A GEOLOGICAL VISIT TO THE THE
SALTEE ISLANDS

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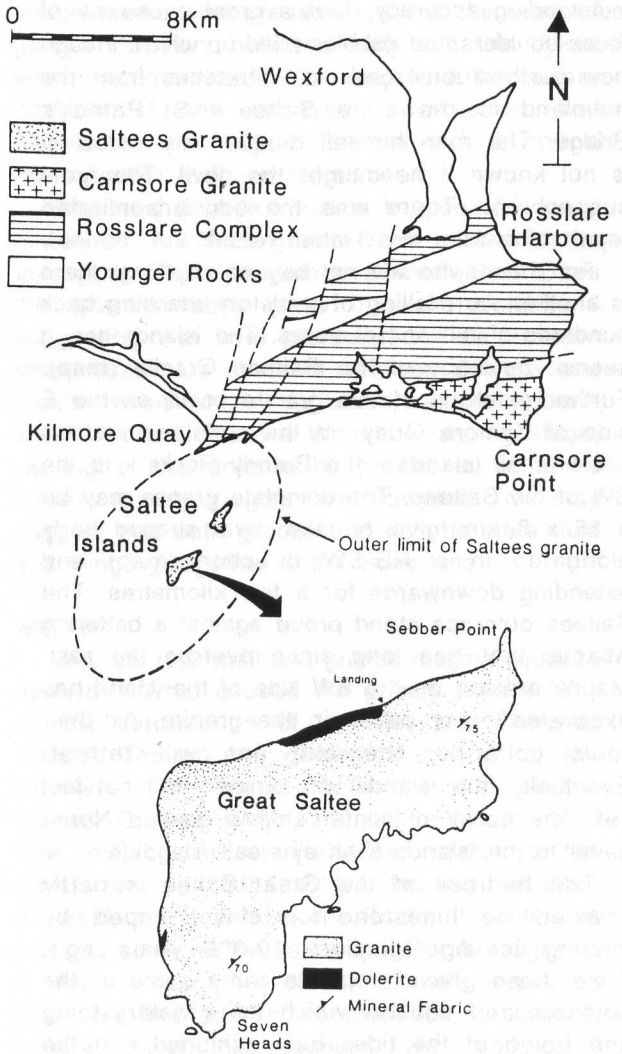

INTRODUCTION

St. Patrick caused it all by hounding the devil through the Galtee Mountains of Tipperary. Scared witless, the devil made a way for himself by chewing a great chunk from an obstructing hill - the Devil's Bit. Chased to the coast, the devil's mouth opened as he swam out to sea. Two large rock fragments fell out - the Saltees. St Patrick, apparently a non- swimmer, was reduced to pelting stones at the fleeing devil. This he did to such effect, if not outstanding accuracy, that a great causeway of loose boulders and cobbles piled up which, though now partly submerged, still stretches from the mainland to the Little Saltee - St Patrick's Bridge. The man himself crossed dry-footed. It is not known if he caught the devil. The facts suggest not. There was the odd unconfirmed report of a faint cry 'I shall return'.

For those who will not believe anything, there is another yarn telling of a history reaching back hundreds of millions of years. The islands are, it seems, outcrops of the Saltees Granite (map). Further outcrops of this granite occur on the E side of Kilmore Quay on the mainland and on some small islands - the Brandy Rocks - to the SW of the Saltees. The complete granite may be a 15 x 8 km (give or take) oval shaped body elongated in a NE-SW direction (map) and extending downwards for a few kilometres. The Saltees outcrops stand proud against a battering Atlantic that has long since overrun the rest. Marine erosion on the SW side of the island has excavated many caves in the granite. As their roofs collapse, the cliff line will retreat. Eventually, the islands will vanish - but not just yet. The spray of winter storms gave a Norse name to the islands (Salt ey - salt island).

The bedrock of the Great Saltee is partly covered by limestone-rich clay dumped by melting Ice-Age glaciers 10,000 years ago. From these glacial deposits came some of the boulders and cobbles which the constant toing and froing of the tides has fashioned into the causeways linking the mainland to the Lesser Saltee and the islands to one another; Sebber Point is the emerging end of one.

Boulders of Carnsore Granite lying about provide more evidence for a past ice age. These are ice-transported erratics from the mainland (or evidence of a strong arm?). Some lie on the foreshore near the landing point. Raised beaches on the islands reflect a time when sea level was some metres higher than it is now. Falls in sea level may be due to continental buoyancy after an ice load has gone; all of northern Europe shows evidence of such. Sea-level rises can result from the the melting of major ice sheets. What does a warmer future hold?

The outcrops lying within 100 metres E and W of the landing point on the Great Saltee provide a good introduction to the rocks of both islands. **Watch out for slippery rock surfaces.**

THE SALTEES GRANITE

The Saltees Granite was intruded into rocks belonging to what is known as the Rosslare Complex (map) about 435 million years ago. It rose to its present position as a magma - hot and mobile rock which had originated by melting of other rock in hellishly hot surroundings some tens of kilometres below. It solidified and crystallized on cooling. The nearby Carnsore Granite (map) is of similar origin and age. The Leinster Granite of the Wicklow Hills to the north is 30 million years younger. Thus, during a rather short time interval, extensive melting occurred at depth and much granite was formed.

The rocks of the Rosslare Complex, seen only on the mainland, are older than the granite by, perhaps, 200 million years. At the time of granite intrusion, they were already rocks with a long history of deformation and alteration. Some had been partially melted - migmatized. Others had been crushed so intensely that their original minerals were reduced to very small fragments and rewelded together to give a rock called mylonite (milled rock). It is now difficult to tell what many of these metamorphic rocks originally were. Some, however, were ordinary sedimentary rocks that had accumulated on a sea floor. Others were dark igneous rocks akin to basalt that had crystallized from a magma.

These old rocks outcrop on the sea-shore immediately to the E and W of Kilmore Quay. They may be a part of some ancient continent. Old rocks don't look any different from many another; rocks don't easily show their age.

The Saltees Granite is a fine-grained, typically pink, equigranular mixture of quartz, two different feldspars (plagioclase and microcline) and some mica. The rock is, locally, deformed; the minerals are somewhat flattened giving a planar texture or fabric that dips (inclines) at about 70^{o} to the NW and which is well seen to the E of the landing point. The easily deformed quartz tends to be plastered against and around the stronger feldspar. At least some microcline appears to have overgrown the fabric; even as it crystallized, it seems, the granite was being squeezed by an external force. As is typical of granite, fractures (joints) are many and define a reasonably regular pattern.

Here and there, e.g., immediately E of the landing point - small patches completely unlike the enclosing granite in appearance, colour and mineralogy can be found. These are, perhaps, xenoliths ('strange stones') - small fragments ripped from a nearby roof during intrusion. Alternatively, they may be residual parts of the rock which, at depth, melted to give rise to the Saltees Granite magma in the first place.

Though all granites contain the same minerals, they can look very different, e.g., grey or red (iron), fine or coarse. The Saltees Granite is relatively fine grained. The Carnsore Granite is, in contrast, course grained and contains large rectangular crystals of feldspar.

DOLERITES

Sheets (dykes) of dolerite (basalt) - occur in both the granite and in the rocks of the Rosslare

Complex. These were injected into fractures as magma. Early dolerite dykes are found in the Rosslare Complex only. Later dykes appear to be linked in time to the granite intrusion. Some of these later dykes are exposed on both islands. On the Great Saltee, a large mass of dolerite - perhaps a large dyke - outcrops on the northern shore immediately W of the landing point (map).

Even the later dolerites are deformed - in places, quite strongly so. As a result of elevated temperatures and pressures about the time of granite intrusion, both the early and late dykes were metamorphosed (altered) to a secondary mixture of the minerals hornblende and plagioclase; the original igneous rock is now a metamorphic rock - a metadolerite.

When did dolerite intrusion happen? Evidence is needed. Are there granite veins in the dolerite to suggest that the granite arrived later? Does the granite fabric pass into the dolerite - suggesting that both pre-dated the deformation responsible? Do contacts between dolerite and granite reveal which cuts which, i.e. which came later? A short distance W of the landing stage, veining of the dolerite by granite is, in some instances, very irregular and complex. This may suggest that both granite and dolerite were fluid and mingling together at the same time.

WHY?

Why did rock melt and granite magma squeeze upwards? What caused the granite fabric? Why all the deformation of the Rosslare Complex rocks.? Though the geological history of the Rosslare Complex prior to intrusion of the Saltees Granite is, in part, lost in the mists of time, melting, intrusion and deformation of the granite and of other Irish granites, e.g. Leinster, Donegal, resulted from a collision of continents 400 and some million years ago. Rocks caught up in this collision were deformed, metamorphosed and even melted. This explanation, of course, begs a host of other questions. Why a collision of continents and where are they now? What about the lost ocean in between? What actually melted to give, on the one hand, granite and, on the other, dolerite? St Patrick might know.

SEA BIRDS

Their isolation and the caved cliffs make the Saltees an ideal place for hermits.The ledges of jointed granite provide a superb nesting place for a great variety of sea birds. **Anybody without wings should take great care.**

Can you recognize the **Guillemot** - brown above, pure white beneath with dagger-shaped pointed bill, the **Great Blackbacked Gull** - white with black wings and massive ferocious bill, the gentle **Lesser Black-backed Gull** - slate grey wings and yellow legs, the **Herring Gull** - pale grey wings and common everywhere even in cities, the diving white **Gannet** - long billed and with a wing span of up to 2 metres, the aptly named **Razorbill** with both bill and wings white-lined, the **Puffin** - a painted clown, the **Fulmar** with its complex (committee-assembled?) bill, the **Cormorant** - black with yellow hooked bill on a white face, the **Shag** - similar but smaller and with an unwhitened face, the small, mild, squawking **Kittywake** with black-tipped wings, the **Manx Shearwater** - awkward on land and nesting in burrows and shy? Many other birds reside or breed on the Saltees and many more visit. **All should be left untroubled by you.**

SOME READING

The shipwrecks, the songs, the smugglers and the rest - a book 'Saltees' by R. Roche and O. Merne (O'Brien Press, Dublin 1977).

Some geology - Max, M.D. & Long, C.B. 1985, Geol. J. 20, 341-66. Max, M.D., Ploquin, A. & Sonet, J. 1979, Geol. Soc. Lond. Spec. Publication 8, 723-25. O'Connor, P.J., Kennan, P.S. & Aftalion, M. 1988, Geol. Mag. 125, 25-29. Winchester, J.A. & Max, M.D. 1982, J. geol. Soc. Lond. 139, 309-19. Murphy, F.C. 1990, Geol. Soc. Lond. Spec Publication 51, 329-39.