

Field trip to the Isle of Man, 10 – 16 May 2009

Day 1 – Monday 11 May (Gordon Freeman).

Our memorable trip to the Isle of Man began on a sunny but chilly Monday morning with a visit to Marine Drive, Douglas, where the roadside exposures at Pigeon Stream enabled us to view and discuss some of the rocks of the Manx Group. Here Bill, our leader, demonstrated his excellent teaching skills and shared with us his wide knowledge and experience of Manx geology.

The exposures comprised of metasediments and were the result of low-grade metamorphism. They consisted of grey interbedded mudstones, silkstones and sandstones of Lower Palaeozoic age. They gave us the opportunity to discuss the concept of Bouma sequences, which are used to divide deep water turbidites into intervals (a, b, c, d, e) in which as the current slows the grain size decreases from 'a' to 'e' (sand to silt to mud). Graptolites have been found in these deposits but the only evidence of oxygenation we were able to observe were trace fossils in the form of burrows and trails, and their grey colour. The orientation of flute casts seen on some of the sole surfaces in these deposits indicated a north east to south west current direction, and that they were formed in submarine fans which developed along the margins of Avalonia and the Iapetus Ocean.



Trails and burrows, and sole surfaces with flute casts.

Our next stop was Peel on the west coast, where, after taking a short walk through a gap in the wall of Peel Castle, we came to a shallow quarry in the floor of which were folded greywackes of the Niarbyl Formation (Silurian). The greywacke beds are 20 - 30cms thick and are separated by thin pelitic bands. The small folds in these beds are upright and trend north east to south west. The steeply dipping or curved bedding planes of the well-developed syncline seen at this location showed ripples of sand and mud which had been deformed.

The palaeo-flow data from the Niarbyl Formation here suggest that its sediments were derived from the Laurentian Continent on the western side of the Iapetus Ocean. This reversal of the source from Arenig to Wenlock times some 60 million years later, indicates that Avalonia and Laurentia had begun to dock as the Iapetus Ocean closed and its floor was subducted along a suture.

After lunch, in the shadow of Peel Castle, which occupies the important site of St Patrick's Isle, we took the footpath southwards to the viewpoint at Corrin's Hill. From here we saw the Antrim Coast and, in the harbour below, the smokestack of Moore's Kipper Factory, whose products were later to feature at breakfast and as gifts to take home. A steep climb down on the seaward side led to the disused Traie Dullish Quarry.

Here there was a large expanse of grey Manx Slate dipping eastwards into the face of the quarry and thus giving, on the north side of the quarry, an exposure of some 10metres depth. At the lower levels many v-shaped orthocone nautiloids were visible. These vary in size from a few mms to about 50cms. Monograptids and Cyrtograptids have also been reported, but we did not see them. Higher in the sequence there were clearly visible meta-bentonite beds, formed by the breakdown and alteration of volcanic ash giving soft yellowish layers in which there are zircon crystals useful for dating. These rocks are of mid-Silurian age and belong to the Niarbyl Formation. The nearest known Silurian volcanism was probably that in South Wales; a long way for quantities of ash to have travelled. In places it had penetrated into fissures in the rocks.

We followed a path back contouring round the hill and passing another, much smaller quarry, but a quick examination did not suggest that it would give any further information.

Day 2 - Tuesday 12 May (Mary Clarke)

A key event of the Manx field trip was our visit to Niarbyl Point on the south west coast (GR 212777). In plate tectonic terms the Isle of Man was perched at the edge of the Iapetus Ocean from Ordovician into Silurian times - during phases of subduction in a southerly and later in a northerly direction. Here at Niarbyl, it seems, the southerly land of Eastern Avalonia (including England and part of Europe) was over thrust by a slither of the north-westerly continent of Laurentia (comprising most of North America and part of Scotland) as the ocean began to close. The evidence of this event at Niarbyl provides clues to a complex and not yet fully understood story.



Fig 2: Mega-cracks in quartzite

coast for about 9km to Peel. Geophysical evidence indicates that the actual line of the Iapetus Suture lies off shore from Man, beneath the Irish Sea.

We went on to visit the strange scenic feature of the Chasms, at the south of the island near Cregneish. This consists of mega cracks in thick bedded quartzites - probably caused by land slippage (Fig 1). Finally we visited an abandoned quarry near Foxdale where a small part of the extensive granite dome beneath the Isle of Man is exposed. This features pegmatite veins and huge quartz crystals.

Day 3 – Wednesday 13 May (Graham Williams-Text & Alan Whitehead-Photos)

The Peel Sandstone Group consists of terrestrial sediments, red sandstone, mudstone and conglomerate beds characteristic of an arid tropical or sub-tropical environment. There are lithofacies characteristic of alluvial fans and of braided river deposits. Interestingly, there are calcretes (also known as caliche, or sometimes as cornstones) which are said to represent palaeosols; where evaporation exceeds precipitation (rainfall) calcareous soils may be formed; they are seen typically in river flood plain sediments, but can develop in aeolian and lacustrine deposits. Calcretes form just below the surface, and over time they develop from scattered to packed nodules and sometimes to a massive limestone layer.

The Peel Group is in faulted contact with the older Manx Group, so that the direct stratigraphical relationships of the Peel to the Manx are unknown. There is no palaeontological evidence to provide a definitive age, and estimates have ranged from Silurian through Devonian to Permo-Trias. However, there are pebbles which contain Wenlockian (Middle Silurian) fossils which give a maximum age, and recent palaeomagnetic data suggests a latest Silurian to early Devonian age, and this would fit nicely with deposits of a similar nature elsewhere in the UK - the Lower Old Red Sandstone.

Figure 1 shows some of the Society members studying the sandstones at Peel Quarry, which is situated at the Northern end of the promenade at Peel; Figure 2 is a good example of a calcrete, which appears to contain a petrified pigeon with a ball point pen in its beak!.

Our leader, Dr W R Fitches, has been and continues to be at the forefront of this research and he discussed with us some of the intriguing problems involved.

Having viewed the structural features of the coastline from the headland we descended to the beach past a picturesque thatched and whitewashed traditional cottage.

On the foreshore near Niarbyl Point the rocks from opposite sides of the former Iapetus Ocean meet. To the south are the Ordovician sediments of the Manx series that make up the bulk of the island. These were deposited by turbidity currents off eastern Avalonia which at the beginning of this period was not far from the Antarctic Circle. To the north of the beach are rocks of Silurian age, deriving from Laurentia - which in early Ordovician times was near the tropics. The evidence suggests that here in mid Silurian times a bit of Laurentia overthrust Avalonia.

Beneath our feet were the results of this catastrophic event - the highly contorted and convoluted rocks of the Niarbyl Shear Zone. North of the beach, the Dalby (Silurian) group, derived from Laurentia, is faulted against the Manx Group by later earth movements. The junction between the two is clearly visible at the bottom of the cliff, marked by quartz intrusions. The Dalby Group is made up of only one unit, the Niarbyl formation. This extends north east along the Manx

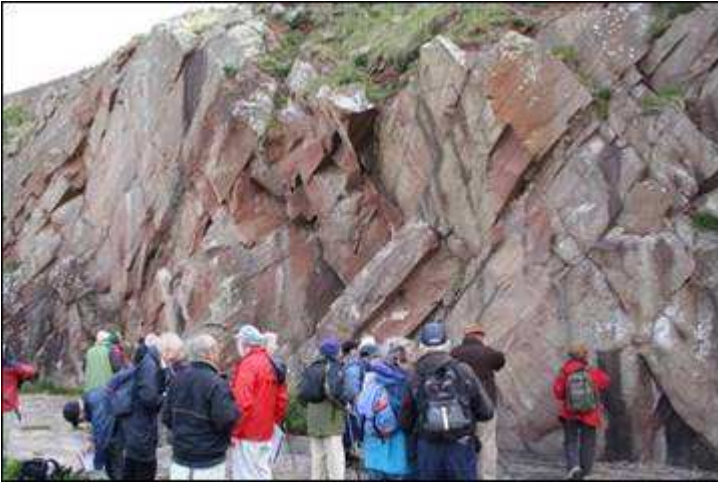


Fig 1: The FGS group at Peel Quarry

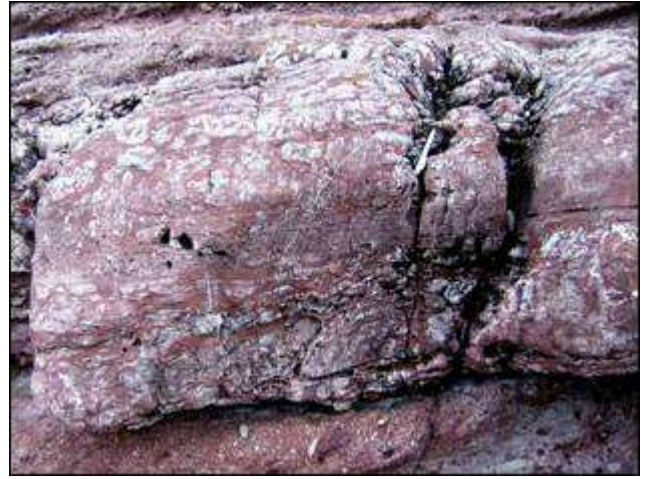


Fig 2: Calcrite

Day 4 - Thursday 14 May (Margaret Richards)

On day 4 of our Isle of Man trip we explored the Carboniferous rocks of the Island, which are found in the south west, around the Castletown area. First we visited Kallow Point where we looked at a bed of Limestone (Fig 1) with a hummocky surface. This 'lumpy' surface (Fig 2) consisted of meter-wide concretions of calcite mudstones overwhelmed by lime grain (sand) with smashed up fossils mainly corals. Stratigraphically higher limestone beds were examined at Standhall Farm where the fossils were much larger. Very large Siphonophyllia were seen (about 35 cms long) plus very clear examples of Megachonetes (Fig 3). (Not seen was the supposedly largest Siphonophyllia in the world, found at this site, at about 1 metre long.) This formation also showed shearing and tension gashes.

Next we moved to Scarlett Point, looking first at limestones cut with numerous dykes, possibly Tertiary but maybe older than this. From here we moved on to the Scarlett Volcanic Formation, which stretches for 1500m along the coast. It consists of Basaltic agglomerates, pillow lavas and other pyroclastics, some highly vesicular. Dykes of basalt were seen cutting the agglomerates as were some poorly defined columnar jointing.



Figure 1: Limestone bedding with lumpy surface



Fig 2: Fossils in lumpy surface

Fig 3: Siphonophyllia and Megachonetes

Day 5: Friday 15 May - Mineralization and Quaternary sediments (Joan Prosser)

After very good weather earlier in the week, Friday dawned both wet and windy. First we were given an excellent recap and explanation by Bill and Graham of the geology we had looked at so far, but it seems there are some formidable questions still to be addressed in connection with the closure of the Iapetus and the formation of the Isle of Man.

The first visit of the day was to the mineral mine at Laxey in the Glen Mooar valley, one of three main mining areas on the island. Ores mined here in the past were sulphides of lead and zinc. The Great Laxey wheel (Fig 1) is a major tourist attraction. It is carefully preserved as the largest surviving working water wheel in the world. It was built in 1854 to pump water from Laxey's mines. In its heyday the wheel was capable of pumping 250 galls of water per minute from the mines 1,500 ft below the ground. (Circumference: 228 ft; diameter: 72.5 ft.) We then visited the beach at Old Laxey where we hunted for mineral samples. We discovered examples of Sphalerite, galena, malachite crystals, ferro dolomite, fibrous quartz, chalcopyrite and an example of vein breccia.



Fig 1: Laxey wheel



Fig 2: Cliff at Dog Mills

The remainder of the day was devoted to Quaternary geology in the north east area of the island, where Pleistocene glacial accumulations conceal Carboniferous and Permo-Triassic deposits. On the way northwards, on the eastern coast the road traversed small valleys which were glacial spillways, part of a large sandur which spreads from east to west almost across the width of the island.

At Dog Mills the low coastal cliff (Fig 2) is composed of outwash deposits of silts and clays. We observed load structures and quicksand features at the margin of the sandur. On the beach were many reworked moraine pebbles including material from elsewhere, riebeckite pebbles from Ailsa Craig among them. A little to the north of this area, at a place called *Phurt*, Neolithic pottery (C. 4000 BC) has been discovered, presumably made from local clay.

At the Point of Ayre, below the raised beach, nesting terns were being given priority over other visitors. Further along however, nearer the lighthouse which marks the most northerly point of the island, we spent some time collecting beautifully polished and reworked pebbles, many representing places we had visited during the week.

Wildlife on the Isle of Man – Susan Williams

Wildlife flourished in exceptional concentration both on the terrestrial and in the marine environments. The cliff grasslands were interspersed with tufts of brilliant thrift and the pretty pale blue of the sea squill. The hedgerows were a mass of blue bells, white bells and occasional pink bells. The tree lined roads were underlain by drifts of pungent wild garlic. *See Figure 1 Primrose, Squill and Thrift with Peel Sandstone in the background.*

Bird lovers followed the activities of the many species that flew or paddled round the shores. On Langness, Heron, Shell Ducks, Eider Ducks and the Mallard families potted in the shallows. Choughs, Sand Martins, Kittiwakes and many other sea birds had colonised the cliffs. The Arctic Terns were starting to nest on the shingle banks at the northernmost point, known as the Ayres.

We were rewarded by the sight of a Seal, who though geologist watching was a novelty, and even an Arctic Hare changing into its summer coat; we discovered a flock of the rare 4-horned sheep (Loaghtan) just outside Douglas, but the famous Manx Cat was not to be found except as a Gingerbread !



Fig 1: Primrose, Squill and Thrift with Peel Sandstone in the background