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

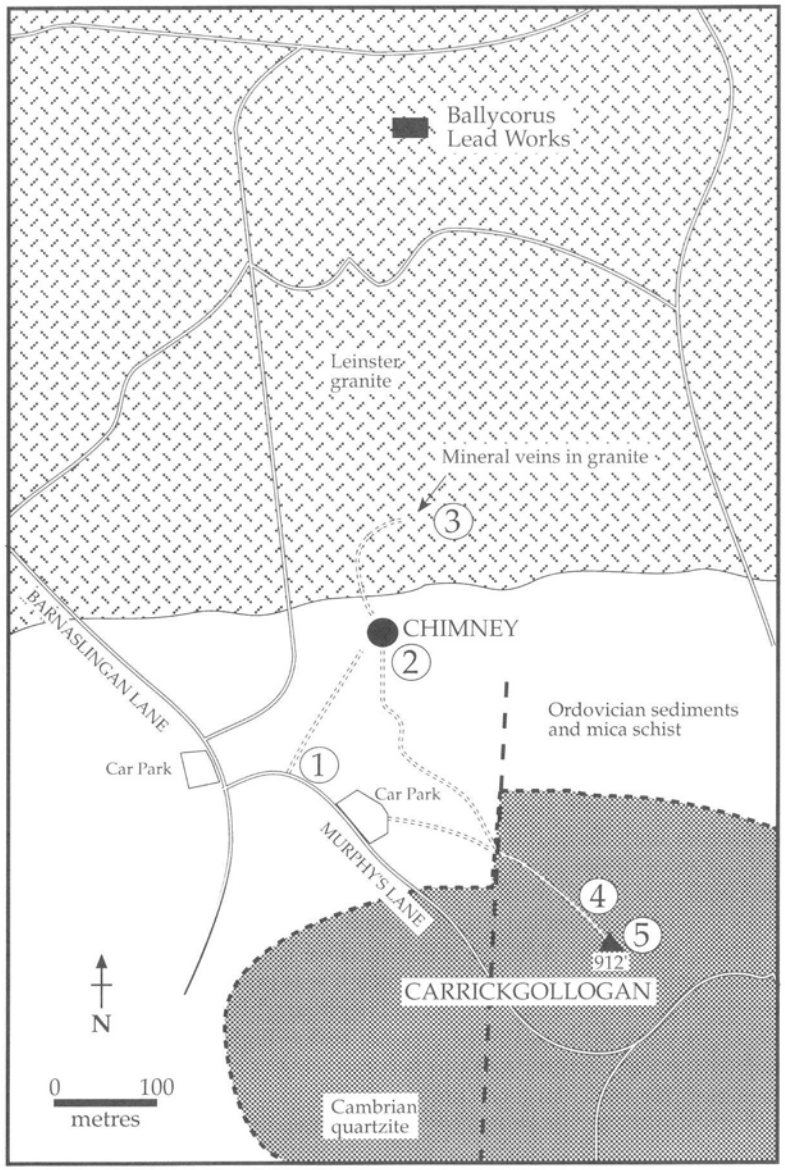

Figure 11. The geology of the Ballycorus and Carrickgollogan area.

fluids migrated into cracks in the granite and from them crystallised the mineral lodes. Since the early 1800s, mining has been carried out at Ballycorus, where several minerals were recovered from veins in the granite (you will be able to examine this material at Stop 3) Apart from the dug out vein and the resulting spoil heaps, you will also be able to see the remains of the smelting works and other mine buildings which stood at the bottom of the hill (to the north).

Stop 2. The chimney was built in 1862 and is constructed of curved blocks of locally-quarried granite. It was built to disperse the fumes derived from the smelting of the ores. A flue snaked its way up the hill (from the smelting works) and entered the chimney at what now appears to be a doorway. You can find traces of the flue on your left (as you look north). It too is built of granite and is semi-circular in shape. It is possible but not altogether sensible to enter the flue. Apparently once a month young children were sent into the flue to sweep it out, as it was discovered that the soot contained a high percentage of silver. The lower steps of the outside stairs have been removed. Do not attempt to climb the chimney as it is dangerous towards the top.

Stop 3. Walk about 50 m northwards down the slope, following a rough footpath (take care as this may be slippy in wet weather). You will come across a gash in the hillside - this marks the site of the main vein from which the metallic minerals were removed. All around are piles of discarded material, mainly quartz which may contain some traces of the ores. Particularly common is galena, the main ore of lead. This is dull grey in colour but when you examine a fresh surface you will see that it is a beautiful shiny grey. This minerals forms small cubic crystals, some of which may be found. It is also possible to find traces of sphalerite, a zinc ore which is a dark brassy brown colour. Occasionally small amounts of green malachite (green-coloured oxidised copper).

Once you have collected some material (please leave some for those you might visit next week!), walk back up the hill to the chimney. You will have noticed that around the chimney and by the mineral vein there is little or no vegetation. This is because the soil contains high values of lead which is toxic.

The second half of this trip examines older rocks which are found about 1 km to the south at Carrickgollogan (affectionately known as Katty Gollagher). As you walk along the path, that meanders through coniferous plantation and open areas (where the trees have been felled recently), underfoot you can make out the pale granite.

Stop 4. Stop at the base of the hill and look at the rocks on the ground. Are they granite? No, they are quite different. They are quartzites, pale grey to buff in colour, and composed of interlocking grains of quartz, which are some 150 million years older than the Leinster granite. How did they get on top of the younger granite? One possibility would be that they were folded. If that was the case then we would expect to find obvious signs of distortion and cleavage in the quartzites - there aren't any. The explanation that geologists have come up with is that the mass of quartzite that makes up the hill of Katty Gollagher was shunted from the south along a flat-lying thrust fault. These rocks are identical to the quartzites of Bray Head and the Sugar Loaf mountains, which are Cambrian in age. The quartzite started off as sand deposits which were consolidated. They were subsequently uplifted and later faulted into their present position high above sea level.

Stop 5. Continue along the path, which rounds the hill rather like a helter-skelter, and climb to the summit (912 feet). From here on a good clear day you can see the coastline of Wales to the east and the Mourne Mountains to the north. To the south Bray Head and the Sugar Loaf Mountains seem to appear as barriers to would be southern travellers. Many people have been told that these cone-shaped peaks are the remains of volcanoes - this is NOT the case. The resistant nature of the quartzite that make them up results in their unusual shape (which may also be seen in Mount Errigal, Co. Donegal, another quartzite peak). Stretching away towards the southeast are the rounded peaks of the granitic Wicklow Mountains which can be traced from Killiney Hill (note the obelisk) to the northeast, to the southwest where they continue into Co. Waterford. Between the Killiney and Bray rocks of Ordovician age underlie the lowlying areas, and to the north and northeast, beyond the granite, is Dublin and the Central Plain under which is Carboniferous limestone.

After taking in the splendid views return to you car or to the bus stop on the Enniskerry road, taking care on the path going down the hill.

SUGGESTED FURTHER READING

HAMILTON, W.R., WOOLLEY, A.R. and BISHOP, A.C. 1980. *The Country Life Guide to Minerals, Rocks and Fossils.* Country Life Books/Hamlyn Publishing, London.

HOLLAND, C.H. (editor). 1981. *A geology of Ireland.* Scottish Academic Press, Edinburgh. [The most up to date account of Irish geology].

HOLLAND, C.H. 1987. *Irish Scenery.* Irish Heritage Series, Easons, Dublin.

IRISH GEOLOGICAL ASSOCIATION. Field Guides on the geology of various locations in Ireland (for details see address below).

MITCHELL, G.F. 1986. *The Shell Guide to Reading the Irish Landscape.* Michael Joseph, London and Country House, Dublin.

RYAN, N.M. 1992. *Sparkling Granite.* Stone Publishing, Dublin. [Describes the history of quarrying in the Three Rock Mountain area of Co. Dublin].

WHITTEN, D.G. with BROOKS, J.R.V. 1983. *A Dictionary of Geology.* Penguin, London.

WHITTOW, J.B. 1974. *Geology and Scenery in Ireland.* Penguin, London.

Further information may got from serial publications including *The Irish Journal of Earth Sciences, The Geological Survey of Ireland Bulletin, The Proceedings of the Royal Irish Academy*, and *The Scientific Proceedings of the Royal Dublin Society.* Additional valuable information can be derived from the maps of the Geological Survey of Ireland.

GEOLOGICAL EXHIBITIONS IN DUBLIN

The Story of the Earth, Geological Museum, Department of Geology, Trinity College, Dublin 2 [Open Monday-Friday 10.00-4.30; group bookings please contact Patrick Wyse Jackson (telephone: 7021477 or 7021074)].

Introduction to Geology, National Museum of Ireland, Merrion Row, Dublin 2 [Open Tuesday-Saturday 10.00-5.00].

Down to Earth, Geological Survey of Ireland, Haddington Road, Dublin 4 [Open Tuesday-Friday 10.00-12.30].