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## Excursion 6: Glen Sannox and North Glen Sannox

((Figure 11), localities 1 to 22)

The main objects of this excursion are: (1) to traverse the Lower Old Red Sandstone succession seen in Glen Sannox and on the hillsides to the north, including a visit to the old barytes mines; (2) to study the exposures of Dalradian and Ordovician rocks on the south side of North Glen Sannox and in the North Sannox river itself; (3) to examine the sections of the coarse granite in Coire nan Ceum and the granite-schist contacts at selected localities; (4) to traverse the faulted outcrops of Lower and Upper Old Red Sandstone between North Glen Sannox and the Fallen Rocks.

The excursion begins where the path to Glen Sannox leaves the Corrie—Loch Ranza road. The path leads past an old burial ground, at one time the site of a small chapel dedicated to St. Michael. An ancient sculptured stone showing a rude effigy of the saint is built onto the outside of the graveyard wall to the left of the gate.

Before going on to locality 1, it is worthwhile lingering for a short time at some point giving a good view of the glen with its rugged rampart of encircling hills; the long southern face of Suidhe Fhearghas to the north; to the south Cioch na h'Oighe with the deep corrie known as the Devil's Punchbowl on its eastern side; and, at the head of the glen, Cir Mhòr.

1. [NS 0098 4536] At this locality sections in the Sannox Burn show fine-grained, purplish sandstones and hard, red, sandy mudstones, sometimes slightly calcareous, assigned to the Lower Old Red Sandstone. These are inclined nearly due east at angles of between 33° and 50°. Two dykes 2.4m and 1.2m thick, respectively, cut the sedimentary rocks; these are both badly decomposed basalts in which the original porphyritic crystals of olivine and augite have undergone alteration and are now largely replaced by pseudo-morphs. They belong possibly to the Lower Carboniferous period of volcanicity. Note the band of quartzite conglomerate crossing the stream a little higher up.

2. [NS 0072 4527] **Barytes mines.** Barytes (barium sulphate) was worked here, both by surface excavation and shallow shafts, in the middle of the nineteenth century (*circa* 1836–1862), and again on a more extensive scale from 1919 to 1939. The main vein crosses the Sannox Water in a northerly direction and is about 1.5 m thick, steeply inclined to the west. During the later workings shafts were sunk on both sides of the burn and the ore followed downwards to a depth of about 9 m. Both downwards and laterally, however, the workings entered unproductive ground and they were abandoned in 1939. The barytes in the worked area occurred as a series of pockets or lenticles aligned along fault-fissures trending north or northwest and it is said that the richest deposits were found at the intersections of these. The crushing and screening plant was situated near the shafts and the ore was taken by a light railway with a self-acting conveyor to the loading pier at the mouth of the Sannox Water.

Exploratory mines were also driven northwards as far as the small veins exposed on the north hill (see locality 4), but no important occurrences were found in the ground between the latter and the main field. Attempts were also made to reach the barytes vein seen crossing the little burn (Allt a'Chapuill) which joins the Sannox from the south, but again without success.

The output from the Sannox mines increased from 300 tons in 1920 to 8,693 tons in 1934. Barytes, known from its high density as "heavy spar" has many uses in industry, particularly as a component of drilling mud in oil wells, as well as being an important source of barium salts.

The country-rocks in the vicinity of the old shafts are fine-grained purplish sandstones, often clayey and slightly calcareous, and red mudstones. Abundant material is available for examination in the waste-heaps.

The broad dyke-like intrusion of dolerite south of the barytes mines is included in the itinerary for Excursion 5 (locality 12a).

3. [NR 9997 4508] From the mines follow the rough track up the glen to locality 3. Examine here the exposures of massive conglomerate containing numerous rounded boulders and pebbles of quartzite as well as boulders of igneous

rock. The latter are in the main hornblende-andesites and represent material derived by denudation in Lower Old Red Sandstone times from a contemporaneous volcanic series (see Excursion 1, locality 16). A short distance beyond this locality the granite margin is reached, but the actual junction is not seen. It should be noted that the Dalradian schists are not present along this part of the granite margin (cf. locality 5).

4. [NS 0041 4553] Cross the drift-covered hillside in a northeasterly direction to locality 4. Here there are fine exposures of a massive conglomerate made up mainly of quartzite pebbles and forming a broad belt some 120m wide running in a north-northeast direction. Examine the types and shapes of the included pebbles and boulders and note also the thin barytes veins traversing the conglomerate. These veins, seldom exceeding 60 cm in width and very impersistent, were opened out and worked for a short time after the closing down of the main mines at locality 2.

5. [NR 9976 4624] Follow the conglomerates northwards from locality 4 for a distance of about 500m and then turn westwards to Torr nan Gobhar (250m). This little hill is built in the main of red and grey conglomerates overlain to the east by purplish, flaggy sandstones and hard mudstones. To the west the conglomerates are brought against the schistose grits of the Dalradian along a line which has been suggested to be a continuation of the Highland Boundary Fault (see p. 27).

The schistose grits form a prominent feature in the topography here, extending in a east-west direction for some 180m and stretching from the North Sannox Water southwards for about 1.3 km until truncated by the granite. Graded bedding seen at a number of exposures indicates that the succession in this belt of schists is an upwards one from west to east.

6. [NR 9965 4646] At this locality the visitor passes westwards across the southern part of the zone of black shales, cherts and lavas, of possible Arenig (Lower Ordovician) age, shown (fig. 11) as running in a north-south direction across North Glen Sannox. In a little burn at this point there is a section showing Dalradian schists separated from "Arenig" lavas by less than a metre of broken rock. Both schists and lavas are somewhat shattered, and Anderson and Pringle (1944, pp. 86–87 and fig. 1) have drawn a fault between them.

The westward route from locality 6 to locality 7 traverses the outcrop of the "Arenig", the rock groups met with being:

Upper lava

Thin band of black shales and cherty mudstones

Lower lava

Thin band of black shales.

The succession can, however, be best studied in the North Sannox Water (localities 14–15) and may be passed over rapidly here. The Dalradian schists following the "Arenig" on the west side are also better seen in the stream (locality 14) but exposures on the hillside should be examined for evidence of graded bedding indicating an upward succession from west to east. It should be noted that in the vicinity of Cnocan Donna the "Arenig" rocks have been indurated by proximity to the granite although the actual contact is not seen.

7. [NR 9879 4639] Note at this locality the altered and indurated gritty schists at the granite-schist contact.

From locality 7 to locality 8 continue westwards round the northern slopes of Creag Ghlas for about 1.6 km, noting various exposures of the coarse granite on the way. Then turn northwards up the headwater of the North Sannox which drains Coire nan Ceum to about the 335 m level.

8. [NR 9745 4563] At this locality a 2m dyke of porphyritic felsite with pitchstone on its northern margin crosses the burn in a northeasterly direction. A short distance downstream is a thin northwest trending basaltic dyke. Note the fine series of moraines on the corrie floor a little higher up. These are among the most recent in the whole of Arran and were probably formed by a small glacier about 9500 B.C.

9. [NR 9820 4685] From locality 8 to locality 9 follow the burn downstream, noting on the way good sections of the coarse granite showing a rude platy structure due to the development of a system of close-set parallel joints. The granite is cut by a few basic dykes.

10. [NR 9847 4686] Examine here the nearly vertical junction of the granite against dark-blue phyllites with gritty bands, all much indurated.

11 [NR 9923 4682] In the North Sannox Water, just above the road bridge, there are excellent sections in steeply inclined greenish-grey schists and schistose grits, sometimes pebbly. Graded bedding, seen at a few places, again indicates an upward succession from west to east.

From locality 11 follow the Loch Ranza road westwards to locality 12. Note at the roadside, 500m west of the bridge and near milestone 48, fine greenish-grey gritty schists, inclined steeply to east-northeast or northeast. A small quarry a little farther on shows a section in alternating fine grey grits and greenish slates all baked and indurated by proximity to the granite.

12. [NR 9807 4738] Examine carefully the vertical granite-schist boundary which follows the burn for some distance. Note the baked character of the schists, A 2.4m, northeasterly directed, felsite dyke cuts across the junction. Note also the sections the burn has cut in the till. In the north of Arran the glacial till is grey in colour, reflecting the local predominance of granite and schist in contrast to the red sandstone-based till in the south of the island.

13. [NR 9786 4771] Here another granite-schist junction can be examined. The line of contact crosses a little stream in an irregular wavy line. The granite is fine-grained near the margin and contains some inclusions of schist.

Return along the road as far as the bridge over the North Sannox Water, noting on the way the striking and ever changing views of the granite mountains of north Arran.

14. [NR 9941 4688] The first exposures below the bridge are grey, gritty schists following those already seen at locality 11. Interbedded with these are fine-grained slaty schists and some 150m downstream from the bridge comes the boundary between the Dalradian and the "Arenig". The actual junction can only be seen low down on the tight bank, where the grey grits are brought against black phyllites associated, a metre or so downstream, with a shattered or brecciated rock made up of fragments of much altered and carbonated lava. This probably represents a thin lava flow brecciated prior to final consolidation. The junction of the Dalradian and the "Arenig" should be carefully examined for signs of faulting (see p. 25).

The brecciated rock, exposed only on the south bank, is followed by a metre or so of black slaty schist with some thin irregular cherty layers and then by a thick bed of "greenstone", the lower lava of the "Arenig" succession, which extends downstream for about 90 m. This is a fine- to medium-grained, greenish or greenish-grey rock and shows the characteristic "pillow structure" of lavas that have flowed into water. The chilled margins of the pillows (30 cm or so in diameter) should be noted as well as the presence of numerous amygdales or steam-cavities filled, on their inner surfaces, with infiltrated mineral matter. This bed of lava is about 113m thick. It is followed downstream, first by a brecciated lava flow similar to that occurring near the base of the succession, then by a belt of thinly laminated black shales with pale-coloured cherty layers throughout and occasional thin ashy beds. This belt, about 30m thick, forms the main outcrop of the "Arenig" sediments. Anderson and Pringle (1944, p. 84) record the occurrence of a 3 m wide intrusion of decomposed and carbonated gabbro which has invaded and indurated the shales. The intrusion can be seen on the south bank and in the bed of the stream. The thick upper lava which follows is only partly exposed here, but a good section of it can be examined on the hillside to the south at locality 6.

15. [NR 9986 4687] Examine here the section of steeply inclined grey gritty siliceous schists which strongly resemble those seen just below the road bridge near locality 11. There is no evidence in the stream itself of the relationship of these eastern schists to the "Arenig", but if the grits are followed up the hillside to the south there are indications of a faulted junction at one or two points (see locality 6).

Graded bedding in the Dalradian outcrops west and east of the "Arenig" indicates in both cases an upward succession to the east.

16. [NR 9973 4694] At this locality the main band of black shales and cherts are exposed in the Allt Cairn Bhain, a little stream joining the North Sannox from the north. It was here that Anderson and Pringle obtained two small hingeless brachiopods referred to *Acrotreta* (see p. 25).

17. [NR 9991 4686] The junction of the Lower Old Red Sandstone with the Dalradian at this locality has been taken as a faulted one and is so shown on the 1:50,000 geological map of the island. This fault was regarded by Gunn (1903, p. 19), by Tyrrell (1928, p. 24) and Anderson (1945, p. 272) as a continuation of the Highland Boundary Fault. It is not seen in the stream but its position can be closely located. To the north it brings the Lower Old Red Sandstone successively against Dalradian, the upper lava of the "Arenig" and then the central belt of black shales.

Here purplish conglomerates are followed downstream by reddish sandstone and mudstone exposed at intervals and dipping east-northeast at angles varying from 20° to 40°. Southwest of North Sannox a well-marked band of conglomerate is exposed: this conglomerate can be followed from Glen Sannox to North Glen Sannox and beyond in an arcuate outcrop.

Note the remains of old dwellings along the north bank here. Bryce (1872) writes: "Many years ago, a large population, the largest then gathered in any one spot in Arran, inhabited this glen, and gained a scanty subsistence by fishing and by cultivating fertile plots on the sunny hillsides. In 1832 the whole of the families, amounting to 500 persons, were obliged to leave the island but were furnished with the means of reaching New Brunswick. They formed a settlement at Chaleur Bay, which became very prosperous. Garden enclosures, tree-clumps, solitary fairy thorns and ruined wallsteads, still remaining, give a melancholy interest to this secluded glen."

From the North Sannox farm area, alternative routes are offered. For those interested in archaeology and the Upper Old Red Sandstone sediments underlying the lavas shown in fig. 11, the route lies generally northwestwards in Lower Old Red Sandstone strata. The alternative route misses out locality 19 and proceeds by way of the North Sannox picnic area from where the coast can be followed southwards towards locality 21.

18. [NS 0013 4732] Here a prominent feature formed by a massive conglomerate of Lower Old Red Sandstone age is surmounted by the remains of an old hill fort known as Torr an t'Sean Chaisteil. The plan of this structure (fig. 12) and the descriptive details that follow are taken from the *Book of Arran* published in 1910. The structure is there described as consisting of:

1. an outer defence wall on the southeast, of which only the entrance or portal, about 1.2m wide and small portions of the wall on either side remain.
2. the main structure with an entrance 2.4m wide and 3.7m long leading into the central enclosure. The walls of this, probably originally 3.0 to 3.7m in thickness, enclose an area about 37m long and 29m wide. On the western or northwestern side the wall seems to have been thicker because there is included in it a hut-dwelling, 2.4m long and about 1.8 m wide, and the remains of what may have been two other similar chambers.
3. an outer defence wall on the west side of the fort and at a lower level. This is now in a very ruined condition.

This fort certainly occupies a very commanding position with wide views of North Glen Sannox and the north Arran granite peaks. A traverse from this locality via the O.S. triangulation station (224m) to the "Navigation Beacon" [NS 009 474] permits examination of the Upper Old Red Sandstone sediments which underlie a volcanic horizon mapped by Gunn. Fine features are formed of massive, whitish conglomerates which alternate with reddish flaggy sandstones with northeasterly dips.

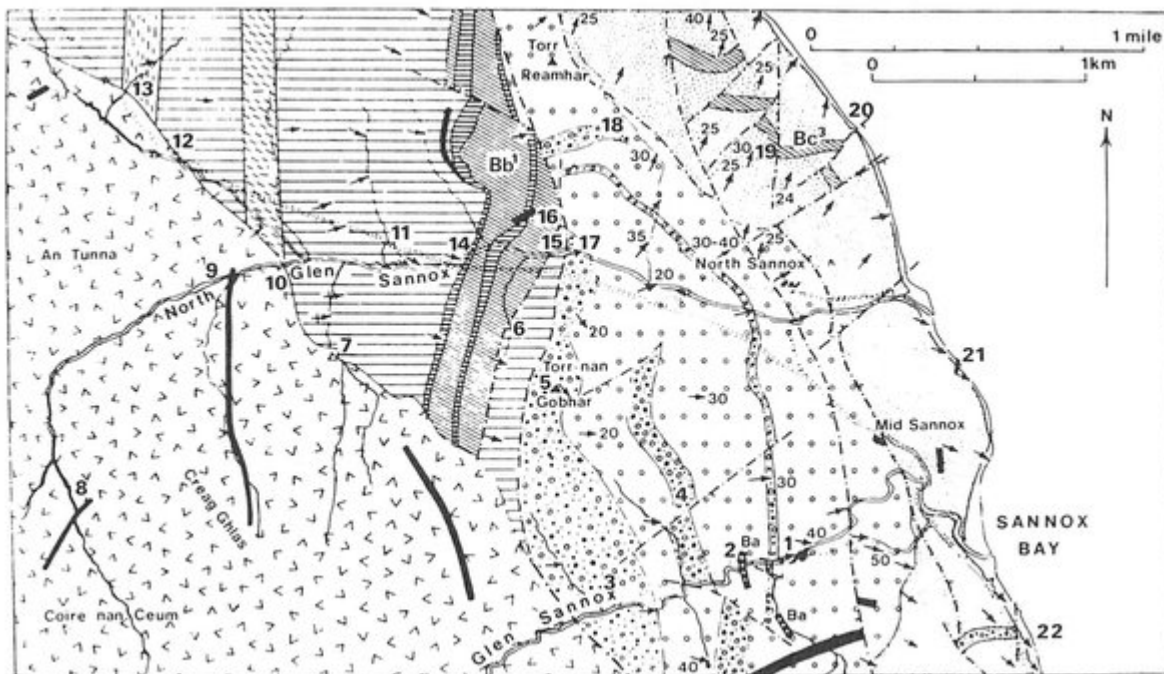
19. [NS 0088 4739] At this locality (beside the beacon) evidence of the volcanic horizon should be sought. The lavas were described by Gunn (1903, p. 29) as purplish red, amygdaloidal and decomposed. The shore is reached by following the route of the overhead lines which carry power to the beacons.

20. [NS 0136 4727] In the vicinity of the lower "Navigation Beacon" cornstones occur in the sedimentary succession and evidence of faulting of various degrees of importance can be examined. On gaining the shore the excursion can be extended to the northwest, if time permits, to visit the land-slipped area of the Fallen Rocks where large masses, mainly of conglomerate, have fallen from the cliffs and obliterated the coastal shelf. It is just north of the Fallen Rocks that the basal Carboniferous beds appear.

21. [NS 0169 4629] Between the picnic area and Sannox Bay the Upper Old Red Sandstone sandstones and conglomerates now dip generally southeastwards. A conspicuous NNE trending composite dyke, with a width of some 16m, has caused obvious alteration of the sandstones. Nowhere is there any trace of the volcanic horizon, which might be expected to reappear at some point along this coastline.

22. [NS 0198 4493] Cross-bedded red pebbly sandstones occur here and are traversed by crush-zones and basic dykes. Note the large erratic block of granite (3 m by 2 m by 1.8m) perched on coarse conglomerate and known as the Rocking Stone. Another granite erratic near it is 1.75 m high and 3 m long with a maximum width of 2.75 m. The sandstones exposed south of the Rocking Stone show on some of their surfaces a pattern of hardened cylindrical projections which Gunn suggested might be worm-casts.

### References



(Figure 11) Geological sketch-map of the Glen Sannox and North Glen Sannox area. For key see Figure 5.