Cuillin Hills 5:

Soay Sound: An Leac

Along Soay Sound, at An Leac, where the Allt na Meacnaish reaches the coast, Paleocene plateau lavas unconformably overstep Upper Cretaceous, Lower Jurassic, Triassic and Late Proterozoic (Torridonian) strata, and are exposed in an accessible coastal section. En route are spectacular views of the southern part of the Cuillin Hills. To the south, across Soay Sound, is the island of Soay, and further south are the islands of Rum, Canna and Eigg.

Aspects covered: Paleocene plateau lavas (An Leac Member of the Rubha an Dùnain Formation); aa-textured lava; Paleocene dykes and sills; Triassic (Stornoway Formation) conglomerates, breccias and sandstones; Lower Jurassic (Ardnish Formation) calcareous sandstones, siltstones and shales, and limestones; Late Proterozoic (Torridonian) pebbly red sandstones (feldspathic arenites) of the Bheinn Bhreac Member of the Applecross Formation (Torridon Group); the base Paleocene unconformity.

Route: Culnamean (Glen Brittle) – Buaile Dhubh – Allt Coire Làgan – Allt na Buaile Duibhe – Lon Bàn – Loch Meàchdannaich – Allt na Meacnaish – An Leac – Suidhe na h-Inghne (- return Culnamean).

Distance: 18 kilometres.

Time: 6-7 hours.

General comments: This excursion, although long (*c.* 18km), is on relatively low and easy ground. The exposures at An Leac require low (preferably Spring) tidal conditions and the excursion should aim to arrive there at the appropriate time. Some parts of the coastline cannot be accessed, although the field relationships of the rocks can be seen from a distance. Superb views of the southern part of the Cuillin Hills, and south towards the islands of Soay, Rum, Canna and Eigg, are available all day, weather permitting!

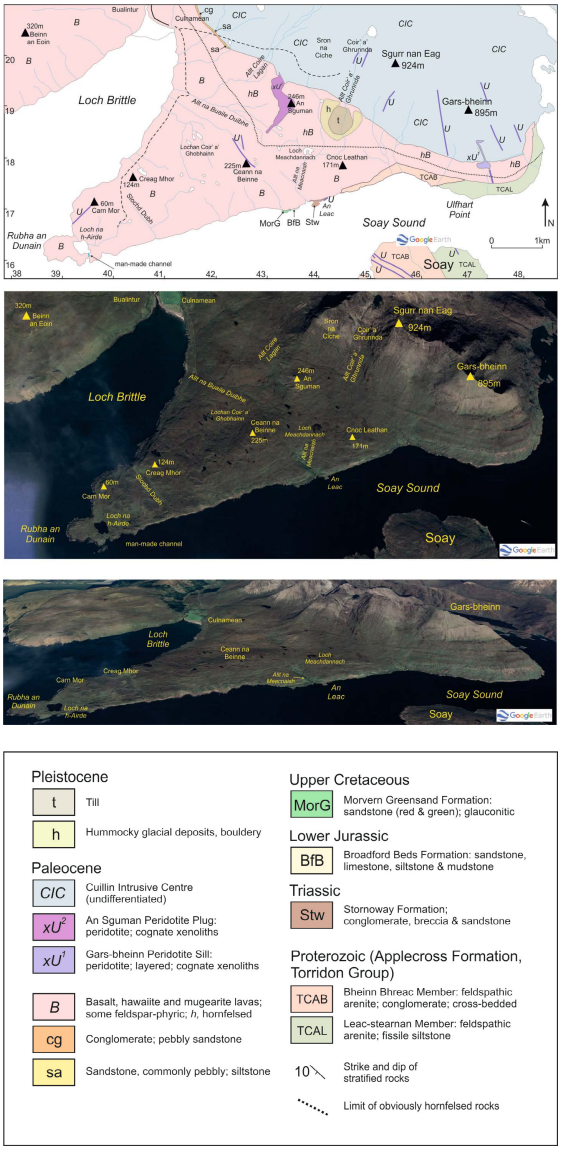

Figure Cuillin 5.1: Simplified geological map and annotated Google Earth® images of the Soay Sound area.

Glen Brittle lies on the west side of the main Cuillin ridge at the head of Loch Brittle. Follow the Broadford- Portree (A87) road to Sligachan (26km (16 miles) from Broadford and 14km (9 miles) from Portree). Take the Dunvegan (A863) road along Glen Drynoch to the Carbost (B8009) road (8km; 5 miles). From here, follow the Carbost road, along the south side of Loch Harport, as far as Merkadale (2.5km (1.5 miles)) and thence take the minor road signposting Glen Brittle. Descend into Glen Brittle (Gleann Bhretail) and continue to the end of the public road, to the entrance to the campsite (13km; 8 miles). Parking is available at the side of the track leading to the campsite above Glen Brittle beach.

From Culnamean, head south along the well-defined and good track towards Rubha an Dùnain. Access to the track is from behind the campsite toilet block. After *c.* 1.5km (*c.*1 mile), cross the Allt Coire Làgan, using the metal bridge west (downstream) of the track if needed. Continue SE across open land, parallel to the Allt Coire

Làgan and then its tributary, the Allt na Buaile Duibhe, through Lòn Bàn towards Loch Meàchdannach. There is a very poorly defined track formed by an off-road vehicle that, if identified, can improve progress over this scrubby ground. Cross the Allt na Meacnaish (to its east side), continue south towards An Leac and access the coast via a zig-zag path at the east end of the promontory of An Leac. There are no other safe access points to this part of the coast. Access to this coastal section requires low (preferably Spring) tides. During periods of heavy rainfall, it may be difficult to cross the Allt na Meacnaish.

The section at An Leac comprises the sedimentary sequence: Triassic (Stornoway Group) terrestrial strata, overlain by Lower Jurassic (Ardnish Formation) marine strata, overlain by Upper Cretaceous (Morvern Greensands Formation) marine strata. Unconformably overlying all are the basal units of the Paleocene plateau lavas: the An Leac Member of the Rubha an Dùnain Formation.

The unit on the coast at the base of the (access) path is the Stornoway Formation, forming a dipping surface of conglomerate cut by an obvious dolerite dyke.

The exposures that are most dependent upon low tide conditions are those west of where the Allt na Meacnaish enters Soay Sound. If timing of arrival is at low tide, then it is best to access this part of the coastal section first. The 'disadvantage' is that these exposures are at the top of the sequence, which may not suit those who wish to undertake a traverse in stratigraphic order, from oldest-to-youngest. Below, the sequence is described in this manner, but is set out oldest-to-youngest, but can be used either way.

The position of Allt na Meacnaish, where it enters Soay Sound, coincides with a NW-SE-trending fault that controls the distribution of the units along the coastal section. To the east of the fault, only Triassic strata are present, with the Paleocene volcanic sequence directly above. West of the Allt na Meacnaish, the units below the volcanic sequence comprise Lower Jurassic and Upper Cretaceous strata. Approximately 200m to the east of An Leac, another NW-SE -trending fault upthrows Torridonian strata (Bheinn Breac Member of the Applecross Formation) to the east.

Head east along the coast to where it is obvious that further easy progress is not possible. In doing so, a distinctive xenolithic peridotite sill (see below) and a fault will be crossed. Beyond, the dominant lithology is a sequence of distinctive reddish-orange feldspathic arenites, the Bheinn Breac Member of the Applecross Formation (Torridon Group).

Locality 1 [NG 4415 1701]:

The view east along this inaccessible section of coastline towards Ulfhart Point, and beyond, is of the sequence of Late Proterozoic (Torridonian) feldspathic arenites that belong to the Bheinn Breac Member, with a gradational base (NW of Ulfhart Point) with the underlying Leac-stearnan Member, which additionally contains beds of conglomerate. Both members belong to the Applecross Formation.

Features common within the nearby and accessible Bheinn Breac Member strata, indicative of deposition in a fluvial system, include cross-stratification, ripples, heavy mineral layers and desiccation cracks.

Locally, Triassic conglomerates unconformably overlie the feldspathic arenites and contain rounded to sub-angular cobbles and pebbles of dolostone, chert and quartz arenite ('quartzite'), derived from the Cambro-Ordovician sequence that crops out to the east, in the district of Strath. Clasts of 'Torridonian' feldspathic arenite are present, but not common.

During the Triassic, deposition was in grabens and the climate was arid, with periodic flash floods. Proximal to controlling faults, alluvial fan and debris flow depositional processes involving coarse clastic material were dominant, with distal deposition of finer-grained material in floodplain fluvial and lacustrine environments. The abundance of dolostone clasts and a granular carbonate matrix confirms the arid conditions.

Figure Cuillin 5.2: Coastal section east of An Leac on the north side of Soay Sound. The cliffs in the near distance are composed of reddish-orange feldspathic arenites of the Bheinn Bhreac Member, intruded by Paleocene dolerite dykes and sheets. The coastal cliffs in the distance are composed of the Leac-stearnan Member. Both are overlain by Paleocene basaltic lavas.

Figure Cuillin 5.3: Reddish-orange feldspathic arenites of the Bheinn Bhreac Member, intruded by Paleocene dolerite dykes and sheets. View is towards the north from Soay Sound.

Figure Cuillin 5.4: Reddish-orange feldspathic arenites of the Bheinn Bhreac Member, intruded by Paleocene dolerite dykes and sheets. View is towards the north from Soay Sound.

Figure Cuillin 5.5: Tabular sheets of cross-stratified Bheinn Bhreac Member feldspathic arenite with thin layers rich in cobbles and pebbles of quartzite, felsite, andesite and jasper.

Figure Cuillin 5.6: Detail of tabular sheets of cross-stratified Bheinn Bhreac Member feldspathic arenite with thin layers rich in cobbles and pebbles of quartzite, felsite, andesite and jasper. In the recess, above, are poorly stratified beds of Triassic conglomerate, dominated by cobbles and pebbles of Cambro-Ordovician dolostone, chert and quartz arenite/sandstone ('quartzite'), and feldspathic arenite. Pole *c.* 1m long.

Figure Cuillin 5.7: Typical coarse, pebbly feldspathic arenite within the Bheinn Bhreac Member. Coin *c.* 24mm across.

Figure Cuillin 5.8: Poorly stratified Triassic conglomerate, dominated by cobbles and pebbles of Cambro-Ordovician dolostone, chert and quartz arenite/sandstone ('quartzite'), and uncommon ('Torridonian') feldspathic arenite, all set in a matrix of sand-grade carbonate grains. Pole *c.* 1m long.

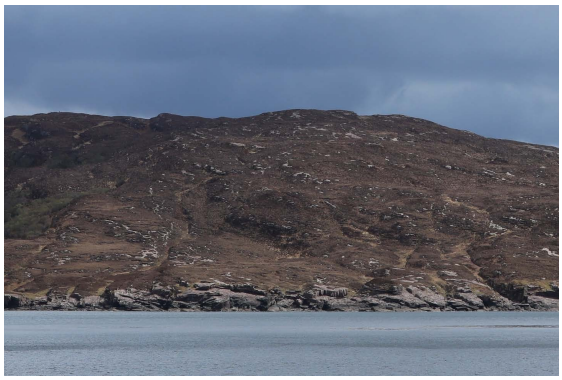

Figure Cuillin 5.9: NW Soay, viewed from An Leac, composed of Bheinn Bhreac Member feldspathic arenites. View towards the south.

Return west to the inclined sheet of xenolithic peridotite.

Locality 2 [NG 4406 1699]:

Paleocene peridotite minor intrusions are relatively common throughout the Cuillin Intrusive Centre, to the north, and in the surrounding country-rocks. Some of these intrusions are xenolithic, composed of similarly olivine- and plagioclase-rich coarse-grained material.

The xenoliths have a variety of mineral textures, all of which can be matched with the material that constitutes the Layered Peridotites that crop out in the southern part of the Cuillin Intrusive Centre.

The orange-weathering 'matrix' of this intrusion is relatively homogeneous and dominated by olivine with lesser calcic plagioclase. By contrast, many of the xenoliths are of troctolite, with plagioclase more abundant than olivine. Xenolith size ranges from a few centimetres, up to *c.* 25cm across. The textures of the xenoliths include relatively homogeneous types, through to banded and complex lace-like variants. The distribution of xenoliths within the intrusion appears to be random and boundaries between the xenoliths and the matrix peridotite are sharp and show no evidence of reaction.

Figure Cuillin 5.10: Inclined sheet of xenolithic peridotite with randomly oriented xenoliths of troctolite. Pole *c.* 1m long.

Figure Cuillin 5.11: Randomly oriented, banded troctolite xenoliths within host peridotite. Coin *c.* 24mm across.

Figure Cuillin 5.12: Troctolite xenolith with delicate lace-like texture. Coin *c.* 24mm across.

Locality 3 [NG 4394 1693]:

Return west to the inclined platform of Triassic conglomerate at An Leac, *c.* 150-250m east of the outflow of the Allt na Meacnaish. These coarse clastic deposits formed by alluvial fan and debris flow depositional processes, with distal deposition of finer-grained material in floodplain fluvial and lacustrine environments.

Most of the clasts are of pale dolostone, derived from the Cambro-Ordovician Durness Group which, although not outcropping locally, constitutes an important part of the Moine Thrust Zone *c.* 15-20km to the east, although a small outcrop is preserved *c.* 7km to the east in Camasunary Bay [NG 5111 1908]. Locally, the conglomerate is dominated by clasts of feldspathic arenite, or of quartz arenite/sandstone ('quartzite'). Rare interbeds of pale brown, coarse, pebbly sandstone, deposited by streamflow in ephemeral fluvial channels, are interbedded with the conglomerates.

Figure Cuillin 5.13: Triassic alluvial fan conglomerate, dominated by pale cobbles and pebbles of Cambro-Ordovician dolostone and uncommon pebbles of quartz arenite/sandstone ('quartzite'), and feldspathic arenite ('Torridonian'). Pole *c.* 1m long.

Figure Cuillin 5.14: Detail of Triassic alluvial fan conglomerate, dominated by pale cobbles and pebbles of Cambro-Ordovician dolostone and uncommon pebbles of quartz arenite/sandstone ('quartzite'), and feldspathic arenite ('Torridonian'). Coin *c.* 24mm across.

Figure Cuillin 5.15: Detail of Triassic alluvial fan conglomerate, dominated by pale cobbles and pebbles of Cambro-Ordovician dolostone and uncommon pebbles of off-white quartz arenite/sandstone ('quartzite'), and feldspathic arenite ('Torridonian'). Coin *c.* 24mm across.

Figure Cuillin 5.16: NW-SE -trending Paleocene dolerite dyke intruded into Triassic conglomerate on An Leac foreshore platform. Pole *c.* 1m long.

Locality 4 [NG 4390 1697]:

West of the An Leac foreshore platform of conglomerate, the back of the beach is dominated by a thick Paleocene dolerite sill intruded into thermally altered strata. These comprise pale calcareous pebbly sandstones, dark grey, buff, green and purplish red mudstones, and dark limestones, all presumed to be of Triassic age. The unconformity between the Paleocene lava sequence and these Triassic strata is also close to the back of the coastal platform and, in places this thick sill intrudes the lavas.

Figure Cuillin 5.17: Thick dolerite sill within the uppermost part of the Triassic sequence of pale calcareous pebbly sandstones, dark grey, buff, green and purplish red mudstones, and dark limestones. View is towards the west from An Leac.

Figure Cuillin 5.18: Detail of contact between dolerite sill and the uppermost part of the Triassic sequence of pale calcareous pebbly sandstones, dark grey, buff, green and purplish red mudstones, and dark limestones. View is towards the west from An Leac.

Figure Cuillin 5.19: Dolerite sill intruded into a'a (rubbly) basaltic lava, immediately east of the outflow of the Allt na Meacnaish. Pole *c.* 1m long.

Figure Cuillin 5.20: Detail of a'a (rubbly) basaltic lava, immediately east of the outflow of the Allt na Meacnaish. Pole *c.* 1m long.

The sill continues west of the outflow of the Allt na Meacnaish, across a fault and into the downthrow side strata. The sill is at or close to the unconformity between the Paleocene lavas and the underlying sequence of Lower Jurassic strata. The top of this coastal cliff comprises the first lava of the Paleocene volcanic sequence, with recognisable colonnade and entablature.

Locality 5 [NG 4378 1694]:

The Jurassic strata are marine shales, siltstones and limestones, thermally altered by the dolerite sill(s) intruded into them. Fossils in this part of the section are uncommon; further west along the coast, not easily accessed, is a similar sequence with abundant *Gryphaea arcuata,* a bivalve common in and typical of the marine Lower Jurassic Ardnish Formation of the Inner Hebrides.

Figure Cuillin 5.21: Lower Jurassic strata intruded by dolerite sills and unconformably overlain by the first basaltic lava of the plateau sequence (An Leac Member of the Rubha an Dùnain Formation). View is towards the west, from the outflow of the Allt na Meacnaish.

Figure Cuillin 5.22: Lower Jurassic shales, siltstones and limestones intruded by a jointed Paleocene dolerite sill, west of the outflow of the Allt na Meacnaish. View towards the east. Pole *c.* 1m long.

Figure Cuillin 5.23: Thermally altered Lower Jurassic shales, siltstones and limestones, west of the outflow of the Allt na Meacnaish. View towards the west. Pole *c.* 1m long.

Figure Cuillin 5.24: Thermally altered Lower Jurassic shales, siltstones and limestones unconformably overlain by a jointed Paleocene basaltic lava, west of the outflow of the Allt na Meacnaish.

Figure Cuillin 5.25: Thermally altered Lower Jurassic shales, siltstones and limestones unconformably overlain by Paleocene basaltic lavas (An Leac Member of the Rubha an Dùnain Formation), west of the outflow of the Allt na Meacnaish. View is towards the north from Soay Sound.

Figure Cuillin 5.26: Paleocene basaltic lava (An Leac Member of the Rubha an Dùnain Formation) intruded by a dolerite dyke, forming the headland west of the outflow of the Allt na Meacnaish.

Return using the same route, *via* the east side of the Allt na Meacnaish.

End of excursion.