
Chapter 26 Physical features and scenery

The Western Isles of Scotland have often been cited in illustration of the enormous amount of material which has been removed by the agents of erosion and transportation during the latter half of Tertiary time. In this respect Skye does not yield in point of interest to any other part of the region. The basaltic rocks which build the north-western part of the island have been cut up into numerous hills and plateaux, divided by deep glens, while from the south-eastern part these rocks have been wholly stripped away. In the central tract erosion has gone still farther; for, not only have the basalts been removed, but the plutonic rocks, of later age and doubtless consolidated at considerable depths below the then surface, have been left standing out as mountains 2500 and 3000 feet high. In this final chapter we shall examine the manner in which the processes of erosion have been controlled by the geological constitution; so that the existing physical features and scenery stand related to the lithological characters, distribution, and arrangement of the various rocks. Such a discussion will derive a certain special interest from the fact that the rocks are, within the area to be more particularly considered, exclusively igneous rocks.

We have pointed out in some detail in the preceding chapter how the successive igneous eruptions in our area have been closely bound up with the development of strains in the earth's crust and the various ways in which these strains have from time to time found relief. From the same causes there also resulted, as we have seen, movements and deformations of the solid crust, sometimes of wide extent, sometimes rather narrowly localised. Such movements, taking in general the form of differential elevation (whether absolute or relative), have of course influenced the broader physical features of the country; and we can trace in the existing surface relief the interaction of the two elements--themselves closely connected — the distribution of the various igneous rocks and actual deformation of the earth's crust.

Disregarding the south-eastern portion of the island, where the Tertiary igneous rocks have had only a very small share in determining the existing surface-relief, Skye divides, for our present purpose, into three strongly contrasted tracts. To the north-west the basaltic country presents a well characterised, though monotonous, type of scenery. The central part of the island offers much greater diversity and, from the point of view of the artist, much more interest, possessing in the Cuillins a mountain-group without rival in the British Isles. This group, with which we must associate also the Blaven range, occupies the western portion of the central mountain-tract, where gabbro is the dominant rock. To the east we have the granitic "Red Hills", and the contrast in form between the two groups of mountains has been the subject of remark by numerous writers. We shall consider these three principal types of scenery in order.

In the *basalt plateaux* the determining element of the surface-relief is, from the lithological point of view, not the basaltic lavas but the great group of sills, to which all the strong features are directly due. At the same time the general arrangement of the features is the simple expression of the tectonic structure resulting from the (regional) system of crust-movements already described. These movements took the form of a shattering of the country by numerous faults and a tilting of the separate blocks or strips towards the west. There was at the same time a certain tilting of the whole country in the same direction. We may express this otherwise, from the point of view of the geological mapper, by saying that the cumulative throw of the faults towards the east is not enough to compensate fully the general dip towards the west; so that the base of the basalt group stands at a considerably higher altitude on the east side of the island than on the west. It has resulted from this that the highest ground in this part of the island occurs near the east coast, in the long and almost continuous range which may be regarded as the main escarpment of the basaltic group. It runs from Beinn Tianavaig, near Portree, northward to the Quiraing, culminating in the Storr (2360 feet).

We turn for a moment to the south-eastern part of Skye. This has clearly experienced, as a whole, since the volcanic epoch a greater elevation (or less depression) than the north-western tract. The greater relative elevation, however, is not sufficient to account for the fact that the basaltic group has here been totally removed. Indeed the average altitude of the surface at the present time is considerably lower here than in the plateau country. The removal of the basalts must be attributed mainly to another difference, depending on the distribution of the great group of sills. As we have seen, these were most developed towards the north and northwest, thinning away towards the south-east, and never reaching the Sleat district. Where the sills were in force, they not only greatly increased (probably doubled) the total thickness of the basalt group, but, by the interposition of sheets of hard rock at numerous horizons, enabled the whole to offer a much

more effective resistance to erosion. In the south-east, where the sills were wanting, the much more perishable basaltic lavas were easily removed. It is interesting to notice that the effect of the general dip is nevertheless still indicated by the distribution of the higher ground, In the tract of Torridonian rocks which extends from Kyleakin to near the Point of Sleat, the greatest heights are found to the northeast (Sgùrr Coinnich, 2400 feet); the average altitude diminishes south-westward, and beyond Loch na Dal the country nowhere reaches the 1000-foot contour-line.

Returning to the basaltic tract, we may remark first that the coast-line affords admirable studies of the results of marine erosion. The finest display is on the west coast, especially between Loch Bracadale and Loch Brittle. Here the basalt group goes down below sea-level, and presents long ranges of precipitous cliffs, in many places practically vertical, rising 500 or 700 or even 900 feet out of the water. This greatest height is found at Beinn nan Cuitheann, to the south of Talisker. The cliffs have a very evident appearance of stratification, due to the alternation of lavas and sills; but in a vertical exposure the sills, with their pronounced cross-jointing, are no more durable than the lavas, and the whole presents one continuous face, in strong contrast with the effects of subaerial erosion inland. On the east coast the Jurassic strata emerge from beneath the basalts. Fortified by sills often more than 100 feet thick, they make in places strong sea-cliffs, especially towards the north, forming an advance-guard to the escarpment of the basaltic group behind.

This main escarpment runs generally parallel with the coastline, but at a variable distance from it. In accordance with its structure, it presents a more or less precipitous face towards the east, with a characteristic broken appearance due to considerable land-slips, while the western slope is a gentle one. In the succession of plateaux west of the main escarpment we find generally a monotony of appearance due to iteration of the same type of structure. Such diversity as meets the eye results from the varying inclination, frequency, and thickness of the sills, which everywhere stand out in relief from the softer lavas. Where the dip is very gentle, as is sometimes the case on the west side of the island, a single sill may form the whole of the summit of a hill, and a remarkable flat-topped appearance is the consequence. This is especially striking in isolated hills<ref>In areas of Jurassic rocks a similar tabular summit may be made by an outlier of a strong sill. A good example is Dùn-can, the highest point of Raasay.</ref> such as Macleod's Tables, the only points near the west coast which reach an altitude of 1500 feet. More usually there is a decided dip to the west, or some point near west. In this case the summit of a plateau is formed by several inclined sills, divided by abrupt steps, and the western slope also may consist in great part of broad dip-faces of other sills. The other slopes are terraced by the outcrops of numerous sills, which appear as so many escarpments separated by intervals of gentle inclination representing the intervening lavas. On the hill-sides bordering Glen Varragill, Glen Drynoch, Glen Eynort, etc., or facing the sea-lochs Harport, Eynort, and Brittle, as many as a score of such terraces may often be counted in the evening light (Figure 79). Farther north, as the sills become thicker, the character of the landscape changes accordingly. A single sill may now be sufficient to form a considerable sea-cliff (Plate 10) or an imposing inland escarpment. At the same time the columnar jointing of the sills becomes very pronounced, introducing a vertical element into the scenery; the long ranges of escarpment present perpendicularly fluted faces, and detached pinnacles and needles stand out in advance. In this way the plateau and terrace type of scenery, which in the central part of the island is only wearisome to the eye, becomes impressive farther north from mere exaggeration of scale. Especially is this the case in the main escarpment facing the east coast, where the Storr Rock and the Quiraing have long been included in the tourist's itinerary.

Next in importance to the basic sills as a factor in the detailed structure of the basaltic country come the basic dykes. A few of these, notably the large solitary dykes of coarse diabase, form salient features, a remark which is true also of the trachyte dykes of the Drynoch group; but the great majority have weathered more readily than the rocks which they traverse, and have often given rise to trenches, gullies, or even deep ravines. A glance at the Ordnance map shows how many of the smaller burns follow remarkably straight courses with a direction varying from N.N.W.–S.S.E. to N.W.–S.E. This is the case especially on moderately elevated and gently inclined stretches of moorland and on the slopes of the hills where these have something of a north-westerly or south-easterly aspect. Slopes such as those of Ben Lee towards Loch Sligachan, Brocbheinn towards Glen Drynoch, etc., are conspicuously scored by long straight parallel gullies, which have been determined by basic dykes, and often by multiple dykes (Figure 80). On the higher ground, and especially where the basic sills attain a great thickness, dykes become less frequent, and the straight gullies cease to be so conspicuous a feature.

The weathering of the dykes into depressions, which are the channels of permanent or occasional streams, is not due to the rock of the dykes being intrinsically more perishable than its neighbours. Indeed the dyke-rock is in most cases very

decidedly more durable than the lavas and often not inferior in this respect to the sills. It is the vertical posture of the dykes that has rendered them specially vulnerable to attack, and this is most markedly the case where a multiple dyke has presented several vertical planes of weakness (the junctions of the different members) in a short space. Any tendency to a platy fracture in an individual dyke tells in the same sense, and the much commoner cross-jointing also facilitates disintegration by allowing the dyke to divide into little horizontal prisms which are easily removed.

Unlike many other areas of somewhat similar geological constitution, the basaltic tract of Skye is remarkably sterile. Cultivation of any kind is possible only in some of the broader valleys, where the rocks are covered by a mantle of boulder-clay. Above the drift-line soil and subsoil are wanting. Several causes contribute to this result: the intractable nature of the sill-rocks, the scouring of the country by ice, the excessive rain-fall under existing conditions, and the prevalent covering of peat, which effectually protects the rocks from subaerial decay. Peat generally clothes the valleys and the less steep slopes, and often covers to a considerable depth the flat and gently sloping heights. The vegetation which gives rise to this accumulation is referable chiefly to *Sphagnum*, various species of *Scirpus*, *Juncus*, and *Carex*, and grasses such as *Nardus stricta*, but many other species also contribute. Among these may be mentioned such bog-plants as *Drosera anglica*, *D. rotundifolia*, *Saxifraga uinbrosa*, *Lobelia dortmanni*, *Pinguicula vulgaris*, *Menyanthes trifoliata*, *Narthecium ossifragum*, and *Eriophorum polystachion*, Elsewhere the common heaths (*Calluna vulgaris*, *Erica cinerea*, *E. tetralix*) and other shrubby plants contribute to the formation of peat. Characteristic species on the higher moors are *Juniperus nana*, *Veronica montana*, *Vaccinium uliginosum*, *Armenia vulgaris* (var. *planifolii*), *Cochlearia officinalis* (var. *danica*), *Cladonia rangiferina*, etc. Birch-bark and wood occur almost everywhere in the peat on the lower ground; and, although the country is now almost denuded of trees, it is clear both from existing relics and from the evidence of place-names Such names as *Coille* (a wood) and *Doire* (a grove), besides the names of individual species of trees, are sometimes found where no trees now exist. The remark is doubtless applicable to much of the Highlands. It is noteworthy that many of the letters of the Gaelic alphabet are named from trees, and that the badges of some of the clans were sprigs of trees which would now be found with difficulty. that much of it has once been wooded. The final destruction must be attributed to the cattle and sheep. Even now any inaccessible ravine, or an islet in any of the tarns, has an abundant, though dwarfed, growth of birch, alder, hazel, holly, rowan, oak, aspen, etc.

We have seen that on the basalt plateaux in general the lavas, which constitute the "country" rock, play nevertheless the least important part in determining the surface relief. There is, however, a broken belt of country, immediately adjacent to the large plutonic intrusions of the mountains, in which the basalt scenery assumes a different character. Here the lavas, metamorphosed by the proximity of the gabbro and granite, become hard enough to offer a stubborn resistance to erosion, and form rough crags sometimes comparable with those of the gabbro itself. At the same time, and as a direct consequence of this induration of the lavas, the basic sills, which are the dominant feature of the plateau country, die out. The bedding of the lavas is usually very apparent, but does not give rise to strong ledges. The character of this sub-montane belt, interposed between the plateaux and the mountains, is well shown by Slat-bheinn and An Stac in (Figure 81), kindly drawn for us by Mr Colin Phillip. The eastern portions of Sgùrr nan Each and Belig belong to the same type. The rough crags of metamorphosed basalt are more striking when they occur in juxtaposition with the smooth slopes of the Red Hills, as on the summit and northern face of Glamaig and especially in Creagan Dubha, a spur of Beinn Dearg Mhòr (of Strath).

The chief interest in Skye to lovers of the picturesque attaches to the *gabbro mountains*. The astonishing indifference of the earlier travellers Pennant, Johnson, Boswell, Jameson, and others either make no mention of the mountains, or refer to them incidentally in terms expressive of aversion, reserving their admiration for a wooded glen or a waterfall. Views of the Cuillins from Beinn na Caillich are given by Pennant and Jameson, but both are quite unrecognisable. to mountain scenery left the Cuillins The spelling Cuillin adopted here is that of the Ordnance Survey: the name is sometimes written Coolin. The Gaelic word is probably Cuilfhionn, as given by Nicolson, and to identify it with the name of the Ossianic hero Cuchullin seems to be purely fanciful. In older writers we find the forms Cuilluelum, Culluelun, Gulluin, Guilin, Quillin, Quillen, etc. wholly unnoticed, and for a long time this part of the island was regarded as inaccessible. J. D. Forbes in 1836 first accomplished the ascent of Sgùrr nan Gillean, and the little sketch-map accompanying his valuable paper shows that he had also become acquainted with some of the peaks of the main range; but it was the late Sheriff Alexander Nicolson who made the district known to the general public See especially a series of articles in *Good Words* for 1875. The highest summit of the Cuillins has been named Sgùrr Alaisdair in memory

of the Sheriff.</ref> The Ordnance Survey was made at a time when many of the summits had not yet been climbed,<ref>Of about twenty peaks of 3000 ft and upward only seven have heights assigned to them on the map.</ref> and the map leaves much to be desired as regards completeness and accuracy. In later years the explorations of members of the Scottish Mountaineering Club have accumulated a store of information, which is preserved in their *Journal*; but the mountains are still practically closed to the ordinary tourist, partly by the lack of accommodation but chiefly for want of knowledge.<ref>The guide books, which direct the tourist to devote a day to the Storr Rock and one or two days to the Quiraing, usually allow but a single day for a hasty visit to Loch Coruisk, and perhaps another for the ascent of Sgùrr nan Gilleann, by no means the easiest peak of the Cuillins. Although a systematic study would necessitate camping, most parts of the mountains can be reached from Sligachan by a hardy pedestrian. Elgol also affords convenient access to the southern part of the district and Carbost to the western.</ref>

We shall examine firstly the broad features of the topography and secondly the minor elements of the surface relief. The former are directly attributable to the form of the gabbro laccolite, while the latter are due chiefly to the dykes and intrusive sheets by which the gabbro is intersected, and to the peculiarities attending ice-erosion.

Especially interesting is the arrangement of the principal ridges and valleys of the Cuillins as dependent on the form of the gabbro laccolite. The laccolite is, as we have seen, of the nature of a thick sheet, thinning away towards its perimeter. The upper surface of the gabbro may therefore be assumed to have had a somewhat similar shape to that of the lower surface, as represented roughly by the contour-lines on the map given above (Figure 15), p. 86. The covering of basaltic lavas which once overspread the whole island has been totally removed from the mountain area. What was the nature of the drainage-system during this earlier stage of the erosion it is not possible to discover; for that system has not been "superimposed" upon the gabbro from which the existing surface-relief is carved out. The gabbro so greatly surpassed the other rocks of the district in the resistance which it opposed to the agents of erosion, that, when in the course of denudation the upper surface of the laccolite was exposed, the drainage-lines at once began to adapt themselves to the form of that surface. On no other supposition can we explain the remarkable correspondence observed between the shape of the laccolite and the existing form of the ground. This correspondence comes out very clearly upon comparing the topographical map with (Figure 15), which for this purpose may be taken as representing very roughly the shape of the *upper* surface of the gabbro laccolite. The Coruisk basin has resulted from the broad syncline which occupied the south-western part of the area, and the main range of the Cuillins marks the southwestern, western, and north-western limits of this syncline, coinciding nearly with the edge of the laccolite itself, which along this line dips always inward. The Druim nan Ramh, and Sgùrr na Stri ridges correspond with anticlinal flexures of the laccolite; and the former, branching off from the main range at Bruach na Frithe, must have been at one stage a more imposing range than now, having been considerably trenched upon by Harta Corrie. The Sligachan and Camasunary valleys coincide very closely with synclinal lines on the laccolite. The north-eastern portion of the gabbro is missing. We know that it was elevated by the intrusion of the granite magma, which invaded the earlier basic rock in a peculiarly intimate fashion. To what extent the gabbro was actually disintegrated by this attack is not certainly known; but the relics which can still be studied on Marsco suffice to show that the impregnation of the gabbro by the granite would greatly impair its durability under weathering agencies. The south-eastern limb of the gabbro laccolite thus came to be almost cut off, and surrounded by rocks much more easily destructible. It has, as we have seen, a synclinal structure, but it was too narrow a strip to originate an interior drainage, and so has given rise to the broken ridge extending from Blath-bheinn to Belig. The peculiar shape of the gabbro laccolite is due, as we have seen, chiefly to circumstances attending its intrusion. In so far as there was actual deformation at a later time, the overlying basalts would be partly affected in common with the gabbro; but it is probable that, when a drainage-system was initiated at the beginning of the erosion, the principal determining factor in this part of the area was not very different from a simple dome-like elevation of no very strong relief.

In a distant view the gabbro mountains at once assert themselves as a distinct geological unit with strongly marked characteristics. They present indeed a unique fragment of Alpine scenery among the mountain-groups of Britain. The spiry summits and acute, deeply-notched ridges are the more striking when seen across a foreground of the basaltic plateaux, or contrasted in the same view with the rounded outlines of the granite hills (Figure 84), p. 449. Approaching the mountains by one of the large corries, or still better by Loch Scavaig, an observer is next struck by the contrast between the smooth surfaces of the lower slopes and the abrupt splintered forms of the peaks which overlook them (see frontispiece). The corries and interior valleys, with the slopes immediately enclosing them, are everywhere moulded by

ice-action, and there is perhaps no district which exhibits more clearly the essential characteristics of glacial erosion. The present writer has discussed this subject in a separate memoir, *Ice-Erosion in the Cuillin Hills, Skye. Trans. Roy. Soc. Edin.*, vol. xl., pp. 221–252; 1901. and has pointed out the significance in this connection of the peculiar form of the valleys, both in cross-section and in longitudinal profile, with their cirque-formed heads, tarn-basins, lake-basins, and other incidents. It is especially to be remarked that these features *We are speaking here of the highly characteristic forms of the valleys, as now to be seen. The valleys themselves, as we have shown, are related to the broad structure of the district, and by far the greater part of the erosion was accomplished before the Glacial period. are never related to anything in the structure or lithological constitution of the country. Indeed many facts observed in the Cuillins go to suggest that a surface-relief very little influenced by structure is a characteristic of direct ice-erosion. On the floor of any of the corries it is often impossible to decide that the eroding force has respected one rock more than another; for the gabbro, the enclosed patches of volcanic rocks, and the various dykes and sheets often figure together on one smooth rock-face* This of course implies, what is otherwise amply demonstrated, that under the present conditions erosion is almost completely checked. See Harker, Notes on Subaerial Erosion in the Isle of Skye, *Geol. Mag.*, 1899, pp. 485–491. As we pass up from the floor of the corrie, the influence of structure declares itself with increasing prominence, and it is most marked on the actual ridges and peaks. This is partly because ice-erosion has there been less efficient, partly because the ridges have subsequently been subjected to prolonged weathering by frost-action. The debris resulting from this shattering action has been in part carried away on the glaciers, but in part it remains in the great taluses or screes which choke the heads of many of the glens. Without further considering the ice-worn valleys and corries, we shall have regard in what follows more particularly to those parts of the mountains in which the effects of differential weathering are clearly exhibited.

While the dominant rock is gabbro, there are, as we have seen, numerous enclosed patches of the volcanic group. In its highly metamorphosed state the basaltic lava is not greatly inferior to the gabbro in its resistance to destructive agents. Sometimes the gabbro stands out in relief from it, or the basalt may give rise to a depression in a ridge, as for instance on the col connecting Sgùrr Thuilm with Sgùrr a' Mhadaidh; but elsewhere, as on Sgùrr nan Gobhar, the basalt even forms salient features, and it builds several of the summits, notably those of Sgùrr Alaisdair, Sgùrr Tearlach, and Sgùrr Mhic Choinnich, which are among the highest peaks of the Cuillins. This metamorphosed basalt, however, with close texture and splintery fracture, disintegrates in a different manner from the gabbro, and it affords less secure holds for hand and foot. In this latter respect the gabbro, above the limit of ice-moulding, offers remarkable facility to climbers. It is even surpassed in some places by the picrite and peridotite group, owing partly to the extreme hardness and toughness of these rocks, partly to the pitted or embossed surfaces which they often present owing to the weathering of xenoliths. The relation of the form of the ground to these ultrabasic rocks is rather peculiar. The large laccolitic intrusion builds the prominent peak known as Sgùrr Dubh na Dabheinn, overlooking the tarn of Coir' a' Ghrundda; but the prolongation of the same mass, both eastward and northward, has been excavated into valleys. This seems to be connected with the very pronounced banded structure of the rocks, both in An Garbh-choire and in Coireachan Ruadha, which has hastened their erosion. Where banding is absent or inconspicuous, the rocks always form prominent features, as is well seen in An Sgùman and in the easterly spur of Sgùrr na Banachdich, the one due to a boss and the other to small laccolite of picrite.

It is, however, to the intrusive sheets and dykes, which traverse gabbro and basalt alike, that the mountains owe some of their most distinctive characters. In particular, the remarkable appearance of stratification often conspicuous upon the outward slopes is due to their being seamed by innumerable parallel sheets of dolerite and basalt. These rocks are of very durable nature, and are not often weakened by cross-jointing like the sills of the moorland country, so that they very frequently show in relief even against the gabbro. Elsewhere they have weathered more rapidly; but in either case they give rise to ledges running along the steep slopes, and in places these assume something of the character of a rude series of steps. This is seen on the outward slopes of the mountains only, because, as we have noticed, the intrusive sheets constantly dip inward.

The shapes of the ridges in different parts of the gabbro tract, and the marked difference often apparent between the opposed slopes, depend largely upon the direction of dip of the intruded basic sheets and the angle which the trend of the ridge makes with the strike of the sheets. For example, in that part of the main or western range which comprises Sgùrr Dearg, Sgùrr na Banachdich, and Sgùrr a' Ghreadaidh the general direction coincides with the strike of the inclined basic sheets. Here the actual crest-line is usually made by one of the strong sheets of dolerite, dipping to the east in a

perilous slope and then breaking away. The western slope is often steep, but is in many places rudely terraced at short intervals by ledges, which dip inward and afford secure 'traverses' to the mountaineer. The eastern slope is in places extremely precipitous, and where this is not the case the climber encounters broad slabs of smooth rock dipping outward and offering only precarious holds. These slabs are sometimes the surface of an intruded sheet, more often a surface of gabbro from which such a sheet has broken away. Approach is thus more difficult from the Coruisk than from the Glen Brittle side. This observation applies to the peaks themselves. Approach to the passes is often easier from the east, at least where extensive screes occur. The character of the interior or eastern slope varies, however, according as its inclination in different parts is greater or less than the dip of the sheets. The outcrops of a group of strong sheets exposed at their upper edges may occasion a short and irregular subsidiary ridge parallel to the main one, or a bold easterly spur may have a summit encircled by the outcrops of a group of sheets. This later is illustrated by the fine peak known as Sgùrr a' Coir' an Lochain, which may be contrasted, e.g. with Sgùrr nan Gobhar, a westerly spur of the main range, where no such arrangement is possible. On the main range itself too is found here and there an abrupt prominence, formed either by a small outlying portion of a strong inclined sheet or by an outlier of gabbro resting on such a sheet. Examples are seen on the northern peak of Sgùrr a' Ghreadaidh and on Bidein Druim nan Ramh.

Corresponding with this part of the main range, but on the opposite edge of the gabbro tract, is the Blaven range, which from the scenic as from the geological standpoint must be regarded as an integral part of the Cuillins. Here the intrusive sheets dip in the opposite direction, *i.e.* still towards the interior of the tract, and the physical aspect of the mountains is in accord with this structure. Blath-bheinn itself on its steep western face has a steady slope (about 40°) nearly coinciding with the dip of the inclined sheets, and in consequence this face, disregarding for the present two or three deep gullies, has a very simple character. The same is true of the Clach Glas portion of the ridge, farther north, although there the summit is more precipitous, so that the outcrops of the sheets encircle it. The eastern side of the range is much more diversified in character, and is easier of access for reasons already pointed out (see (Plate 14)).

In contrast with the above, we may look at that portion of the Cuillin ridge which constitutes Sgùrr a' Mhadaidh, where the general trend, nearly E.-W., runs athwart the strike of the inclined sheets. Here there is no continuous crest-line. The ridge is broken into a succession of small peaks, each presenting an abrupt drop towards the west and a steady slope towards the east, the latter always tending to coincide with the dip (about 40°) of the intrusive sheets to which this disposition is traceable. On the flanks of the mountain the same sheets are seen as ledges running obliquely down to the left as seen from Tairneilear (Plate 15), or the right as seen from Coir' an Uaigneis (frontispiece). The same structure is exhibited on a ruder scale in Sgùrr Dubh, and again, with some modification, in other E.-W. ridges such as those of Sgùrr Sgùmain and Sgùrr nan Gobhar. In these latter examples alternations of basaltic lava with gabbro also contribute to the effect. It is to be noticed generally that the intercalated patches of basaltic lavas and agglomerates have in most cases the same inward dip as the inclined sheets, though not always in precise parallelism with them. It follows that where the occurrence of such enclosed patches has given rise to evident surface-features, these are in general agreement with the structure impressed upon the mountains by the inclined sheets. Gars-bheinn affords the best illustration of this. On the south-easterly ridge of this mountain, and in the shape of Coire Beag and Coir' a' Chruidh immediately adjacent, the general effect of a stratified group of rocks is very conspicuous, and is clearly indicated on the topographical map.

Not less important than the intrusive sheets as regards their part in controlling the erosion of the gabbro tract are the dykes. The only dykes which consistently make features in relief are the few composed of peridotites on Sgùrr Dearg, Sgùrr na Banachdich, etc. The ordinary basic dykes, and especially the latest ones which intersect the intrusive sheets as well as the gabbro, tend always to betray their presence by weathering out into depressions. In this way arise most of the deep gulleys which furrow the steep sides of the mountains, and become in wet weather the channels of mountain torrents. Less commonly a platform of gentler slope is trenched by a straight water-course of like origin, such as the deep gorge which drains Coir' a' Bhàsteir, north of Sgùrr nan Gillean. Sometimes the gullies are confined to the actual slopes, but very often they pass up into gaps in the ridge and are continued on the opposite side. Many deep notches, such as that which divides the twin peaks of Blath-bheinn and that named An Dorus (the door) between Sgùrr Mhadaidh and Sgùrr a' Ghreadaidh, have originated by the weathering out of dykes or groups of dykes. Distinct peaks, such as these which form Bidein Druim nan Ramh, owe their individuality in large measure to their being divided and cut off by dyke-notches; and it is in this way that the north-easterly ridge of Sgùrr nan Gillean is divided into a succession of

graceful pinnacles (Plate 16). This latter and the much broken arete extending westward from the same peak<ref> See Geikie, *Ancient Volcanoes of Great Britain*, vol. ii., p. 338, fig. 333; 1897.</ref> are instances of ridges in the most apt position to display such breaches of continuity, since they run nearly at right angles to the dominant set of dykes in their neighbourhood. In most of the other minor ridges, however, the tendency is for the trend to follow the direction of the principal set of dykes. This is well seen in such small spurs as those running out from Sgùrr a' Ghreadaidh, and especially in the Sgùrr na Fheadain ridge which runs out from Bidein Druim nan Ramh towards Coire na Creiche (Plate 15). Even the long north-westerly ridge of Bruach na Frithe seems to have had its direction determined in some measure by the dykes. In a few places the breaking away of a dyke parallel to a ridge has occasioned for a short distance a vertical precipice. A more remarkable case is that of the isolated rock near the summit of Sgùrr Dearg known to climbers as the "Inaccessible Pinnacle". This is a relic of a wall-like mass of gabbro bounded on the two sides by parallel dykes which have broken away. Since it is also of the nature of an outlier upon a strong inclined sheet of dolerite, and is extremely precipitous at the end facing the mountain, its shape is a singularly striking one<ref>The height of the pinnacle is about 60 feet, reckoned at the "short end", but the ascent by the "long end" is about 150 feet. It overtops the summit-cairn by quite 20 feet, and is a conspicuous object in a distant view.</ref> (Figure 82).

We see that the dykes, like the inclined sheets, produce different effects according to their angle with the trend of the ridges. Other variable elements which enter are the comparative frequency of the dykes in different parts of the area and the occurrence in some parts of two or three distinct sets of dykes differing in direction. The main ridges, connected as they are with the deformation of the gabbro laccolite, must have been outlined from an early stage in the erosion of the region. Starting from this rough plan, the existing surface-relief has been developed largely with reference to the two leading structural elements which have been noticed, the intrusive sheets and the dykes. To the predominance of one or other of these elements, and to the ever-varying combination and interaction of the two, most of the mountain-scenery of the Cuillins in its ultimate analysis reduces. The noteworthy features in the landscape which do not fall under these heads are few. The behaviour of the rocks of the peridotite group has already been alluded to; and we may also recall certain special acid intrusions described on pp. 287, 288, which have occasioned the gap occupied by the "Alasdair Stone-shoot" (Figure 83) and the passes of Coire Labain and Coir' a' Ghrunnda.

The great toughness and strength of the gabbro itself is shown by the steepness which the mountain-sides may attain without breaking into precipices. The usual inclination of long continuous slopes varies from 35° to 40°, but on some of the minor ridges, such as Druim nan Ramh and Sgùrr na Stri — still excluding actual precipices — the angle of slopes more than 1500 feet high reaches <15° or even 50°. The ordinary slopes of the Cuillins are too steep either for screes or for vegetation, and accordingly the mountains consist in general of naked rock. The colour is derived from the augite of the gabbro, and ranges, with varying conditions of moisture and light, through every tone of purple; deepening to a velvety black in glimpses caught through a wrack of mist or brightening to burnished copper under the level rays of a cloudless sunrise. The sterility of the mountains is, however, relative rather than absolute. Even at 3000 feet and higher the narrow ledges and crevices nourish in places a small flora of Alpine habitat,<ref> Among the common species are *Arabis petreea*, *Silene acaulis*, *S. inflata*, *Cerastium alpinum*, *Alchemilla alpina*, *Geum rivale*, *Sedum rhodiola*, *Saxifraga stellaris*, *S. oppositifolia*, *Antennaria dioica*, *Vaccinium myrtillus*, *Loiseleurea procumbens*, and *Oxyria renzformis*.</ref> or even a scanty herbage which tempts the sheep from Glen Brittle to high up on some of the less difficult slopes and ridges. Permanent springs may occur up to as much as 2500 feet altitude, and there are some very copious ones at about the 2000 feet line.

The *granite mountains* do not require very detailed notice. The large body of granite, granophyre, etc., from which the majority of the Red Hills are carved out has, as we have seen, the general form of a great sheet or laccolite. It is, however, much more irregular in its behaviour than the gabbro of the Cuillins, and we are not able to trace out so close a correspondence between the broad features of the existing relief and the shape of the large plutonic mass. Nevertheless it appears that the western range of the Red Hills, from Ruadh Stac and Marsco to Glamaig, corresponds with an anticlinal curve in the granite mass, while Loch Ainort and the surrounding low ground coincide with a broad syncline.

The smooth slopes and flowing curves of the Red Hills are in strong contrast with the acute summits and deeply indented ridges of the Cuillins (Figure 84), and the reason of this difference is manifest. Just as the diversity of form in the gabbro mountains results from the complexity of their structure and the infinitude of sheets and dykes intersecting the dominant rock, so the simplicity of the surface-relief in the other case is mainly referable to the uniformity of geological constitution

and the paucity of minor intrusions or other interruptions of the granite. Dykes are comparatively infrequent, and the inclined sheets of dolerite, which figured so prominently in the gabbro mountains are absent.

The variety of lithological characters met with among the acid rocks themselves is not often of a kind to express itself in the physical aspect of the ground, but instances of this kind might be cited; notably the precipice of Fiaclan Dearg, on Marsco, formed by a rock with marked columnar structure (see (Plate 8), above). In the large acid intrusions of the Western Isles generally any pronounced columnar jointing seems to be rare. The best examples are Ailsa Craig and the west coast of Rum. As a rule any conspicuous departure from the characteristic smoothness of outline (apart from glacial cirques) is occasioned either by enclosed patches of older rocks or by younger dykes. The sheet of marscoite which forms Sròn a' Bhealain has already been mentioned (see (Figure 37), p. 188). In one or two places, as on the north-western slope of Ruadh Stac, small enclosed patches of gabbro make slight features; while, on the other hand, strips of gabbro impregnated by granophyre give rise to gullies, such as that on the north-west face of Marsco and that which crosses Druim Eadar da Choire. The rough northern half of the Beinn na Cro ridge is made by an enclosed patch of basalt lavas, with a thick sheet of gabbro below, which builds some prominent buttresses at the northern end. Another place where a considerable patch of the lavas makes a noteworthy feature is Meallan a' Bhealaich Bhrìc, on the east side of the Tormichaigh valley, but this seems to be rather an exposed inlier than a portion truly detached and enveloped.

The basalt dykes which traverse the Red Hills weather out in relief against the granite. For this reason, but still more on account of their dark colour, they are conspicuous from a distance; e.g. on Beinn Dearg Mheadhonach as seen from Marsco, or Beinn Dearg Mhòr from Sligachan. Sometimes, as in Allt na Measarroch, to the north of Marsco, they have determined the course of a stream, but the channel is cut by the side of, not along, the dyke. In one place only, viz. on Beinn na Caillich, facing Broadford, does a dyke in the granite cause a strong feature: it is one of the large diabase dykes of solitary habit (Figure 5), p. 17.

The granite hills are not only lower than those built of gabbro, but they are also less steep. The inclination of a long unbroken slope may rise to 30°, but never exceeds this by more than two or three degrees. When it declines a little below this, it falls within the angle of repose of loose material, and accordingly many of the slopes are encumbered by screes. The Red Hills also support vegetation much more than the Cuillins do, a result mainly of the more facile decay of the rock-surface. The rounded summits and ridges, when not grassed over, often have a thin layer of coarse quartz-sand derived from the subaerial waste of the granite. Whether consisting of naked granite or covered by screes of the same material, the slopes show something of the "red" tint implied in the name of these hills; but the colour is very changeable, varying from a cold greyish yellow in the dry days of early summer to a fiery crimson under an autumnal sunset. Permanent springs are not found so high, either absolutely or relatively, as in the gabbro mountains.

To the east of the large area of granite smaller intrusions in the form of bosses have caused the eastern Red Hills (Beinn na Caillich and its neighbours) and the more isolated Beinn an Dubhaich. We have pointed out that the prominence of the former is partly due to bounding faults. This, being a comparatively broad tract of granite, is trenched by deep corries and divided into three distinct hills; while the other boss, of narrow elongated form, has given rise to a simple unbroken ridge. It may be enquired why the gabbro boss north-west of Broadford has not caused any noteworthy eminence. On this question we may remark that there is no evidence of the intrusion having ever been prolonged upward with the boss form. At a short distance above the present surface of the ground it would pass from the Cambrian limestones to the Torridon Sandstone, and it is probable that it would then change to an irregular sheet of no great magnitude, as indeed it is actually seen to do at its northern extremity, on Creag Strollamus.

The granophyre hills of Carn Dearg, Beinn a' Mheadhoin, and Beinn a' Chairn reproduce on a small scale some of the features of the Red Hills. The other composite sills of the Cnoc Càrnach group give rise to more or less marked ridges, the more constant and massive acid rock being more in evidence in the thicker sills and the more durable basalt in the thinner. The numerous dykes which intersect the Cambrian limestone series are remarkable for the prominent fashion in which they stand out, often presenting the appearance of stone walls two or three feet high. A few, such as the large multiple dyke which runs S.E. from Loch Kilchrist, have given rise to very noticeable ridges. The dykes in the Lias are not often so prominent, except on the sea-shore, e.g. about Broadford, where they sometimes rise five or six feet above the soft shaly and calcareous strata. When we have recalled the volcanic agglomerate of the Strath vent, which in the low broken hills overlooking Loch Kilchrist presents a very characteristic appearance, we have almost exhausted the scenic

aspects of the Tertiary igneous rocks in Skye.



FIG. 79.—Terraced hills on the west side of Glen Varragill; outline view, looking northward to the Storr, which is seen in the distance (right). The terraces are caused by the very numerous intrusive sills intercalated in the basaltic lavas.

(Figure 79) Terraced hills on the west side of Glen Varragill; outline view, looking northward to the Storr which is seen in the distance (right). The terraces are caused by the very numerous intrusive sills intercalated in the basaltic lavas.

PLATE X.



Columnar sill of dolerite forming the cliff at Rudha Buidhe, near Braes.

(Plate 10) Columnar sill of dolerite forming the cliff at Rudha Buidhe, near Braes.

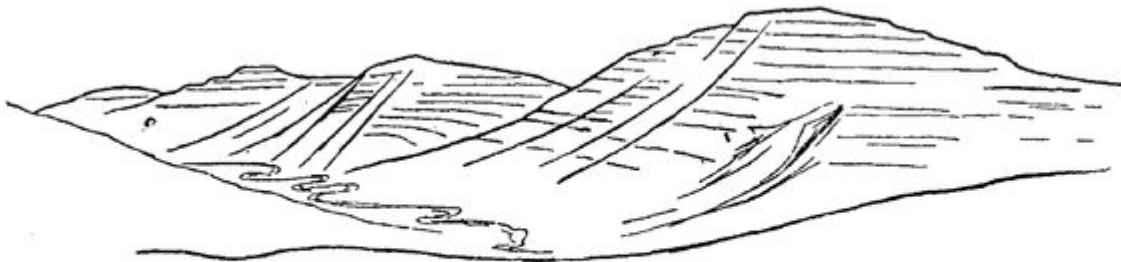


FIG. 80.—Outlines of hills on the west side of Glen Brittle, seen from near Bealach a' Mhaim. The terraced appearance is due to the intrusive sills, and the long straight gullies are determined by the weathering of dykes.

(Figure 80) Outlines of hills on the west side of Glen Brittle, seen from near Bealach a' Mhaim. The terraced appearance is due to the intrusive sills, and the long straight gullies are determined by the weathering of dykes.



FIG. 81.—View of Blath-bheinn, looking west from near Kilchrist. Above the drift-covered Jurassic rocks of the foreground, An Carnach, formed by strong intrusive sills in the basalt group, illustrates the plateau type of scenery. Behind this rise Slat-bheinn and An Stac, in which the sills rapidly die out, and the indurated basalt lavas themselves constitute marked features, the bedding being sharply turned up towards the mountains. Blath-bheinn and Clach Glas in the background are characteristic gabbro mountains. (Del. C. B. Phillip.)

(Figure 81) View of Blath-bheinn, looking west from near Kilchrist. Above the drift-covered Jurassic rocks of the foreground, An Carnach, formed by strong intrusive sills in the basalt group, illustrates the plateau type of scenery. Behind this rise Slat-bheinn and An Stac, in which the sills rapidly die out, and the indurated basalt lavas themselves constitute marked features, the bedding being sharply turned up towards the mountains. Blath-bheinn and Clach Glas in the background are characteristic gabbro mountains. (Del. C. B. Phillip.)

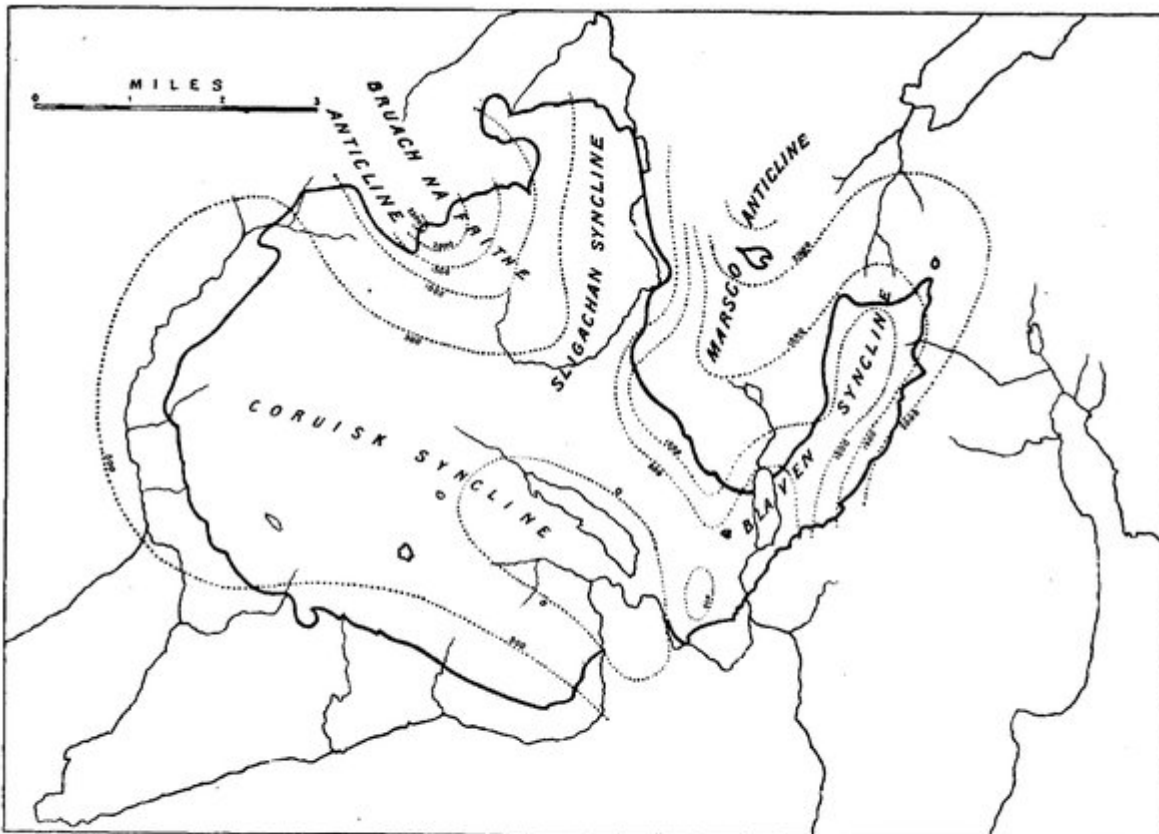


FIG. 15.—Sketch-map to show the shape of the gabbro laccolite of the Cuillins: scale, $\frac{1}{2}$ inch to a mile. The boundary of the laccolite (omitting minor irregularities) is shown by the heavy line; the chief streams and lakes and the coast to the south by lighter lines. The dotted lines are intended to represent approximately the shape of the lower surface of the laccolite, being contour-lines of that surface at intervals of 500 feet, reckoned from sea-level.

(Figure 15) Sketch-map to show the shape of the gabbro laccolite of the Cuillins: scale, $\frac{1}{2}$ inch to a mile. The boundary of the laccolite (omitting minor irregularities) is shown by the heavy line; the chief streams and lakes and the coast to the south by lighter lines. The dotted lines are intended to represent approximately the shape of the lower surface of the laccolite, being contour-lines of that surface at intervals of 500 feet, reckoned from sea-level.

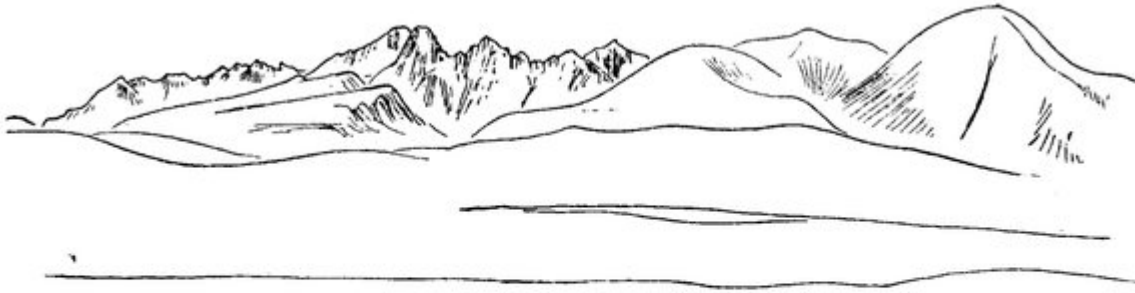
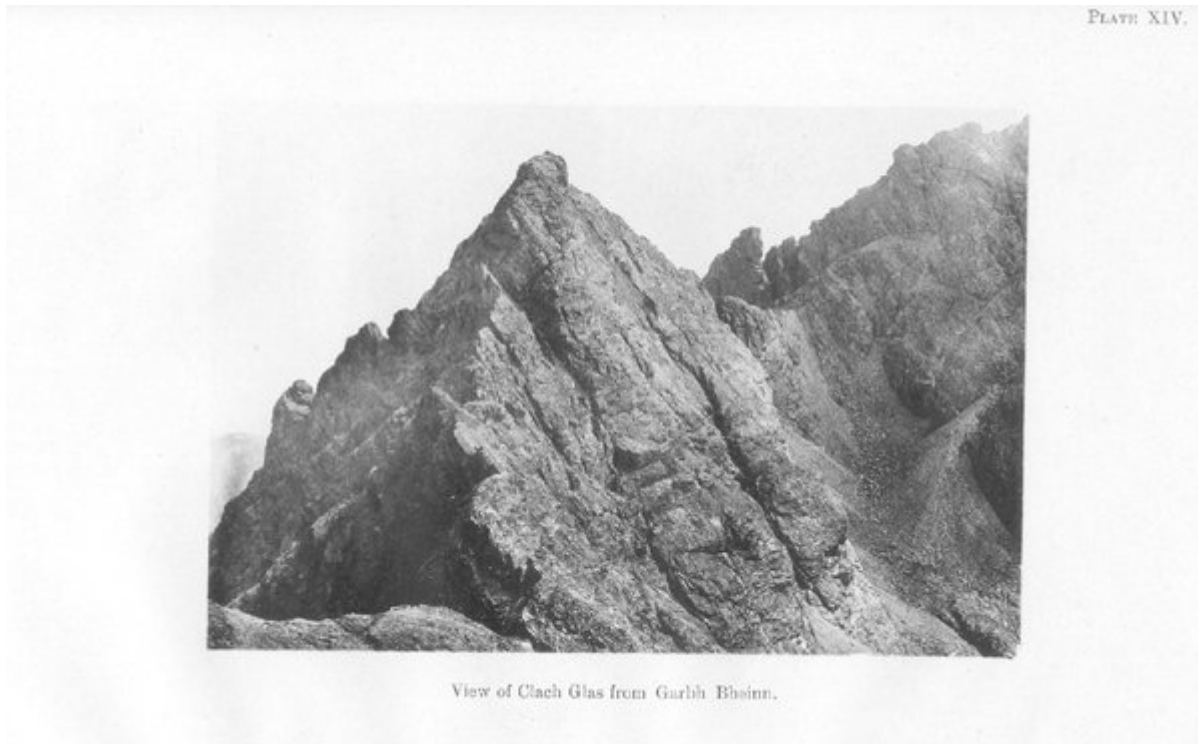


FIG. 84.—Contrasted outlines of the gabbro and the granite, as seen from Cnoc Carnach. To the left is the Blaven range, with the southern Cuillins beyond and the basaltic plateaux of An Dà Bheinn and An Stac in front. To the right are the most easterly of the Red Hills, viz. Beinn Dearg Bheag, Beinn Dearg Mhòr, and Beinn na Caillich.

None



View of Clach Glas from Garbh Bheinn.

(Plate 14) View of Clach Glas from Garbh Bheinn.



View from Coire na Creiche.

(Plate 15) View from Coire na Creiche.



View of Sgurr nan Gillean.

(Plate 16) View of Sgurr nan Gillean.

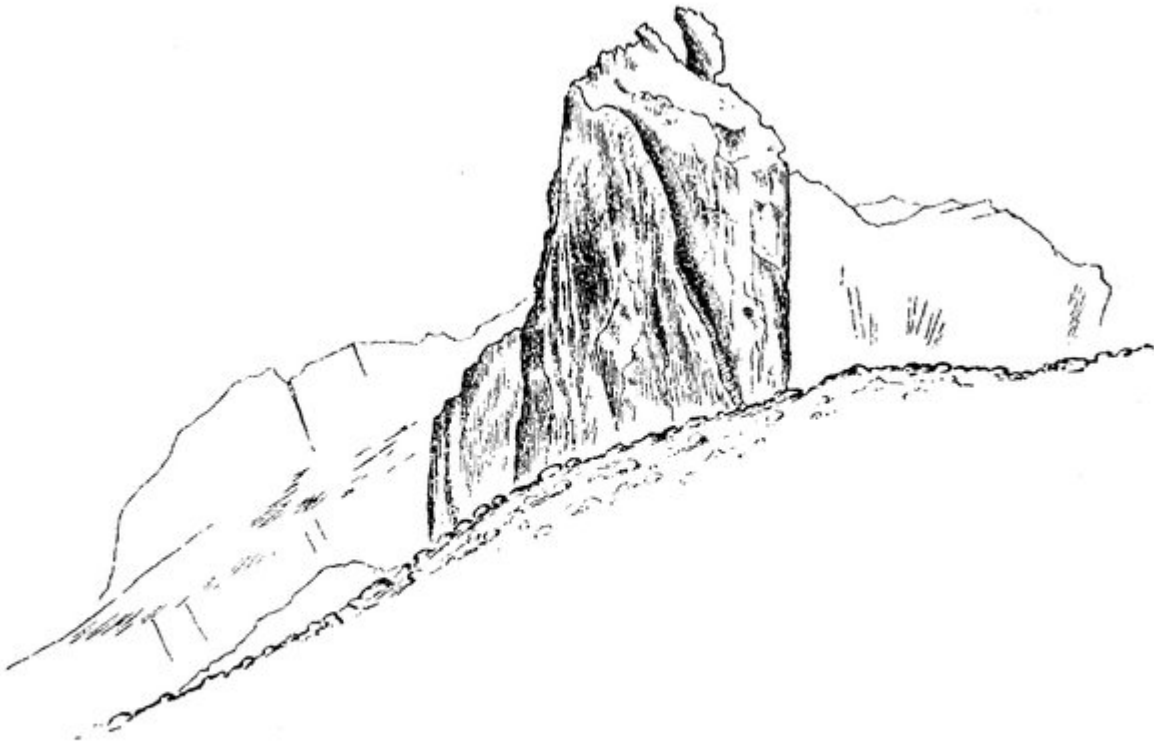


FIG. 82.—The “Inaccessible Pinnacle” of Sgùrr Dearg, seen from near the summit-cairn. In the background the outlines of Sgùrr Sgùmain (right) and Sgùrr a' Coir' an Lochain (left).

(Figure 82) The "Inaccessible Pinnacle" of Sgùrr Dearg, seen from near the summit-cairn. In the background the outlines of Sgùrr Sgùmain (right) and Sgùrr a' Coir' an Lochain (left).

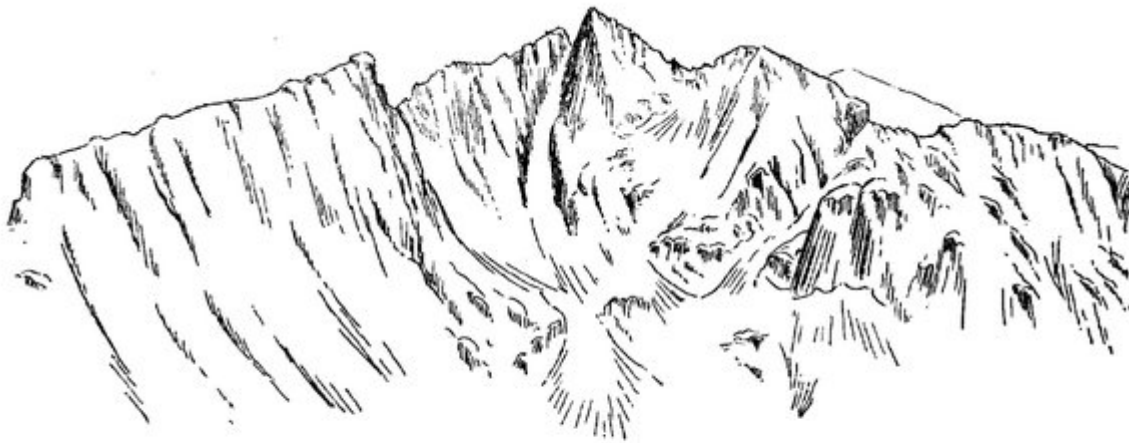


FIG. 83.—Outlines of the Alaisdair group of mountains, seen from Sgùrr Dearg. The highest point is Sgùrr Alaisdair (3275 feet), separated from its neighbour, Sgùrr Tearlach, by the great stone-shoot. To the left is Sgùrr Mhic Choinnich, and to the right the broken ridge of Sgùrr Sgùmain with the outline of Sgùrr nan Eag behind.

(Figure 83) Outlines of the Alaisdair group of mountains, seen from Sgùrr Dearg. The highest point is Sgùrr Alaisdair (3275 feet), separated from its neighbour, Sgùrr Tearlach, by the great stone-shoot. To the left is Sew Choinnich, and to the right the broken ridge of Sgùrr Sginnain with the outline of Sgùrr nan Eag behind,



Marsco, from the North-west.

(Plate 8) Marsco, from the North-west.

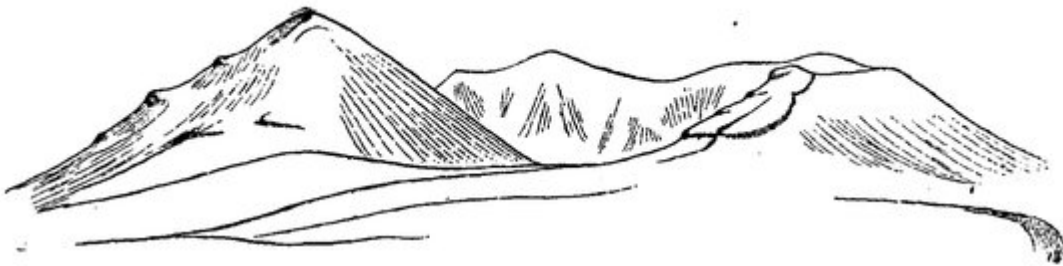


FIG. 37.—Outlines of Glamaig and Beinn Dearg, seen from the road a mile north of Sligachan. The broken north face of Glamaig, on the extreme left, consists largely of metamorphosed basaltic lavas. Beinn Dearg illustrates the characteristic rounded outlines of the granite hills; while, in strong contrast with this, the abrupt knoll of Sròn a' Bhealain is seen towards the right of the sketch.

(Figure 37) Outlines of Glamaig and Beinn Dearg, seen from the road a mile north of Sligachan. The broken north face of Glamaig, on the extreme left, consists largely of metamorphosed basaltic lavas. Beinn Dearg illustrates the characteristic rounded outlines of the granite hills; while, in strong contrast with this, the abrupt knoll of Sròn a' Bhealain is seen towards the right of the sketch.

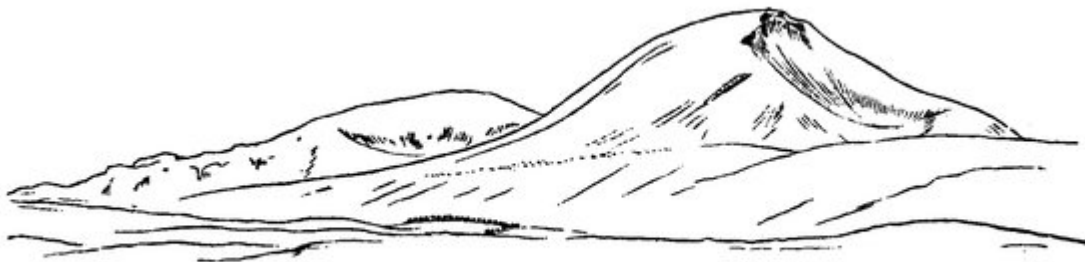


FIG. 5.—Contrasted outlines of volcanic agglomerate and granite, as seen from Broadford.

(Figure 5) Contrasted outlines of volcanic agglomerate and granite, as seen from broadford. The low broken hills to the left mark the situation of the Kilchrist vent, and are composed of volcanic agglomerate. The smooth outline of the granite is seen in Beinn Dearg Bheag and Beinn na Caillich, which form part of the Red Hills. In one place on Beinn na Caillich this smooth outline is broken by the outcrop of a large dyke intersecting the granite.