**. Tiny spheres of calcium carbonate called **ooliths** make up most of this rock. In Bath Stone, the ooliths are yellowish with milky white calcite cement holding them together. These rectangular pillars with carved pediments are present between the shop fronts in this small parade, but a number have been painted over.

Kerbstones. The majority of kerbstones in Pinner are of granite or diorite. On the **Card Factory** side of a service road outside **Pink & Rose** is a kerbstone with conspicuous white feldspar crystals; this is of **Cornish granite** (Fig. 30). On the same side, another, 1-2 metres nearer the main road, is of the distinctive **Shap Granite** (Fig. 31) from the SE corner of the English Lake District. It is well known to geologists for its large pink feldspars within a finer-grained matrix.

Fig. 30. Cornish Granite kerbstone

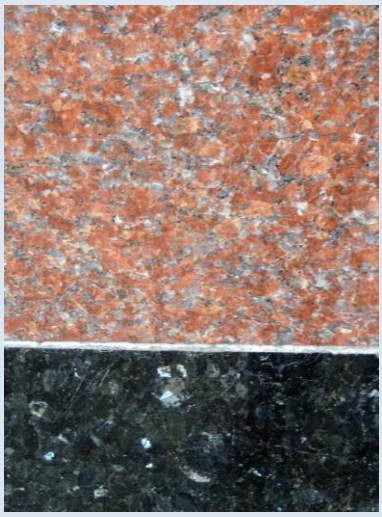

*Fig. 32. Probable **Balmoral Red Granite** from Sweden with **'Emerald Pearl' Larvikite** below, empty premises level with bus stops*

*Fig. 31. **Shap Granite** kerbstone*

The **vacant premises** (as of August 2019) close to bus stop D and next to the private driveway has two flat pillars of a deep red **granite** with milky-blue quartz crystals (Fig. 32). This is probably a Precambrian rock from Sweden, known in the trade as **Balmoral Red Granite**. In the 19th century Aberdeen stone yards began importing granites from Scandinavia but gave them local names supposedly to disguise their true provenance. Thus the trade name of a stone cannot always be taken as an indication of where it has come from. Below this granite is an example of the other commonly used **larvikite**, called '**Emerald Pearl'**. The blue Schiller effect is more subdued in this darker Larvikite.

The **Santander** façade has a light cream composite cladding of **reconstituted stone**. The slabs are cast in a mould using a mixture of Portland cement and crushed stone as fine aggregate to make a less costly imitation of limestone.

Barclays Bank. The architects have used two stones in the imposing façade: glittery grey **granite** in small slabs under the bricks and creamy-white **Portland Stone** displaying weathered-out fossil shells which are visible around the entrance.

W.H. Smith. Along the base of the pillars is a small piece of cladding of **'Emerald Pearl' Larvikite**.

*Turn right into Chapel Lane, go under the bridge and turn left into the car park for **Pinner Memorial Park.***

Sarsen boulder, Pinner Memorial Park (Fig. 33)

You will soon find this boulder on the right along the main path (the 'Celendine Route'). It is not *in situ*. See page 1 for notes on sarsen stones. The holes in the boulder were most likely made by plant roots penetrating the sand before it was cemented.

This is the end of the walk. The path leads on to the Heath Robinson Museum and café.

Pinner has a greater variety of stones used for cladding the façades of shop premises than any other centre in this area. All the rocks commonly used in the London suburbs are to be found in these two streets in Pinner; many of them are particularly beautiful examples. Not only that, there are one or two building stones that are very unusual: the metamorphosed cladding on Brook's Bookshop and the ferricrete of the historic parish church.

GEOLOGICAL TIMESCALE

ERA	PERIOD	AGE (MILLION YEARS)
Cenozoic	Quaternary	2.6 – present
	Neogene	23 – 2.6
	Paleogene	66 – 23
Mesozoic	Cretaceous	145 – 66
	Jurassic	201 – 145
	Triassic	252 – 201
	Permian	299 – 252
Palaeozoic	Carboniferous	359 – 299
	Devonian	419 – 359
	Silurian	444 – 419
	Ordovician	485 – 444
	Cambrian	541 – 485
Precambrian		~4600 (age of Earth) – 541

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