

Colonsay Group Metasediments

- Sanaigmore Phyllite
- Smaul Greywacke
- Kilchoman Phyllite
- Coul Grit
- Rubha Gaidhealach Grit
- Kilchiaran Phyllite
- Eilean Liath Grit

- Fault
- Geological contact
- X Syncline
- ◇ Anticline

- Intrusive Igneous Rocks
- Paleocene dolerite dykes
 - Silurian Appinites

- Tarrd road
- Farm track
- Recommended walking routes
- Beach and dunes
- Peat
- Late-glacial gravels
- Esker

Fig. W3.1 Geological map of the area between Machir Bay and Saligo Bay after British Geological Survey (1997), showing the localities described in Excursions 3a and 3b.

Excursion 3: Saligo Bay

Two dramatic and scenic coastal walks at Saligo Bay in the upper part of Colonsay Group.

Grade: 1/1+ .

Access: No restrictions.

Terrain: Excursion 3a is relatively easy (1), but with areas of soft sand. Excursion 3b can be boggy in places and cut up by cows (1+).

Distance: Both sections are about 2.5 km return.

Duration: Allow 1.5 hours for each section.

Start: Park at the gate at Saligo [NR 2117 6638].

Facilities: Coffee shop in Kilchoman distillery at Rockside Farm.

Dogs: No dogs at Saligo during the lambing season (March-June).

Please heed notices at the gate.

These walks display metamudstones and metagreywackes of the upper part of the Colonsay Group, deposited as turbidites into deep water about 800 Ma ago. They were then folded and metamorphosed at 470 Ma but the deformation here was not very intense and many original depositional features can be observed. The rocks were then intruded by some unusual igneous rocks around 430 Ma.

This excursion is divided into two parts, both starting and finishing at the parking at Saligo. Excursion 3a is a circular walk at Saligo Bay over the machair and onto the beach (Localities 1 to 4) and Excursion 3b is a walk to rock features known locally as ‘The Arches’ (Localities 5 & 6). The map opposite (Fig. W3.1) shows the location of the two walks on a large-scale geological map, whereas Fig. W3.3 shows more detail.

Excursion 3a – Saligo Bay

Go through the gate and follow the farm track N past the WWII radio station buildings for about 400 m to some old farm buildings on the left which are 100 m past the northern of the two old radio masts. Leave the main track and follow vehicle tracks across the machair heading NW towards the coast, eventually (after some 500 m) reaching the coast just south of the large bay known as Taigh Fleisgein Bheag.

Locality 1 [NR 2095 6718]

Traigh Fleisgein Bheag.

*The rocks exposed around the bay are laminated **metamudstones** of the Kilchoman Phyllite Formation - which is part of the Colonsay Group . They*

were probably deposited in deep water and are about 800 million-years old. Here they are on the southern limb of a large **anticlinal** fold, the axis of which lies a few hundred metres north of the bay.

The pebble beach here (like others in the immediate vicinity) has some flint pebbles - but careful searching is needed! These flints played an important part in the post-Ice Age colonisation of the land by hunter-gatherers in the middle stone age (Mesolithic) as they were vital for tool making. Flints are from Cretaceous-age rocks (about 100 Ma) and are unknown on Islay. However they do 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 during the waning stages of the last Ice Age some 15,000 years ago.

Walk S following the edge of the machair for about 200 m.

Locality 2 [NR 2086 6701]

South of Traigh Fleisgein Bheag.

In this vicinity the metamudstones are abruptly succeeded by thick metagreywackes of the Smaull Greywacke Formation. **Greywacke** is term used when a sandstone has a high proportion of rock fragments as well as the usual quartz sand grains. The term immature is often applied to rocks like this reflecting their direct derivation from mountainous areas nearby and a consequent lack of reworking and sorting. The metagreywacke beds, with occasional thin metamudstone interbeds are exposed continuously to the next locality, and exhibit some small-scale folding.

These folds have a similar style to larger-scale folds which have resulted in the Smaull Greywacke forming the high ground and dramatic cliffs to the north of Smaull (Fig. W3.2) - which for the adventurous, are worth a visit.



Fig. W3.2 Folded bedded metagreywackes near Smaull Farm. Dun Bheolain (The Opera House Rocks) in the background.

Continue walking south, past a small pebbly bay, for about 400 m. The next localities are shown on the detailed map (Fig. W3.3). Exposure is continuous so Locality 3 extends as far as Locality 4, likewise Locality 4 extends to Locality 5.

Locality 3 [NR 2087 6663]

Saligo Bay.

At this locality the metagreywacke beds are dipping southeast at about 35° and are intruded by an elongate **igneous** intrusion (Fig. W3.4) with large pink feldspar and black biotite crystals - it is classified as an alkali-rich **syenite** (it has a lot of potassium) and is one of many Silurian-age (about 430 Ma) intrusions in this area. These rocks vary in chemistry and mineralogy across Argyll and are often called **appinites**. Here chilled margins, baked metamudstones and internal grain-size variations can be observed. These

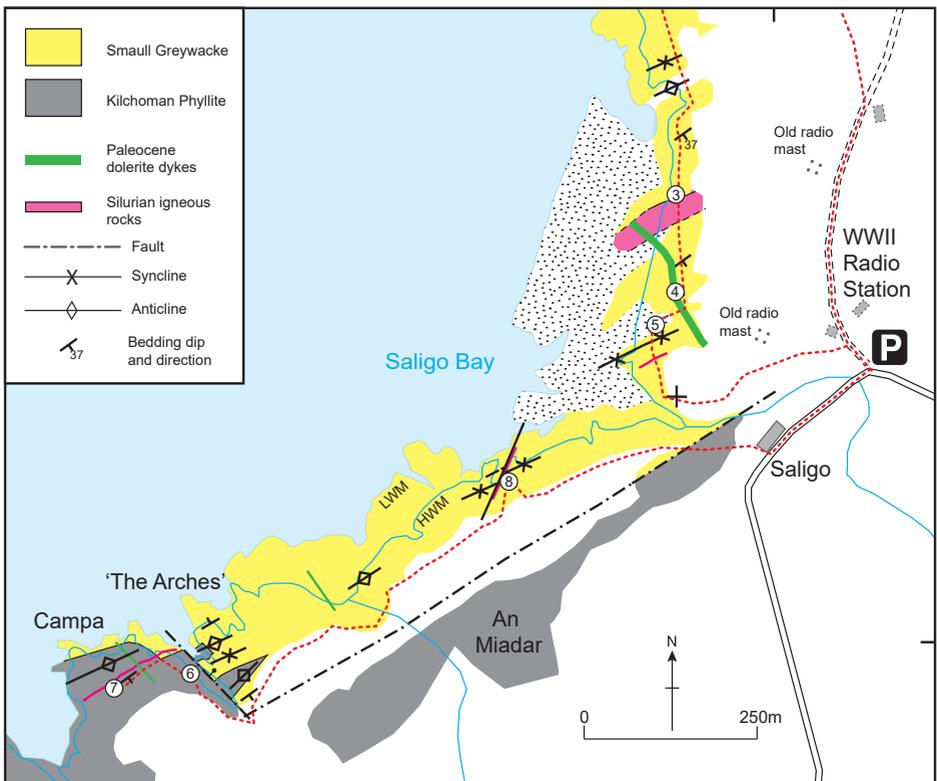


Fig. W3.3 Geological map of the area from Saligo Bay to Campa.



Fig. W3.4 Silurian-age syenite intrusion (on the right) at Locality 3.

rocks were intruded in the late stages of the Caledonian Orogeny, probably up zones of weakness related to movements on the nearby Great Glen Fault.

The section extending south from the intrusion at the edge of the sands is a good place to review the sedimentology of the

*metagreywackes. The bases of the beds are erosive and the grain-size varies from coarse near the base to fine near the top, grading into the overlying metamudstone - a feature known as **fining-up**. They are **turbidites** - the products of mass turbid flow from shallow water into deep water usually as a result of some major catastrophic event such as an earthquake. Poorly-consolidated sediment, previously accumulated in shallow water, slides off into deep water, breaking up and mixing with the water to form a flow which spreads out for many kilometres across the sea bed. The sediment load then settles out as the flow diminishes, with coarse grains at the base and finer ones at the top. There are lots of examples of clasts of mudstone within the greywackes which are termed **rip-up clasts**, testimony to the strong currents. There are also a variety of ripple and soft-sediment injection features.*

*Samples near here have been analysed to determine their age and the likely source area of the sediment. This **radiometric dating** on minute **zircon** grains shows that the sequence must be younger than about 900 Ma and the distribution of the ages of the zircon grains suggests a westerly source from ancient mountainous areas. The zircon data also suggests a correlation with the Grampian Group of the Dalradian in NE Scotland, and deposition in a **foreland basin** to these mountains is now envisaged.*



Fig. W3.5 Fining-up turbiditic metagreywackes of the Smaulle Greywacke Formation, Locality 3.



Fig. W3.6 (L) Complexly folded rocks at Saligo Bay. The metagreywacke beds are stronger (more competent) and less folded than the metamudstones.

Fig. W3.7 (below) Quartz veining with early folds.

Progressing southwards there is a small area of deformed strata at the back of a small embayment near [NR 2088 6652]. There is some complex folding reflecting a difference in strength (competence) between the mud-rich layers and the more rigid sand-rich layers (Fig. W3.6). Three well-defined fining-up cycles can be observed here too.



*There is a lot of white **quartz** veining evident, these veins were injected as the wet sediment pile was being buried and before the main folding (Fig. W3.7). Silica, derived from the greywackes, starts going into solution at temperatures above 250°C and then buoyancy drives the hot fluids upwards until they crystallise at lower temperatures higher up. Some geologists use the analogy of the rocks 'sweating' out these silica-rich fluids.*

Walk about 50 m to the SW. Locality 4 is the prominent wall of rock next to a sandy gully (Fig. W3.8)

Locality 4 [NR 2086 6649]

Dolerite Dyke.

*The NW-SE trending ridge of brown compact rock is a 5 m thick dyke of **dolerite** which has intruded the metagreywacke succession. Some of the dolerite is very coarse-grained and is therefore called a **gabbro**. Some baking of the adjacent*



Fig. W3.8 A 5 m thick NW-SE trending dolerite dyke crosses the beach at Locality 4.

metamudstones can be observed in the gully on the NE side. The dyke has a sinuous outcrop shape (see Fig. W3.4) and is of Paleocene-age (about 60 Ma), intruded as the North Atlantic Ocean began to open. The dyke was probably a feeder to a fissure volcano on the surface (like today in Iceland).

Walk up the sandy gully on the right of the ridge, and cross over it through a gap and reach rocks on the other side, across a small area of sand. Locality 5 extends from here, through a sand-filled gully to reach the Saligo River.

Locality 5 [NR 2086 6644]

Dyke to the Saligo River.

*The beds of metagreywacke beds now show many signs of deformation with small-scale folds in what is a complex syncline axial area (Fig. W3.9). The metamudstones in the core of the anticlines show an **axial-planar cleavage** developed as platy minerals (such as **muscovite** and **chlorite**) responded to the sideways pressure.*

The low cliffs near the river mouth consist of 0.5 to 1 m thick beds of metagreywacke with very thin metamudstones between each bed. Bedding here is approximately horizontal in the axis of a box-shaped anticline (Fig. W3.10).



Fig. W3.9 Folded metagreywackes and metamudstones at Locality 5 (photo C. Bentley).

Follow the rock ledges (or go higher onto the grass above the cliffs) and then take any of the several paths that lead NE following the river back to the gate and the parking.



Fig. W3.10 Metagreywackes of the Smaull Greywacke Formation, N bank of Saligo River, Locality 5.

Excursion 3b – The Arches

From the parking at the gate walk SW down the road for 200m and turn right through a kissing gate just to the right of the cottages at Saligo. The route to The Arches essentially follows the edge of the grass to the left of the wide strip of bare rock that characterises the south-western side of Saligo Bay. It is about a 1 km walk (past a small pebbly area) to a prominent gully which defines the north-eastern edge of the Campa peninsula. The grassy area is criss-crossed by a number of open field drains so care is needed as there is no well-defined path. The outward route by-passes Locality 8 as this is better seen after visiting The Arches and Campa. Once at the gully, skirt it on the south-eastern side above the small area of pebbles and choose a suitable line up the southwest side of the gully on the grass, eventually reaching a dramatic viewpoint across the gully looking NE.

Locality 6 [NR 2015 6595]

The Arches.

*The Arches are so-called after the classic **anticline** seen across the gully (Fig. W3.11). The rocks are the same metagreywackes and metamudstones seen at Saligo. The anticline has a low-angle fault on its SW-limb, which has compressional features meaning it is a thrust, however it may have originated as a syn-depositional extensional (normal) fault based on the bed thickness changes across it - there are thicker beds of greywacke on the (original) downthrown (or hangingwall) side. Another anticline can be*



Fig. W3.11 The Arches: metagreywackes and interbedded metamudstones folded into a low-amplitude anticline and syncline, Locality 6.

observed to the SW with a shallow intervening **syncline** between them. These folds and thrusts result from the compression that formed the Caledonian mountains about 470 Ma ago.

Locality 7 [NR 2007 6597]

Campa.

The **metamudstones** of the Kilchoman Phyllite Formation (which are stratigraphically below the Smaull Greywacke Formation) are well exposed on the promontory and are often laminated, have strong metamorphic foliation and occasional beds contain half-cm sized cubes of pyrite (Fig. W3.12).

They are intruded by a light-coloured fine-grained **igneous** rock about 2 m thick, trending SW-NE. It appears to have been intruded approximately parallel to the bedding and is therefore classified as a **sill**. It stands out well amongst the dark-grey metamudstones (Fig.



Fig. W3.12 Large pyrite cubes in metamudstones near Campa, Locality 7.

W3.13). It has a light colour because it is composed of **felsic** minerals and is a type of **microgranite**, known as a **felsite**. It is very likely to be of a similar age to the igneous rocks seen at Locality 3 and was intruded in the late stages of the Caledonian Orogeny about 440 Ma.



Fig. W3.13 Felsite sill intruding metamudstones near Campa, Locality 7.

Fig. W3.14 Felsite sill intruding metamudstones on the promontory of Campa, cut by a Paleocene-age dolerite dyke, Locality 7.



Close to the highest point of the promontory the felsite is cut by a (Paleocene-age) dolerite dyke (Fig. W3.14). This cross-cutting relationship clearly demonstrates that the dolerite must be younger and intruded after the felsite.

Return to the parking place by the outward route, but if time permits it is worth visiting an extra locality on the return route.

Locality 8 [NR 2059 6622]

Below Am Miadar.



Fig. W3.15 Anticline with flat top, Locality 8.

The anticline so well displayed at The Arches trends NE parallel to the coast and can be examined at this locality. A quartz vein has intruded into the box-shaped crest of the anticline (Fig. W3.15).

The cliff line of Am Miadar lies about 200 m inland and runs NE, parallel to the coast for about 1 km. It marks an early glacial or pre-glacial shoreline.

WHISKY RECOMMENDATION

After this walk try a whisky from the Kilchoman distillery. Most of the barley is grown locally and is also malted on-site. The barley grows well on the glacial gravels and some of the water used comes from a spring in the Colonsay Group rocks.