
Chapter 4 (?) Arenig rocks

A strip of rocks that may be separated from the ordinary schists of the island is found in North Glen Sannox. It crosses the valley from south to north at a distance of rather over a mile from the sea. It is upwards of a mile and a half in length, and its width varies from 100 to 400 yards, being narrowest at its northern end. The rocks in this area, so far as can be ascertained, are not separated by any structural line from the ordinary schistose grits on either side of them, and they appear to be essentially a part of the metamorphic series of the Highlands. They differ much in character, however, from ordinary schists, in that they consist mainly of igneous rocks, both volcanic and intrusive, with which are intercalated bands of black shales or schists, and thin bands of chert.

The black shales and cherts are associated together, as they are in the Aberfoyle district along the Highland border, and in the band of similar deposits intercalated with volcanic rocks in the Arenig group of Ayrshire. The black shales are partly in the condition of phyllites, and are much contorted in places. The cherts are perceptibly granulitized, and in structure similar to those parts of the cherts which have been altered by the granite of the Southern Uplands. When in this condition, such rocks have generally lost all trace of their organic remains, and no radiolaria have yet been found in these Arran cherts. The most prominent members of this group of rocks are those of igneous origin, and it is now definitely ascertained that there is in Arran a very old volcanic series which includes undoubted lavas and volcanic tuffs. The lavas form bands of a dull-green, fine-grained rock, which may be conveniently spoken of as 'greenstone'. Like their associated sediments they have undergone a considerable amount of deformation, and are now in the condition of epidiorite. The whole of the rocks, both aqueous and igneous, appear to be in the same state of metamorphism as the schists to the east and west of them. They have an apparent dip to the east-south-east at high angles, and sometimes are practically vertical, and it is by no means certain which is the top or bottom of the series. They have also undergone much plication, which is particularly observable in the intercalations of black schist, and, as has been before observed, they are flanked on either side by schistose grits of the ordinary Southern Highland type.

The strip of rocks thus defined is truncated at its southern end by the intrusion of Arran granite at the north-east end of the ridge of Suidhe Fhearghas, while its northern boundary is a fault which brings down against it a part of the Lower Carboniferous Series. The Schistose grits, which apparently underlie these rocks, are well exposed in the North Sannox Burn at the bridge, while another series of schistose grits, which apparently overlies these volcanic rocks, can only be observed in the main stream and on the south side of the glen, as they are cut out on the north side by the Highland border fault, which brings down the Lower Old Red Sandstone against the igneous rocks. This fault gradually crosses the line of strike of the igneous group, so that only the lower portion of it is represented at its northern end.

The general succession of the members of this group of rocks, together with the underlying and overlying sedimentary strata belonging to the Highland schists, is apparently, in descending order, as follows

1. Coarse schistose grits or gritty schists, grey in colour, and weathering with a smooth surface.
2. Thin bands of slaty schist, with traces of dark schist or shale, apparently alternating in places with thin bands of greenstone.
3. Upper bed of greenstone, generally fine grained and quite schistose in places, with some lenticular bands of agglomerate.
4. Bands of light-coloured and dark chert, associated with bands of laminated black shale or schist. Lenticular bands of volcanic tuff and of schistose grit also occur on this horizon.
5. Lower bed of greenstone, often massive. It contains an agglomerate band on the north side of the valley.
6. Bands of black shale or schist, associated with chert, and with some fine-grained slaty schist. There are traces of agglomerate also.
7. Thick mass of strong and coarse schistose grit, sometimes greenish in colour and generally different in character from No. 1.

The whole succession may be observed in the North Sannox Burn, and on the hillside to the southward. On the north side of the glen the upper grit and greenstone are obscured by glacial drift for some distance till they are cut off by the Highland fault. Nos. 2 to 6 embrace the rocks supposed to be of Arenig age. W.G.

Another reading of the section in the North Glen Sannox Burn, taken in the same direction, is given below. It varies in detail, but corresponds well in essentials with that worked out by the late Mr. W. Gunn.

Starting at the eastern margin of the outcrop, and proceeding westward, the coarse quartz-conglomerate of the Lower Old Red Sandstone is succeeded, after a blank interval, by dark, bluish, not much altered schistose grits, abundantly intersected by quartz veins. The prevalent colour of these rocks is blue, and they weather with very smooth polished surfaces in the stream bed. These rocks correspond to No. 1 of Mr. Gunn's section, and are not included as belonging to the Arenig.

Farther west there are quartzose and slaty bands of a greenish colour dipping at 70° to the east-south-east. These rocks are interbedded with a few bands of rather more argillaceous green slates, and a bed of red and green jasperoid mudstone. These rocks are regarded as the uppermost beds of the Arenig section, and correspond to No. 2 of Mr. Gunn's section above.

Beneath these rocks comes a band of hard greenstone marked with dark spots (the 'spotty lava'). This is the upper lava (No. 3) of the above section.

At the bend in the stream near 138 feet O.D., a quarter of a mile E.N.E. of North Sannox Bridge, there is a thick band of striped, blue, argillaceous slates, with some coarser gritty bands which resemble ash beds. These are underlain by coarse angular breccias mainly composed of fragments of spotty lavas. The dip of these beds is nearly vertical, and their outcrop is about 25 yards wide. This is No. 4 of Mr. Gunn's section.

Then comes the main band of lavas (No. 5). They are green compact rocks, smooth-weathering, and for the most part devoid of the spots characterizing the upper band. The pillow structure is here best exhibited. The pillows are rather small, averaging only 12 inches in diameter, and are often crushed together. Mr. Gunn's acute observation of the chilled margins of the pillows, and their concentric bands of amygdales, to be discerned in spite of the crushing and alteration the rocks have undergone, was confirmed. At the base of the lavas is another thin bed of breccia, underlain by blue banded slates and slaty grits, in which are occasionally intercalated beds of blue schistose grit. This represents No. 6 of Mr. Gunn's section, and is the base of the series recognized as Arenig.

At North Sannox Bridge are alternations of fine-grained grey and green-banded siliceous slates or slaty quartzite (siltstone), coarse quartzite with only a faint schistosity, dark green schistose grits, and green slates. Above the bridge coarse schistose grits become the dominant rocks of the section. The prominent crag to the south of the bridge is composed of the lower band of lavas, which are here frequently vesicular. In the crag higher up and farther to the east the spotty lavas of the upper band are encountered, and are followed by shattery green slates, which are interbedded with a band or two of spotty lava and with coarse schistose grit. The latter becomes the dominating rock east of the little stream descending from Torr nan Gobhar, and continues up to the boundary with the Old Red Sandstone conglomerate. G.W.T.

Details of sections

The gritty schists, No. 7, are well exposed in the stream where the road to Lochranza crosses, both above and below the bridge. They are here crossed by some basalt dykes. About 70 yards east of the bridge the coarser rock contains a band of fine-grained schist, and 80 yards farther down the stream dark schists are seen to be associated with a brecciated rock like that which occurs in several places. It is composed of fragments of old lava, but is not exactly like a true volcanic agglomerate, and may have been produced by the brecciation of igneous rock in motion before final consolidation. Above these rocks in the main stream comes the lower mass of lava (No. 5), which occupies the burn for 100 yards. It is for the most part a massive rock, moderately fine grained, and of a greenish-grey colour. It exhibits well-developed 'pillow structure' identical in character with that of the basic lavas of Arenig age in the Southern Uplands, but not on so large a

scale. The chilled and rounded margins of these 'pillows', and the numerous amygdalae that are found a short distance inward from their surfaces are marked features. The dark schist that apparently overlies the pillowy lavas is much contorted in places, and is accompanied by a breccia or agglomerate similar to that previously described in No. 6, and also by some thin lava-like bands. The cherts that are associated with the black schists are well exposed about 200 yards up Allt Cairn Bhain, a small stream on the north side of the glen. Some of them are dark in colour, but the thickest and purest bands seem generally to be grey or light-coloured. High up on the south side of the valley there is associated with this black schist a strong gritty band, and immediately upon this rests the upper greenstone, No. 3. In the main stream this is but occasionally exposed, and the best sections of it are on the hillside to the southward. It much resembles the lower bed, but the pillowy structure is not so prominent. In its upper part the rock is often so schistose that it might be taken for the so-called 'green beds' of the southern Highlands. There is a good exposure of this upper lava on and about the two small hills called Cnocan Donna, where the doubtful Arenig rocks attain their highest point above the sea (944 feet). On each of the knolls a band of true agglomerate is interbedded with the greenstone. These bands are lenticular, and are made up of large angular fragments of fine-grained lava. Neither of them can be traced for more than 40 or 50 yards along the strike, and the more southerly is not more than 6 feet across at its widest part. The other is larger, and probably as much as 30 feet across in its broadest part.

The upper schistose grits, but partly exposed in the main stream, are a prominent feature on the hillside to the southward, where they form a strip of ground 200 yards in width. They can be followed in this direction along the strike to the eastward of Cnocan Donna till they in turn are cut off by the granite.

The lower greenstone forms prominent crags, one of which, about 300 yards south-south-east from the bridge, is a conspicuous object from the road. The same rock forms crags at Corloch, at the northern extremity of the area, and all the crags on the north side of the valley between Allt Cam Bhain and Allt Dornach, the next small stream to the west.

There can be little doubt that these bands which we have called greenstone are true lavas, and they show many points of resemblance to the lavas of the Arenig volcanic series of Ayrshire.

Two specimens from these doubtful Arenig lavas were sliced and submitted to microscopical examination by [Sir] J. J. H. Teall. One of these from Cnocan Donna on the south side of North Glen Sannox, was found to be a fine-grained, greenish-grey, massive rock ([S8666](#)) [NR 99 46] composed of minute prisms of nearly colourless hornblende, epidote, leucoxene after iron-ores, quartz, and chlorite.

It is evidently an altered basic igneous rock, a variety of epidiorite.

Another specimen ([S8667](#)) [NR 99 47] from Torr na Lair Brice on the north side of the glen is a scoriaceous rock, the cavities of which have been filled by calcite. The main mass is formed of microlitic felspar, chlorite, leucoxene, and carbonates. It is an altered basic rock, but differs from the first in having recognizable felspar. It is closely allied to, but not identical with, the common forms of pillow lavas.

These two fine-grained rocks are highly altered greenstones, allied to those found in association with cherts in other areas.

Later some additional specimens were cut, and the slices were described by [Sir] J. S. Flett. Three of these ([S9381](#)) [NR 997 472], ([S9382](#)) [NR 997 472], ([S9383](#)) [NR 997 472] from Torr na Lair Brice, 550 yards N.E. of North Sannox Bridge, though differing somewhat in individual characters have a general resemblance to those described by [Sir] J. J. H. Teall. A specimen ([S9384](#)) [NR 990 460] from a small burn on the south side of the glen opposite Allt Cairn Bhain is rather peculiar, being a grey-green rock with brown streaks and patches. It is a fine-grained basic igneous rock which has undergone much deformation. There is a band of this rock along the strike, and it may be seen also just south of the main stream. Two specimens of the supposed lavas altered by contact with granite ([S9385](#)) [NR 980 460], ([S9386](#)) [NR 980 460] are very different from the rest, and one of them ([S9386](#)) [NR 980 460] appears to have lost all trace of its igneous origin (can it be altered black shale?). The last of these new slices ([S9387](#)) [NR 990 470] was taken from a fragmental rock of a tuffaceous character in the upper part of Allt Cairn Bhain. Many of the fragments are fine grained and not certainly igneous, but the band from which the specimen was taken is several feet thick and the coarser parts contain

undoubted large fragments of the lavas. This band is associated with the black schists.

Intrusive igneous rocks, probably of Arenig age

At a distance of 600 yards north from the main stream in North Glen Sannox, and near Allt Dornach, is a rock which differs considerably in character from the lavas. It is coarser grained than these, and was probably a hornblende-gabbro originally. It was the first of the igneous masses to be noticed in this area, and from the way in which it is associated with ordinary schistose rocks of a elastic origin it was regarded as an intrusive rock, which view has subsequently been corroborated by the result of a microscopic examination and also by its similarity to undoubted intrusive rocks associated with the Arenig lavas of Ayrshire. It forms a band some 15 to 20 yards in width, which is about 50 yards east of the small stream mentioned, and on the west side of the bedded lavas, and separated from the latter by a considerable band of black schists with chert. The intrusive band, however, as given above, includes some lenticular and irregular strips of schist. The best section occurs a few yards below the old track or road which was formerly the highway to Lochranza, and the intrusive rock there forms a small crag, but it cannot be traced far either way. A rock of a somewhat similar character is found on the west side of Allt Cairn Bhain (the next small burn to the east) between 100 and 250 yards north from the main stream of the glen. W.G. These rocks are probably closely related to the large mass of epidiorite or hornblende-schist at Scalpsie Bay in Bute.<ref>Geology of North Arran, etc., (Explanation of Sheet 21), *Mem. Geol. Surv.*, 1993, p. 22. W. R. Smellie, The Igneous Rocks of Bute, *Trans. Geol. Soc. Glasgow*, vol. xv., part iii., 1916, pp. 336–338.</ref>