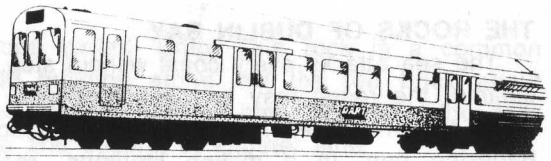

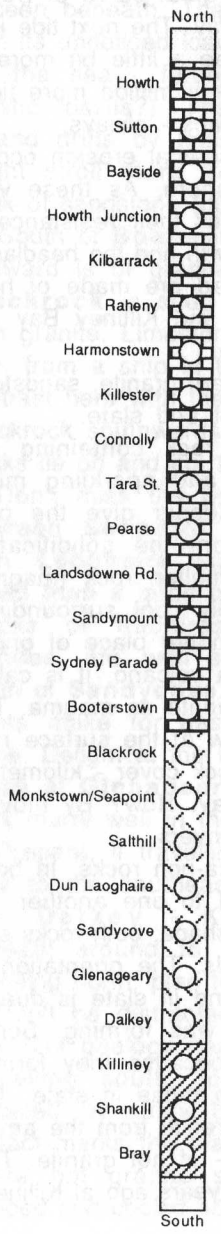

DART ON THE ROCKS

IT SHOULD BRING YOU BACK

The rocks of Dublin Bay span a history of over 500 million years. They shape the Dublin landscape and, in its walls and buildings, help to make Dublin the city it is.

LIMESTONE

GRANITE

SCHIST & SLATE

QUARTZITE

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THE ROCKS OF DUBLIN BAY

The sea attacks every coast without stop. In a lifetime, the result may be seen, perhaps, as a fallen cliff or a broken harbour wall. This coastal battering can, in a million lifetimes, reshape continents. Planet Earth is 4500 million years old. In that time span, the great curve of Dublin Bay was carved but yesterday. The next tide in a few hours from now will see a little bit more of it made - and there are many million more tides to follow. The sea always wins - always.

The rate at which this coastal erosion occurs depends on the rocks onshore. As these vary from place to place, so does their resistance to weathering and removal. Howth and the headlands at Dalkey and at Bray Head are made of hard resistant rock. Dublin Bay and Killiney Bay are cut into a much softer stone.

These Dublin Bay rocks are granite, sandstone (quartzite), limestone, schist and slate.

Granite is a granular rock containing the minerals quartz, feldspar and sparkling mica. Grey quartz and white feldspar give the pale colour. Granite results from the solidification deep underground of hot molten rock (magma) driven upward into relatively cool surroundings from an even deeper and hotter place of origin. When magma pours from a volcano, it is called lava. All igneous rocks originate as magma. The granite at Dalkey is on view at the surface now only because the original rock cover - kilometres thick - has been worn away. How? By moving water mainly - waves and rivers.

Schist and slate are mica-rich rocks. In both, the mica grains lie parallel to one another. As each mica has a sheet-like shape, both rocks split easily - like a deck of cards. The orientation of the mica grains in schist and in slate is due to compression as the mica was forming. Schist micas are relatively large because they formed at higher temperatures than those in slate. The heat and the pressure can result from the arrival from below - the intrusion - of hot granite. This happened about 400 million years ago at Killiney.

Prior to their being made into schists, the rocks close to the granite at Killiney were sedimentary rocks - 500 million-year-old sea-floor muds. Baked by the granite, new micas grew and the metamorphic rocks - the schists seen to-day - were formed. Further away, the muds were made into finer-grained slates.

Limestone is a soft sedimentary rock composed of the mineral calcite. On sea floors, calcite-rich muds and/or the shells of marine animals often collect. Buried under further layers of sediment, the muds and the shells consolidate into limestone. The shells become fossils. Fossils record the history of life.

Limestone is a soft rock. It is also slightly soluble in water and is, as a result, easily weathered. Limestone statues exposed to the rain are often witnesses to this fact. Visit poor old Nelson - late of O'Connell St. - in the Civic Museum sometime. He is in a very sorry state.

Sandstone (often called quartzite on this journey) is also a sedimentary rock - a rock in which small quartz grains are cemented together. These grains were once beach sand. Beach sand is made of quartz, not feldspar or calcite. This is simply because quartz is hard and resistant and they are not. Quartzite is the rock of headlands and mountains. The quartzites of Bray and Howth are the sands of some 550 million years ago.

DART ON THE ROCKS

Perhaps **Howth** is the place to begin with a stroll to the east pier. Climb the steps and look seaward. The dark rocks in the sea, and nearby to the right, are limestones some 350 million years old. Pale-coloured quartzite boulders lie loose in front of you. Quartzite makes the cliffs and the high ground over Balscadden Bay. The cliffs extending east mark the junction of the soft limestone with the much harder quartzite.

On the right, below the tower, is a mound of clay dumped by Ice-Age glaciers not a million years ago. It is not yet consolidated into rock.

Imagine a storm. It is no wonder that the pier was built using heavy boulders of hard quartzite. At the pier end, the lighthouse is a granite building that is also storm- and weatherproof.

Across the water beyond the harbour, is the quartzite of Ireland's Eye - and the bit fallen off. Even quartzite falls to the sea in the end.

On the train departing from or approaching Howth station, look south. Outcrops of pale grey limestone in layers (beds) sloping westward outcrop in a cutting below the road. Between **Sutton** and **Bayside**, the Hill of Howth is seen above the rooftops on the seaward side. Howth is really an island joined to the rest of us only by a ridge of sand. At **Howth Junction**, limestone, like that to be seen around Howth, has been used as a coping stone - a cap on the station walls.

A thin clay veneer covers the bedrock limestone on the journey between **Kilbarrack** and **Raheny**. Beautiful St. Annes Park to the east merits an excursion from here or from **Harmonstown**. Only at **Killester** is the limestone seen - a small outcrop on the inward platform and others in the railway cutting nearby. Some of the beds here are thinner than they are near Howth. Some of the rock is a dark colour; it is limestone mixed with darker mud.

Bedding is typical of sedimentary rocks. The beds (layers) reflect periodic changes in the raw material, e.g., mud and sand deposited on a sea floor. Initially, when first laid down 350 million years ago, the beds here and those at Howth were horizontal. They are clearly not so now. Even the earth's crust can be pushed about.

To the north of **Connolly**, some of the muds exposed at low tide in the sea to the east have been carted there by the weary Tolka River. These muds are, perhaps, slates, of a distant future. Man-made Fairview Park, to the west, is built on recent sediment (junkstone!) - city rubbish put to use. The limestone below is not seen. South of the Liffey, the passing track-side wall between **Tara St.** and **Pearse**, and many other walls around, are of dark-grey, muddy

limstone called 'Calp' This rock is a common Dublin building stone. All the red brick about comes from somewhere else. The red colour tells of the arid deserts of another time.

Though there are granite walls at **Lansdowne Road**, it is limestone that lies unseen beneath. The Dodder passes quietly by with its unnoticed load of mud and sand destined for the sea - future sedimentary rocks (with plastic fossils?). The expanse of Sandymount Strand drifts by unseen to the east. A Bloom might stroll there from **Sydney Parade** and think of sandstone (quartzite) in the making.

South of **Booterstown**, the boundary wall to seaward is of granite with a cap of limestone. **Blackrock** is sited at a junction of limestone with granite. Limestone, when wet, is very black and, from a ship in the bay, must have been a contrast here with the granite to the south. From Blackrock southwards all the way to Dalkey, the tracks lie on and cut through the paler rock.

Don't miss the granite outcrops in the sea between **Seapoint** and **Salthill**. The piers of **Dun Laoghaire** harbour are made of granite mined from a large quarry near Dalkey. Regular cracks or fractures (joints), typical of all granites, are well seen in granite exposures south of **Sandycove** and in many others about. Joints make for easy quarrying as a building stone. Delight at the use of granite in the station house at **Glenageary**. This local rock and red brick marry well in the Dublin streetscape.

Prepare, if travelling south, for the exploding view to the southeast as the train turns away from **Dalkey** - Killiney Bay curving from beneath around to Bray Head - beautiful. If travelling north, plan to come back again.

Don't be distracted for long. There is some important geology nearby on the landward side. Travelling south, jointed granite is abruptly replaced by rusty brown schist This granite contact marks the place, then way underground, where hot granite squeezed up from below, stopped and cooled 400 million years ago.

If you pause at **Killiney**, visit the shore. Killiney Hill, with the White Rock ('granite') bathing place below, bounds the view to the north. Bray Head stands out to the south. In between, the bay is cut into soft schist and slate.

The cliffs nearby are of dangerous unconsolidated glacial sands and clays like those at Howth. Underfoot, the pebbles - many fallen from the cliffs - include strangers from places north, e.g., rocks from Lambay (lava) and even from distant Scotland (Ailsa Craig granite). Pebbles of flint - from N. Ireland perhaps - are common. Ice sheets brought all of them here. Near the station, the train passes by some small outcrops of these bouldery glacial deposits.

South of **Shankill**, the Sugarloafs dominate the view to the south-west. The Great Sugarloaf and the Small Sugarloaf to the east of it, are both huge masses of hard durable quartzite. Both merit climbing. The summit views are stunning.

On the skyline to the west, an old lead-works chimney at Ballycorus remembers a mining past. Other remnants of that past are to be seen at Glendalough and at Avoca in Co. Wicklow.

At **Bray**, enjoy a promenade by the sea on a long beach with pebbles rounded, as on every beach, by continuous rolling in the waves. At the edge of a rough sea, you may hear them rattle.

Look at the great variety of different pebbles and their many different colours and textures. All have a story to tell. Most are, however, of resistant quartzite. The waves will eventually reduce all of them to sand which, when buried under yet more sand, and more, will compact into rock - quartzite. Quartzite-to-be on the beach. Old quartzite rock on the headland. The sea makes each of the other - endlessly.

The end - or the beginning - of a journey around the edge of Dublin Bay - seeing a moment in the constant warring interplay of land and sea and in the evolution of a landscape. And perhaps to see a hazy vision of a distant geological past which lies beyond any possiblity of recall - but for rock. What does the future hold?