Chapter 18 Coigach to Loch Maree

By the late W. Gunn, with notes from C. T. Clough, L. W. Hinxman, and H. M. Cadell. The district described in this chapter is comprised Within Sheets 91, 92, 100, and 101 of the Geological Survey Map.

The district described in this Chapter includes the broad but much-indented belt of Torridon Sandstone which stretches southward from Rhu Coigach and the Loch Lurgan chain of lakes, across the mouths of the two Loch Brooms, to the line of the great depression filled by Loch Ewe in its seaward part and by Loch Maree inland. To the south of the lake-filled valley that extends from Enard Bay to Drumrunie Lodge the ground mounts up into the range of the Coigach hills, which culminate in the long ridge of Ben More (2438 feet), and presents other three summits which rise above 2000 feet. The north-west part of Coigach, including the peninsula of the Rhu More between Loch Broom and Enard Bay, is a comparatively low-lying tract traversed by the north and south valley which, with its two lakes, runs from Baden Bay to Achnahaira. The highest point of the peninsula, Meall an Fheadain (663 feet), forms part of a ridge that runs north and south in the direction of the strike of the strata.

Opposite the mouth of Loch Broom lies a little archipelago formed of Torridon Sandstone like the adjacent parts of the mainland. The most northerly group of islands, known as the Summer Isles, are a continuation of the rocks of the Rhu More, and display a rugged, rocky surface, of which most of the marked features trend with the strike of the strata, as in the peninsula to the north of them. The largest and highest islet, Tanera More, rises to a height of 406 feet.

The peninsula between Loch Broom and Little Loch Broom, which consists almost wholly of Torridon Sandstone, rises near its north-western end into the featureless mass of Beinn Ghobhlach (2082 feet). But it is to the south of Little Loch Broom that the Torridonian formation presents in this district its most imposing topography. In the Dundonnell Forest it towers into the majestic mass of An Teallach, which for height, extent, and endless variety of cliff, buttress, peak, and corrie has no rival among the north-western mountains of the Scottish Highlands.<ref>An Teallach, with its flanking waterfalls, was briefly described by Macculloch in his *Highlands and Western Islands of Scotland,* vol. ii., p. 311. Ho called it Kea Cloch. A view of a portion of the mountain as seen from the east is given in *Scenery of Scotland,* p. 225.</ref> Its loftiest summit (3483 feet), called Bidein a' Ghlas Thuill, is the western culmination of its central ridge, but Sgurr Fiona to the south is 3474 (only 9 feet lower). The three great spurs of the mountain which run out to the eastward all exceed 3000 feet in height. On the same vast ridge, at a distance of three miles, Sail Mhor rises to 2508 feet.

On the south-west side of the An Teallach range the ground sinks rapidly into the long hollow filled by the Loch na Sheallag, the surface of which is only 279 feet above the level of the sea. This depression furnishes another striking instance of the coincidence of the more important topographic features with the structure of the older rocks of the district. It runs down to the sea in the usual north-westerly direction along the general trend of the tectonic lines of the old gneiss. On the southern side of this valley the Torridon Sandstone rapidly rises once more into an imposing group of mountains hardly less in altitude than their gigantic neighbours to the north — Beinn Dearg Mhor (2874) and Sgùrr Bàn (3194). On the long chain of heights that stretches southward from the head of Little Loch Broom a number of the summits are capped with outliers of quartzite-remnants left there after the prolonged post-Cambrian denudation of the region. As these cappings are white and contrast vividly with the reddish-brown colour of the sandstones below, they present not the least singular feature of the landscape in this part of the district. It seems as if the mountain-tops retained their coverings of winter snow, and where the quartzite screes have slid down the slopes below they might almost be taken for the first beginnings of glaciers of the second order.

Another of the long north-west and south-east depressions, with its chain of lakes (Lochan Fada, Dubh Loch, Fionn Loch, and others), separates the Torridonian ridge of Sgùrr Bàn from the great mass of the formation which at the head of Loch Maree sweeps up to a height of more than 3000 feet above that sheet of water and forms the imposing bulk of Slioch (3217 feet).

Three other separate areas of Torridonian rocks have here to be mentioned as coming within the district now under description — the Rudha Mor, between Gruinard Bay and the mouth of Loch Ewe, a strip of ground which stretches from

Gruinard Bay to Poolewe, and another strip on the west side of Loch Ewe. The Torridonian rocks of the Rudha Mor peninsula are a continuation of those of Coigach and the Summer Isles, and display the same topographic features in coincidence with the strike of the strata. This tract, however, is varied by the occurrence in it of patches of Secondary formations. These, together with the underlying Torridonian Sandstones, are prolonged into the Isle of Ewe. The strip of these sandstones between Gruinard Bay and Loch Ewe is separated from the Rudha Mor by the Triassic and Liassic band of Aultbea and Laid. Towards its northern end it rises to a height of nearly 900 feet, but falls gradually towards the south until in the neighbourhood of Loch Ewe most of it lies below 500 feet. On the west side of Loch Ewe a low-lying strip of Torridonian ground stretches from Inverasdale in a north-westerly direction to Camstrolvaig. Nearly the whole of it lies below 300 feet, and it is abundantly strewn with lakes. Its western boundary is marked by the straight line of the great fault which has been already referred to as coincident with the hollow of Loch Maree. On the west side of this dislocation the ground rises steeply to more than 900 feet in places along the central line of the peninsula.

Torridonian unconformability on the Lewisian Gneiss

The present district furnishes much interesting and important evidence that the surface of Lewisian Gneiss on which the Torridon Sandstone was deposited resembled in its irregularity the gneiss ground now exposed to view. Indeed, some of its hills and valleys, after having been long buried under the overlying sandstone, have been uncovered and are still hills and valleys at the present day. In several placegi the nearly-level beds of the Torridon are seen to abut against the gneiss along a line which runs steeply up a hillside sometimes for a vertical height of 1000 or 2000 feet, or even more. On Slioch the ancient land surface rises up to 2200 feet above the level of Loch Maree at Fasagh. Another conspicuous example is displayed on the south side of Loch na Sheallag, where the gneiss in Beinn Dearg rises as an old hill, the summit of which is 2000 feet above the level of the loch. Beinn Dearg Bheag is connected with its loftier neighbour by a narrow and thin strip of Torridon Sandstone perched on the ridges above Loch Toll an Lochain, and is thus practically an outlier. Along the flanks of the gneiss hill the sandstones on either side in gently inclined beds overlap each other for a height of some 2000 feet. A further proof of the unconformability is furnished by patches of nearly horizontal Torridon rocks adhering to the sides of gneiss cliffs several hundred feet above their base. A gain this relation of the two formations can sometimes be strikingly shown where subsequent movements have deranged their original position. Thus in some areas the Torridon Sandstone, dipping at a somewhat steep angle, strike directly at a gently-sloping surface of gneiss, as may be seen on the east aide of Loch Ewe between Tuirnaig and Loch min Uain. The line of junction between the two formations can there be followed across the strike of the Torridon Sandstone for about half a mile, and as the dip of the beds is from 20° to 25°, if they were restored to their original approximately horizontal position, they would be found to end off against a steep hillside for a height of as much as a thousand feet.

In this and other cases no faults exist along these lines of junction, for the sandstone can be traced into little bays and around projections. At one point of this tract, where a bay of Torridon Sandstone runs up into the gneiss in a north-east direction to Loch Mhic Ille Riabhaich, no fault can be detected at the junction-line. The distance across the strike of the strata amounts to about 6600 feet, and if the average dip be taken as only 20° (though it is 25° to 30° for a considerable distance), there must be a thickness here of at least 2200 feet, which would be the height of the ancient mountain of gneiss against which the level beds of sandstone were deposited.

General structure of the district

All the different subdivisions of the Torridon Sandstone are well developed in this district, especially the highest known beds, of which there is a unique section at the Cailleach Head near the mouth of Little Loch Broom. The district may be conveniently sub-divided into two portions by a line drawn in nearly a S.S.W. direction from Enard Bay to Loch Maree. It will be seen from the map that this line coincides with that of the chain of gneiss inliers which, beginning at Enard Bay, is continued by those of Achiltibuie, of the islands that stretch across the entrance to Loch Broom, of the knobs near the Cailleach Head, and of Carn Dearg an Droma, till we reach the main gneiss area at Gruinard. It may be reasonably inferred that this long line of gneiss summits marks a prominent ridge of Torridonian time which might not improbably serve for a time to separate the areas of deposit on its two sides until it was submerged and buried under the Torridonian sediments. But, besides any original topographical feature which may have existed, the line of separation which has here been taken appears to be in large measure one of faulting, the effect whereof has been to throw down the strata on the

west side so that the uppermost members of the Torridonian series are brought down against the basement beds which wrap round the bosses of Lewisian gneiss.

As this line of fault is such an important feature in the structure of the district, its precise course may here be traced. From Baden Bay in Coigach southwards for some distance it is concealed under the sea to the west of the Horse Island and Carn nan Sgeir. It crosses the promontory just east of the Cailleach Head, and, again passing under the sea, trends between Gruinard Island and the mainland, until it emerges again at First Coast on the south side of Gruinard Bay. Thence it can be traced by Beinn Dearg, Bad na Chailleach to Loch Thuirneag, where its throw seems to be decreasing. Everywhere along the course of this dislocation either Cambrian or Upper Torridonian strata appear on its western side, while the lowest division of the latter formation is found on the east side.

The rocks on the two sides of this line of dislocation present some characteristic differences in their topographical features and tectonic structure. While the ground on the east side rises into lofty hills composed of strata so gently inclined that their basset edges form lines of terrace along the shores, that on the west side presents no lofty prominences, and the strata often dip at steep angles and give rise at their outcrops to minor features that for the most part trend with the general strike. Another important distinction is to be found in the entire absence of the highest group of the Torridonian series in this eastern area, where the Cambrian quartzite lies every where unconformably upon the arkoses of the Middle or Applecross group, while the western area contains the most complete representation of the whole Torridonian formation that is to be found in Scotland.

Eastern area

(1) Diabaig Group

Beginning at the northern part of the district, we may remark that the Diabaig or lowest group of the Torridonian series is not improbably represented in Coigach, but this ground was mapped by the Geological Survey before the Torridonian sub-divisions were established elsewhere. The basement beds are varied in character, and probably do not always mark the same geological horizon. The lowest is sometimes a coarse conglomerate, sometimes a coarse red felspathic sandstone. Elsewhere fine flaggy sandstones and bands of shale or mudstone appear, which cannot be traced far.

Conglomerate and brecciated conglomerate made up mainly of gneissose fragments can be observed on the north and west sides of the gneiss inlier at Achiltibuie, and west of Achlochan (east side of Baden Bay) the basal conglomerate is of a very coarse character, consisting of large gneiss blocks. The rest of the peninsula here consists of the ordinary red flaggy false-bedded sandstones.

Grey micaceous flags of the Diabaig type intercalated with shales having a low westerly dip are exposed on the shore to the south-east of Loch Poll an Dunain, and beds of much the same character are well seen in the first stream east of Polglass (north side of Horse Sound). These flags are succeeded along the shore to the south and in the Badenscallie Burn by overlying fine and coarse red sandstones. Beyond Badenscallie the shore shows grey and purple micaceous flags succeeded by green flags capped by sandstone, and further south still, by grey flags, shales and flaggy sandstones. These flags and shales are probably a repetition of those near Polglass.

Round the bosses of gneiss near the entrance of Little Loch Broom the basal beds are in places well developed. In the bay west of Carn Dearg patches of red sandstone may be observed adhering to the cliffs of gneiss. At Annat fine red felspathic well-bedded grits and sandstone with no false bedding dip to the south-east at low angles or roll slightly. Near Badacrain (Annat Bay) rocks of much the same character appear, with occasionally a few large pebbles and ripple markings that trend north-east and south-west, together with some thin shale bands. Fine grits and hard-bedded sandstone dipping easterly are found east of Scoraig, and again on the south side of the loch from Badcaul to Badluchrach, where, however, they mostly present a westerly dip. On the south side of the entrance to this loch a band of a peculiar kind has been mapped from Stattic Point to Sron na Faire Moire ranging nearly parallel to the coast. At first sight this rock seems igneous, but closer examination shows it to be a breccia made up of igneous fragments, principally of epidiorite, &c., evidently derived from the basic dykes associated with the gneiss, and therefore merely a variety of the basement conglomerate. The same band occurs on the north side of the loch to the west of Scoraig, where it takes the

form of a dark-purple grit deeply stained with ferric oxide, and composed of angular fragments of felsite and grains of quartz and felspar.

On the south side of Gruinard Bay several detached patches or outliers of the basal Torridonian rocks may be seen. Again, between Gruinard House and Mungasdale, a number of outliers of the basal conglomerate have escaped denudation. Further west, between the Little Gruinard River and Inveriavanie River, two larger outliers of a coarse gneiss-conglomerate present a north-westerly dip. The cliff on the west side at the foot of the Inveriavanie River affords a fine section of the material. Further evidence of the former extent and subsequent denudation of the basement members of the Torridonian series is afforded nearly three miles to the south-west, where another outlier of these strata may be seen resting on the gneiss east of the outlet of Loch Fada. The long strip of Torridonian rocks east of the fault at Beinn Dearg Bad Chailleach affords good sections of the basal beds, which display regular bedding and characteristic large white quartzite pebbles.

On the southern side of Little Loch Broom much of the ground south of Badluchrach is so drift-covered that the rocks underneath are concealed. South of Durnamuck, however, numerous sections which have been laid open on the shore, and still better in the water-courses, show alternations of fine sandstone, mostly flaggy, with coarser and thicker bedded portions which pass into pebbly sandstone and then into conglomerate. The streams west of Badbea expose the characteristic red and grey flags of the Diabaig group, ripple-marked but not false-bedded, which seem to abut against a knob of gneiss. Between Lochan Gaineamhaich and Loch na Sheallag the greater part of the basal group consists of sandstones of a brighter red than the coarse arkoses which come above. In places, however, below these bright red beds, coarse pebbly sandstones and conglomerates may be seen, which appear sometimes to alternate with the brighter beds. All these strata, which are taken to represent here the Diabaig group, dip at a low angle to the eastward under the coarse grits or arkoses of An Teallach.

On the south side of Loch na Sheallag a series of hard flaggy bright-red sandstones without pebbles separates the basal shales from the purple sandstones or arkoses. Below these on Beim' Dearg black shales, about 40 feet in thickness, make their appearance, followed by blue, black, and ferruginous greywacke and sandy seams in shale, the whole succession having a thickness probably of about 250 feet. A fine section has been laid bare north of Beinn Dearg Bheag, where about 40 feet of black shale can be seen. These shales and those visible at Doire Gaineamhaich (one and a quarter miles north-east of Beinn Dearg Bheag) are full of black streaks and blotches, which are strongly suggestive of the possibility of discovering. fossils in them. In a Silurian region such strata might be expected to yield ling-ulce or trilobites.

It is important to note that the local base, which is always a conglomerate or breccia, may occur at any horizon for a distance of 2500 feet up in the series, according to the irregularity of the gneiss ground on which the Torridonian series was laid down.

On the southern margin of the district described in the present chapter some extremely interesting exposures have been found of the basal conglomerates and breccias and of their relations to the remarkable topographical features of the subsiding gneiss land on which they were deposited. At the back of the mountain Slioch an outlier, consisting mainly of coarse breccia, extends from near the foot of Loch Garbhaig far up the high ground to the north-west. As it ascends it divides into irregular arms which show well the steepness of the surface on which the breccia was deposited. Four other small outliers of similar rock which lie still higher up indicate how the hornblende-schist has here been encased in Torridonian sediments. Again, the patch of coarse breccia which rests on the steep hillside of hornblende-schist, on the north side of Loch Garbhaig, half a mile east of the outlet, shows clearly that its different bands have been deposited almost horizontally against a steep face of the schist. On the other side of the same hill, half a mile south-east from the foot of Lochan Fada, another outlier of breccia sends out westward an arm, at the north end of which the hornblende-schist face to which the breccia adheres is nearly vertical. Where no breccia is now left the planes of the hornblende-schist are frequently stained with hiematite and are streaked with haematite veins, while the quartz veins are reddened and abundant epidotic strings have been developed, the epidote being sometimes in distinct crystals which are included within quartz crystals. Examples of these features may be found to the west, south-west, and east of the top of Beinn Lair, in one case at a height of more than 2500 feet. The general inference to which they point is that the present gneiss surface coincides in its larger features with what was the form of the ground in Torridonian time also. (Figure 11)

To the north-east of Beinn Lair the lofty A' Mhaighdean has preserved an outlier of breccia and grit, the most abundant pebbles in which are of the Beinn Lair type of hornblende-schists, and often 5 or 6 inches long. Yet this outlier rests directly on quartzose gneiss, hornblende-schist *in situ* being quite a mile and a half distant, though possibly at the time of the formation of the breccia hornblende-schist may have existed in mass at a nearer point. About half a mile north-west of the top of A' Mhaighdean, in a rather fine breccia, the hornblende-schist pebbles, about 1 inch in length, indicate by the direction of their inclination that they have probably come from the southwest. In the large outlier which rises on the north side of Fuar Loch Mor the breccia bands contain pebbles, one or two inches long, chiefly of the Beinn Lair type of hornblende-schist.

(2) Applecross Group

This group as developed in the eastern area of the district now under description attains a considerable thickness and presents the characteristic features by which it is everywhere distinguished. It is usually of a purplish-red colour, but with occasional lighter-coloured bands. It is often markedly pebbly and felspathic, the felspar when newly broken being red and fresh, but weathering to a whity-brown or rusty colour. The pebbles, mostly of vein-quartz but with a few of felsite, range up to two or three inches in length. Though sometimes scattered sparsely through the rock, they are often arranged in layers. They abound in false-bedding to such an extent that the amount of their dip is often indeterminable, but here and there thin bands of finer sandstone serve to mark the true inclination. The angle of dip of the beds is almost uniformly low, ranging between 5° and 15°, with perhaps an average of about 10°. The direction is commonly towards the south-east, though sometimes to the north of east. About An Teallach it is nearly due east. Sail Mhor, at the north-west end of the Dundonnell Forest, seems to owe its isolated position to the fact that it lies in a geological basin or syncline.

The false-bedded pebbly grits of the Ben More Coigach group of mountains dip steadily to the south-east at an average angle of 10°–15°. Some of the pebbly bands on Ben More Coigach are so coarse that the rock might be described as a conglomerate. It contains rounded and sub-angular fragments of quartz, quartzite, jasper, and chert, set in a felspathic matrix which is often slightly epidotic. A band of hard, fine-grained, bright-red or pink sandstone, resting on greenish-grey, ripple-marked flagstone, forms a low escarpment along the southern shore of Loch Lurgan west of the islands. Similar rocks can be traced along the hillside between Loch Bad a' Ghaill and Lochan Sgeireach, and also on the coast at Horse Sound, between Badenscallie and Achininver.

The bright-red rocks of Loch Lurgan recall the upper red grits of the Diabeg group, but their position at more than one horizon in the arkose group in this area shows that they are here a local development only, and lie considerably higher in the series than the red rocks of the lowermost group.

Coarse conglomerate with grit bands is seen resting on the gneiss at several places between Loch Bad a' Ghaill and Meall Leathad an Sithein, where it is cut off by a fault. A considerable amount of overlap occurs along this line, and the Torndonian strata rise rapidly from the shore of the loch and pass over the summit of a hill of gneiss more than 250 feet in height.

Owing to the unequal extent of the denudation, the visible thickness of the Applecross group in the eastern area of this district varies considerably. It is more than 2500 feet in Sail Mhor, about 2300 in Mac' us Mathair, and about 3000 in the crags of An Teallach, or more than 3000 if counted from the level of Loch na Sheallag to the summit of the mountain. Allowing for a moderate dip in the latter case, the thickness may be 4000 feet or more. On the south side of Loch Broom an estimate of the thickness in a section drawn from the sea level at Annat Bay over Beinn Ghobhlach to the summit of Beinn. nam Ban (1901 feet), a distance of 4½ miles, with a fairly steady dip of 10° or more, gives between 5500 and 6000 feet. Another computation, from near Achiltibuie in Coigach over Ben More to Achendreall in Strath Kanaird, a distance of nearly 7½ miles, gives a totalthickness of 6600 feet. If 600 feet be taken for the thickness here of the Diabaig group, then that of the arkose group will amount to 6000 feet. Yet, in spite of this vast depth of sediment, no trace has here been found of the highest or Altbea group. In this area the Cambrian quartzite everywhere rests on the arkoses, while only a few miles to the west, on the down-throw side of the large Coigach fault, 2000 to 3000 feet of the Altbea series are interposed between these two formations.

In concluding this account of the Torridonian groups in the eastern area of the district, reference may be made to some singular results of the weathering of these rocks. Where the pebbly sandstones decay rapidly, as in Isle Martin, the pebbles of vein-quartz, quartzite, felsite, and other materials are left behind on the surface, while the fine sand is blown or washed away. Again, the disintegration of finer sediments in the tempestuous climate of these north-western regions sometimes gives rise to effects that are usually thought in this country to be confined to our coasts. On the high plateau between the peaks of An Teallach and Mac' us Mathair to the north-west the sandstone is decomposed to great depths, and the loose sand blown about by the wind forms dunes comparable to those ordinarily seen on the sea-shore.

Western area

On the west side of the powerful fault that traverses this district the Diabaig group is specially characterised by the great development of its basement conglomerates and breccias. If we follow the distribution and variation of the group from south to north we find that on the north-eastern shore of Loch Maree the coarse detritus of which the lower portions of the group largely consist is well displayed to the south-east of Inveran, where coarse greenish and grey gritty sandstone pastes into a conglomerate or breccia of gneiss fragments, so coarse and massive that it might be mistaken at first for gneiss itself. The red and greenish sandstones alternate occasionally, sometimes containing large pebbles and often much veined with quartz in small strings. The dip is west or north-west from 15° to 20°, and sometimes more. A specimen (S3893) [NG 878 789] taken from a rock in this locality is shown by microscopical examination to be a greenish grit with epidote. East of Loch Ghiuragarstidh (two miles east of Poolewe) another breccia of gneiss fragments, which forms a marked faulted feature running north-eastwards from the loch, represents a singularly coarse aggregate. One block of gneiss in it was found to measure 14 feet in length.

Above these strata to the north of Loch Kernsary a thick series of light red and often bright red sandstones, with occasional bands of conglomerate which dip steadily to north-west, gives rise to ridges and hollows that strike to the northeast or north-north-east. Near the mouth of the River Ewe the inclination turns round towards the north-east. The upper limit of these strata is not easily determined, for it is hard to say where the regular arkoses come on. This well-bedded series of fine-grained bright red sandstones appears to belong to the Diabaig group and to correspond in great measure to what has been called the "foxy" group elsewhere, but no shales or grey flags have been met with in the area now under description. The rocks are much crushed near the line of fault which runs N.N.W. from Loch Kernsary, while along the great north-east fault, which runs parallel to the road between Inverewe and Tuirnaig, much brecciation may here and there be observed.

The second or Applecross group of the Torridonian formation in the western area of the present district is best displayed to the west of the Coigach hills in the Rudha Mor and some of the islands that stretch across to Gruinard Bay. The usual Ethological features of the group are there characteristically shown. All the outermost of the Summer Isles consist of the typical coarse felspathic sandstones, except the Priest Island, of which only a small portion of the northern end belongs to this group. An interesting section is found on the west side of the Island of Glasleac Beag. A coarse sandstone, which there forms a marked feature, dips E.S.E. at 30°–40°, and has a very irregular base. It overlies and overlaps a set of grey flags (varying up to five feet in thickness) with some three or four thin shale bands, while the flags are underlain by coarse false-bedded grit. Eilean Cuir and the north-west end of Tanera Beg belong to the Apple-cross group. Glasleac Mor presents numerous faults and joints, with the dip in the unusual direction of west of south. Eilean Mullagrach likewise abounds in faults, and on its eastern side several sharp folds may be noticed. In the large island of Ristol, where the dip is uniformly eastward at a low angle, some of the uppermost beds of the group are visible.

On the mainland of the Rhu More the arkoses are well seen. To the east of Reiff they have been folded in an anticline which ranges about north-east, but their dip is far from regular and nowhere high, except near Faochag Bay, where, among many faults and crushes, it varies considerably, rising in some places to as much as 30°. To the east of the headland of the Rhu Coigach fine sandstones in strata from one to three feet thick lie between coarse sandstone. In the little bay west of the headland, where the dip is 15° to the south of west, red, yellowish and grey shalt' mudstone appears together with some thin fine-grained sandstone. The arkoses occupy the shore east of Rhu Coigach as far as the fault which runs north from Clar Loch Mor.

The strata laid bare on the shore west of Achnahaird Bay he on the strike of the high-dipping Altbea group to the south, but are totally unlike these beds. Consequently a fault with a north-westerly trend, as drawn on the map, must exist between them in the peat-covered ground in the centre of the peninsula. On the west side of Achnahaird Bay coarse red pebbly arkoses dip at first E.S.E., and then successively S.S.W. and S.S.E., as far as an anticline, where the dip changes to north-west at 20°, and round the west point of the bay to west at 10°–20°.

Altbea Group

We have now reached the consideration of the highest member of the Torridonian formation, which is typically developed in the district now under description, and has received its name from the village of Altbea on Loch Ewe, near which its characteristic features can be satisfactorily studied. It rests conformably on the arkoses below, the sedimentation having been continuous from the one group into the other. But the general character of the sediments underwent a marked change at the close of the deposition of the coarse felspathic sandstones of the Applecross group. In the first place the prevailing colour of the strata is different, the Altbea group being marked by a paler and sometimes a considerably brighter red than that of the arkoses underneath. Again, the sandstones are finer in grain, frequently present the peculiar variety of curved false-bedding, and often weather into smooth or rounded forms somewhat resembling those of calcareous rocks. Bands of shale more often appear in this group than in that of the arkoses. They are most frequent and thickest among the highest members.

The most northerly place at which the base of this group has been traced is about Altandow, in the Rhu More of Coigach. In it southward progress the base line must keep to the east of Isle Ristol and west of Eilean Fada Mor, passing through the north-west part of Tanera Beag, and just touching the north end of the Priest Island. It then keeps out to sea, and first strikes the mainland on the Rudha Mor near Meallan Udrigill, whence it runs south-westwards across the peninsula, reaching the shore of Loch Ewe near Ormiscaig. It then continues southwards across the west end of Isle Ewe, but no trace of the group has been detected on the opposite side of Loch Ewe. It should here be remarked that the position of the base line here sketched was not always exactly determined in the Altbea district, as at the time the survey of that ground was made (at an earlier date than the mapping of Coigach and the Summer Isles) no subdivisions had been introduced into the maps of the tracts of Torridon Sandstone.

East of the line now traced the Altbea group occupies a strip of ground varying in width from two to four miles, and bounded on the east side by the large fault above mentioned, save where in Coigach a narrow band of Cambrian quartzite lies between it and the fault, and where from Altbea to Laid a band of Secondary rocks intervenes. The group thus forms many of the Summer Islands — Tanera More and the greater part of Tanera Beag, sgeirs lying south of these, nearly all the Priest Island and the islets stretching eastwards to Eilean Dubh, besides Gruinard Island, and most of Isle Ewe. The dip of the component strata is nearly every where towards the east-south-east or south-east at angles of 20° to 30°, or even sometimes 40° to 50°.

These highly-inclined sandstones have given rise to a form of surface in Coigach, the Summer Islands, and in the Rudha Mor different from the topography of the main masses of the Torridon Sandstone. No part of the ground rises to a great height or presents isolated conical hills. The distinguishing characteristic of the ground is its disposition in ridges and hollows, which have been already alluded to as coincident with the strike of the beds — that is, N.N.E. to S.S.W. The slopes of these ridges lie on their east or dip side, while the scarps and cliffs front towards the west. Priest Island, where the strata dip to S.S.E., affords a good example of this structure, many of the hollows along the strike being occupied by fresh-water lochs. Other excellent illustrations of the same feature are furnished by the smaller rocks or sgeirs, such as Sgeir nam Mult, which shows a succession of four examples. The same type of ground prevails south of Gruinard Bay, in the area to the east of the faulted Secondary rocks, though there it is much obscured by drift.

The best continuous section of the Althea group is displayed on the southern shore of the Rhu More peninsula of Coigach opposite Dorney and Polbain, where, the width of the outcrop being two miles and the angle of dip varying from 15° to 30°, its thickness is estimated to be at least between 2000 and 3000 feet, and may possibly even amount to as much as 4000 feet. There may, however, be some repetition by faults, and the bedding in this group is so irregular and occasionally massive in character that false-bedding may have been here and there mistaken for the normal stratification.

The higher beds of the Althea group, like those exposed at the Cailleach Head, may possibly exist under a concealed space of 600 yards opposite Badentarbet. The group does not extend to the northern shore of Coigach. It is cut off by the fault at Achnahaird, to which reference has already been made.

It is on the promontory of the Cailleach Head, at the mouth of Little Loch Broom, that the thickest bands of shale in the Altbea group are to be seen. One of these bands forms a conspicuous feature along the strike at the extremity of the headland. The section here laid open reveals a continuous succession of well-bedded hard brown. sandstone, with beds of green and grey micaceous shale and mudstone, the whole having a thickness of probably 1500 feet, sometimes ripple-marked and sun-cracked. A band of black shale shows black impressions like plants. Though these strata have been diligently and repeatedly searched for fossils, they have not yet yielded more than the obscure evidence of organic structure referred to in Chapter 16.

The most important bands of shale which have been observed in this group as, developed in other parts of the district may be here enumerated in the hope that future observers may be successful in detecting organic remains among them. Among the Summer Isles, at the east end of Tanera Beag, a band of grey shale, 10 feet thick, cannot be traced far on account of a fault which cuts it off. On the north-east side of Eilean Dubh a band of grey shale, 18 inches thick, has been noted, and flags occur on the north-west side of the same. On the south-east side of Bottle Island three or four feet of flags and grey shale may be seen. On the north-east side of Priest Island different bands of flags and shale, a few feet in thickness, have been observed in two places among the cliffs. Beds of dark grey shale are visible at low water on the eastern side of the Gruinard Island.

On the mainland of the Rudha Mor, the shore north of Laid and immediately east of the hill called Meallan Tidrigill exposes some 15 feet of regularly smooth-bedded fine red sandstone, which in its lower part is so flaggy as to yield what might be called "tiles". The dip is about 12° south of east, at an angle of 40°. On this coast a beautiful example of unconformability is presented in an arch worn by the sea, wherein the sides consist of steeply-inclined Torridonian strata, while the crown is formed by gently-inclined Secondary beds.

On the south side of Gruinard Bay the Altbea group appears again to reach the mainland, but it is there so much faulted, jointed, shattered, and veined with quartz that its usual characters have been destroyed, and it cannot everywhere be satisfactorily separated from lower portions of the Torridonian series. This obscurity continues across most of the ground up to the shores of Loch Ewe, but to the north-east Of Loch a' Bhaidluachraich the strata exposed, dipping towards the south-east at high angles, appear to belong to the Altbea group.

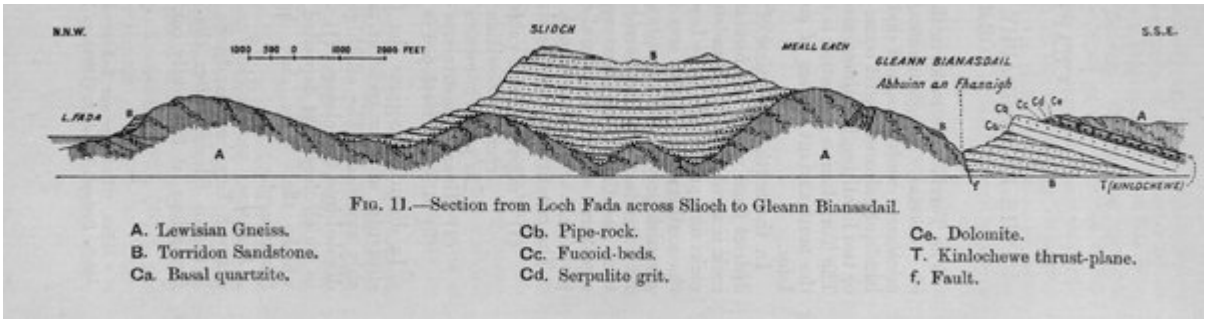

Fig. 11.—Section from Loch Fada across Slioch to Gleann Bianasdail.

A. Lewisian Gneiss.
B. Torridon Sandstone.
Ca. Basal quartzite.
Cb. Pipe-rock.
Cc. Fucoid-beds.
Cd. Serpulite grit.
Ce. Dolomite.
T. Kinlochewe thrust-plane.
f. Fault.

(Figure 11) Section from Loch Fada across Slioch to Gleann Bianasdail. A.Lewisian Gneiss. B. Torridonian Sandstone. Ca. Basal quartzite. Cb. Pipe-rock. Cc Fucoid beds. Cd Serpulite grit. C.e. Dolominte. T. Kinlochewe thrust-plane. f. fault.