The Geology of Shenick Island

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Introduction

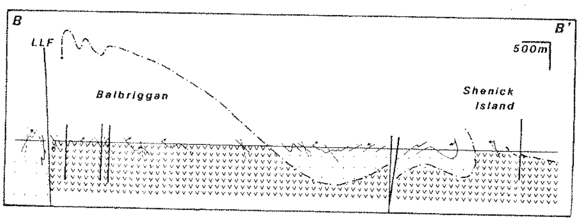
The history of Shenick Island holds a general interest for many of its visitors, not least because it displays a variety of interesting geological features. These features, some of which are unique to the island, are described below after, firstly, considering where the island is placed geologically with respect to the rocks that now surround it in eastern Ireland (Figure 1).

Many types of rock formed at different times in eastern Ireland, and Shenick Island is no exception. It lies at the south eastern tip of a roughly rectangular area of *Lower Palaeozoic* rocks. This area is called the Balbriggan *inlier* (Figure 1), which extends from Duleek (in the northwest), Laytown (in the northeast), to near Ardcath (in the southwest). Younger *Carboniferous* rocks occur outside of this area; these are composed of *limestones* and *shales* which can be seen, for example, on the shore to the south of Skerries between Holmpatrick and Loughshinny.

Lower Palaeozoic rocks in this area are divided into two age categories. Firstly, the oldest category are *Ordovician* rocks which formed mainly by the products of *volcanic* activity. Such rocks are the foundation stone to Shenick Island. The younger category, termed *Silurian,* are rocks which formed mainly by *sedimentary* processes; these are *sandstones* and shales, laid down after the volcanic activity had ceased and are the foundation stone to the other islands in Skerries (Figure 1; excepting Rockabill, which is a *granite*).

The geological features of Shenick Island were first recognised during mapping by members of the Geological Survey (Hull, Cruise and Baily, 1871). A modern study by P.M. Brück and P.S. Kennan (1970) gives a comprehensive and picturesque description of the geology on Shenick Island (to which the interested reader should refer. The present author mapped the island for the Geological Survey of Ireland as part of a doctoral thesis on the geology of the Balbriggan inlier (Murphy, 1984).

The geological history encompasses four major events:



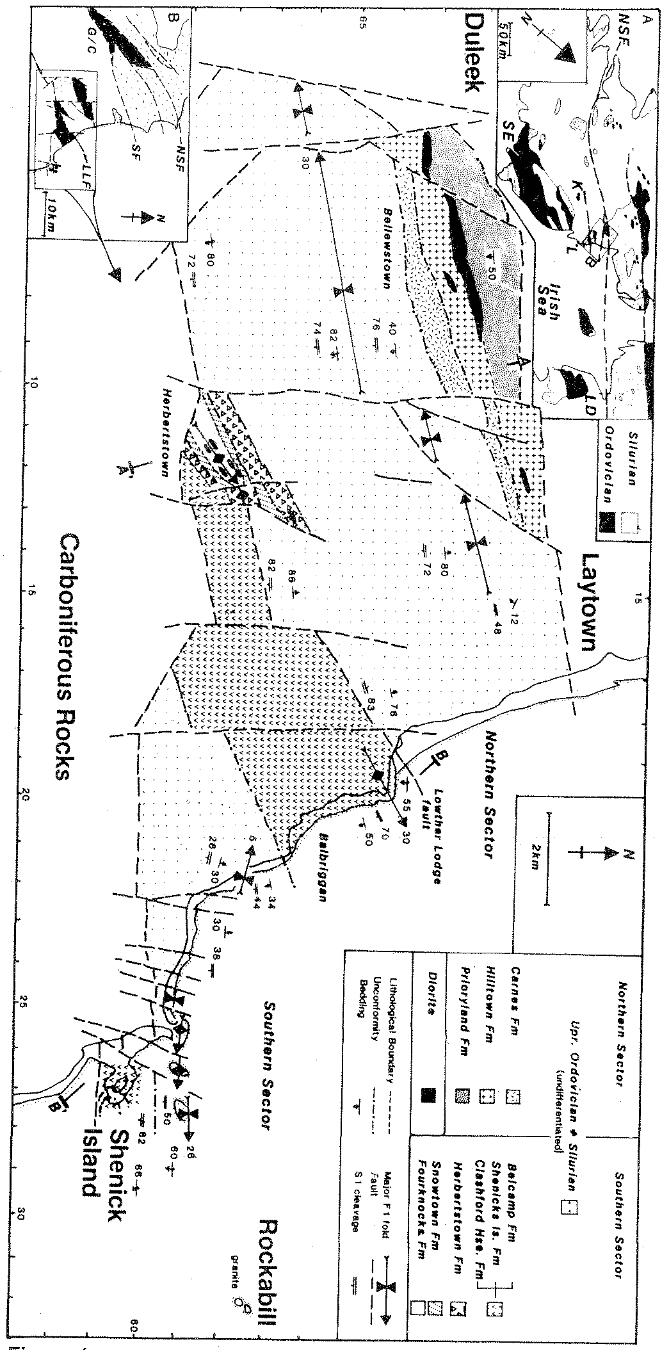


Figure 1:

Geological map of the Balbriggan inlier and its place in eastern Ireland. Shenick Island located at southeastern corner of inlier.

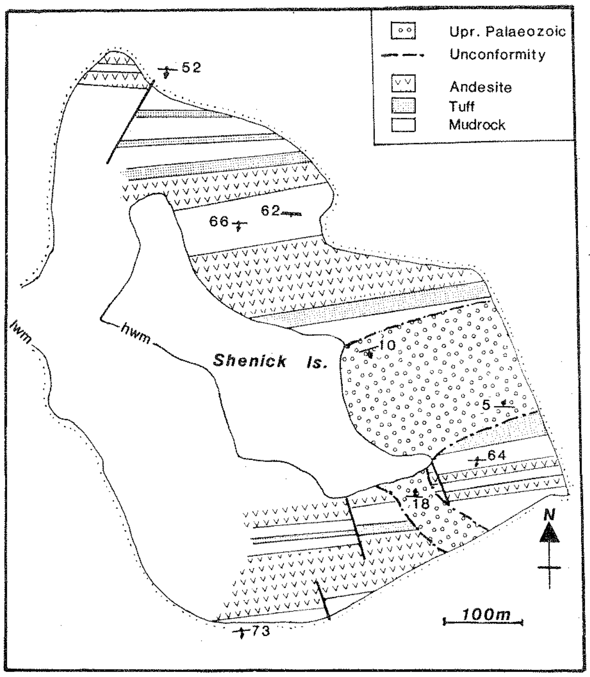


Fig 2

Geological map of Shenick Island showing relationship between Ordovician (Lower Palaeozoic) rocks and Carboniferous (Upper Palaeozoic) rocks.

Ordovician Events

About 440 million years ago the oldest rocks on Shenick Island were formed. During this time period, eastern Ireland was covered by seawater and was part of a substantial ocean, called *Iapetus.* Shenick Island was then an area at the bottom of the sea, located close to numerous volcanic islands. Lambay and Balbriggan were active volcanic centres at this time (Figure 3) whose eruptions caused explosive outpourings of hot *lava flows, ash* and *volcanic bombs.* In the comparatively quieter, deep water location at Shenick Island rocks called *andesite, tuff* and shale were formed as layered deposits which are now inclined east-west trending layers across the island (Figure 2). Although these rocks contain no *fossils* to precisely determine their age, their similarity with dated fossiliferous rocks at Balbriggan strongly suggests an Ordovician age.

Silurian Events

Shenick Island contrasts with the islands to the north of it in that the rocks of the latter islands are distinctly different and are considerably younger. These rocks

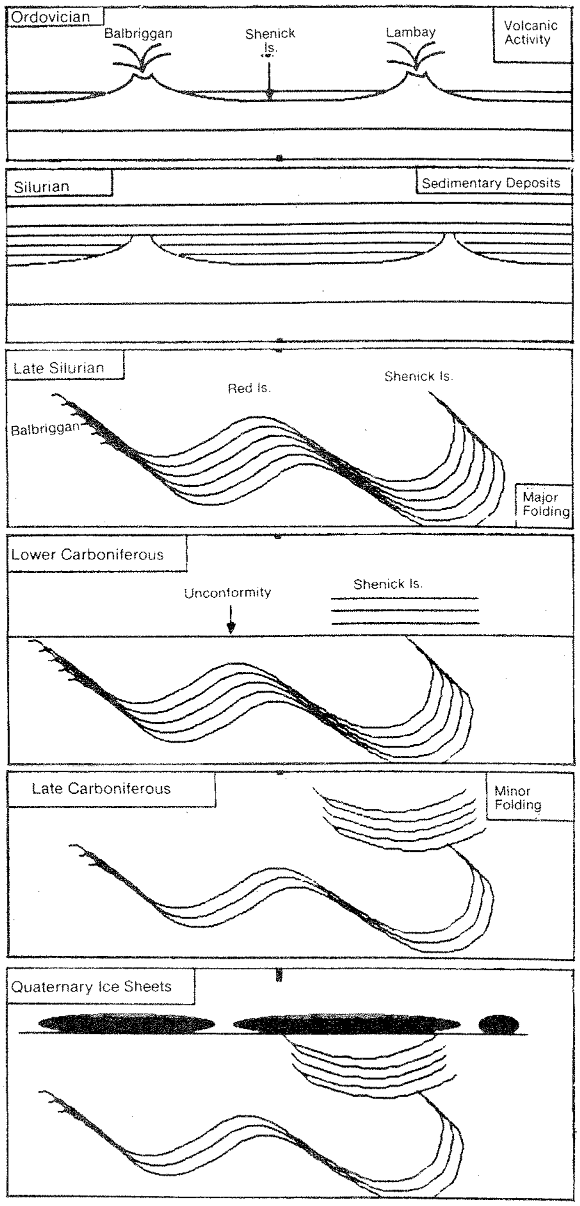


Figure 3:

Cartoon diagram illustrating geological events through time as recorded by the rocks on Shenick Island.

are sandstones and shales laid down as sedimentary layers *(beds)* on top of the Ordovician volcanic rocks. During the Silurian period, about 420 million years ago, eastern Ireland was still submerged

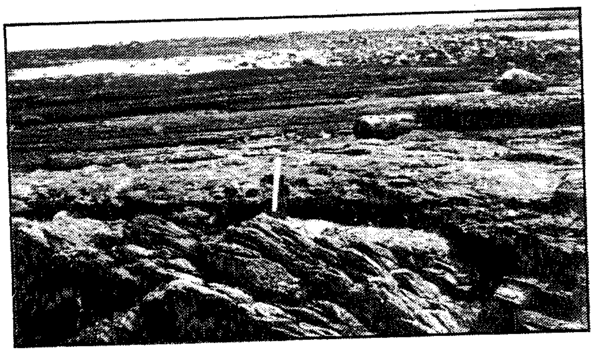


Figure 4:

Photograph of angular unconformity between Ordovician below and Carboniferous above the contact.

beneath the sea whereas the volcanoes were then largely extinct (Figure 3).
The reason why no Silurian rocks were found on Shenick Island is explained by major earth movements which occurred at the end of the Silurian time period (about 400 million years ago). The effect of the earth movements were so profound that the Iapetus seaway disappeared, and the rocks were tilted, *folded* and eventually turned upside down! This is easily visualised on a geological cross-section (Figure 1, B-B') which shows that, whereas the rocks on Red and Colt Islands are the right *way up*, the rocks on St. Patrick's and Shenick Islands are unpside down. The effect of the major folding accounts for the fact that the nearest similar rocks to Shenick Island are at Balbriggan — on the cross-section one can see that the Balbriggan Ordovician rocks continue at depth beneath the Silurian rocks so as to emerge again at the surface on Shenick Island.

Carboniferous Events

After the major earth movements and folding had ended, the Lower Palaeozoic rocks were gradually uplifted from a position deep below the ground until eventually reaching the land surface (Figure 3). At this stage in the history, about 350 million years ago (Lower Carboniferous), the old rocks were being *eroded* and broken up by water action so as to form new rocks, called *breccia* and sandstone. These rock layers occur at the southern part of the island and contain angular fragments of the old rocks from beneath them.
The spectacular contact between the old and the new rocks is called an *angular unconformity* (Figure 4). The uncomformity is recognised by a marked angular discordance between the inclination of the

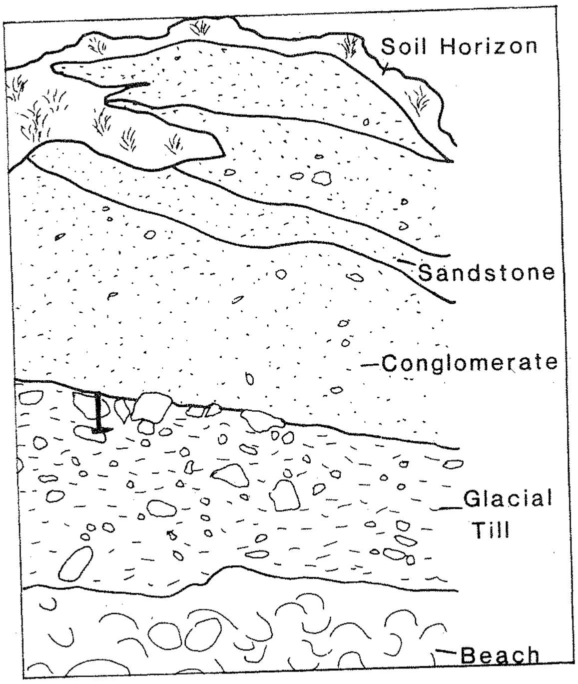


Figure 5:

Sketch of cliff section through glacial deposits at northwest end of the island.

older layers below and the younger layers above the contact; in this case, steep southerly inclined upside down Ordovician age rocks are overlain by Carboniferous age red breccias and sandstones.
The red colouration of the breccias and sandstones may indicate that, between periodic flood events, the climate was relatively hot and dry causing the iron content in the sediment to be oxidised (similar to a rusting process).
Towards the end of the Carboniferous period, the newly formed rocks were tilted and gently folded by earth movements. The result on Shenick Island is that the breccias and sandstones form a broad dish-like structure.

Quaternary and recent events

Since about 2 million years ago the relatively temperate climate in Ireland has fluctuated between cold and warm periods (Holland, 1981). The cold periods were times of ice accumulation so as to form *glaciers* which covered much of Ireland (Figure 3). During warmer periods the ice sheets gradually melted, releasing their frozen water into rivers which transported rock fragments and re-deposited

them elsewhere in the form of sandstones and *conglomerates*. These deposits occur on Shenick Island (Figure 5) as a thin veneer above the foundation stones. The comparatively recent erosive effect of the sea has cut a cliff section through these deposits at the northwest end of the island, beneath the Martello tower. Distinct layers of sandstone, conglomerate and *glacial till* can be seen beneath the soil horizon (Figure 5). The conglomerate and till contain fragments of Carboniferous limestone, Silurian sandstone and Ordovician volcanic rocks.
With the gradual warming and eventual melting of the ice sheets, the sea level began to rise. The effect in Skerries was that elevated areas beside the rising shore line were partially submerged and surrounded by the sea so as to form the present distribution of islands. Strong tidal currents, over the past 1,000 years, have contributed to deepening of the channels between the islands and effecting their further isolation from the mainland.

Conclusion
As well as being a recreational facility, Shenick Island is a natural geological laboratory. It records a long earth history and displays a wide variety of features which give it an important educational potential. The ecology of the island is firmly rooted in its stones and an appreciation of these is only a part of a history which continues to unfold.

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