Pavements of the Aran Islands

The western coast of Ireland offers a magnificent chain of scenic delights and geological treats, and a gem among them is the trio of Aran Islands, out in Galway Bay. Formed of Carboniferous limestone that is dipping gently to the south, they are fragmented westerly extensions of the well-known Burren and limestone hills of County Clare.

Largest and outermost of the three islands is Inishmore (Inis Mór in Irish, which translates as *Great Island*), 14 km long and around 2 km wide, with Kilronan as its main village and little more than isolated cottages elsewhere. Much of the island is bare limestone pavement, on a truly spectacular scale. Soil is sparse, and mostly lies along the northern fringe, away from the Atlantic weather and sheltered beneath low north-facing scarps. The Aran limestone sequence is notable for its relatively thick shale horizons between some of the limestone beds, and these would have provided elements of mineral soil on the stepped terrain. Probably most of the island's fields were improved by placing rain-washed kelp seaweed in layers with beach sand to create an organic soil that could support the island's subsistence agriculture of yesteryear.

Looking westwards across the main limestone pavements of Inishmore, dipping at about one degree to the left (south) with fort of Dun Aengus on the skyline far beyond the cottages of Gort na gCapall.

Limestone pavement with a glacial erratic of Dalradian quatzite derived from Connemara.

Away from that northern fringe, the highest and widest dip slope is dominated by limestone pavement, even though a large share of it is criss-crossed by a network of dry stone walls. These enclose fields that are mostly less than 50 metres across, and many of which are bare limestone that cannot justify being called fields in any sense applicable to farming. One cannot help but wonder how much soil might have been lost since any initial cover was depleted by gathering field stone to build the walls, or since maintenance of artificial soils ceased when people drifted away from low-value farm work.

The largest areas of bare pavement, fringing the southern coast, have fewer walls and appear never to have had any significant soil cover. Like all limestone pavements, they are features of glaciokarst, where they owe much to having been stripped bare and scraped clean by Quaternary glaciers. Ice sheets spread across Galway Bay many times during the Quaternary, but most significantly there was complete ice cover during the Last Glacial, in Devensian times (known as Midlandian in Ireland). Glacial erratics scattered across the pavements are largely of limestone, but include granite from Galway and pink Dalradian quartzite from the hills of Connemara.

Distinctive clint morphology with flat tops and sharp edges to the grikes.

These Aran pavements differ from those in classic sites on the same limestone in and around the Yorkshire Dales, because the Aran clint blocks are not rounded over the edges that drop into the grike fissures. Rounding of features in limestone pavements is normally due to sub-soil formation, where soil can hold corrosive water against the limestone and permit dissolution from all angles. Where drainage runnels have been formed, the rounded troughs and ridges of sub-soil rundkarren contrast the sharp interfluve ridges between runnels of rillenkarren formed in the open air by rainwater or snowmelt draining over bare limestone.

It is likely that part of the rounding of the Yorkshire Dales clints is due to their almost ubiquitous cover of lichen acting as a micro-soil and thereby retaining corrosive rainwater. The finest of the Aran pavements are notably poor in lichen, perhaps due to any growth being restricted by saltwater spray from crashing surf along the cliffs that lie immediately up-wind of the main pavements. Widths of the grike fissures suggest a degree of maturity that is hardly compatible with their fresh and sharp edges, and this could be accounted for by the lack of lichen. Most of these Aran pavements have been bare rock, and soil-free, ever since the glaciers receded.

Any geologist's visit to Inishmore, even just a day-trip, should take in the splendour of the pavements, and that is easily done with a walk between Kilronan and the obvious landmark of Dun Aengus. The latter (Dún Aonghasa on the maps) is the stone remains of a fort more than 2000 years old and now partly restored. It stands right on the edge of vertical sea cliffs that are 75 metres tall. Though on the down-dip side of the island, these southern cliffs are the spectacular ones, cut back into the dip-slope by relentless Atlantic storm waves. The limestone's north-facing scarp face had southbound glaciers rising over it, thereby breaking it into a staircase of low crags and rock terraces.

From Dun Aengus, the cliff scenery towards the east fully justifies a walk that is in the right direction back to Kilronan and also passes the Wormhole. Cut into a lower rock bench, this is a singularly clean-cut, rectangular pool, some 30 m by 12 m in size. It was formed by block collapse into an underlying sea-cave, where the breakdown was guided by well-defined joints

The joint-guided pool of the Wormhole broken into a wide limestone ledge close to sea level.

Viewpoint on the cliffs near Dun Aengus, after stability of the limestone slab had been carefully assessed and the photographer had got onto another precarious ledge.

within the right-angle systems that are conspicuous across the whole island. Despite appearances, it is a natural feature (though claims of recognising a few cut marks suggest that its shape could possibly have been tidied up by a little trimming of stray blocks). It is not related to the mythical sea monster that provided its fanciful name. The pool is 15 metres deep, and divers have passed through the wide underwater cave that is only 25 metres long to the open sea. Storm waves can break over the rock platform, but low tide and low surf reveal a most unusual site, which is now the venue for an annual cliff-diving competition.

It is an easy day trip to Inishmore, with ferries from Rossaveel on the mainland. An option is to fly one way on a combo-ticket, but this is only worthwhile if the weather is clear, which is hardly usual in western Ireland. Also, though advertised as flight-seeing, the tiny planes have some seats with no window. Minibuses meet the ferries to offer a ride to Dun Aengus; which can be welcome before a gentle downhill walk back to Kilronan. The two other Aran islands are also dominated by limestone pavements and stone walls, but have less appeal for casual visitors and have fewer ferries that call in to their tiny ports.

Tony Waltham

VALE

Reflections on Dorrie Morrow

Dorothy M. Morrow died early in 2020 at the remarkable age of 101. She played a major part in the early days of the Society serving on Council for many years as Minutes Secretary from 1966, then Secretary 1971–77, and President and Vice-President 1979–84. The following recollections have been kindly supplied by Frank Taylor, one of the Society's founding members.

I knew Dorrie Morrow for a long time. She was a stalwart member of the EMGS and in some ways typical of many of the founder members. She had attended a WEA course in geology, like many others, came to the end of the course and was then unable to continue her interest in a more detailed way. Becoming a member of the EMGS was therefore a way forward of which she took full advantage.

She was an active member of the Society, not only attending lectures and excursions but helping out in many other ways. For example, in the early days of the Society the *Mercian Geologist* had to be put together by hand. She was one of the few dedicated people who assembled each individual part, and it took a whole weekend to assemble more than 500 complete issues together with author's separates.

Everyone has their eccentricities. Perhaps Dorrie's was being kind to all. This included looking after an injured pigeon. Dorrie was headmistress of an infants school off Carlton Road, Nottingham, where the injured pigeon, which she named Wilfred, was originally housed. But when the school holidays came, Wilfred went home with Dorrie. Then came the EMGS summer excursions, and the pigeon came too, becoming the first unofficial member, though we did have a few dogs as well.

She was a member of Council for many years and acted as Secretary so that I could do the Editor's job which no one else wanted to do at that time. When she retired from the 'day job' she was always available to read scripts and other documents to ensure they were as intended and could be understood by all members of the Society. A very useful, erudite friend to have, she helped me a lot.

In the early years the Society went through some difficult times. It has reached its present status largely through the energy and commitment of members like Dorrie Morrow.

Frank Taylor