# Chapter 14 Loch Carron to Point of Sleat (Skye)

## A. Loch Carron to Loch Alsh

By B. N. Peach and J. Horne. The district here described is comprised in Sheets 71, 81, and 82 of the Geological Survey Map of Scotland on the scale of one inch to a mile.

The district now to be described extends from Sgòrr a' Gharaidh and Glas Bheinn (two to three miles north from the village of Loch Carron) southwards across Loch Carron to the shores of Loch Alsh. It differs in one important respect from the ground to the north which has been dealt with in the foregoing chapters, for whereas the Lewisian Gneiss hitherto discussed has lain almost entirely to the westward of the post-Cambrian thrust-planes, and has not been displaced by them, the rocks now to be noticed have all been affected by these movements. As the new structures thus superinduced upon them will be described in Part 4 of this Memoir, it will be sufficient in this place merely to point out their general petrographical characters as undoubted portions of the same series of rocks which have been the subject of the previous chapters, and their distribution on the ground.

On the north side of Loch Carron the area occupied by these thrust gneisses between Achnashellach on the Highland Railway and Stromeferry amounts to about twelve square miles. Instead of being overlain by the Torridon Sandstone, as in the normal relation, the position of the rocks has here been reversed. The sandstones and basal conglomerates have been inverted, and now dip under the older crystalline masses, which rise into a lofty escarpment above them. The topography of the ground occupied by the Lewisian rocks in this area resembles that of many parts of the typical gneiss country further north.

On Glas Bheinn and Sgorr a' Gharaidh the rocks consist of biotite and hornblende-gneisses with bands of hornblende-schist, which evidently represent the basic dykes in the unmodified areas of Lewisian Gneiss in Ross and Sutherland, already described, for many of them still show intrusive junctions.

They also include a considerable development of early basic material, composed largely of garnet-amphibolite, and traversed by massive pink pegmatites, which are well seen on the hill; slope about a mile west of Slumbay and south of Sgòrr a' Gharaidh.

An important feature of this displaced mass is the occurrence in it of a massive sill of hornblende-schist, which with minor bands of the same material closely resembles the Ben Lair intrusive sheet north of Loch Maree. This type has been traced almost continuously from Cearcall Dubh, north-east of Loch Kishorn, south by An Sgerr to Kyle Strome, and beyond Stromeferryto Gleannan Dorch, south of Duncraig. Along part of this line it forms a portion of the prominent escarpment of Lewisian rocks that overlie the inverted Torridon Sandstone. In certain places, as, for instance, on the hill-slope one mile W.N.W. of Strome Castle and on the north-west slope of Bad à Chreamha, these hornblende-schists are associated with flaggy garnetiferous mica-schists and rusty brown mica-schists, which appear as thin bands folded with the sill. In places they are garnetiferous, and recall certain zones of the altered sediments in Gairloch and at Loch Maree, already described in Chapter 12.

On both sides of Loch Carron all the Lewisian rocks dip to the E.S.E. in common with the underlying Torridon Sandstone strata, but northwards between Cearcall Dubh and Sgòrr a' Gharaidh the inclination varies considerably.

Both the hornblende-schists and the biotite-gneisses of the Fundamental Complex are traversed by pink pegmatites like the early basic masses, which, in places, have been much sheared by the post-Cambrian movements. The accompanying reproduction of a photograph (Plate 29) illustrates the marked phacoidal structure on a large scale developed by the shearing in these pegmatites west of Stromeferry Station. A fine flaser structure has not infrequently been developed, and the felspars then form augen in a mylonised matrix.

Between Stromeferry and Glen Dorch, apart from the finely-foliated hornblende-schist already referred to, the rocks consist of biotite gneiss resembling in part the Meall Riabhach type north of Loch Maree, their general dip being to the

E.S.E. or south-east. Beyond Glen Dorch towards Loch Alsh, the Lewisian rocks are highly sheared and merge into platy mylonites, the relations of which will be described in Part 4.

## B. Skye

By C. T. Clough. The district here described is shown in Sheets 61 and 71 of the Geological Survey Map of Scotland on a scale of (1:63360) one inch to a mile.

In Skye also the Lewisian rocks are not in their normal position and condition, but, like those of Loch Carron and Loch Alsh,of which they are a continuation, have been largely modified in structure. They are confined to the peninsula of Sleat, where they appear in a number of detached areas according to the position of the great thrust-planes by which they have been displaced. The most easterly of these lines of movement or Moine thrust-plane is followed by some others further west, and the Lewisian rocks are found partly on the Moine thrust and partly on those below it. They are never covered unconformably by rocks which can be confidently claimed as Torridonian, but are frequently folded with altered sediments like those of the "Moine series" of Sutherland and Ross. The junctions of the two groups of rocks, however, show no clear evidence of unconformability, or of the intrusion of the one group into the other.

The most northerly exposure of Lewisian rocks appears in Dun Ruaige, a mile south of Kylerhea, and is only 250 yards long. The rocks are there all in a mylonised condition, and are probably separated from the Torridonian rocks on the east side by a thrust. The other areas of them lie to the south-west of Loch na Dal, one and a half miles north of Isle Ornsay. Of these much the largest area strikes from Camas a' Mhuilt to Aird, near the Point of Sleat, a distance of about 11 miles, and reaches a breadth of nearly two miles and a half. Here the rocks lie upon the Moine thrust. Most of the surface of this area is smooth, showing few rock-exposures save on the coast and between Knock Bay and Isle Ornsay. The material of some of these rocks is in many places so soft that it can be scooped out with the hand. From their general tendency to decomposition, the Skye gneisses have given rise to a much smoother form of surface than is found in the undisturbed gneiss tracts of the west of Sutherland and Ross.

The gneiss below or to the north-west of the Moine thrust lies on the Tarskavaig, Caradal, and Lamarscaig thrusts. It is greatly mylonised, and the boundary between it and the adjacent Moine rocks is sometimes a little uncertain. The most extensive tract occurs on the Lamarscaig thrust, and is about two miles long and three-quarters of a mile broad at the maximum. On the west side the boundary with the Moine rocks is repeatedly folded and shows no evidence of thrusting. Near the west limb of the Caradal thrust small exposures of rock appear in several places, while a larger exposure extends from three-quarters of a mile E.N.E. of Rudh' an Iasgaich to 200 yards of Geur Rudha.

The gneiss on the Tarskavaig (south of Loch Eishort) thrust makes an almost continuous, but usually narrow, strip along the outcrop of the thrust. On the coast between Gillean and about 1500 yards south-west of Gillean it is sometimes only a few inches in breadth. The best sectims occur on the coast two-thirds of a mile E.N.E. of the foot of Loch Nighean Fhionnlaidh (one mile south of Tarskavaig Bay) and on the hillside between Gillean Burn and the foot of Loch a' Ghlinne. At the former place the breadth of outcrop is about 150 yards, and in the latter it varies from 30 yards to nearly a quarter of a mile.

The gneiss on the south-east side of the Moine thrust includes two classes of rocks, one later than and intrusive in the other. But the later rocks, in consequence of the folding and deformation which they have suffered, are not readily separable from the earlier.

Nearly a quarter of a mile north-east from the west end of Ard Thurinish, near the Aird of Bleat, a small exposure of calcareous chloritic schist appears, partly folded with and partly faulted against "Moine rocks". It contains two lenticles of impure marble four or five feet thick. On the coast 700 yards northeast from Ard Thurinish some calcareous bands about six inches thick can be seen.

The axial planes of the folds in the Lewisian Gneiss of Skye usually strike north-east and dip to south-east at gentle angles, but sometimes they strike north-west.

Although the Lewisian rocks of Skye have been so affected by post-Cambrian movements as to have lost most of their original characters and might therefore be most appropriately dealt with in Part 4, where the effects of these movements will be more particularly considered, an account of them by way of illustration may perhaps be appropriately inserted as the concluding portion of this chapter, which ends the detailed description of the undisturbed or normal type of these rocks.

In the following description attention will first be drawn to those representatives of the Lewisian rocks which lie to the northwest of, and therefore under, the great Moine thrust and next to those that come above it.

At the Dun Ruaige exposure (one mile south of Kylerhea) most of the mylonised rock is flaggy, of a greenish-grey colour, and with lustrous foliation planes which generally dip E.S.E., and are crossed by stretching lines running in the same direction. The stretching is here much more pronounced than in the adjacent Torridonian rocks. That the bulk of the mylonised rocks further south have been formed from the Lewisian Gneiss is probable, partly from their similarity to rocks which in other districts are known to be sheared forms of this gneiss, and partly from the character of occasional less-sheared patches. Nowhere, however, can the original relations of the different parts of the mylonised rock be ascertained, and the rocks of the early complex and of later intrusions, if, as usual, these originally existed here, cannot be separated.

One of the commonest rocks is soft, flaggy, and of a yellowish-green colour, with occasional red felspathic spots and streaks. It is well represented near Gillean and Tarskavaig. Elsewhere the red parts are more conspicuous and mixed with the greener ones in thin parallel bands, from a quarter to a few inches thick, as may be seen on the hillside half a mile N.N.E. and two-thirds of a mile east of the outlet of Loch Sgùrr na Caorach (about three miles S.S.E. of Tarskavaig Bay). The green bands occasionally contain pieces of hornblende, rarely exceeding a pea in size, or of hornblende-schist, as in the area east and north-east from Loch Sgùrr na Caorach, where some of the pieces are as much as three feet long. Their occurrence, and the frequent contrasts of red and green colours — colours which are rare in the "Moine rocks" — indicate a probable derivation from Lewisian Gneiss.

About 1000 yards N.N.E of the outlet of Loch Sgùrr na Caorach, and for three-quarters of a mile still further to the northeast, the commonest rock, which weathers with a dirty-white colour, but has a greenish-grey fracture, consists of thin parallel streaks and lenticles of quartz, mixed with others of a honey-yellow or yellowish-green colour. A thin slice taken from a specimen (S7333) [NG 588 045] obtained rather more than half a mile N.N.E. of Loch Lamarscaig outlet, shows the yellow bands to be composed of small epidote granules, with rounded outlines, and to be repeatedly crossed, almost at right angles, by thin quartz-veins which never extend far outside them. If the epidotic layers have been formed from felspathic layers there must have been a shrinkage of volume<ref>See F. Becke, Ueber Beziehungen zwischen Dynamo metamorphose and Molecular volumen, *Neues Jahrbuch,* Band II., p. 182, 1896.</ref>, and the little quartz-veins have perhaps been formed along contraction cracks.

In Gillean Burn, a little more than two-thirds of a mile E.S.E. of Gillean, a dark-grey schist, with silvery white unctuous surfaces, encloses more massive eye-like portions, as much as a foot broad, chiefly composed of small grains of a yellowish-green pyroxene (S7336) [NG 599 085].

The planes of the mylonised rocks are repeatedly folded and contorted, but perhaps most markedly so east from Loch Sgùrr na Caorach. A little more than half a mile slightly north of east of the loch the axial planes of the folds are occasionally waved, now dipping east and now west. Near many of the basaltic and other dykes the surface of the lamina; become less lustrous, and those which are green become dark-grey, and are difficult to distinguish from the altered phyllites of the "Moine series", or from Torridonian shales.

The gneiss which lies above the Moine thrust is chiefly granulitic, and, excepting at a few places chiefly near the thrust, it has not a mylonised aspect. The granules of the water-clear minerals are often larger than those in the mylonised rocks to the north-west; many of the flakes of mica and chlorite are also larger. In this gneiss many bands may be observed which closely resemble types of Lewisian gneiss in other unthrust areas. The commonest type of rock is fissile and granulitic, its colour varying, with the amount of chlorite, from dark-green to pale-yellowish-grey. The green colour sometimes prevails in bands half an inch thick, but is usually subordinate to the other. The surfaces of the foliation planes

are lustrous, with small flakes of mica or chlorite, and occasionally with larger flakes which have their longer axes parallel. In Knock Bay (three miles S.S.W. of Isle Ornsay) the longer axes strike nearly east and west, but half a mile S.S.W. of Cnoc Malagan they strike north-west. The pale-grey parts contain parallel, thin, nearly transparent streaks which consist chiefly of quartz, while the rest of the rock contains much felspar. Needles of black actinolite, often half an inch long and crossing the foliation, are extremely abundant at some places.

This type, mixed with more gneissose pink or pale-grey rocks and occasional bands of hornblende-schist, forms the greatest part of the area east of the road between Isle Ornsay and Armadale. As it disintegrates with great rapidity, it has presumably given rise to the smooth features so characteristic of most of the Skye gneiss.

Near a line drawn between Isle Ornsay and Knock the flaggy soft rocks give place south-eastwards to more gneissose, less finely granulitic types. In Knock Bay, near the mouth of Allt Gleann Horavaig, the change between the two types is somewhat sudden. East of the burn acid and basic bands alternate, the former being hard and containing subparallel broad streaks of quartz, which are not always properly granulitic, together with many needles of black actinolite and large flakes of black mica and chlorite, which repeatedly cross the banding. Other areas furnish evidence that similar actinolites have been developed after the rocks were sharply folded. For instance, a quarter of a mile south-west from Sgeir Ramasgaig, the early banding is crossed by a second foliation parallel to the axial planes of fold, and most of the actinolites have been developed along the second foliation.

Bands of hornblende-schist are abundant. Some that are irregular in character and mixed with white streaks and opalescent quartz strings are probably parts of the original complex. Examples of them may be seen on the sides of Ob Snusaich and in the south-eastern and central parts of Ard Ghunel, south of Isle Ornsay. They are accompanied by smaller lenticular masses which are swathed round by laminae of acid gneiss.

South-west from Armadale the rocks are granulitic and flaggy, and generally show thin alternating red and green bands. Extensive exposures of shivery chloritic schist appear in many places, but hornblende is rare. Here and there, not far above the Moine thrust — for instance, in Allt Bealach na Coise, about 300 yards above the road, and on the south side of Allt Duisdale, about 1000 yards above the road — the gneiss appears partially mylonised, and contains small eyes of felspar about the size of mustard seeds. Still nearer the thrust, and nearly parallel to it, occasional lines of crush break up the earlier structures of the rock. They can be seen most distinctly on the south side of Allt Duisdale between a half and three-quarters of a mile above the bridge.

Between Knock and Camas Croise a band of rather hard impure serpentine which weathers into an orange or buff colour strikes north-east, and can be traced more than a mile. It is seen best on the west side of Loch Baravaig, where it forms three hillocks<ref>On the top of one of these there is a Dun, not marked in the Ordnance Maps</ref>. Its greatest width is about 60 yards. While in most places it is massive, foliated varieties of it also occur. It contains abundant spots, about the size of peas, of ferriferous carbonate, and also strings of this mineral mixed with magnetite. In some places the strings of magnetite are six inches thick.

Magnetite also forms thin lamina running with the foliation, as well as scattered grains and clots in the rock mass. No good junction-sections are visible, but the relation of the serpentine to a folded band of hornblende-schist on its north-western side warrants the conclusion that the former rock is intrusive.

The hornblende-schist on which Isle Ornsay lighthouse stands is in places very coarse in texture and contains hornblende crystals two inches long, also abundant garnets, which are sometimes as large as beans and united in bands an inch or two thick. It strikes E.N.E. Fifty yards north-east from the lighthouse the bands of acid gneiss with basic knots, a few feet away from the schist, strike against it at a considerable angle, but as they approach it they twist into parallelism with it and become thinner, in the way so often seen near the basic dykes of the Scourie district. On the headland 700 yards south-east of Camas Croise Pier, south of Isle Ornsay, a folded hornblende-schist of rather uniform character shows on its north-eastern side a somewhat similar junction with an acid gneiss containing basic knots. Some of the hornblende-schists on the coast to the south-east of Camas a' Mhuilt transgress the gneiss to a small extent. That the transgression is not more marked may be due to the way in which the rocks were dragged at the time they were folded into isoclines with limbs haling south-east.

Perhaps the thickest pegmatites are some unfoliated veins in a hornblende-schist at the top of a scar 300 yards north-east of Loch nan Dubhrachan, about two miles south-west of Isle Ornsay. The hornblende-schist at Isle Ornsay lighthouse contains red pegmatites a foot or two thick and without foliation.

Phacoidal structure in Biotite-Gneiss and pegmatite, produced by post-Cambrian movements. Three-quarters of a mile west of Stromeferry Railway Station, Ross-shire.

*(Plate 29) Phacoidal structure in biotite-gneiss and pegmatite, produced by post-Cambrian movements; three-quarters of a mile west of Stromeferry Railway Station, Ross-shire. C64*