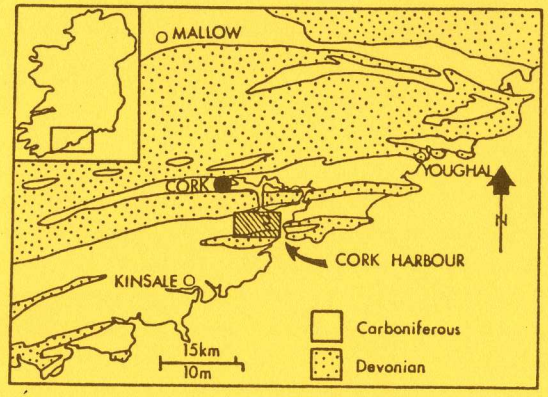
IRISH GEOLOGICAL ASSOCIATION

FIELD GUIDE SERIES
No. 2

THE GEOLOGY OF THE WEST SIDE OF CORK HARBOUR, CO. CORK

By M.A. Cooper & I.A.J. MacCarthy

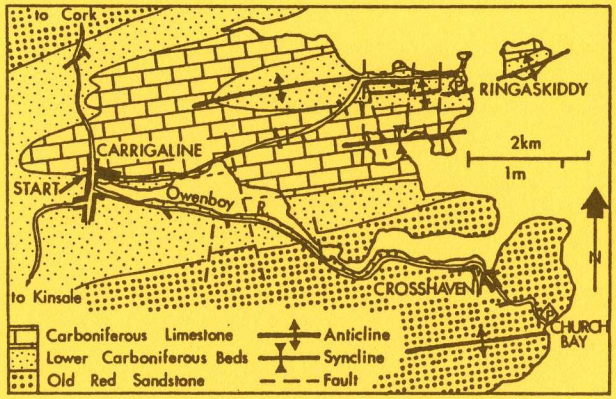


START: Carrigaline R.C. Church Grid Ref. W731627 on Ordnance Survey Half Inch to One Mile (1:126720) Map No. 25.

1984

START: CARRIGALINE R.C. CHURCH AT W731627 (on the left hand side of the L66 from Cork).

TIME - Allow 3 1/2 hours; a vehicle is necessary for this excursion. The section at Ringaskiddy must be visited at low tide and the order of localities may be reversed if required. The section explaining folds and cleavage should be studied before starting.

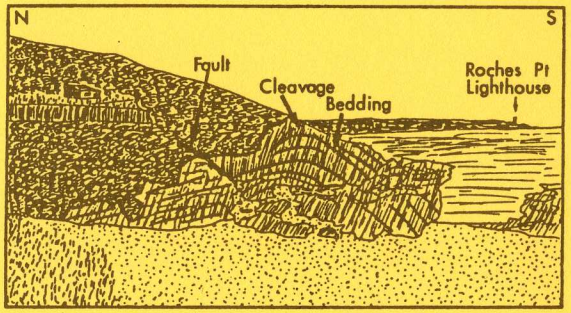


EXCURSION ROUTE MAP

CHURCH BAY - Continue into Carrigaline turning left immediately after crossing the Owenboy River onto the L66 to Crosshaven. The river follows a large synclinal fold and the valley is underlain by Carboniferous Limestone; the steeply wooded slopes to the south are the northern limb of an anticline exposing Devonian Old Red Sandstone. This relationship between topography and geology is common in Co. Cork. Approximately half-way between Carrigaline and Crosshaven the road passes a deep tidal pool in the Owenboy River named Drake's Pool after Sir Francis who once sought refuge there. In Crosshaven take the small road signposted to Church Bay from the village square. Take the second turn left about 1 mile/1.6 km. up this road and park by the public house (W807603). From the beach there is a fine view of the Church Bay anticline and the lighthouse on Roches Point. The rocks here belong to the Old Red Sandstone and were deposited 360 million years ago. Two sedimentary rock types are present; sandstone and siltstone. The sandstone is composed of compacted sand grains cemented together. Siltstone is similar but the individual grains of sediment are finer than in sandstone. The constituent grains of both rock types were weathered and eroded from pre-existing rocks and were transported and deposited by rivers flowing southward into the Cork area.

Rocks of the Old Red Sandstone, as the name implies, have a characteristic red colour because they contain iron oxides.

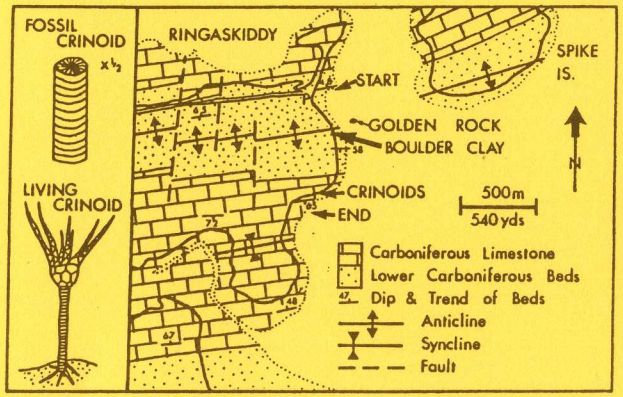
The Church Bay anticline is a large fold and its core is a thick well-cleaved red siltstone. The sub-vertical cleavage is so well developed it is difficult to recognise bedding. The hinge of the fold is offset by a small fault running perpendicular to the fold which is responsible for the near vertical face in which the anticline is exposed. Walk to this point where the effects of preferential erosion by the sea along this weakness are apparent, and the cleavage can be observed in detail. Roches Point lighthouse is built on the hinge of the same anticline which is offset by a fault in Cork Harbour entrance similar to the minor fault seen here.



A VIEW OF CHURCH BAY

RINGASKIDDY - Return to Carrigaline R.C. Church and turn right at the crossroads. In the Owenboy River extensive mudflats can be seen, an example of present-day sediment accumulation. This road leads straight to Ringaskiddy; at the T-junction turn right and continue through the village past the ferry terminal and park at the end of the road (W792643). This coastal section contains fine exposures of both bedrock and superficial glacial deposits. The bedrock consists of sedimentary rocks which dip (slope) at a steep angle to the south, thus on traversing the section from north to south successively younger beds are encountered. The rocks are divided into the Lower Carboniferous beds and the Carboniferous Limestone.

The Lower Carboniferous beds are interbedded sandstones and siltstones which were deposited in a shallow sea, were compacted and later folded. In contrast to the rocks at Church Bay the sediments at Ringaskiddy are dominantly grey. The Carboniferous Limestone is a sediment composed of calcite ($CaCO_3$) carried to the sea in solution and then precipitated or used by animals to build shells. The bedding in this rock is poorly defined. The limestone contains abundant fragments of fossil crinoids. These fossils were once animals that were anchored to the seabed and fed on the plankton in the warm Carboniferous sea.

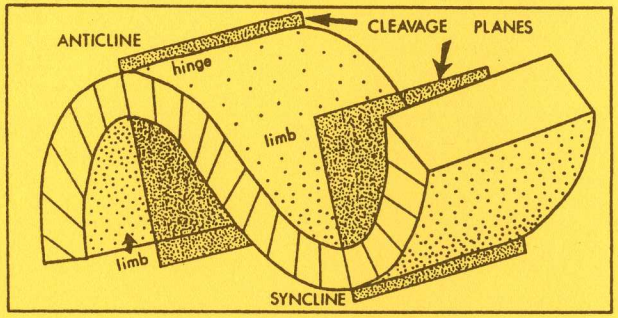


GEOLOGY OF RINGASKIDDY

The bedrock is overlain by boulder clay which forms the low cliff. This consists of round boulders of sandstone and limestone in a brown silty clay matrix. The boulder clay was deposited from a thick ice sheet which covered the area during the last Ice Age. The boulders in it do not match the local bedrock and thus must have been transported by the ice prior to deposition. The flat bedrock surface is a wave-cut platform produced by the sea. The erosion of the soft clay matrix of the boulder clay has left a number of the boulders stranded on the bedrock as erratics. The limestone erratics are particularly large and have a characteristic scalloped weathered surface, Golden Rock is a good example.

FOLDS AND CLEAVAGE

Beds of rock strata are normally deposited as horizontal layers of sediment. As successive beds are deposited the older, lower strata are buried deeper in the earth. Here they are subject to pressure (stresses) which can deform them. Depending primarily on the depth of burial and the temperature the deformation may be accomplished by fracturing producing faults, or by buckling which produces folds, or the two processes in combination. Usually more than one fold will result and a folded bed would resemble a sheet of corrugated iron.



A FOLD PAIR

The diagram illustrates a typical fold pair one of which closes upwards - anticline, the other closing downwards - a syncline. The folded layer can be divided into two zones; the hinges which show marked curvature and limbs which are relatively straight. Note how the two limbs of either fold in the diagram slope (dip) in opposite directions. In anticlines the limbs dip away from the hinge; in synclines they dip towards the hinge.

Folds often have a cleavage associated with them. Cleavage is a set of closely spaced planes of parting in the rock. If this is well-developed the rock becomes fissile (readily split into sheets as in roofing slate). Sediments contain clay minerals and mica both of which have a sheet-like form. During deformation these minerals align so that the 'sheet' is perpendicular to the direction of pressure responsible. This preferred alignment of minerals allows the ready parting of rock along the cleavage. Slate has a particularly high percentage of these minerals.

The folding, faulting and cleavage in Cork Harbour developed at the end of the Carboniferous during the Hercynian orogeny. The hinges of the folds run approximately E-W.

GEOLOGICAL HISTORY OF IRELAND

Ages are quoted in millions of years (my). Permian to Tertiary rocks are restricted to northeast Ireland, but also occur widely offshore.

ERA	PERIODS	AGE	IRISH ROCKS AND THEIR ENVIRONMENTS OF DEPOSITION	TECTONIC & IGNEOUS EVENTS
CENOZOIC	QUATERNARY	2	Superficial soils. Peat. Boulder clay & fluvioglacial gravel.	
	TERTIARY	65	Non-marine (Lough Neagh) clays.	Basalt flows, dykes & granites in north east Ireland.
MESOZOIC	CRETACEOUS	135	Chalk & shallow water marine & non-marine sandstone & mudstone.	
	JURASSIC	190	Marine & non-marine shale & sandstone.	
	TRIASSIC	225	Red, non-marine sandstone, marl & evaporite.	
PALAEOZOIC	PERMIAN	290	Red, non-marine sandstone & marl. Marine dolomite.	Hercynian folding & faulting.
	CARBONIFEROUS	345	Sandstone, shale & coal formed in coastal swamps. Shallow water, marine limestone.	Volcanism
	DEVONIAN	395	Red, non-marine conglomerate, sandstone & siltstone.	Late Caledonian folding faulting & granites.
	SILURIAN	435	Marine sandstone & mudstone, some of deep-water origin.	
	ORDOVICIAN	500	Deep & shallow water marine sandstone, mudstone & limestone.	Volcanism. Early Caledonian metamorphism folding & granites.
	CAMBRIAN	570	Marine, mainly deep-water quartzite & mudstone.	
PRE-CAMBRIAN ERAS			Quartzite, schist, gneiss & marble.	Pre-Caledonian metamorphism, folding & granites.
Origin of the earth ca. 4600 my				

A RESPONSIBILITY

The user of this guide is strongly urged to take every care of the countryside and particularly areas described in this guide. Specimens should be collected with great care and only if they are going to have some continuing interest. Use a camera or a sketch-pad instead of a hammer and please leave all gates fastened, leave no litter and avoid damage to fences and hedges.

AN INVITATION

If you have enjoyed using this guide you may be interested to know that the Irish Geological Association organises many field excursions and lectures for its members every year. Many of these prove of interest to amateur geologists. Information about these events can be had by writing to the Association care of any University Geology Department or to the Geological Survey of Ireland, 14, Hume Street, Dublin 2.