

Fig. 14.1 Geological map of part of Islay after British Geological Survey (1997) and the author, showing the localities described in Excursion 14.



Fig. 14.2 Lagavulin Distillery from the path to Dunnyvaig Castle.

Excursion 14: Lagavulin

Sedimentary and igneous dykes, archaeology, history and a distillery.

Grade: 1.

Terrain: Tarred roads, straightforward tracks and relatively easy shorelines (see notes)

Duration: Allow 1.5 hours each.

Facilities: Toilets at Lagavulin Distillery. Cafe at Ardbeg (1 mile east).

Access: No known issues.

Distance: A total of 5 km. The eastern part (14a) out to Dunyvaig and back is 2 km. The western part (14b) is a 3 km return walk.

Dogs: There may be livestock in the fields before Localities 5 & 6.

Start: Park at Lagavulin Distillery.

Notes: The optional ascent of the promontory of Barr An T-seann Duine (Locality 6) is steep in places and can be overgrown.

The easterly excursion (14a) from the distillery examines the metabasite igneous sills intruded into the metamorphosed mudstones, siltstones and sandstones of the Laphroaig Quartzite Formation. Some later igneous dykes of Palaeocene-age (c. 60 Ma) cut across the area.

Excursion 14b on the western side of Lagavulin Bay, examines a metabasite sill (with a feeder dyke) which forms the high headland and spectacular folded sandstone dykes can be observed nearby. The sills are harder than the metasediments and stand out in the landscape.

Excursion 14a

Leave the distillery (Fig. 14.2), heading east on the main road for 300 m, then onto the footpath for another 60 m. Turn right down the side road signposted to Dunyvaig Castle. Follow this for 200 m past some cottages. At far end of the walled garden of the large house at the road end (The Plateau) bear left on a narrow grassy path, heading south and then southeast for about 100 m into the small bay directly south of the house (Fig. 14.3).

Locality 1 [NR 4081 4562]

Bay, south of 'The Plateau' house

*The brown-coloured rocky ridge running up the centre of the bay is a **dyke** of **dolerite**, an **igneous** rock intruded up a pre-existing vertical **fault**. This dyke is about 2 m wide and trends NNW-SSE. It is one of many such dykes that cross Islay in roughly this direction and is about 60 million years old; dating back to the time of **thermal doming** that preceded the opening of the North Atlantic Ocean.*



Fig. 14.3 The dolerite dyke in the centre of the bay at Locality 1 is a obvious feature.

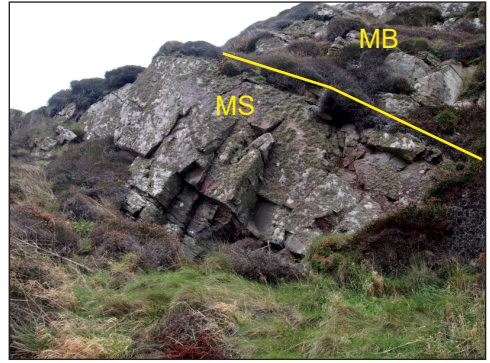


Fig. 14.4 Beds of metasandstone (MS) with a metabasite sill (MB) above on the eastern side of the bay at Locality 1.

*The dyke cuts across a succession of thickly-bedded **metasandstones** which are exposed on the eastern side of the bay (Fig. 14.4). The **bedding** can be seen to dip to the SE and above is a thick **metabasite**. This igneous rock was originally a basalt that was intruded into the sediments. As it follows the bedding planes it is classed as a **sill** and was intruded not long after the sediments were deposited about 600 million years ago. The sediments with their igneous sills were all **metamorphosed** at **greenschist facies** conditions and tilted to the SE during the Grampian phase of the Caledonian Orogeny about 470 million years ago. The geology of these sills will be further discussed at Locality 5.*

Leave the bay on its western side, climbing up the grassy slopes on obvious, small grassy paths. At the top of the slope there is a short branch path off to the left where a good view can be had of an obvious ridge jutting out into the sea (Fig. 14.5). Locality 2 is in the gully next to this ridge.



Fig. 14.5 Looking southwest from the cliff-top towards Locality 2. A dyke forms the promontory jutting out into the sea.

To get to this locality, return to the main path, turn left and follow it downhill for another 30 m. Then turn left down another branch path into a narrow gully with a small shingle beach at its head.

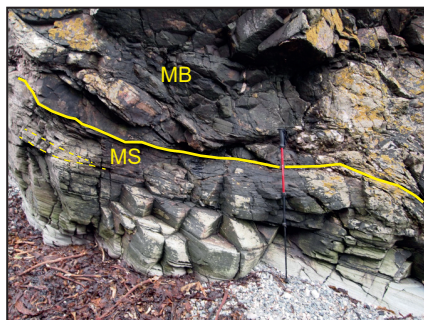


Fig. 14.6 Metasandstones (MS) with cross-bedding (yellow dotted lines) in the gully at Locality 2. The contact with the metabasite above (MB) is well exposed.



Fig. 14.7 A fault, trending NE-SW along the coast, forms a prominent erosive gully, here cutting through the metabasite sill.

Locality 2 [NR 4075 4554]

Gully, southwest of Dunyvaig House

*The dolerite dyke here is about 5 m thick and is very similar in composition and orientation to the one observed at the previous locality. It is one member of the Islay-Jura **dyke swarm** that crosses these islands in a NW-SE direction. This swarm is probably related to the (now submerged) Blackstones Bank volcanic centre which is about 80 km (50 miles) to the northwest.*

*The metasandstones of the Laphroiaig Quartzite are well exposed in the gullies on either side. In places **cross-bedding** can be observed (Fig. 14.6), indicating deposition in some form of **sandbar** or **megaripple** by water currents.*

*A noticeable feature of this area is the obvious narrow gully trending NE-SW sub-parallel to the coast. It cuts across the gully occupied by the dolerite dyke at right angles (Fig. 14.7). Aerial photography (Fig. 14.8) clearly shows it cuts through the dyke, which appears to be displaced by 5 m or so by a fault occupying the gully. The southern portion of the exposed dyke has moved to the SW and this sense of motion along a fault such as this is defined as **dextral** (i.e. from whatever side it is observed, the other side has moved to the right).*

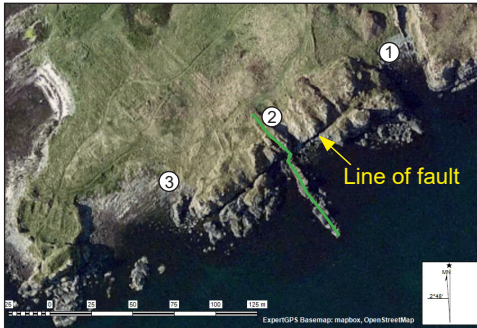


Fig. 14.8 Aerial photograph of the coast east of Dunyvaig Castle showing the prominent NE-SW trending fault which appears to offset a dolerite dyke in a dextral sense at Locality 2.

However, it is unclear whether the dyke was intruded before the fault, during its movement or possibly afterwards.

Exit the gully and turn left. Continue south-westwards along the coast for a further 100 m towards the castle; the next locality is the bay immediately to the northeast of the castle (Figs. 14.9 & 10).

Locality 3 [NR 4075 4554]

Bay east of Dunyvaig Castle

*The headland on the left (east) of the bay (Fig. 14.9) is formed from the same metabasite sill observed at the two previous localities, and once again its basal contact can be observed. In other exposures in southern Islay the sills were intruded into sediments dominated by mudstones and their clay minerals contained a lot of water, which on burial and metamorphism reacted with the minerals in the sills, forming new minerals prone to showing a **foliation**. Here, the surrounding rocks were predominantly sandstone which contained a little clay and hence show little evidence of this type of metamorphism.*

Looking west, Fig. 14.10 shows the castle, the tower of which is built on the eroded remnants of the same sill.

Fig. 14.9 Interbedded metasediments and metasediments (MS) of the Laphroaig Quartzite Formation on the eastern side of Locality 3. The metabasite sill (MB) forms the headland and its contact with the metasediments can be examined.

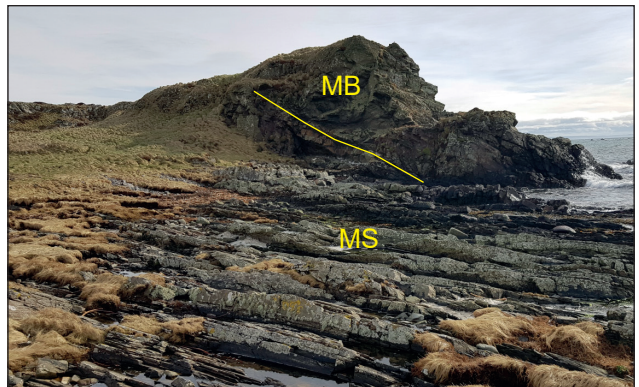




Fig. 14.10 The tower of Dunyvaig Castle was built on a metabasite sill (MB), whereas the rest of the castle was built on the metasandstones (MS) exposed here on the foreshore .

To complete this part of the excursion, walk over to the castle, which is currently being excavated by Islay Heritage. It was once a naval fortress of the Lords of the Isles, possibly constructed on top of a pre-existing fort. The remains of a 15th century keep and a 13th century tower survive, although much of what remains probably dates from the 16th century. The castle was the object of much wrangling between the MacDonalads and the Campbells of Cawdor. See the Islay Heritage website for up-to-date information.

Return to the road along the castle access footpath and back to the distillery.

Excursion 14b

The second half of the excursion is on the western side of Lagavulin Bay. Walk along the road from the distillery heading southwest and soon join the new footpath running alongside the road. After about 500 m turn left down the track to the boatyard. Turn right through an opening into a field just before the ‘Tin House’. Once in the field bear left following for about 50 m to reach a ford (plus a gate) over the Kilbride River (Fig. 14.11).

From here keep heading for another 100 m across the next field to the corner of a new paddock Turn right and follow a narrow path for about 200 m, then follow narrow paths downhill towards the shoreline, going right to avoid a boggy section near the base of the slope.

Localities 4 and 5 are on the shoreline section at the north-eastern end of the bay known as Port na Sròine Gairbhe (Fig. 14.12).

Locality 4 [NR 3982 4527]

Fig. 14.11 The ford over the Kilbride River and the gap in the wall to the right of the trees across the field.





Fig. 14.12 Overview of Port na Sròine Gairbhe showing the access route and the location of Localities 4 and 5.

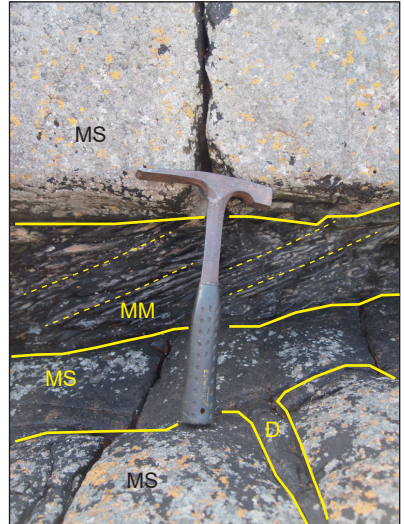


Fig. 14.13 Beds of metasandstone (MS) separated by a bed of metamudstone (MM). The latter has a cleavage (dashed lines) at a low angle to the bedding. A small sandstone dyke (D) can be seen cutting down into a lower bed.

Port na Sròine Gairbhe (NE)

This bay is formed in interbedded metasandstones and metamudstones of the Laphroaig Quartzite Formation. The metasandstones are harder than the metamudstones and form small ledges. The interbeds of metamudstone have



Fig. 14.14 Folded sedimentary dyke at Locality 4. Cleavage (dotted lines) in the metamudstone is axial planar to the folds in the dykes.

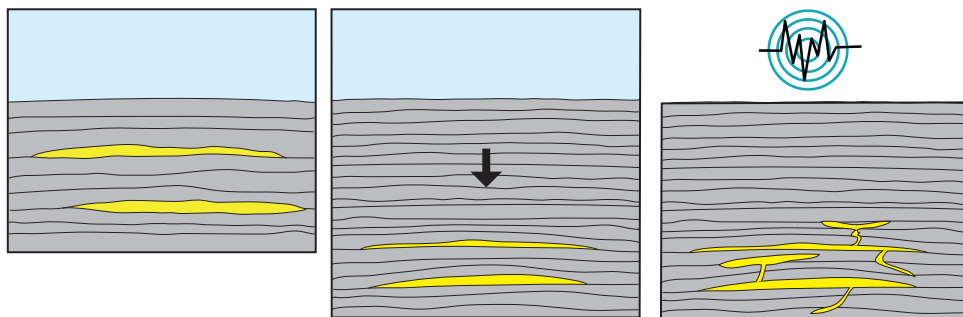


Fig. 14.15. Cartoons to illustrate the process of sedimentary dyke formation: (a) Mudstone-dominated sedimentation with some thin sandbodies, followed by (b) burial and overpressuring of trapped water in the sand bodies and then (c) an earthquake triggers injection of sand into the mudstones.

a **cleavage** at a low angle to the bedding and small sandstone dykes can be readily observed coming out from a source bed (Fig. 14.13).

Sedimentary dykes of sandstone are not uncommon in Dalradian metasedimentary rocks, although most are small - only a few centimetres or so wide and a few tens of centimetres long. However, much larger sedimentary dykes occur at this locality; the largest is 0.5 m wide, penetrates 16 m beneath the sand source bed and is spectacularly folded (Fig. 14.14). The folds in the dykes are associated with an **axial planar cleavage** in the host rock metamudstone.

These dykes were originally interpreted as **neptunian**, that is the infilling with sand of fractures in already consolidated sediment. More recently, many sedimentary dykes elsewhere have been interpreted as being caused by the forceful injection of sand from an unconsolidated source bed into adjacent consolidated beds (Fig. 14.15). This process usually requires **overpressured** pore fluid, which commonly arises from rapid burial of the sediments. The formation of sand-filled dykes possibly being triggered by earthquakes.

Locality 5 is on the foreshore 50 m to the west of this locality.

Locality 5 [NR 3977 4523]

Port na Sròine Gairbhe (NE)

Whereas metabasite sills are common in southern Islay, dykes of metabasite rock are rare. There is an unequivocal example of such a dyke on the shore here. It is 2 m wide, sub-vertical, has a foliation and trends north-south, clearly cross-cutting the metasedimentary rocks (Fig. 14.16). It is probable that this dyke was a feeder for the nearby or higher sills.



Fig. 14.16 A 2 m wide metabasite dyke at Locality 5. It probably was a feeder dyke for a (now removed by erosion) sill above.

Dykes of metabasite rock up to 30 m wide have been described cutting through stratigraphically older rocks on Jura but they are rare on Islay and on the mainland.

*Fig. 14.17 illustrates an igneous ‘plumbing system’ where the level of intrusion of sills is constrained by the **lithostatic pressure** in the surrounding rocks (which directly relates to their depth of burial) and the **hydrostatic pressure** in the feeder dyke. The lateral spreading out of the magma into sills occurs where the pressure of the magma balances the pressure in the surrounding rocks.*

At the time of intrusion of the sills and dykes, the stratigraphically older

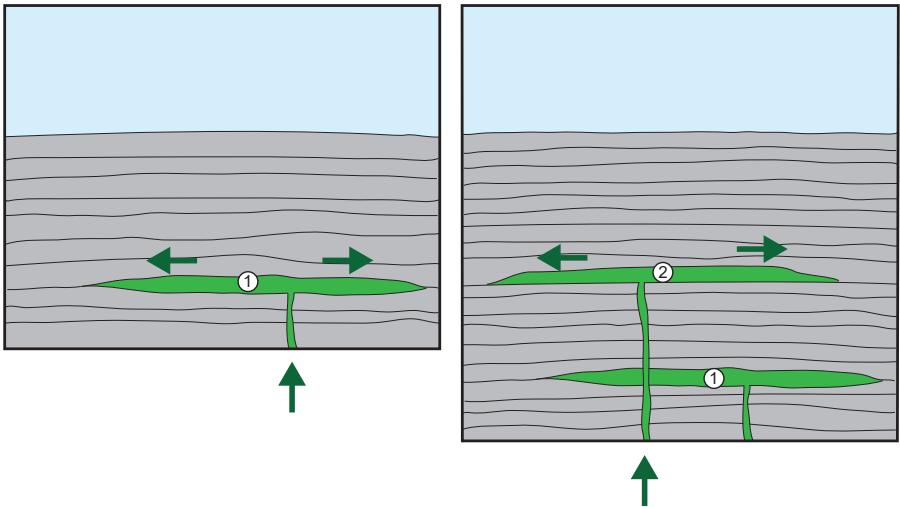


Fig. 14.17 Cartoons to illustrate the relationship and timing sequence of the sills and feeder dykes. (a) The first sill is fed by a dyke from below and it spreads out between the beds when the pressure in the magma is greater than the pressure in the sedimentary rocks. (b) Sediments continue to be deposited and the next pulse of magma up a new dyke spreads out as a sill at a higher level.

rocks on Jura will have been at a greater depth than the Port Ellen Phyllite and Laphroaig Quartzite formations on Islay and, critically, too deep for the intrusion of sills. They are important indicators of the **extensional stress regime** associated with the formation of the Dalradian sedimentary basin. The orientation of this dyke is similar to the majority found on Jura and indicates an extension direction that is approximately east–west.

The last locality is at the top of the promontory known as Barr An T-seann Duine, which forms the western end of the bay. The paths up the hill are narrow, steep and overgrown in places. Return to the road and follow the track around the bay to the boatyard. About 50 m past the entrance and by the new harbour, a small grassy path heads uphill and winds its way to the top past some old walls which are the remains of a pre-historic fort.

Stop at the edge of a deep gully running north-south across the peninsula (Fig. 14. 18).

Locality 6 [NR 4021 4536]

Barr An T-seann Duine

The headland is formed from a thick metabasite sill, similar to the other exposures visited on this excursion. However, here, as at the previous locality, there is another N-S metabasite dyke; this time cutting through a sill. The edges of the dyke appear to have distinct **chilled margins**.

Return to Lagavulin by the outward route or by heading 50 m west to the cairn at the top on of the Dun and following a narrow, sometimes steep, path which winds down the hill on the boatyard side, emerging on the road near the boatyard entrance.



Fig. 14.18 A 2 m wide metabasite dyke cutting through an (older) metabasite sill at Locality 6. It probably was a feeder dyke for a younger sill. Probable chilled margins (CM) can be observed on both sides of the dyke.

WHISKY RECOMMENDATION

The 16 year-old Lagavulin is an Islay classic. The typical peaty flavour of Islay's whiskies is particularly powerful here. Lagavulin is intensely dry and has smoky and salty flavours as well as seaweedy and medicinal notes.