

Colonsay Group

- Rubha na h-Airde Moire Phyllite
- Rubha Gaidhealach Grit
- Kilchiaran Phyllite
- Eilean Liath Grit

Rhinn's Complex

- Metagabbro
- Gneiss

- Fault
- Geological contact
- X  
-----  
----- Syncline
- ◇  
-----  
----- Anticline

- Paleocene dolerite dykes
- Silurian lamprophyre dykes

- Tarred road
- Farm track
- Path
- Recommended walking route

**Fig. W2.1** Geological map of the area around Kilchiaran, modified after British Geological Survey (1997), showing the localities described in Excursion 2.

## Excursion 2: Kilchiaran

Coastal walks looking at the lower part of Colonsay Group and the 'Billion-Year Gap'. There are old slate quarries, some unusual Ice Age deposits and a variety of igneous rocks.

**Grade: 2**

**Terrain:** The coastal walk is pathless and relatively easy, but with two gates to climb after Locality 3. For those with limited mobility Localities 1 and 2 are recommended.

**Duration:** Allow about 2 hours

**Facilities:** None.

**Access:** No restrictions.

**Dogs:** There are often livestock around the bay.

**Distance:** 2 km from the chapel to locality 6.

**Start:** At Kilchiaran on the back road from Port Charlotte to Portnahaven. Coming from the Port Charlotte direction park in the large passing place next to the chapel.

*This excursion comprises a traverse through the lower part of the Colonsay Group. This is a sequence of metamudstones and metasandstones deposited as sedimentary rocks about 800 million years ago (Ma). They were folded and metamorphosed some 470 Ma in the Caledonian Orogeny but unlike in other parts of Scotland the deformation here was not very intense and many original depositional features can be observed. It also encounters some excellent examples of glacial features from the recent Ice Age and at the end visits the 'Billion-Year Gap' - a fault gully between the Colonsay Group and the underlying Rhinns Complex - which is a billion years older.*

The excursion is in two parts: the north side of the bay (Localities 1 to 6) and the 'Billion-Year Gap' (Localities 7-9) on the south side. For those with limited time or reduced mobility then Localities 1, 2 and 8 are recommended

### Excursion 2a – Kilchiaran Bay

From the parking place go through the gate near the 14<sup>th</sup> century chapel. Follow the farm track alongside the burn for about 75 m and stop at the dark smooth rocks next to the track on the left.

#### **Locality 1** [NR 2037 6007]

Kilchiaran burn.

*Next to the track (and also across the burn further downstream) are outcrops of the bedrock which is smoothed, rounded and scratched (Fig. W2.2). These marks were caused by rocks embedded in glacier ice as it flowed E to W*



**Fig. W2.2** Outcrop of Colonsay Group metamudstone across the burn which was polished and puckered by ice. The flow was from right to left, Locality 1.



**Fig. W2.3** Gravel and pebble beds with sandy lenses probably deposited in the sea beneath melting ice. The pebbles include clasts of chalk and flint. Kilchiaran Bay, Locality 1.

*across Islay some 20-25,000 years ago when the ice sheet was probably about 500 m thick. Directly across the stream are some exposures of sandy gravels (Fig. W2.3). The deposit is unusual in that the gravel is relatively well-sorted with only a little clay; there are also small lenses of sand and **imbricated** pebbles. It is thought to have been deposited in the sea directly from melting floating sea ice when the sea level was somewhat higher than today. These gravels are also notable for their **flints** (Fig. W2.4) and lumps of **chalk** which must have been transported here by the ice as these rocks do not crop out on Islay. Flints also occur in the pebble beaches on the western Rhinns, western Colonsay and Iona and were probably eroded from material to the north around Mull and carried here in the ice. With careful searching they can be still be found amongst the beach pebbles along the west coast of Islay; including the beach here. These beach flints played an important part in the early post-Ice Age colonisation of the land by hunter-gatherers in the middle stone age (Mesolithic) as they were vital for tool making.*

Continue walking for another 100 m towards the beach along the track towards Kilchiaran Bay. The next locality extends from the small abandoned quarry on the left-hand side just above the high tide mark to the rocks on both the left and right hand sides of the beach.



**Fig. W3.4** Pebbles of flint collected from the beaches on the western coast of the Rhinns. The largest is about 12 cm long but most are smaller (about 5 cm). Characteristically they have an ochre-stained chalky surface (patina).



**Fig. W2.5 (L)** Slates (fine-grained metamudstones) in the quarry with a near-vertical cleavage, Locality 2.

**Fig. W2.6 (above)** Colonsay Group laminated metasiltstone on the beach with a soft-sediment slump feature, Locality 2.

### **Locality 2** [NR 2025 6001]

Kilchiaran Bay.

The rocks around the bay are part of the Colonsay Group of rocks here called the Kilchiaran Phyllite. It overlies and is about 1 billion years younger than the Rhinns Complex. The rocks in the quarry (Fig. W2.5) are **slates**; they were once **mudstones** deposited about 800 Ma which were compressed into **metamudstones** during the later **Caledonian Orogeny** about 470 Ma. They have developed a type of **foliation** called **slaty cleavage** (a natural preferred splitting direction) as the flat platy minerals realigned themselves at right angles to the main stress direction. Although of generally poor quality, they were used locally for roofing.

The slate is the lower part of a thick unit of **laminated** metamudstones and metasiltstones which are well exposed in the wave-polished rocks further towards the beach (Fig. W2.6). The metasiltstones are typified by thin stripes or laminations of lighter-coloured more silty layers. They are well exposed in the centre of the bay and in many places the once-parallel lamination is disrupted. These structures are thought to be **soft-sediment deformation** features. The laminations make it quite easy to determine the original bedding direction and they can be seen to be dipping down to the NW. At the N end of the bay a **dyke** of **igneous** rock cuts across the bedding. It is an example of a relatively uncommon rock type called a **lamprophyre**. There are some more exposures of these rocks at Locality 4.



**Fig. W2.7** Bedded sandstones of the Rubha Gaidhealach Grit at Rubha Liath, Locality 3.

Follow a vehicle track over the first small headland on the N of the bay; after 75m or so there is a small bay on the left and on the other side a low headland area with ‘fingers’ of rock sticking out into the bay. Follow the grassy area out to the rocky part of the headland (Fig. W2.7).

### **Locality 3** [NR 1990 6011]

Rubha Liath.

*The ‘fingers’ of rock that protrude into the sea here are formed from beds of **metasandstone** that lie above the Kilchiaran Phyllite and have been termed the Rubha Gaidhealach Grit, named after the larger peninsula to the north. The rocks are still dipping to the NW and walking in this direction means that successively younger rocks are encountered. The metasandstone is often quite coarse-grained with gravel sized clasts; occasionally **cross-bedding** and evidence of channels can be seen. These indicate that the sediments were probably deposited in an environment comprising river channels with sizable sandbanks close to the sea in some form of **delta**.*

*There are some more interbeds of metamudstone, some of which have a slaty cleavage and have been quarried. Many of the bays in this area have been enlarged by quarrying and the shorelines at their heads are comprised of waste from the quarries. There are several cycles of mudstone, laminated siltstone, bedded **sandstone** and more massive sandstone. The size of the particles increases upwards in each cycle; these **coarsening-up** cycles are very typical of a **deltaic** environment of deposition.*

Head towards the prominent bay on the north side of Rubha Liath and climb the steep grassy slope on the opposite side of the bay up to the gate in the fence. From the gate head downhill (SW) for about 150 m to a small tidal rock pool (Fig. W2.8).

### **Locality 4** [NR 1979 6022]

Rubha Gaidhealach.

*The tidal pool is formed by an igneous dyke intruding into the Colonsay Group metasandstones. The dyke is a lamprophyre (an uncommon highly potassium-rich rock) similar to that seen at Locality 2 but here it has a crude foliation at about 45° to its edges (Fig. W2.9) which is at a different*

**Fig. W2.8 (below L)** View of Locality 4 from the slope down from the gate. The tidal pool is visible to the left of centre.

**Fig. W2.9 (R)** View of the lamprophyre dyke and close-up (insert) of the foliation that characterises these dykes on Islay.



*direction to the weak foliation in the rocks into which it is intruded. The origin of this is unclear, it could be as a result of a later deformation event or caused by stresses during fault movements whilst the rock was still molten. Similar rocks on Colonsay have been dated at about 440 Ma. These dykes are interpreted as having been intruded at a late stage in the Caledonian orogenic event, probably along active faults.*

From the pool follow the coast N for 100 m to an extensive area of old slate workings and walk a further 100 m to a small burn. Continue N for another 200 m following the edge of the grass to a fence. There is a gate towards the right near the change of slope. Once over the gate walk a further 100 m N to a prominent gully trending SW-NE sub-parallel with the coast.

### **Locality 5** [NR 1976 6068]

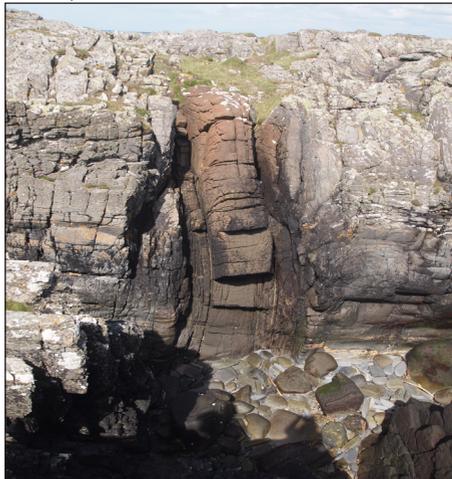
N of Rubha na h-Airde Moire.

*The coast from here northwards is characterised by metamudstones – known as the Rubha na h-Airde Moire Phyllite. The base of this unit occurs at the slate quarry N of Locality 4, above this the metamudstones are thicker and tightly folded with several foliations. In these areas of increased deformation the rocks have characteristic wavy appearance and can be described as **phyllites** - a term usually applied to metamudstones which have undergone more metamorphism than a slate but not enough to be called a **schist**. A **syncline** (a downward fold in the rocks) has been mapped just after the quarry and after crossing the central area of the fold the rocks dip in the opposite direction, i.e. to the SE. The main foliation is parallel to the axes of the folds. There are numerous examples of smaller scale folds with more*

**Fig. W2.10** Anticlinal fold developed in metamudstones between Localities 4 and 5.



**Fig. W2.11** Paleocene dolerite dyke at Locality 5.



*foliation developed within the larger folds (Fig. W2.10). These occur in the mud-dominated parts of the succession because they are more plastic and less competent compared to the metasandstone sequences.*

*There is a large dyke in the vicinity (Fig. W2.11). This is a **Paleocene**-age (60 Ma) igneous intrusion of **dolerite** formed at the start of the opening of the North Atlantic Ocean.*

Carry on following the coast for a further 400 m.

### **Locality 6** [NR 1983 6103]

An Crois-sgeir.

*The metamudstones have given way to more metasandstones; the beds here are quite thick and folded with beds of coarse gravel (Fig. W2.12), erosive scours and some cross-bedding. This sequence is thought to be the same Rubha Gaidhealach Grit seen at Locality 4 which has been repeated by folding.*

To return to the start, retrace the outward route to the large slate quarry, and either follow the coast or ascend the slopes to the east, and take the rough track towards the farm buildings at Kilchiaran.



**Fig. W2.12** Steeply dipping gravelly sandstones at Locality 6.

## Excursion 2b – The Billion-Year Gap

From the parking place walk SW for 150 m along the road. The first locality is the rocks exposed on the left-hand side of the road.

### Locality 7 [NR 2031 6000]

Roadside on south side of Kilchiaran Bay.

*Alongside the road are exposures of metamudstones of the Kilchiaran Phyllite (as seen in the quarry below the road) with complicated sets of foliations which are wavy and intersecting – a feature known as **crenulation cleavage**. This deformation was caused by movement on the nearby Kilchiaran Shear Zone – which runs parallel to the road about 50 m or so inland. Adjacent to these exposures there is a inclined smooth slab of metasandstone (assigned to the Eilean Liath Grit Formation which underlies the mudstones) with a complex jigsaw-like pattern of fragments in a darker matrix. This is brittle deformation and the darker matrix is a quenched melt known as **pseudotachylyte**. It was caused by an earthquake during the shearing events.*



**Fig. W2.13** Brittle deformation of metasandstone with pseudotachylyte matrix, Locality 7.

Continue along the road for 100 m. Some 50 m after crossing the burn flowing under the road look for a gate on the right at the end of a roadside wall and head down the grassy slope towards the sea to the head of a very pronounced gully.

### Locality 8 [NR 2012 5989]

Gully on south side of Kilchiaran Bay.

*The gully contains the Kilchiaran Shear Zone which marks a one-billion-year gap between the Rhinns Complex (1,800 Ma) and the overlying Colonsay Group (800 Ma). The gully has formed where the weaker sheared rocks have been eroded out (Fig. W2.14). The rocks on the north side of the gully are metasandstones of the lowest part of the Colonsay Group (the Eilean Liath Grit) dipping to the NW at about 35°. The rocks on the south side are mainly pink gneisses of the Rhinns Complex.*



**Fig. W2.14** The Kilchiaran Shear Zone at Locality 8. The shear zone is about 3 m wide and comprises very sheared rocks which have been eroded into a gully. On the right are the 1,800 Ma gneisses of the Rhinns Complex and on the left are bedded metasandstones of the lower part of the Colonsay Group which are about 800 Ma. The shear zone thus represents an age gap of about 1 billion years.

Return to the road. To get to Locality 9 follow the road SW for about 450 m uphill to a gate on the right. Descend the grassy slopes heading NW, reaching the coast at a spectacular system of pebble-lined NE-SW trending gullies and tidal pools (Fig. W2.15), which can be followed SW for at least 1 km.

### **Locality 9** [NR 1939 5972]

Lodan Mor.

*The gully with its tidal pools and beaches have formed along the erosion hollow of the Kilchiaran shear zone. The rocks on the NW side are the*



**Fig. W2.15** One of the tidal pools at Lodan Mor, Locality 9. The pools and pebble banks follow the eroded gully of the Kilchiaran Shear zone.



**Fig. W2.16** Mylonite in the shear zone. Top-to-the-left (sinistral) shear-sense.



**Fig. W2.17** Metasandstones with deformed elliptical clasts.

*metasandstones of the Eilean Liath Grit and those on the SE side are gneisses of the Rhinns Complex. The rocks in the **shear zone** can be found in a few places and have been drawn out and stretched and are classified as **mylonites** (Fig W2.16). Some of the metasandstones were originally muddy sands (with **quartz**, **feldspar** and clay-mineral **matrix**) with thinner silty and gravelly layers and there is some cross-bedding, indicating that they were probably deposited in some form of river system. The originally rounded clasts have been deformed into elliptical shapes close to the shear zone (Fig. W2.17).*



**Fig. W2.18** A Paleocene dolerite dyke at Locality 9. It is offset by 10 m or so in a sinistral sense across the shear zone. Although the main movement on the shear zone occurred during the Caledonian Orogeny, there was some later smaller-scale movement either during or after the dyke emplacement.

*At the NE end of the first tidal pool, a 3 m thick Paleocene-age dolerite dyke (c. 60 Ma) cuts across the shear zone at right angles and has been displaced by about 10m in a sinistral sense by late movement on the shear zone (Fig. W2.18).*

Return via the outward route.

#### WHISKY RECOMMENDATION

Try a peated Bruichladdich from the Port Charlotte range. Some expressions use barley grown on Islay – mostly locally around the distillery on Colonsay Group rocks. The water used for cutting down to cask strength comes from a unusual silica-rich spring located near the road back to Port Charlotte.