

EXCURSION 6: KILLINEY

Patrick Wyse Jackson

How to get there: DART to Killiney Station; Bus No. 7, 59; Car parking close to railway station.

Geological horizon: Ordovician - Silurian & Quaternary.

What to see: contact between the Leinster granite and surrounding Ordovician sediments; metamorphism; veins in granite; glacial deposits in cliffs; varied selection of pebbles derived from cliffs, including Ailsa Craig microgranite from Scotland.

Duration: 2 hours

Warning and Notes: Beware of going close to the cliffs south of Killiney Railway Station - these are quite unstable and portions of them are liable to collapse. It is advisable to go to Killiney at low tide.

Leave the car park or railway station and make your way down to the beach via an arch under the railway line. Reaching the beach turn left and walk approximately 800 m north (10 minutes) to the granitic exposures which crop out as knobbly masses at the shoreline, passing an extensive collection of beach huts on the way. There are several features in different outcrops worth examining.

Stop 1. At the first exposure of granite that you meet along the beach (at the end of the retaining wall) the junction between the Leinster granite which makes up the Dublin and Wicklow mountains, and the surrounding Ordovician rocks, can be seen. These Ordovician rocks were originally mudstones and sandstones which were deposited in moderately deep sea 450 million years ago. About 400 million years ago during the Silurian period, the area that now makes up Ireland lay on opposite sides of an ocean called Iapetus which was slowly closing due to the drifting of the continents. This movement resulted in volcanic action, folding, faulting, and melting of rocks at depth. Some of this molten rock was injected into the surface rocks as granite. The largest area of granite in the British Isles is the Leinster granite which stretches from Killiney to County Waterford, and forms mountains 2,000 feet high. It cooled at depth in the earth's crust and is only exposed today because the overlying rocks have been eroded.

Granite is a very distinctive rock that may occur in several different colours. The Leinster granite is grey while many of the Donegal granites are red in colour. It is made up of interlocking crystals of three minerals: quartz,

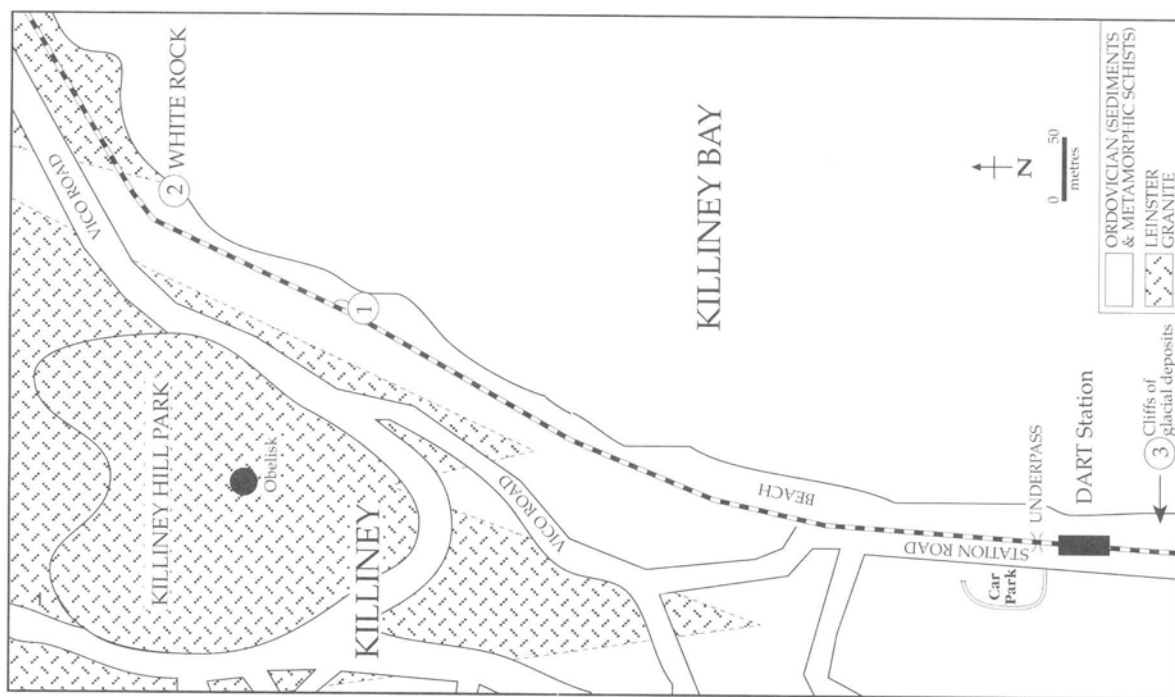


Figure 9. The geology of the Killiney area.

feldspar and mica. The quartz forms glassy grey crystals, the feldspars are white in colour, while the mica forms small flat platy silvery crystals. Although these are the major constituents of granite a number of rarer minerals are known to occur in the granite at Killiney, including beryl, barytes, apatite, rutile, and tourmaline (difficult to see).

You will notice these veins crosscutting the granite. Also notice that the granite appears to be swirly in places, and that some parts of it contain more micas or quartz than other parts.

The Ordovician rocks into which the Leinster granite was injected can be seen above the granite, just below the grassy slope. They are dark in colour, and have been metamorphosed or altered by the heat of the granite, and are now called schists. They contain a great deal of mica and other interesting minerals including andalusite (which is seen as long needle-like crystals 2 cm long and 0.5 cm wide). This mineral generally occurs only in metamorphic rocks that have been heated.

On your left-hand side is a high granite wall which protects the railway from erosion. See if you can spot the Bench Mark (shaped like a bird's foot) cut into one slab. It is the wrong way around and shows that this wall was built of recycled blocks of stone!

Stop 2. If the tide is not in you might be able to skirt around the granite outcrop that you have just examined and make your way about 100 m along the beach to the next granitic exposure at White Rock.

White Rock is so called because mariners out at sea noticed a change in the colour of the rock from dark to light at this point. The opposite is true at Blackrock on the northern edge of the Leinster granite where its pale colour contrasts with the darker Carboniferous limestone.

Here the rock differs from the granite that you have just examined - it is a finer-grained rock called aplite (which contains the same minerals as granite). In addition you may come across some very coarse pegmatite veins. These contain very large quartz, feldspar and mica crystals (up to several centimetres in diameter). Some metallic minerals such as galena (an ore of lead) may be found also.

Return back along the beach towards the DART station.

Stop 3. Walk back along the beach for 1200 m to the high cliffs (do not stand at the base of the cliffs or attempt to remove stones from them as they are liable to collapse). They are composed of sand and gravels and boulder clay that were laid down by the ice of the Irish Sea Glacier (during the last Ice Age between 2 million and 11,000 years ago) in perhaps two advances. At this time much of Ireland was covered in sheets of ice, up to 1 km in thickness. The ice scoured the surface and picked up rocks that it passed over. At

Killiney there are several till units as well as a sandy unit; the relationships between these units are quite complex. The highest tills (exposed at the top of the cliffs) are composed of a mixture of cobbles and boulders which are set into a fine-grained matrix (or rock flour). You will see that the arrangement of the cobbles is quite random - this is characteristic of glacial tills. Underlying these 'upper' tills are some fluvio-glacial sands, seen best at right end of the cliffs, 200 m south of the life-guard hut. They dip 50° to the south, and level off as one walks southwards. These well-sorted deposits which are composed mainly of sand, but which also contain some gravelly levels, were deposited by water that flowed away from the front of the glacier as it began to melt. The junction between these fluvio-glacial deposits and the overlying till is quite clear. The tills were deposited when ice moved over the lower sands. About 500 m further south a second till underlies the sandy unit (the junction between these two units is quite complicated and not easily recognisable).



Figure 10. Glaciations and inter-glacial periods in Ireland during the last 175,000 years.

The sea has been eroding these cliffs and has caused problems to railway engineers in the past, when the DART line was threatened with collapse. From the cliffs are derived an assortment of different rock types which are now found on the beach as pebbles. You should find grey Carboniferous limestone which may contain fossils of different animals (these show up as white patches). This limestone probably came from the Irish midlands. Granite is also present in considerable amounts, as is andesite (a green rock with whitish flecks from Portrane), and buff-coloured quartzite (from

Bray). This particular rock consists of sand grains that have been cemented together, and partially recrystallised. You may find flint, which is a pale white to brown-coloured glassy rock. It occurs as nodules in Chalk, which is found in sedimentary basins in the Irish sea. How might these flints have got on to Killiney beach? They were dredged by the Irish Sea Glacier which moved down the Irish Sea from Scotland about 30,000 years ago. This glacier also carried little erratics of an unusual and beautiful microgranite from Ailsa Craig in the Clyde estuary near Glasgow, Scotland. This rock contains small crystals of quartz, feldspar, and mica (much smaller than those in the Leinster granite, as well as a distinctive blue mineral called riebeckite).

ROCK TYPE	COUNT	MIN. SIZE	MAX. SIZE
CARBONIFEROUS LIMESTONE			
LEINSTER GRANITE			
WHITE QUARTZ			
AILSA CRAIG GRANITE			
RED SILTSTONE			
GREEN SILTSTONE			
OLD RED SANDSTONE			

ACTIVITY: Make out a chart like that illustrated above. Then collect 100 pebbles at random and list them and their maximum and minimum sizes on your chart. Which rock type is the most common?

EXCURSION 7: BALLYCORUS & CARRICKGOLLOGAN

Patrick Wyse Jackson

How to get there: Bus 44 from Hawkins Street to Barnaslingan Lane (2 miles before the Scalp on the Enniskerry Road), walk 1.5 miles to Ballycorus chimney. Car parking is available at a car park at the top of Barnaslingan Lane, or at another on Murphy's Lane.

Geological horizon: Cambrian & Silurian-Devonian.

What to see: Old Mine Workings, metallic minerals (lead, silver, copper, zinc) in veins in Leinster Granite; rounded hill of Cambrian quartzite; coniferous plantation; great views of surrounding areas.

Duration: 2 - 2.5 hours

Notes: Wear walking boots or tough shoes, and bring binoculars.

The Leadmines chimney at Ballycorus is one of the most familiar of Dublin landmarks. It testifies to a time, not so long ago, when this area and others like it were mining centres, where men and machinery dug up rock and extracted valuable metals from it. Today the chimney stands alone; the silence is occasionally broken by the barking of dogs.

Leave your car at the car park at the top of Barnaslingan Lane, and walk up Murphy's Lane 200 m, turn off the tarred road on to a track which leads directly to the chimney.

Stop 1. As you walk along this rough path look down and examine some of the rock underfoot. It is a shiny dark rock called mica schist. It contains a lot of mica (a flat platy mineral), which is aligned parallel in the rock (foliated), and this allows it to be easily split into layers. Further along the track you will see familiar granite, pale in colour, with crystals of quartz, feldspar, and mica. You are standing close to the contact between the granite and the country rock into which it was injected some 400 million years ago at the end of the Silurian and beginning of the Devonian periods. This took place far beneath the ground, and at high temperatures which caused the surrounding rocks to become metamorphosed. The zone of metamorphic rock (largely mica schist) which surrounds the granite extends some 2 km from it. This zone has been termed a 'metamorphic aureole'.

The emplacement of the granite brought hot fluids which carried various metallic minerals such as zinc, copper, lead, and silver. These laden