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## Chapter 17 Detail of the Palaeozoic intrusions

The arrangement of this chapter will follow that met with in the field, where dykes associate with dykes, and sills with sills, whatever their petrological character.

### Detail of the basic dykes

#### Those that cut rocks later than the Mona Complex

The thin one at Careg-onen is placed with the dykes because of its strike, but it is much inclined. It is in a poor state of preservation. Of the three in the Baron Hill Outlier, the only one that is now well exposed is a nine-foot dolerite in the southwest knob of grit on the drive. It is one of those that approach the tholeiitic type ([E9491](#)) [SH 599 756] and its chilled edge has the little lath-felspars. Most likely these dykes are cut off at no great depth by the Baron Hill thrust-plane and are riding on it. Those in the Arenig grit of Garth Ferry ([E9489](#)) [SH 579 740], ([E9516](#)) [SH 579 740] are about three inches, six feet, and two and a half feet in thickness respectively. They also are in poor condition, but are albitised and have the usual characters and texture, with the same type of chilled margin. The exposures are clear, and one is seen to be cut off by the fault at its north end, in a little recess of the cliff. It is also severely crushed along its middle, and is decidedly schistose in that zone. A thin branch is also sheared. The dyke in the Arenig grits west of Tai-rhos Smithy by the Malldraeth Marsh is obscure.

#### Those that outcrop in the Mona Complex

Of the innumerable dykes that outcrop in the Mona Complex, details will be given of a small selection only, arranged according to the regions of the Complex.

**Aethwy Region** — The Menai shore from Gallows Point to Garth Ferry is one of the best sections in Anglesey for the study of these rocks, but an ebbing tide should be chosen, some parts not being easy of access at high water. Beginning at Gallows Point, the second dyke shown on the one-inch map contains the veins of second injection of (Figure 225). Where small crush-lines pass through, these veins are shifted. But where their margin is uninjured it has a fine wavy structure, which is therefore fluidal. Similar fluidal structure can be seen in a six-inch vein about 65 yards nearer Gallows Point. At the 'y' of 'Pen-y-part', near a walled-up part of the cliff, a pair of large dykes is well exposed. The first ([E6060](#)) [SH 594 750] is remarkably rich in apatite, some parts being quite crowded with slender hexagonal needles. The next is that of (Plate 30) and (Figure 233). The branch is clearly seen, and the effects of crushing easy of access on the eastern side. Brecciation has taken place along the margins, but shearing internally, the one being seen to pass into the other between the dyke and its eastern tongue. There are small secondary injections. Beyond the long dyke that runs up to Pen-y-parc ([E6058](#)) [SH 590 750] is an interesting group of five small ones (Figure 234), cutting an old basic schist of the Mona Complex. They are not much crushed, the western one, though suddenly shifted, having a good chilled selvage all across the shift. A large pair to the west of these is much broken down in parts, the original intrusion having been, apparently, complex as well. The massive parts of the old basic rock, especially where traversed by late crush-lines, are very like the dykes, but can be seen to grade into good fissile schist belonging to the Complex. The dolerite north-east of the Ferry is better seen in the road than on the shore. On its under side it has a rude vertical schistosity, which does not perceptibly affect the old foliation of the Gwna rocks. Nor are the amygdules of the dyke deformed. In Baron Hill Drive a nine-foot dolerite north-northwest of the first milestone of the road below shows both a vertical schistosity and marginal brecciation.

The large dykes of Menai Bridge are best exposed in deep trench-like old quarries, but one of them is still being quarried by the roadside at Yr-allt, and is again well seen on a natural boss, cutting the glaucophane schist at Castellior. The effects of movement on the large dyke at Pant-bowel (Figure 253), (Figure 254) were well exposed a year or two ago in the quarry just below the road. The dolerite at Pont Dic, which has a high specific gravity, is very fresh, and coarsely crystalline. Llanddwyn Island (Folding-Plate 15) is an excellent locality for the study of the dykes. The large one that runs out on the cliff east of Trwyn-ffynnon-y-sais, which is not much albitised, turns abruptly from its course and runs along the

strike for a few yards. At the south-west point of the Beacon-tower islet a dolerite ([E10122](#)) [SH 386 624] with large porphyritic labradorites is a little sheared transversely to its course. Its lath-felspars are labradorite edged with oligoclase, and not much albitised. Along the hills overlooking the marsh it is possible that some of the isolated exposures hitherto assigned to dykes may be really parts of sills (see p. 530). Two large dolerites are well exposed in the railway cutting at Berw-uchaf; and another, containing an inclusion of schist three to four feet wide, near the eastern side of the road at Phis Berw.

The interesting large dyke of Gaerwen on the south side of the Holyhead road ([E6059](#)) [SH 476 720], ([E9492](#)) [NZ 957 047], that is encroached upon by the late dyke ((Figure 306), Chapter 28) is a quartz-dolerite rich in apatite and micro-pegmatite as well as in secondary hornblende. It gives rise to a steep feature, at whose east end, 275 yards west by south from Gaerwen Church, is the quarry where it is seen in a schistose condition and in contact with the late dyke, but as work is going on actively the details are changing. It contains a large inclusion of baked siliceous mica-schist, against which it is chilled. The highly schistose part is to the north of this inclusion, south of which there are only isolated lines of shearing.

Among the basic gneisses, dolerites easily elude observation. A little to the north-east of Graig-fawr, one of them is shifted 140 yards at the line that parts hornblende-gneiss from hornblende-schist, which is thus evidently a Post-Silurian rupture. On a boss about 600 yards a little north by east from Bwlch-gwyn several dolerites are seen, one showing a very clear chilled selvage ([E9855](#)) [SH 485 730], ([E9927](#)) [SH 485 730]. Near the middle of the large dyke, on the south-east crags of the boss, is a zone some two feet wide crowded with large porphyritic labradorites, which are present in but moderate numbers outside this zone. In a dolerite only 25 yards to the south-west the phenocrysts are labradorite-andesine.

The intrusion west of Careg-onen (Figure 258) is practically a sill, but this is largely due to mere local coincidence with the strike of the Complex. It disappears westwards. At a small knob 400 yards south-west of Hafotty a dyke about 25 feet wide, unusually fine in grain, contains many inclusions of a coarser dolerite, against which the including material shows fluidal structure. Further investigation will probably be interesting, as this would seem to be a case of later injection which was larger than the first one, a reverse of the usual relative dimensions. The large dolerite of Bryn-cogail seems to belong not to the later but to this series, and, if so, it is one of the very rare cases therein of spherulitic structure.

The numerous dykes of Mynydd Llwydiarth need further study.

They are abundantly exposed. One from near the summit ([E6056](#)) [SH 546 792] is a typical ophitic dolerite, not much albitised, and contains the deeper-coloured augite.

**Middle Region** — The sections at Bryn-yr-odyn are among the best for study of the thermal effects upon the schists. The core and the fine selvage of the dyke are shown in (Plate 28), Figs. 3 and 4 ([E10027](#)) [SH 397 737]–([E10028](#)) [SH 399 736]. A four-inch vein at the northeast end of the boss is slightly schistose, and shifting is seen on a small boss about 400 yards north-north-west of the cottage, on the north-east side of the large dyke. To the south of this, where the dolerites pass through the large tract of old spilite-schist, on the eastern side of the high knob of Dinas, they are not always easy to separate, as, bending down, their outcrops run along its strike for a little way (see p. 502). A small one between Soar and the alluvium attains the highest degree of albitisation known in the district. In the railway cutting north-west of Llyn Coron several dykes are well exposed, porphyritic, and with good contact-metamorphism on the further side of the large one beyond the bridge ([E10077](#)) [SH 383 704] (p. 489). In another, at the 'r' of 'Ty-mawr' (which is between two field-walls' ends), there are small strips of fine white saccharoid calcite, in which, running parallel to the cheek, are long straight needles of green actinolite ([E11390](#)) [SH 378 709]. They may be xenoliths.

Many dolerites are well exposed in the bold sea-cliffs of the Bodorgan Headlands. The most interesting is the 60-foot dyke which is seen in the cliff at a place nearly to the south of Bodorgan House, an albitised dolerite with brown hornblende and lavender-polarising chlorite ([E10231](#)) [SH 387 665]–([E10232](#)) [SH 387 665], for it contains the two kinds of vein that are discussed on p. 488. It produces good spotted alteration in the schists, unlike the adinole produced by the ancient hornblende-diabase through which it cuts. The vein of later injection, which is vertical, cuts the peculiar thin segregation-veins. One of those to the south-east of Bonc-twni, which runs up a narrow creek, turns into its east cliff for a

few yards, the deflection being original, as there is a fine selvage. The three-foot injection on the north cliff of a little cove just beyond Porth Twyn-mawr is shifted about four yards, and, although it cuts the schists very sharply, is traversed by a slight schistosity parallel to their own, which is not any stronger at the shift-plane than elsewhere. The deep gap filled by the sea at high water (and very likely the one further out, which is always filled) in Dinas Trefriw is due to a dyke. In this is a strip of baked grit several yards long, which, though parallel to the dyke-wall and only about a yard away, is not composed of the same material as the wall, and must therefore have been carried up.

Many dykes run out on and along the coast between Aberffraw and Porth Nobla, and the sections will repay further study. Those on the north cliffs of Porth Tre-castell show the effects of movement very clearly, though not excessively. Shear-zones, with small shifts (Figure 257) and brecciation, are seen, the rocks being perfectly preserved between them, with good marginal selvages. The dyke in which the maximum deformation ([E9515](#)) [SH 328 708] (p. 514) has been observed is best found by walking round the north headland of Porth Tre-castell, beyond which a cove with rocky walls runs in a little eastwards. On the north side of this cove is a rugged chasm, trending north and south (which is east of the 's' of 'Barclodiad-y-gawres'), and in this is the dyke. The chasm is quite easy of access from the north. The faulting of (Figure 255) will be found in the reefs just at the south-east end of Traeth Lydan ([E6055](#)) [SH 329 714]. East of Plâs Maelog chilled selvages against the granite are well seen at several places at and south of the roadside. They are sometimes intricate, but no perceptible effect has been produced upon the granite. Another good junction with granite is seen at the forking of the road north of the 'g' of 'Llanfaelog'. Further to the north-east, the dolerites that cut the basic gneisses may easily be confused with their unfoliated parts. The slightly schistose dyke of (Figure 256) is in the granite moor of Gwalchmai, about 833 yards south-south-east of Clegir-mawr, and the other one mentioned in the same connexion is by the cottage at the north end of a lane, south of the 'n' of 'Bryn-Ala'. Passing on to Mynydd-mwyn-mawr, the porphyritic, dolerite with brown hornblende ([E9984](#)) [SH 407 823] can be studied on bosses about 170 yards west of the farm. Its large feldspars are micacised, but the laths are labradorite zoned with oligoclase and albite. That at Tryfil ([E9981](#)) [SH 414 811] seems to have contained a rhombic pyroxene.

**Western Mainland** — The few dykes of this region call for little special comment. The smaller ones have the usual characters. The solitary little three-foot dyke of Church Bay is very inconspicuous. The large dolerites of Traeth y Gribin, Ysbylltir, Pen-y-mynydd, and Bodowyr (all of which are one zone of intrusions, and probably connected) are coarse and gabbroid like those of Holy Isle. The spilosite with micropegmatite ([E10285](#)) [SH 31 78] is seen on a good exposure, but must not be confused with the bedded jaspers that adjoin the old basic band of the Mona Complex.

**Holy Isle** — The smaller dykes resemble externally the ordinary ones of the main Island, and call for no further remarks. Of the large, coarse, gabbroid ones, there are four; the two great dykes of Holyhead and Rhoscolyn (the latter having been rich in olivine), and the short ones of Perth Ruffydd and Tre-Arddur Bay. In the last (accessible at ebb-tide) thin zones of deformation, as well as the later injections, can be seen on the little shore stack. The Ruffydd dyke is not well exposed, even in the cove.

Neither are the coast sections of the Rhoscolyn dyke its best ones, contact effects, however, being seen at the south end. For much of its inland course this dyke runs in a 'slack' or hollow, and has been traced by means of that and by its boulders. There is, however, a succession of excellent exposures, with many points of interest, along the course of about three-quarters of a mile from the south side of the alluvium east of Cromlech farm ([E6054](#)) [SH 262 771], ([E9484](#)) [SH 264 767]–([E9485](#)) [SH 264 767], ([E9490](#)) [SH 264 767], in a north-westerly direction. On the steep crags that overlook the north side of the alluvium the planes of movement described in Chapter 18 are well seen, and the selvage, with little porphyritic feldspars, is also exposed upon the western side. Where the dyke turns westward, shear-zones can be found in several places. It then suddenly resumes its north-westward course, and splits up in the manner shown in (Figure 232), part of which is conjectural, part clearly seen on the high boss east of Gareg-lwyd. The thin branches on the eastern face of this boss are admirable examples of porphyritic selvage. Then comes the first of the two shifts; but this does not seem to be due to movement, for although the dolerite is not compact at the truncated end that faces the north-west (where a little serpentine is seen), yet at the other truncated end facing the south-east there is a chilled selvage, again with a little serpentine adhering to it. The next shift is at the Garan thrust-plane (pp. 208, 263), but it by no means follows that the Garan thrust is of Palaeozoic age. The behaviour just described shows how easily the dyke is diverted from its course by pre-existing divisional planes. It will be recalled that sudden diversions of dykes can be seen in perfectly clear exposures, as on Llanddwyn and along the Menai shore (p. 519), to be quite unruptured. On the crags immediately beyond this

diversion is the albite-epidote vein ([E10229](#)) [SH 262 772], about 60 yards north of the cottage.

Along most of the south-eastern portion of its course, the Holyhead dyke is seldom to be seen, but can easily be traced by the strong feature to which it gives rise. The first good exposure is a quarry by the Porth Dafarch road. Its behaviour is then uncertain for a quarter of a mile. It must either fork, or be shifted to the north-east about 200 yards, but the positions of the lines in the enclosing schists do not point to such a fault. It then runs once more in a hollow, which, three-eighths of a mile before Llain-goch is reached, becomes unusually pronounced, with little walls of crag on both sides. In the angle between the houses and the road at Llain-goch is a good natural exposure, in which ([E10124](#)) [SH 233 826] is the coarsest and most gabbroid-looking dolerite that has been observed in any of the dykes. The selvage is not seen, but a few yards from the margin the material is indistinguishable from that of the cores of the ordinary dykes of Anglesey, save in being unusually rich in brown hornblende ([E9483](#)) [SH 233 826], *cf.* p. 487]. Where it passes through the quartzite of the great quarries it is unusually decomposed for one of this series, and so is the small dolerite a little to its west, near the silica-works. This, and the hollow feature along its course, are doubtless due to the presence of bastite. Finally, there is an excellent section in the cove where the dyke runs out to sea. It is in better preservation than at the quarries, and the fresh parts are like the rock of Llain-goch. There is a slight spheroidal structure, but not with the strongly developed concentric shells of the late olivine-dolerites. Near the north-east side are inclusions of schist with a north-west strike, somewhat brecciated, and against them the dolerite is mylonised.

**Northern Region** — Those of the coast between Carmel Head and Trwyn Cemlyn need further study, and there are many good sections. The large dyke at Henborth is full of inclusions, and its texture rather fine. It has quartz-filled amygdulæ. Among those to the south-east of Pen-yr-orsedd are quartz-dolerites, with a tendency to disappear beneath the schists along the strike. On the cliffs at the 'M' of 'Mynydd Wylfa' is a one-foot dyke ([E10515](#)) [SH 358 945] whose margin has become unusually schistose (p. 307). It cannot be shown even on the six-inch map, but will be found in (Figure 139), on the north side of a creek, cutting the planes of deformed spilites, Gwna Green-schist, and granite. The one near the north-east point of the headland is also deformed on its northern side. The dykes of the two remarkable groups at Cemaes (Figure 227) ([E11000](#)) [SH 367 937] and Llanbadrig are decomposed but not much albitised. They are traversed by planes of schistosity, and at the junction of the Gwna grits with the Amlwch schists on the west shore of the bay brecciated also. At Llanbadrig they are shifted a little. Yet the deformation they have suffered is but slight, they even retain good uninjured margins (Figure 229), and their condition contrasts vividly with that of the broken rocks they traverse.

Like those of the northern coast, the numerous and well-exposed dykes of the little cocky moorlands of Cefn-coch and Groes-fechan, and above all, of the Mynydd Mechell would well reward a special study, for their numbers made that impossible at the time of the surveying. (Figure 226), (Figure 243), (Figure 244), (Figure 269), will be of some aid, but the six-inch coloured maps should be taken on the ground, and even they are often a mere abstract. The following few notes will indicate some of the points of interest:

On the northern slopes near the letters 'Mynydd Mechell' the dykes terminate in a very irregular manner, and also branch, turn, pass into sills, and wedge out in both directions. About 166 yards west of the Smithy a dolerite behaves as a sill, but runs on as if resuming a vertical position. The large one that reaches the road near Llanddygfael-hir is complex, and full of large inclusions, the direction of whose foliation is little, if at all, disturbed. Around the little tarn east of Llanffiewyn Church several small dykes about a yard in thickness behave locally like sills. A quarter of a mile to the north, on an escarpment above a cottage, in the group shown in (Figure 226), there is some curved banding in a dolerite. Just here the curving and expanding of the outcrops is complex, and may be due to lowerings of the hade (Figure 236), (Figure 237). The same happens between Llyn Bwch and the thrust-plane. The large dyke that runs through Llyn Bwch ([E10390](#)) [SH 358 894] is a coarse ophitic quartz-dolerite, with micropegmatite, but much of its augite has passed externally into green hornblende. It bakes the schist, to which its relations are as in (Figure 235). Eastwards it splits for a while. Shearing has not been observed in it. The curved one south of Tyn-y-gors is finer in texture considering its width, which is due to reduction of hade, the thickness not being really unusual. Schist is seen above and below at a knob to the south of the farm. Thence to Creigiau-mawr the dolerites are often porphyritic, and very free from crushing; but they often look as if their augite were passing into hornblende. The little dyke that splits the great felsite by Careg-lefn marsh ([E10324](#)) [SH 385 891] is not ophitic, and is highly albitised. It presents, in places, chilled selvages to the felsite, into which it appears to send veins. The remarkable ophitic epidiorite ([E10394](#)) [SH 363 894] described in Chapter 18 is on the north

side of a high boss to the east of the little Llyn Bwch, and about 233 yards north by west from the centre of the tarn near the 'C' of 'Creigiau-mawr'. It is short, and only some 10–20 feet wide. The dyke [\(E10395\)](#) [SH 370 888] which is seen to be crushed at the Carmel Head thrust-plane is one which runs out to the outcrop of that plane in a bay of the escarpment at a point about half-way between Creigiau-mawr and Gwaen-ydog (Figure 269), and nearly in a line with those two houses. The cut specimen was taken at a point 83 yards north of the outcrop of the thrust-plane, but the dolerite (in less good condition for slicing) can be traced to within a few yards of that line.

To the south of Groes-fechan Dr. Matley obtained a specimen [\(E11044\)](#) [SH 351 916] with pseudomorphs after olivine (see p. 485, footnote). Its matrix is very fine, and somewhat reminiscent of certain andesites; and there are xenocrysts of quartz with reaction-borders. At the time when this ground was being surveyed, the Later Dykes (Chapter 27) had not (see pp. 21, 26) been satisfactorily disentangled from those of Palaeozoic age. Thirteen basic dykes were mapped on Groes-fechan moor, and the one from which this specimen came was not identified in the field. Its age is therefore still uncertain. But neither its petrological characters nor its state of preservation are like those of the Later Series.

**The Corwas Inlier** — Four small dykes traverse the Corwas Inlier of the Mona Complex, about 350 yards south-east of Pengorhwyssfa cross-roads. The largest [\(E10458\)](#) [SH 468 917] is a meshwork of lath-felspars now completely albitised, in a matrix of chlorite with granules of epidote, and is traversed by veinlets of albite. It resembles [H. H. Thomas and O. T. Jones, Quart. Journ. Geol. Soc., 1912, pp. 389–90.](#) those of the St. David's country.

It is remarkable that in the Corwas Inlier, which is actually encroached upon by the great Eilian picrite, not a single picritic dyke is known. This, however, becomes intelligible when we recall that this inlier is really *sans racine*, over-riding the Palaeozoic rocks of Mynydd Eilian and Parys Mountain; and that the Eilian picrite was (pp. 514–15) intruded at a late interval of the thrusting. Thus, the rocks of the inlier were not the floor through which the Eilian picrite magma came up. On the contrary, they formed a part of the roof to which it ascended, and underneath which its laccolite spread out. It is not a little curious to reflect that this picrite must have traversed, first autochthonous Mona Complex of the true local floor, then almost the whole of the, Ordovician Series, and finally come once more into contact with rootless' Mona Complex riding on the Corwas thrust-plane.

## Detail of the lamprophyre dykes

Only three lamprophyres have been observed as yet. They are at the river's mouth, Aberffraw, on the seaward face of the little headland, and about 150 to 160 feet from each other. They trend north-north-east or north-and-south. The first one, a few yards west of the river's mouth, is about five feet wide, and slightly amygdaloidal in the middle. It shows a good chilled selvage, and has caught up some small xenoliths of schist. It is traversed by planes of movement, and slightly sheared. On some of them.

The next one is of about the same width, but almost nipped out at the edge of the sand, and partly obscured on, the beach. It is the best preserved of the three [\(E9488\)](#) [SH 353 680], and shows the micas well. The other one is about three feet wide, and is not in good condition..

**Detail of the intermediate dykes**[These have not been separated from the acid dykes on the one-inch map. The following particulars, however, will enable them to be identified on the ground.](#)

All the best examples are at Coedana. Close to the 200-foot. contour, 570 yards south-south-west of Coedana Church, is a dyke of quartz-biotite-porphyrityte with large phenocrysts of oligoclase [\(E9988\)](#) [SH 428 817], and 80 yards to the west of it a small one of somewhat similar aspect. On the north side of the Neuadd and Sarn-fadog lane there is a cottage, 250 yards north of which is another dyke of intermediate aspect, yet another being visible some 90 yards east by north from that one. On the north side of a fence, 300 yards north by west from the cottage, is a quartz-biotite-hornblende-porphyrityte [\(E9989\)](#) [SH 430 819], not so distinctly porphyritic as [\(E9988\)](#) [SH 428 817]. Hornblende is here in excess over biotite, and the matrix, though still almost felsitic, has a tendency to panidiomorphism. Quartz-phenocrysts are rare, and the rock is decidedly less acid. Doubtless a good many dykes of this kind have escaped notice. They should be looked for in the



rocky tract between Bryn-twrog and Llynfaes, and indeed wherever the felsites are numerous.

In the Corwas Inlier there is a thin dyke of andesitic aspect that is in good condition. It is 225 yards north of the north end of the alluvium, at the east end of a crag, between the forking of the two lanes. Most of the dykes of the north of the Island, however, that appear to be of intermediate composition are now schistose. To these may belong a small but interesting one on the eastern cliffs of Point Lynas (Figure 259), about 233 yards from the Lighthouse. In spite of the deformation its intrusive junctions are still intact in places. Others cut the gneiss of the Gader Inlier (Folding-Plate 13), and are well seen on the cliffs of Ogo'r Arian and Porth-yr-hwch-fach. They are thin, but will probably repay microscopic investigation.

## Detail of the acid dykes

### Northern Districts

The large dyke that cuts the Ordovician rocks on Mynydd Eilian (Figure 245) is well exposed in a line of knobs and its relations are clear. It is a typical porphyritic sodium-felsite ([E10464](#)) [SH 469 920] like the rest, composed of quartz and albite phenocrysts in a quartz-albite base, micro-pegmatite fringing much of the albite and being present also in the base. The place where shearing, which is from the north, is seen in it is at Graig-lwyd. One or two small siliceous veins in the proterobase at that place might be thought to proceed from it. But the proterobase is chilled against it, and it bounds the picrites on the north. It might have risen along an old chilled margin, but there is no proof of this, and the chilling of the basic sill against it is in harmony with what we have found to be the sequence among these intrusions.

The two felsites that are seen on the cliffs of Bull Bay are somewhat silicified and their characters obscured. That on Trwyn Cemlyn ([E11057](#)) [SH 321 904], which has a fine devitrified base, is well exposed and in good condition. The exposure is on the western shore, and shows a north-east inclination.

A clear general view of a group of inland dykes is to be seen from across Llyn Hafodol, the light-weathering felsites being conspicuous as they run up the rugged hillside through the grey-green schists. A dyke to the south of Groes-fechan ([E11045](#)) [SH 351 916] has phenocrysts of quartz, albite, micro-perthite, and micropegmatite, in a micro-crystalline base. Other dykes with interesting characters are ([E10391](#)) [SH 390 899]–([E10392](#)) [SH 371 913], ([E10824](#)) [SH 357 899]–([E10825](#)) [SH 357 899]. Banding that appears to be fluidal has been seen in the felsite north of Neuadd, Cemlyn, running along the middle. Three or four of the dykes to the south-east of Amlwch also show banding, which, in the short one 120 yards south-west of the end of the lane that crosses the h ' of Amlwch', is folded, as if by fluxion. The exposure is on the north side of a wall. Another, a few yards to the south-west of this, is slightly spherulitic. Several of these Amlwch felsites display good intrusive junctions, approaching to the relations of a sill, as at 300 yards south-east of the farm by the 'B' of 'Bryn Eilian', where ([E10502](#)) [SH 455 925] the porphyritic quartz has the cloudy enlargements. Some of them are slightly sheared.

The most markedly spherulitic dykes ([E10393](#)) [SH 367 899], ([E10941](#)) [SH 370 901]–([E10942](#)) [SH 363 904] are all in a single zone; one being at Bwchanan, another on the ridges north of Coeden, another in the lane about 280 to 300 yards west of Coeden house, and another on the south side of Drum house. The great dyke at the 'C' of 'Carreg-lefn' ([E10323](#)) [SH 385 891], which contains green biotite, is also spherulitic.

The dyke at Hafod-onen, south-west of Amlwch, which is the beautiful sodium-granophyre ([E10827](#)) [SH 422 914], ([E619](#)) [SH 423 915] of (Plate 28), Fig. 2, is well exposed among the barns and in a quarry near the railway. It consists of a complex matrix of albite, quartz, and micro-pegmatite, in which are compound phenocrysts of albite and microperthite fringed with micro-pegmatite. The peculiar characters of these dykes are displayed by it in great perfection.#

Thermal alteration may be seen ([E9525](#)) [SH 376 895] on a crag a few yards north-west of the road at Drum, and also at Trwyn Cemlyn.

The spot at which a felsite dyke shows crushing just above the Carmel Head Thrust-plane ([E10396](#)) [SH 367 885] is on a crag (Figure 269) 225 yards north-north-east of the 181-foot level in the road at Gwaen-ydog.

**Multiple Dykes** — The best section across a multiple dyke is. the quarry on the north side of the road at the 'r' of 'Maes-mawr', south-west of Llanfechell (Figure 260), in which, as quarrying is still in progress, the details change from time to time. At a recent visit, six junction-lines (quite uninjured by shearing or slickensides) of acid and basic rock were clearly laid bare, at every one of which the basic member presented a chilled selvage to the acid. One of these ran round an apparent inclusion of acid rock, but which must have been the tip of a much larger mass. An 8-foot dyke of dolerite ran along in the midst of the felsite. Its core ([E11804](#)) [SH 361 906] is quartz-dolerite with well-preserved augite, and feldspars nearly two millimetres long. But its selvages ([E11805](#)) [SH 361 906]–([E11806](#)) [SH 361 906] (see pp. 486–7 and (Plate 28), Fig. 4 are compact basalts with a little isotropic matter, and with slender phenocrysts of feldspar, which display a tendency to fluidal arrangement parallel to the margin. The junctions of acid and basic rock (well seen in [E11805](#)) [SH 361 906]–([E11806](#)) [SH 361 906] are very sharp, the basalt cutting into some of the phenocrysts of the felsite. On the heights above the road, 170–260 yards north of Drum (Figure 244), are two multiple dykes, with three exposures at which dolerite presents a chilled selvage to felsite, the north-easterly one, which is at the south-westerly foot of a low wall, being especially clear. On the eastern side of Llyn Llygeirian there are two small multiple dykes, whose basic member presents, in each case, clear chilled selvages to their acid member. The great dyke of Carreg-lefn can be well seen, split by the little basic dyke (p. 525) that is chilled against it, at a crag just above a marsh, 150 yards east-south-east of the place where it is crossed by the village street. Dolerite also adjoins the spherulitic felsite west of Coeden, and close to the junction contains crystals of quartz like those of the felsite, which appear to be xenocrysts robbed from that rock.

Other exposures of multiple dykes are as follows. About 100 yards to the south-west of the Maes-mawr quarry there is a double dyke; and another, where dolerite seems to cross felsite, 250 to 360 yards east-south-east of Bwchanan (Figure 243); while a triple one is to be seen upon a knob some 300 yards north of Coeden house (Figure 243); another double one being visible 360 yards south-east of Drum. The Hafod-onen dyke is also multiple at both its principal exposures. At the six last-named sections, though actual junctions have not been found, the basic member grows markedly finer as the margin of the acid member is approached.

Some 20 sections, therefore, afford evidence in favour of the view put forward on p. 515 as to the chronological order of the acid and basic dykes; and at 12 of them we can actually see chilled selvages presented by the basic to the acid member.

## Middle Region

Near Gwalchmai, a quarter of a mile south of the tenth milestone on the main road, a thin dyke running north-west and south-east, directly across the foliation of the hornfels, is well exposed upon a rocky knob. Several of those (Figure 239), (Figure 240), (Figure 241)) that run along the strike may also be seen, on scrutiny, to cut the same foliation, though not so conspicuously.

The great dyke of Pencarnisiog ([E10717](#)) [SH 406 815] contains phenocrysts of quartz and albite in a micro-crystalline quartz-albite base. It is finely exposed near its western end, three-eighths of a mile from Pencarnisiog village, on the north side of the road, on an ice-worn boss that has been quarried. The felsite cuts abruptly across the foliation of the fine hornfels, and includes masses of it, a specimen displaying which relations is preserved in the Museum. The felsite itself is traversed by what appears to be a very feeble shearing that runs north and south. Veins of slightly foliated granite, up to six inches wide, also cut the hornfels, but they are in their turn cut across by the felsite, and are traversed by shear-lines that have not been traced on into that rock.

Where these dykes traverse the granite, they are apt to simulate it externally, and are easily overlooked, the red porphyritic ones especially simulating the red porphyritic granite. The singular sheet-like mass, with little dykes running up vertically from it into the granite outlier, at Bryn-twrog (Figure 242) is fairly exposed, but its nature is not absolutely demonstrated. On a crag above the footpath that crosses the granite moor of Gwalchmai, 250 yards north-west of the parish boundary, a small dyke, unsheared at that place, truncates for a few inches the final mylonites of the granite. Some of the best sections are at a group of crags north of Neuadd, Coedana. Junctions with the granite are exposed on both sides of the streamlet, and the late crushing and shearing are well seen. There are also fluidal structures. Some of the dykes are crowded with porphyritic crystals. Some are split by basic and hypo-basic dykes, as at the south end of a long boss, 633 yards north-north-west of Neuadd, inclusions of the acid dyke being caught up in the other. A little acid

dyke about a foot wide and a few yards long, 217 yards north-north-west of N'euadd farm-lane gate, has a fluidal margin which truncates both the foliation and the final crush-lines of the granite, at angles of 60° to 80°. The margin is displaced by later crushes, but between them is uninjured and runs into bays of the granite. A felsite at Ynys-fawr (Figure 238) sends out some small tongues on one side. The dyke in the Penmynydd mica-schist (p. 509) is in the old quarry east of Gwalchmai, south of the eleventh milepost. A late crush brecciates both it and the mica-schist, and it is very decomposed, but is hardly sheared at all. Four small dykes cut the Bodafon quartzite, west and south-west of the tarns.<ref>The following slides have also been cut from the acid dykes of Mid-Isle: [\(E6121\)](#) [SH 342 728], [\(E9860\)](#) [SH 379 761], [\(E9906\)](#) [SH 347 734], [\(E9976\)](#) [SH 413 796], [\(E9988\)](#) [SH 428 817], [\(E9989\)](#) [SH 430 819], [\(E9998\)](#), [\(E10049\)](#) [SH 464 848].</ref>

## Detail of the basic sills

### 1. Diabases

A hornblende-diabase at Bryn-madog, Newborough, which is somewhat sheared, has the characters of this series. The rock in the Arenig Beds at Glan-morfa is a short double sill, but produces good spilosite. Its powder contains abundant brown hornblende, as well as biotite. The outlier of Careg-onen Beds upon the northwest face of Mynydd Llwydiarth [\(E9817\)](#) [SH 551 798]–[\(E9818\)](#) [SH 551 798] is baked by a nearly hidden sill.

The ten sills that are grouped around the margin of the Tywyn Trewan have marked affinities with the dyke-rocks. The intrusion in the conglomerate [\(E9487\)](#) [SH 328 736] north of Llyn Maelog could not be distinguished if placed among a collection of dyke-dolerites. It is porphyritic, and contains, moreover, an abundance of apatite, another link with the dykes. Its feldspars range from labradorite to oligoclase and are somewhat albitised. Its augite is hypidiomorphic. Those in the Mona Complex on the eastern side of the lake have orthoclase fringes and micro-pegmatite, but lines of mylonisation traverse them. That in the conglomerate at the north-east bay of Llyn Traffwll also closely resembles the dyke-rocks, and its powder has yielded a remarkable abundance of apatite. Another dyke-like rock is the thin band that runs along the schistosity of the gabbro between Llyn Penrhyn and Llyn Dinam [\(E10301\)](#) [SH 309 769], an unusually fresh dolerite, sub-ophitic, with labradorite that has' less basic outer zones. Two sills occur in the conglomerate of the Harlech cottage ridge, and of the, same character is that which is involved in the curious little 'complex' on the western shore of Llyn Traffwll (pp. 440–2) (Figure 202), and lies along the junction. They are albite-diabases with an approach to intersertal structure, and with some secondary quartz [\(E10298\)](#) [SH 318 761], [\(E10655\)](#) [SH 321 769]. All these sills are, locally schistose, the last-named being almost a chloritic schist in parts. In the Mona Complex east of Tre-Angharad, close to a true dyke, is another sill of doleritic aspect, and those about Chwaen-hen are of the same character.

Turning now to the great crescent of sills that runs through the Principal Ordovician area, and beginning- on the west, we find typical diabases both at Llanfairynghornwy and at Llanfflewyn. The long band injected along the Crewyn thrust-plane (Folding-Plate 13), about 20 feet wide where it runs out on the cliff at Porth y Bribys, is an albite-diabase, decidedly schistose at the junction. The sill which bends curiously round with the boundary between the Ordovician rocks and the great Western Region of the Mona Complex, which is an albite-diabase with indigo-polarising chlorite and secondary quartz, is seen in contact with the shales at a quarry about 223 yards east of Orsedd-goch, where it splits into a number of sheets 'above, in, and under the shales, which are converted into a spotted spilosite. The rock west of Mynydd-y-garn produces the same effect at a quarry by the road. Spilosite is also produced in the 'hook' of the sill to the north of this one, about half a mile west of Hendre-fawr, and adjacent places, among which is one where no igneous rock is to be seen.

Passing on to Llanffiewyn, the sill at Cot [\(E10399\)](#) [SH 345 886] is a light-grey quartz-albite diabase, with fringes of orthoclase and micro-pegmatite, as well as secondary quartz. Those between Ucheldref-goed and Gwaen-ydog are more like the dyke-rocks, the northern one on the west bank of the river [\(E10398\)](#) [SH 359 880] having intersertal structure. The junctions of these along the river-side are exposed, and there is contact-alteration. Further east, a massive diorite rests upon altered shale at the bend in the road west of Penbol, beautifully fresh, and with lustre-mottling. Its powder yields a brown hornblende and a colourless biotite, indicating affinities to the hornblende-picrites. The diabase at Llanerchymedd Station (Figure 247), which is an outlier cut by two faults, also yields abundance of brown hornblende, and produces alteration, even in the grits. It is easily seen from the platform, though some of the massive grits may, at



first glance, be confused with it. Similar rocks are seen in the river south-west of City Dulas, but as the exposures between were inaccessible at the time of surveying, they may possibly belong to a single sill. Of the seven intrusions near Dulas Bay (Figure 248) one only, that which is a quarter of a mile -south of Llys Dulas, was powdered, and it yielded abundant brown hornblende.

The sills between Mynydd Eilian and the coast need further petrological investigation. The larger ones are, for the most part, hornblendic, the rest being classed as quartz-diabases. The rock at the foot of the Mynydd Eilian escarpment contains micro-pegmatite, and some of its chlorite polarises with the lavender tint. But their composition has been in many cases modified by silicification (see Chapter 19), and they are frequently sheared. The place where these new planes of schistosity are sharply folded ([E10468](#)) [SH 485 924] is at the g of Pant-y-groes, on a little crag that rises on the south side of the sill at the edge of the ravine on the eastern side. Spilositic alteration is well seen at Ogo-fawr; also along the large sill a quarter of a mile north of the '394' level, and even beyond its eastern end. The relations of the Ogo-fawr sill are shown in (Figure 249), (Figure 252). The little sills of Parys Mountain are chiefly of interest because of their silicification (see Chapter 19). That in the Mona Complex to the north of Parys Mountain is a highly epidotised epidiorite.

The igneous rock on the Middle Mouse ([E10511](#)) [SH 382 959] is an outlier, with transgressive junctions and a chilled selvage. It is a porphyritic albite-diabase.

The six sills on The Skerries (Folding-Plate 14) are closely allied to the dyke-dolerites. The one below the Lighthouse [[E10575](#)] [SH 268 948], (Figure 250)] is exceptional, being an amygdaloidal basalt with well-preserved augite, and labradorite in the matrix. It reappears on the other side of the footpath. The junctions have been sheared in places. That on Ynys Arw is only six inches thick, and the one on the adjacent islet was inaccessible when surveyed. The Haven sill, about a foot thick, is a fine basalt with acicular augite. The small patch furthest away to the north-east near Race Point is an outlier, sending down veins along the foliation of the grits. It is porphyritic and has a good chilled selvage full of little lath-shaped felspar phenocrysts that have a parallel arrangement as in the selvages of the dykes, but the matrix is crystalline, a mesh-work of later felspars, which are labradorite, partly albitised. This and the large one at the Foot Bridge between the two chief islands ([E10576](#)) [SH 268 949]–([E10577](#)) [SH 271 949], which are both hard, fresh, dark-green rocks, are among those described in Chapter 18 as having undergone a peculiar kind of anamorphism, the whole of their pyroxene having been converted into green hornblende without any deformation of the felspars. They are therefore ophitic epidiorites. The Foot Bridge rock is seen to be a true sill, its upper surface, which has a good chilled selvage with lath-felspars, winding about at a low angle. A feeble zone of shearing, about a yard wide, passes through it, parallel to the foliation of the grits, probably of the same age as that which cuts the quartz-vein (p. 319).

## 2. The picrites

The hornblende-picrite of Capel-coch (Llangwyllog Area) is very coarse in places, rudely interbanded with somewhat less coarse varieties, as well as with the minveritic type. On the north-west is an ill-defined camptonitic margin ([E9980](#)) [SH 456 822].

The sill by the alluvium east of Pandy has a similar margin, and the picrite itself is very coarse at the crags by the river. On the west side of the Amlwch road, between the Workhouse and Cae-mawr is a quarry, in which good bedded spilosite can be seen dipping under picrite. The Dwyran sill displays the rude banding, with the variety containing hypo-porphyritic hornblende. There is a good section on the crags close to the road. Passing eastwards, we now enter the tract of continuous thermo-metamorphism (p. 493) ([E10211](#)) [SH 437 856]–([E10212](#)) [SH 443 863]. The fault is conjectural, but is in continuity with a line of springs along a hollow to the south-west. The Bryn-tyfrydog sill is well exposed, and also the two further ones, very coarse picrite being seen in the north-eastern parts of the last but one. Flaggy spilosite is well developed in the quarry by the road opposite the turning to Plâs-Llandyfrydog, and on the bosses to the north and north-east of this. The alteration dies away very rapidly on the south of the last intrusion. Along the south edge of the Bodneithior sill unaltered shale appears to be faulted against the spilosite, thus causing a gap within the altered area, but a little east of the road, 230 yards south-south-east of Bodneithior, spilosite is seen again. The proterobase margin ([E10210](#)) [SH 446 860] and analysis] of the large Bodneithior sill is exceptionally well exposed, especially at the quarry on the west side of the road at the farm. The picrite itself is very coarse in the interior, and contains, at a spot 166 yards south-east of the farm at the west end of the sill, some of the best of the acid segregation veins. On its northern margin,

at the river's bend it grows finer and lighter in tint, but no compact selvage has been seen. The highly micaceous spilosite was obtained immediately below the picrite, close to the stepping stones across the Afon Goch, opposite Tyddyn-bach. The sill north of the river is very variable, and is the best locality for a study of the less basic bands.

***Mynydd Eilian*** — To dismiss the smaller sills first: That at the south end appears to be isolated. It consists partly of proterobase, but this could not be separated on the maps. Spotting reappears in the shales about 70 yards beyond, as if another mass were hidden there. The picrite east-south-east of Pant-y-groes is not very coarse, and may be comparatively thin. At its eastern end it is schistose ([E10466](#)) [SH 471 916].

The great sill (Figure 245) is abundantly exposed, and the picrite itself can easily be studied, especially along the lane south-west of Graig-lwyd ([E10455](#)) [SH 471 919], on the slopes above the Nebo road as far as the first cottage, and on the north-west side of the summit. Though very massive, the rock is perhaps rather less coarse than at Bodneithior. The marginal proterobases [[E10453](#)] [SH 470 918] and analysis] can easily be found from (Figure 245). They are rather finer than the picrite. The exposures of the picrite-selvage ([E10456](#)) [SH 470 916]–([E10457](#)) [SH 473 910] are shallow roadside sections. One is at the south end of the sill, where the road to Nebo crosses the margin. The other, which is where the dark amygdules are developed, is in Glasgoed farm-lane. At a knob 75 yards west of the lane-fork by Pen-yr-allt there is a junction with the Gwna schists, which are indurated, the picrite being still crystalline; and another contact (not so clear) is to be seen 140 yards north-north-west of Glasgoed. The alteration of the shale ([E10459](#)) [SH 474 919]–([E10460](#)) [SH 474 919] is best seen between the tongues of the picrite on the north-west slopes, and at a junction visible south of Pant-y-clociau hardly any fissility remains in the spilosite. The deformation of the picrite is to be seen to north, north-north-east, and east of Glasgoed, at places all within 50 yards of the road. But the best exposure is that at the aforesaid junction south of Pant-y-clociau. The phenomena at this important section are described in Chapters 16 and 18. For a discussion of the tectonic relations of the Eilian picrite, see pp. 514–15, 525.

## Sills of intermediate composition

In the railway cutting about 170 yards west of Llangwyllog Church there is one of the unsatisfactory intrusions that are referred to the leucophyres. It is decomposed, but bakes the shales. Probably it is the termination of a hidden sill of some size, for along the south side of the churchyard the shales are converted into a micaceous spilosite for some yards. No igneous rock is to be seen, and there is little doubt that it lies below, for the alteration seems to wax downwards. About three-eighths of a mile south-south-east of Llanerchymedd Church, at a quarry on the south side of a fence, a three-foot leucophyric sill, traversing shale with thin grits, was well exposed some years ago, but it also is decomposed. And at a small farm about half-way between Pen-y-graig-wen and Gaer there is a one-foot sill of similar type. In much better condition, but not well exposed (some years ago), is a thin grey sill in the Ordovician escarpment, near the base of the grits, about 100 yards west-north-west. of Prys-owen.

## Detail of the acid sills

***The Mynachdy Sill*** is well exposed, but even where in best preservation, which is at its broad end, east of the track to Cannel Head, is somewhat sheared and silicified. Further west it becomes highly silicified, and is difficult to separate from the siliceous schists on its southern side, so that the boundary is uncertain. Its abrupt eastern termination does not seem to be due to faulting.

***The Parys Mountain Sill*** (p. 496, and (Figure 212), (Figure 213), (Figure 214)) is abundantly exposed, and can be studied anywhere among the rocky knolls north-west of Trysglwyn; on the rugged escarpments near the 's' of 'Mines'; on those about 250 yards east of the Windmill; on the West Hill of Pensarn; and on a high boss north of that village. In the great pits it is excessively altered (see Chapter 19). Its deformation can be studied best on the West Hill of Pensarn, where it is sheared into lenticular augen, with schistose matter between them. The junction with the outer shales is exposed in the farmyard at Rhwnc (where there is powerful shearing at the Rhwnc thrust-plane), and at two places between that and the road over the hill north-west of Trysglwyn.

A banding that is probably original can be seen at a spring at the bend in the escarpment in that part of the boundary, and on the western side of the road just mentioned, also on the escarpments along the north limb of the fold east of the Windmill. The decisive specimen [\(E10247\)](#) [SH 445 907], see Chapter 19 that showed porphyritic felspars in thin section came from these banded rocks at a point on the brow of the escarpment 266 yards east by north from the Windmill. The relations of this felsite are much obscured both by shearing and alteration. On the southern escarpment, north of Trysglwyn, it seems, locally, to transgress the graptolitic zones, thus indicating intrusive relations. But the evidence is not at present very satisfactory.

**The Rhosmynach Sill** is well exposed on a high boss at the old mine. It is very fine, and closely resembles the Parys felsite. Shale wedges into it, but does not appear to be much altered. Probably the original junctions are destroyed, for there are abundant signs of movement, and shale is driven right through the boss. For its internal characters see Chapter 19.

**The Trwyn-du Sills**, though small, are conspicuous objects (Figure 251) on the cliffs between Ogo-fawr and Trwyn-du. The first one south of Ogo-fawr is highly sheared, the schistosity being cut by thrusts from the north at lower angles. The junctions are sharp, but unlikely to be the original ones. The third sill [\(E10472\)](#) [SH 488 920] on the cliff's brow is rather a large one; it is about west by south from the little creek, and is that whose base is visible. That on the cliff below the large one is the least sheared of all, massive and with granular texture. Its base [\(E9486\)](#) [SH 487 921] is finer than its core, and there is a banding that may be fluidal, now, however, nearly at right angles to the junction. The junction with diabase is at the most southern of the sills, 30 to 35 yards from the brow of the cliffs of Porth y Gwchiaid, and the basic sill presents a chilled selvage to the acid one.

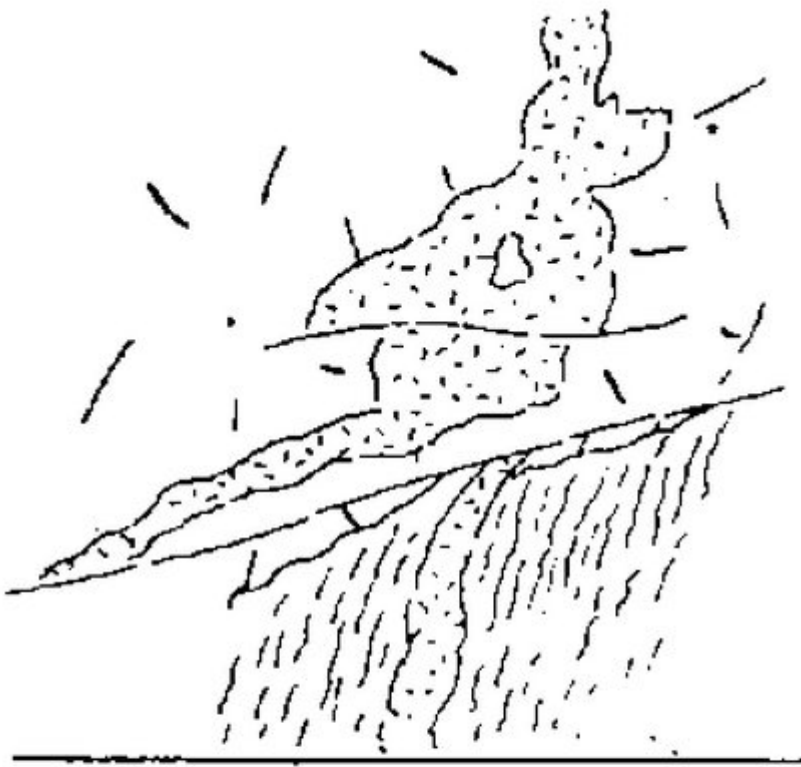
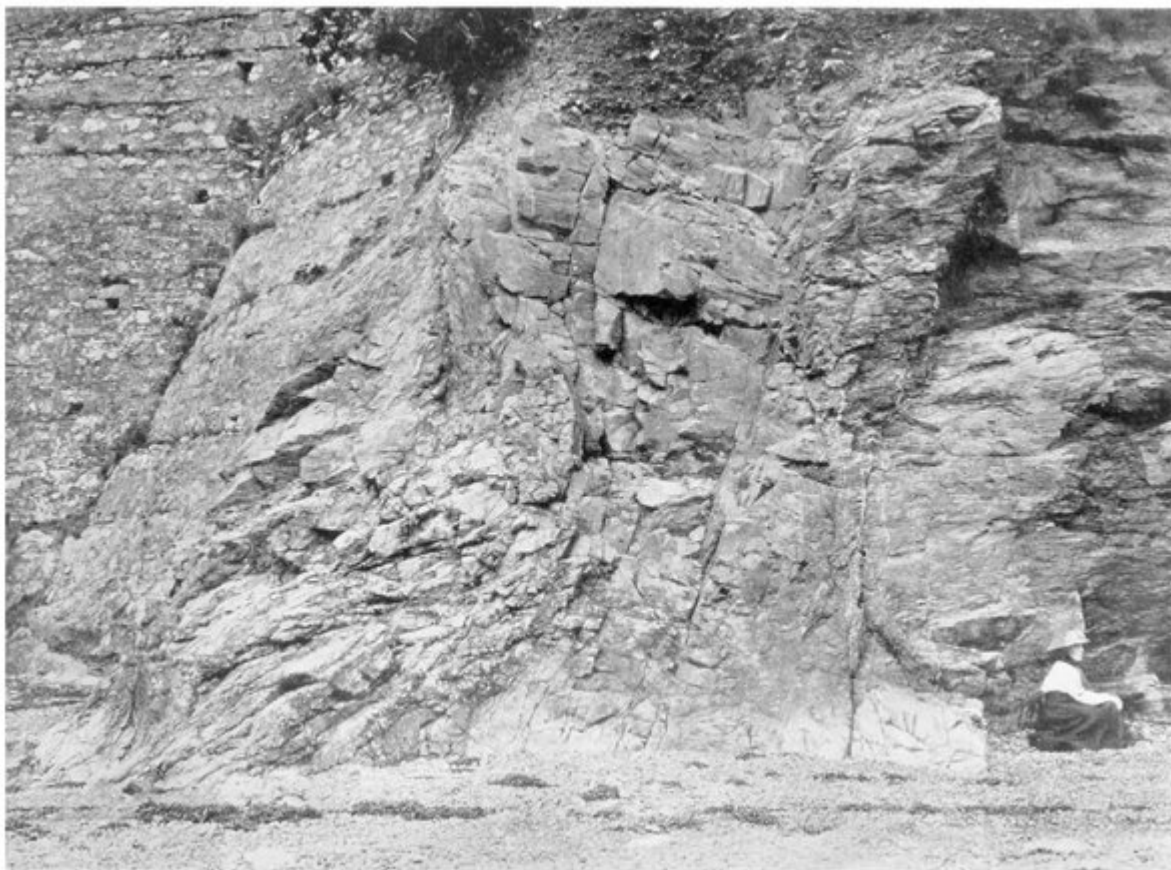


FIG. 225.

SECOND INJECTION  
(3—4 inch thick)  
IN DOLERITE DYKE.

*(Figure 225) Second injection (3–4 inch thick) in dolerite dyke. Menai strait, east of Pen-y-parc.*



*(Plate 30) Paleozoic dolerite dyke on the Menai shore.*

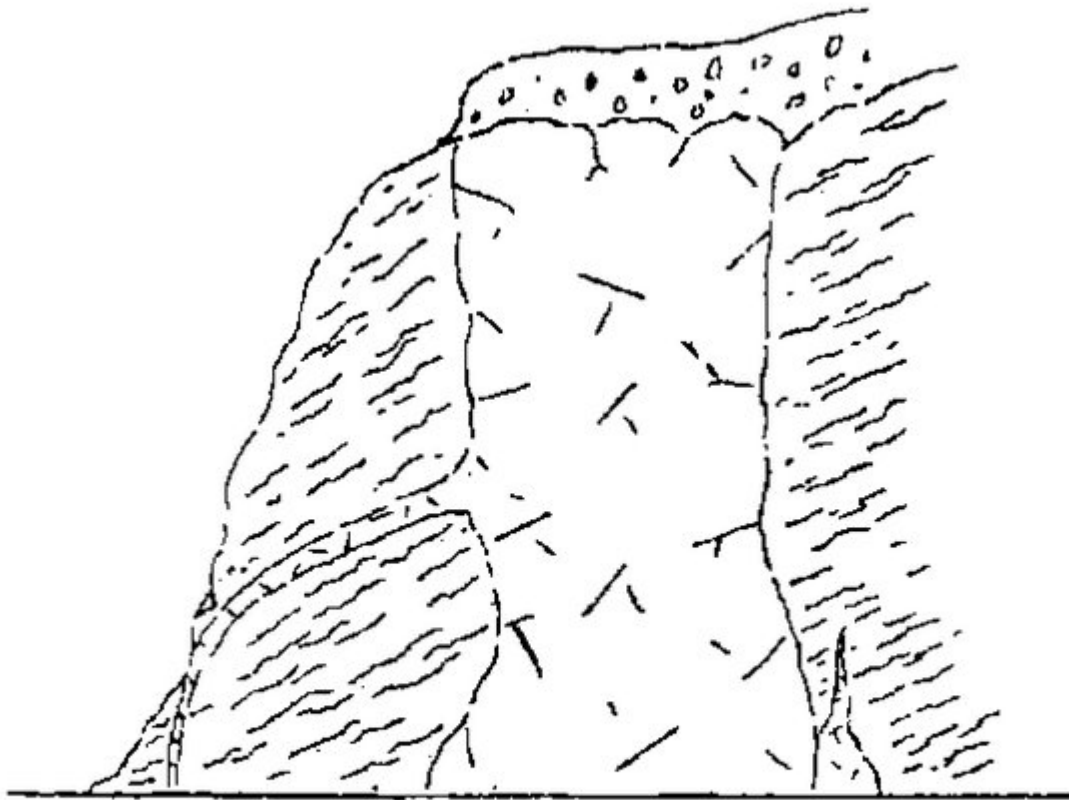


FIG. 233.

# 13-FOOT DYKE OF PLATE XXX.

(Figure 233) 13-foot dyke of (Plate 30).

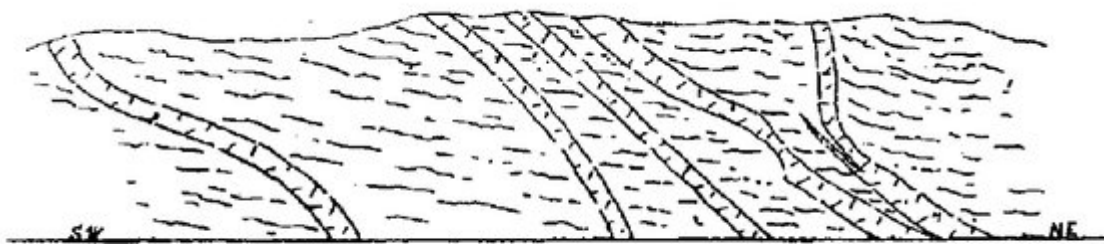


FIG. 234.—GROUP OF SMALL (six to 12-inch) DYKES.

(Figure 234) group of small (six to 12-inch) dykes. Menai Strait, east-south-east of Pen-y-parc.





FIG. 253.

THRUST IN DYKE AT  
PANT-HOWEL.

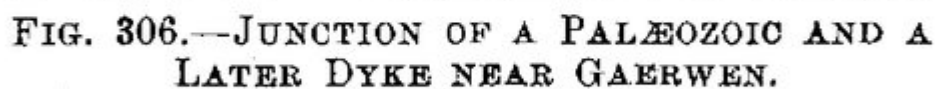
*(Figure 253) Thrust in dyke at Pant-howel. Height about 20 feet.*



FIG. 254.

A FEW INCHES OF THE  
NORTHERN MARGIN  
SHOWN IN FIG. 253.

*(Figure 254) A few inches of the northern margin shown in (Figure 253).*



Scale: One inch = about 15 feet.

M = Penmynydd Mica-schist.      D = Palæozoic Dyke.  
D' = Later Dyke.

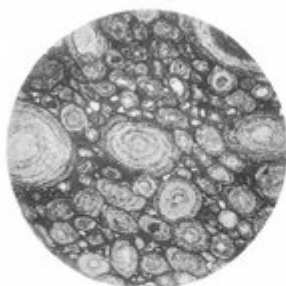
(Figure 306) Junction of a Palaeozoic and a later dyke near Gaerwen. Scale: one inch = about 15 feet. M = Penmynydd mica-schist. D = Palaeozoic dyke. D■ = later dyke.



FIG. 258.—DOLERITE ON COAST WEST  
OF CAREG-ONEN.

(Figure 258) Dolerite on coast west of Careg-onen.

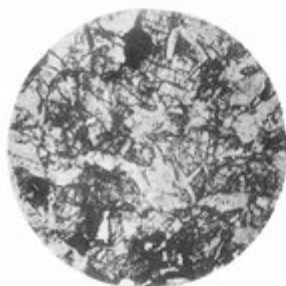
*Plate XXVIII.*



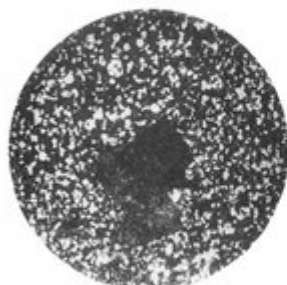
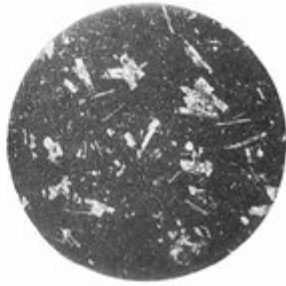
*1. Oolitic Ironstone.*



*2. Palaeozoic felsitic dyke.*



*3. Palaeozoic basic dyke, core and selvage.*



*5. Keratophyre pebble  
in Red Measures.*



*6.  
Late olivine-dolerite dyke.*

Hutch coll.

(Plate 28) Microphotographs of rocks later than the Mona Complex. 1. Oolitic Ironstone. 2. Palaeozoic Felsite Dyke. 3, 4. Palaeozoic Basic Dyke. 5. Keratophyre Pebble in Red Measures. 6. Late Olivine-Dolerite Dyke. See Appendix 3.

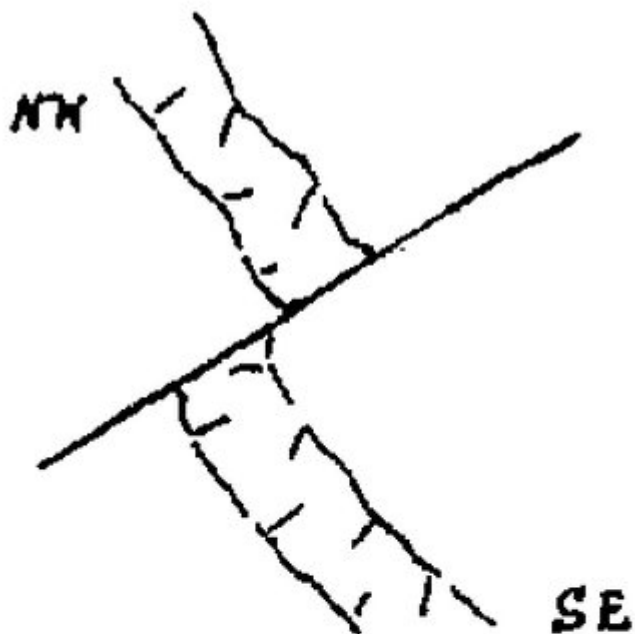


FIG. 257.

SHIFTED ONE-FOOT  
DYKE. NORTH  
CLIFF OF PORTH  
TRE-CASTELL.

*(Figure 257) Shifted one-foot Dyke. North cliff of Porth Tre-castell.*



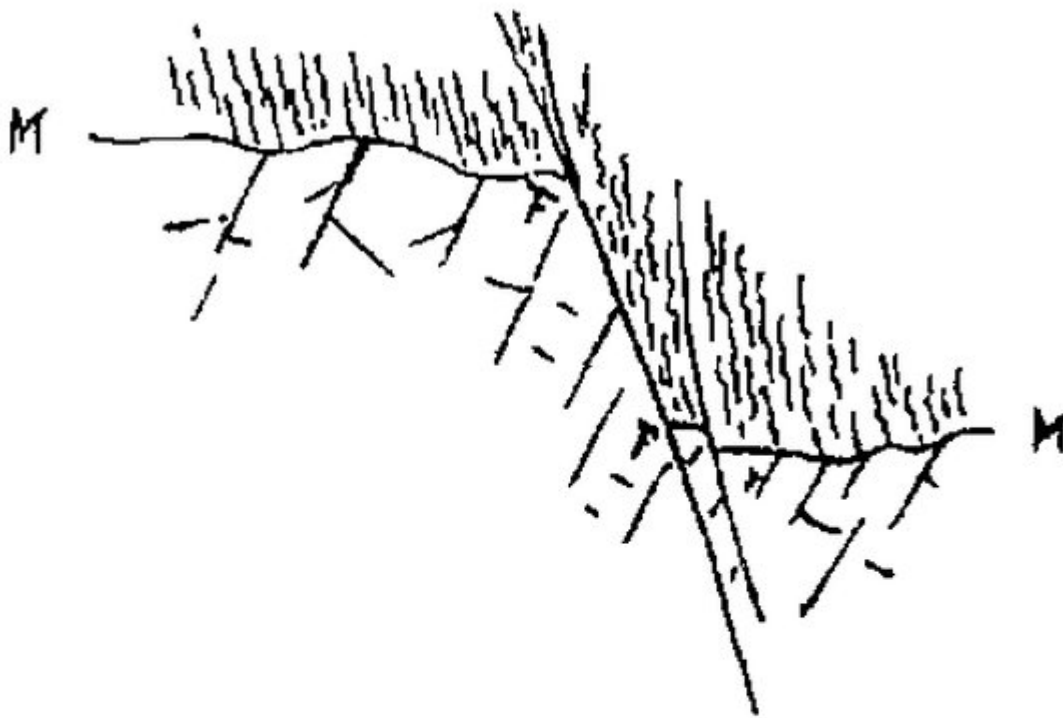


FIG. 255.

PLAN ( $2\frac{1}{2}$  feet long) OF SHIFTS  
IN DOLERITE DYKE AT  
CAREG LYDAN.

(Figure 255) Plan ( $2\frac{1}{2}$  feet long) of shifts in dolerite dyke at Careg Lydan.

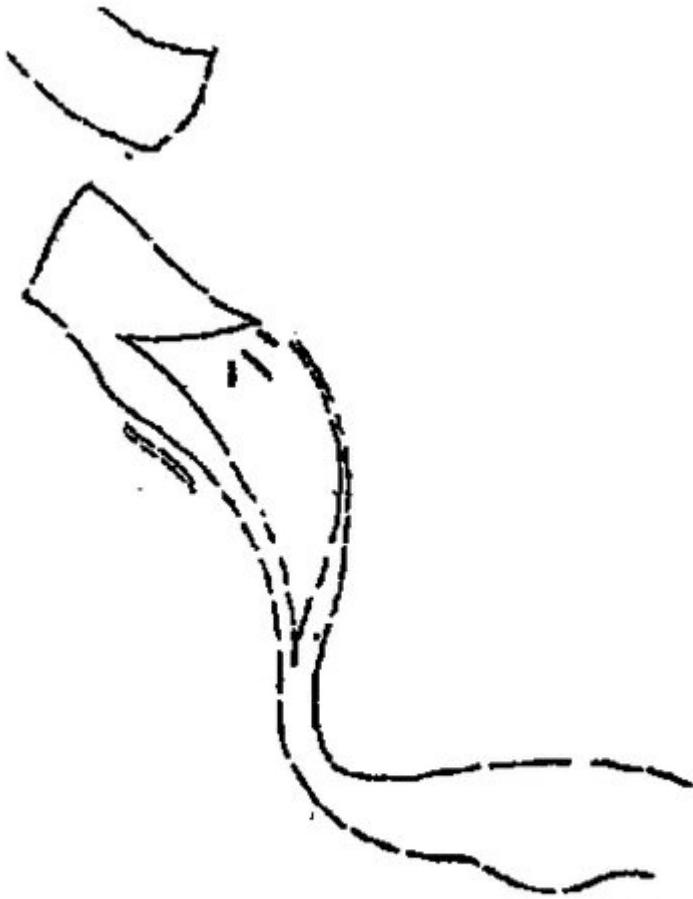


FIG. 256.

SCHISTOSE DYKE  
AT GWALCHMAI.

Seven-sixteenths of  
mile north-east of  
Caer-glaw.

*(Figure 256) Schistose dyke at Gwalchmai Seven-sixteenths of mile north-east of Caer-glaw.*



**FIG. 232.**  
**SPLITTING OF THE**  
**RHOSCOLYN DYKE.**

*(Figure 232) Splitting of the Bhoscolyn dyke. Scale: .0002 or 1: 5000.*

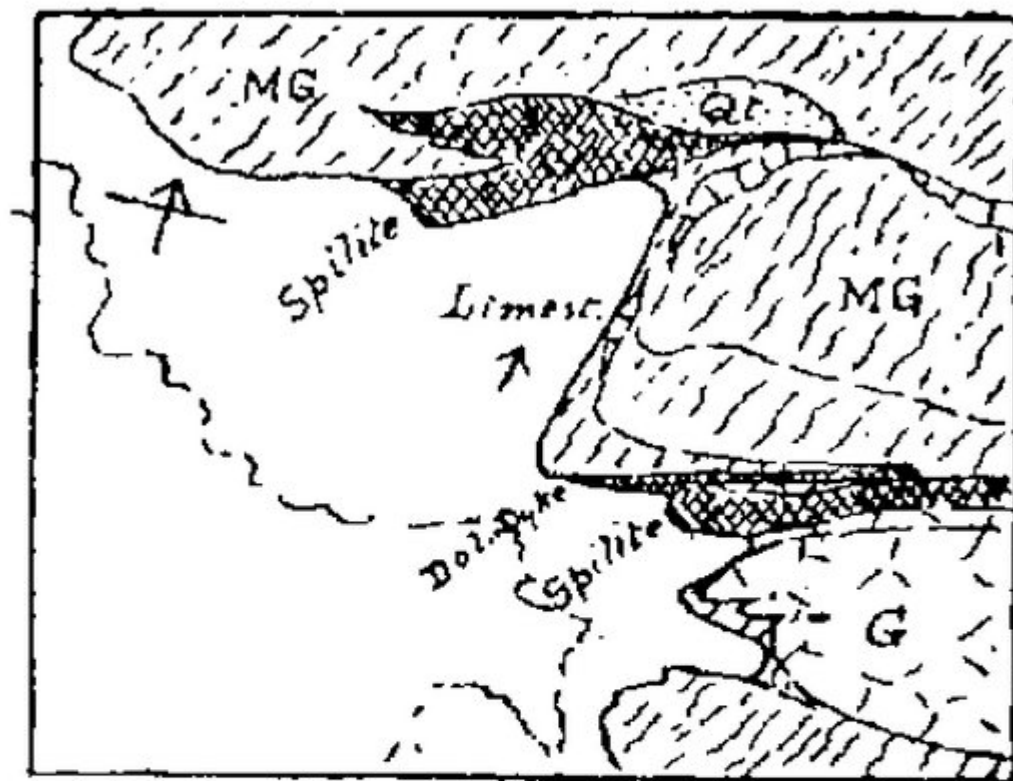
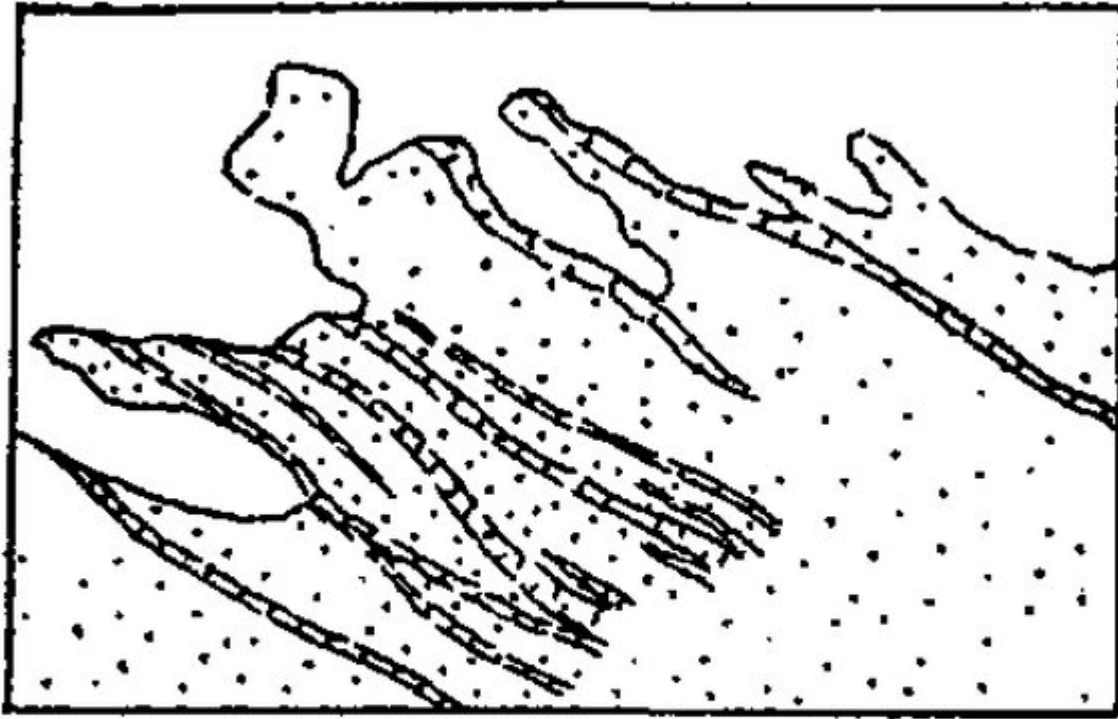


FIG. 139.

## NORTH-WEST CLIFFS OF Mynydd Wylfa.

(Figure 139) North-west cliffs of Mynydd Wylfa. From the 1100-1 or 1:2500 map. MG=Gwna Mélange. Qt=Gwna Quartzite. G=Granite.



**FIG. 227.**

**BASIC DYKES AT PENRHYN,  
CEMAES.**

*(Figure 227) Basic dykes at Penrhyn, Cemaes. From the .0004 (1:2500) maps.*





**FIG. 229.**

**ONE-FOOT VEIN  
FROM DYKE IN  
CEMAES BAY.**

*(Figure 229) One-foot vein from dyke in Cemaes Bay.*



FIG. 226.

DOLERITE DYKES CROSSING  
Mynydd Mechell.

(Figure 226) Dolerite dykes crossing Mynydd Mechell. From the six-inch map.

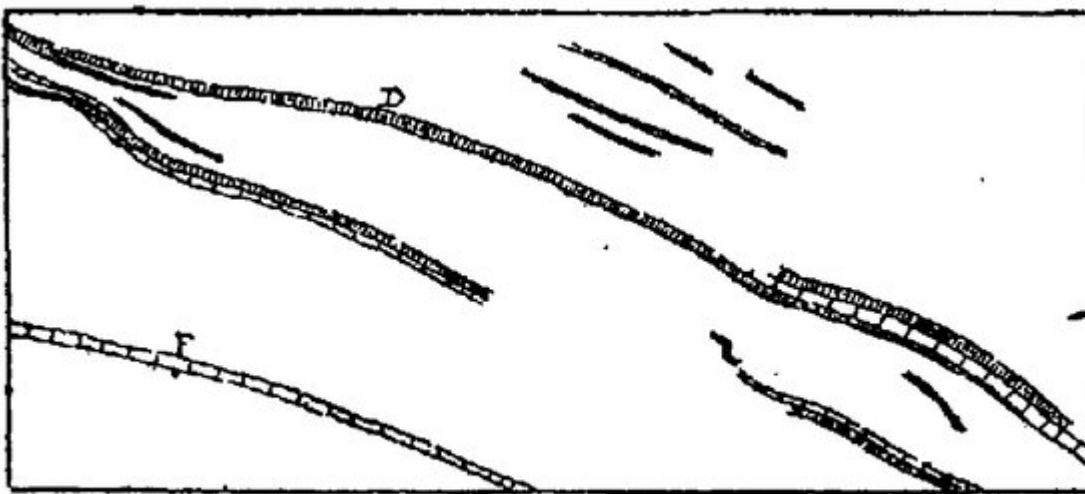
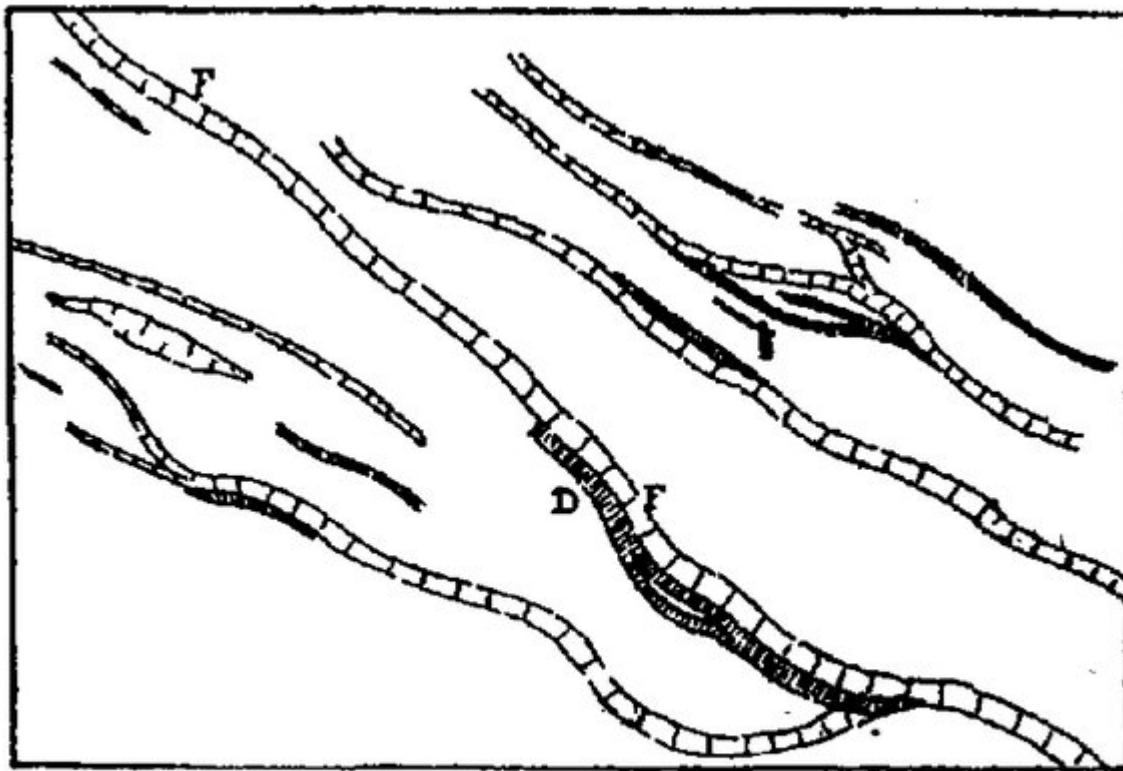


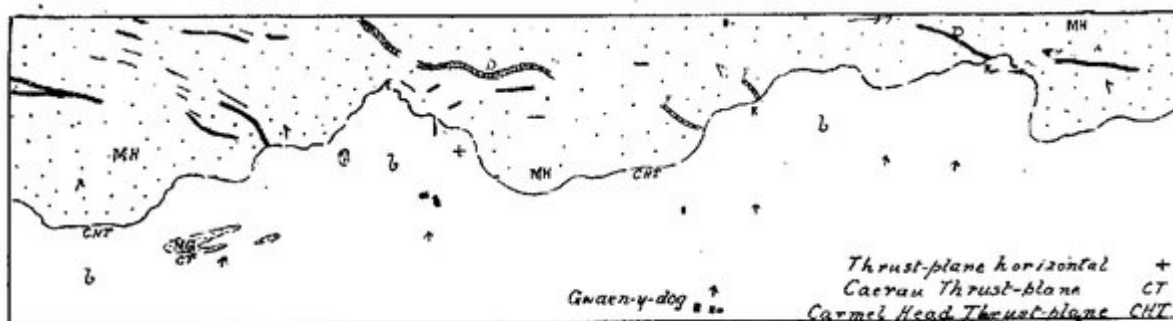
FIG. 243.—FELSITE, DOLERITE, AND COMPOUND  
DYKES.

(Figure 243) Felsite, dolerite, and compound dykes. North of Coeden. From the six-inch map.



**FIG. 244.—FELSITE, DOLERITE, AND COMPOUND DYKES AT DRUM.**

(Figure 244) Felsite, dolerite, and compound dykes at Drum. From the six-inch map.



**FIG. 269.—OUTCROP OF THE CARMEL HEAD THRUST-PLANE AT GWAEN-Y-DOG.**

From the six-inch maps.  
 MH = Coeden Beds.      MG = Gwna Beds.      b = Arenig Beds.  
 F = Felsite Dykes.      D = Dolerite Dykes.      K = Crushed Dykes.

(Figure 269) Outcrop of the Carmel Head Thrust-plane at Gwaen-y-dog. From the six-inch maps. MH = Coeden beds. MG = Gwna Beds. b = Arenig Beds. F = Felsite Dykes. D = Dolerite Dykes. K = Crushed Dykes.

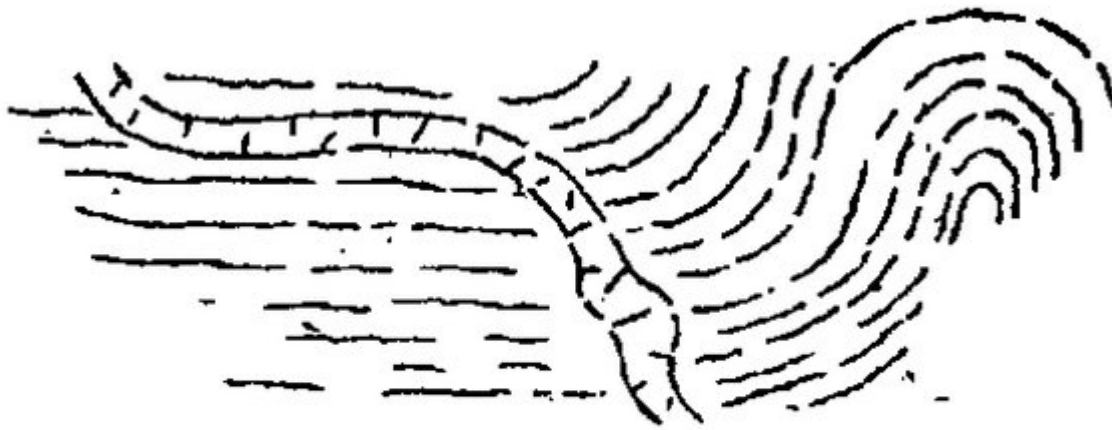


FIG. 236.

SIX-INCH DYKE.

*(Figure 236) Six-inch dyke. 286 yards south-south-east of Llanddygfael-hir.*

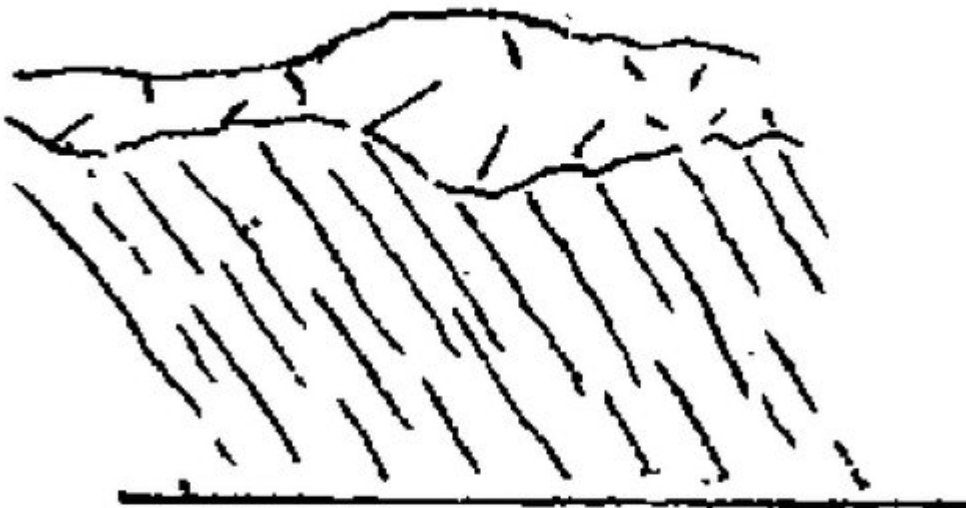


FIG. 237.

TWO-FOOT DYKE.

*(Figure 237) Two-foot dyke. Three-eighths of mile north of west of Bwlch.*

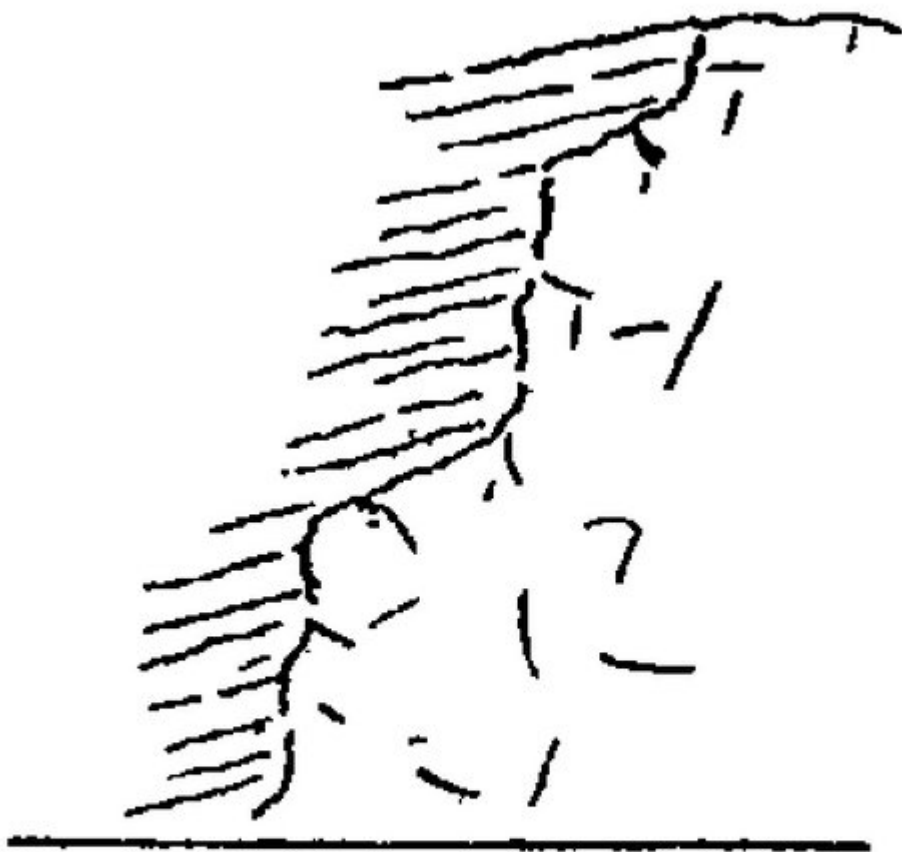


FIG. 235.  
LARGE DYKE.

*(Figure 235) Large dyke. Quarter of a mile east-south-east of Llyn Bwch.*



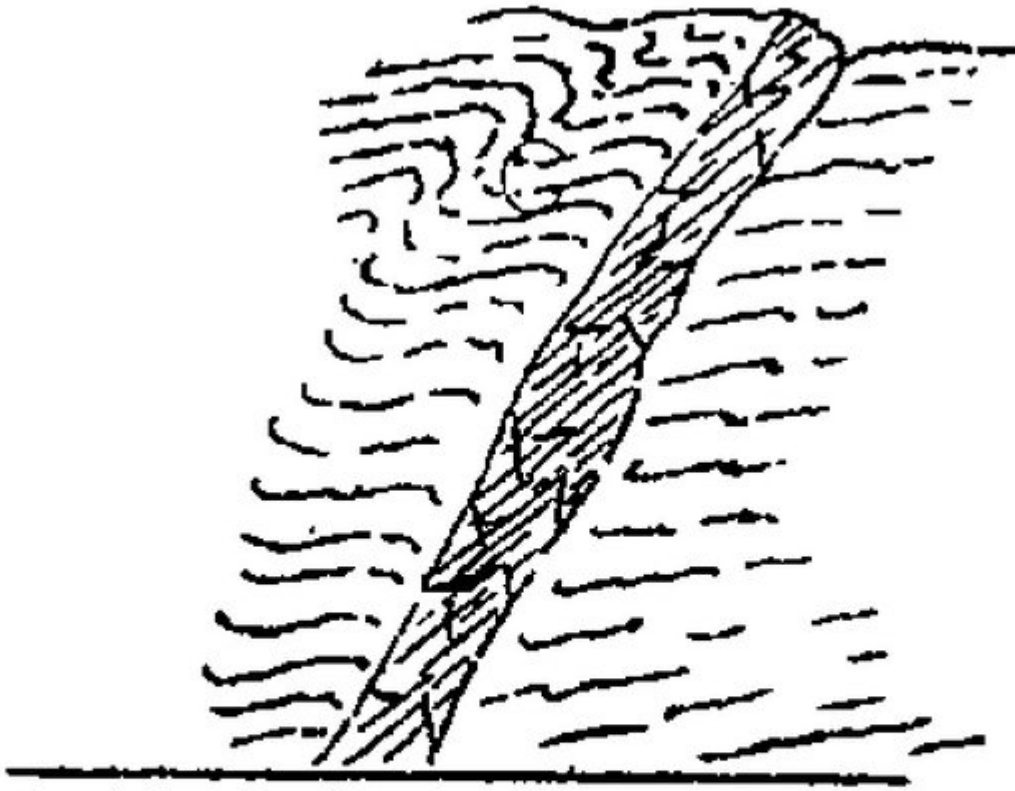


FIG. 259.

TWO-FOOT SCHISTOSE  
DYKE.

*(Figure 259) Two-foot schistose Dyke. Eastern cliff of Point Lynas.*

## NORTH WEST CORNER OF ANGLESEY.

- Alluvium.
- Metamorphic Quartz.
- Palaeozoic Diabase or Dolomite.
- Palaeozoic Slate.
- Ordovician Shale (black shale).
- Ordovician Conglomerate or Grit.
- Amloch Beds (chloritic mica schist).
- Church Bay Tuffe (pelite).
- Gwynn Diabase.
- Gwynn Limestone.
- Gwynn Quartzite.
- Gwynn Green Schist (chloritic quartzose schist).
- Melange (cataclastic clastic schist).
- Fydllyn Beds (foliated schist).
- Granite of the Gneiss.
- Bronze Gneiss.
- Gneiss.

Scale, 6 inches to one Mile.



(Folding-Plate 13) The North-West corner of Anglesey. Reproduction of manuscript six-inch map.

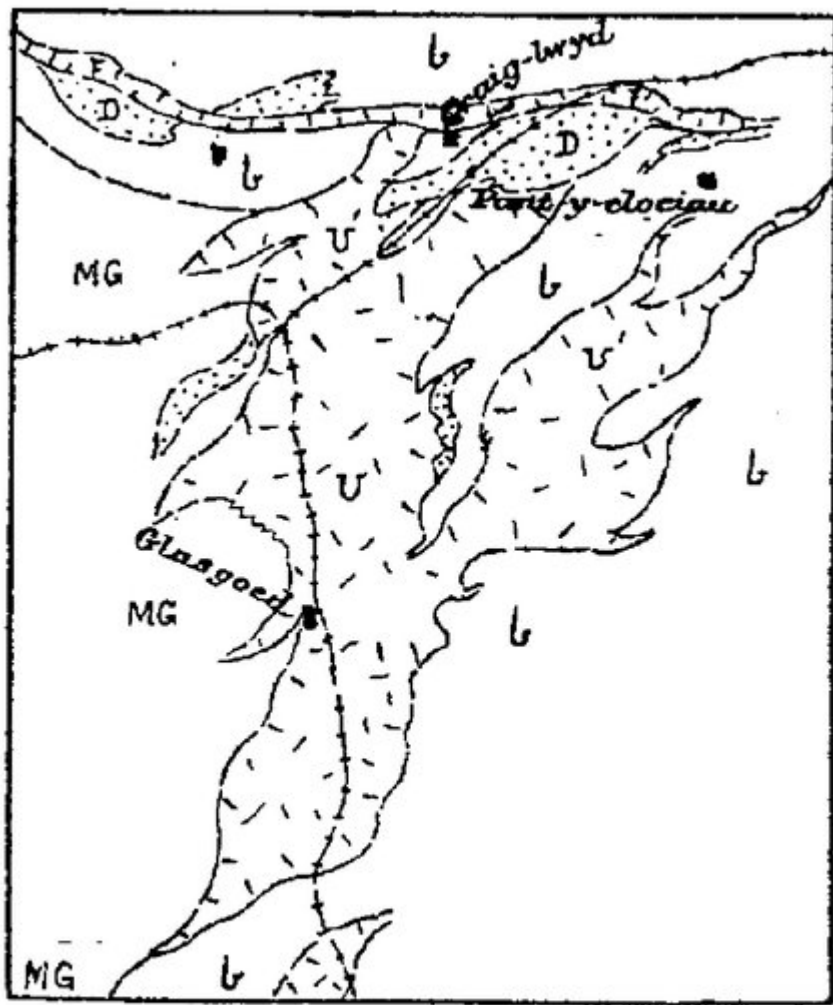


FIG. 245.

### INTRUSIONS ON MYNYDD EILIAN.

(Figure 245) Intrusions on Mynydd Eilian. From the six-inch map. MG = Gwna Mélange. b = Ordovician. F = Felsite. U = Hornblende-picrite. D = Proterobase. Cross-hatched lines = roads.

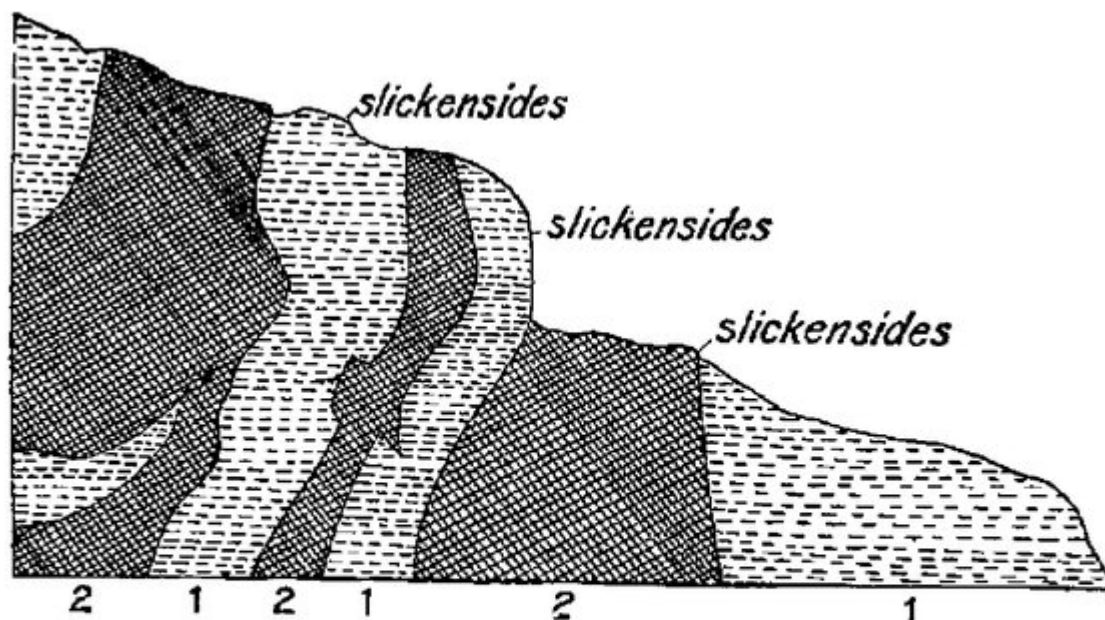


FIG. 260—SECTION IN THE COMPOSITE DYKE  
WEST OF LLANFECHELL. (Matley.)

Width shown = about 16 feet.  
1 = Felsite. 2 = Dolerite.

(Figure 260) Section in the composite dyke West of Llanpechell. (Matley.) Width shown = about 16 feet. 1 = Felsite. 2 = Dolerite.



FIG. 239.

FLANK OF  
FELSITE  
DYKE.

*(Figure 239) Flank of felsite Dyke. Group south-west of Gwalchmai.*

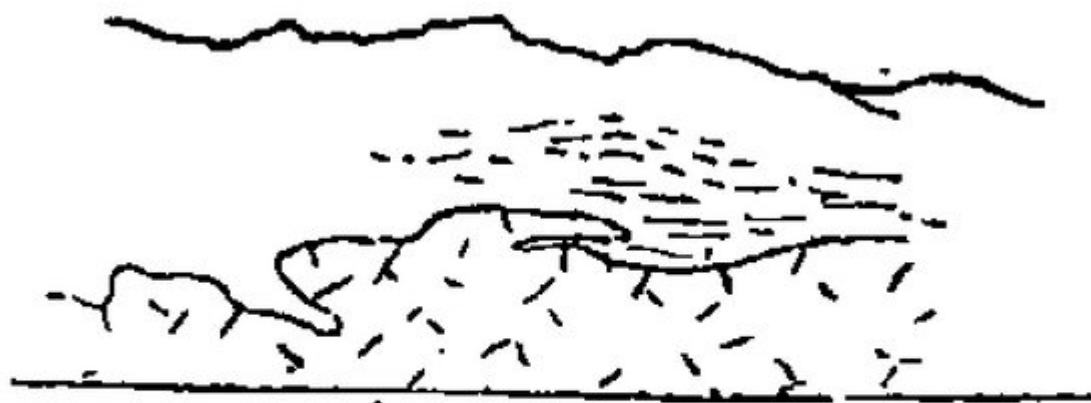


FIG. 240.

FELSITE DYKE.

(Figure 240) Felsite dyke. 270 yards west-north-west of Gwalchmai Inn.

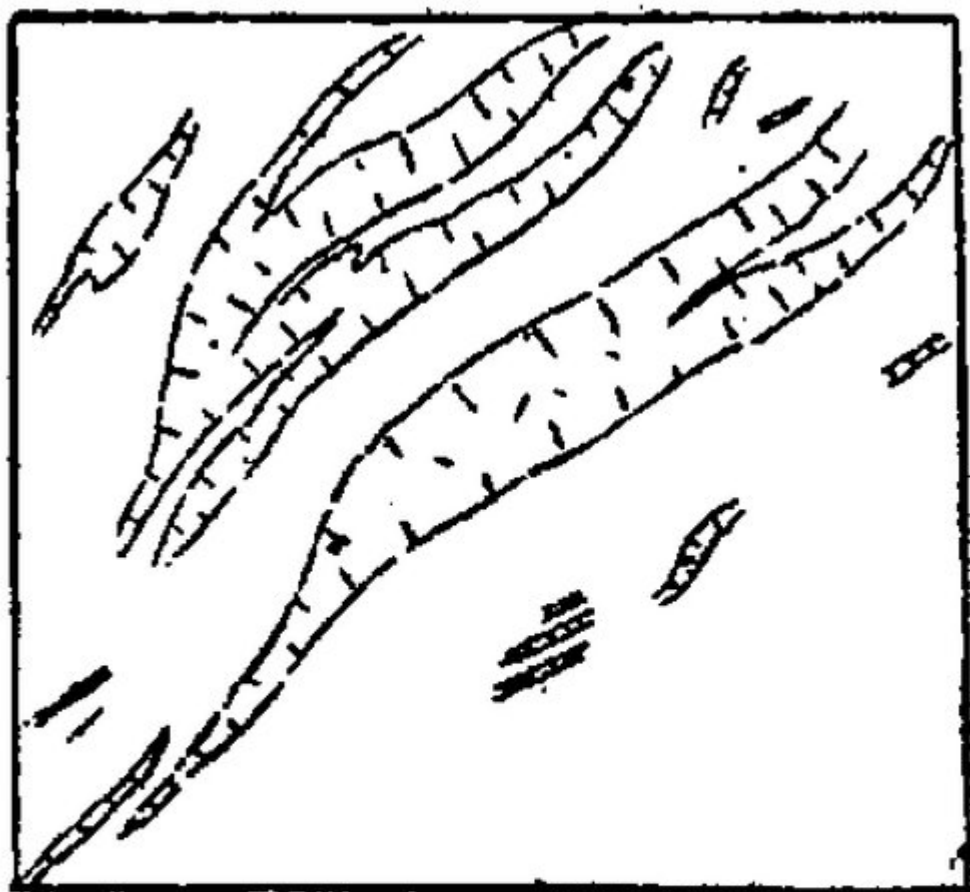


FIG. 241.  
FELSITE DYKES.

(Figure 241) Felsite dykes. South-west of Gwalchmai. From the six-inch map.

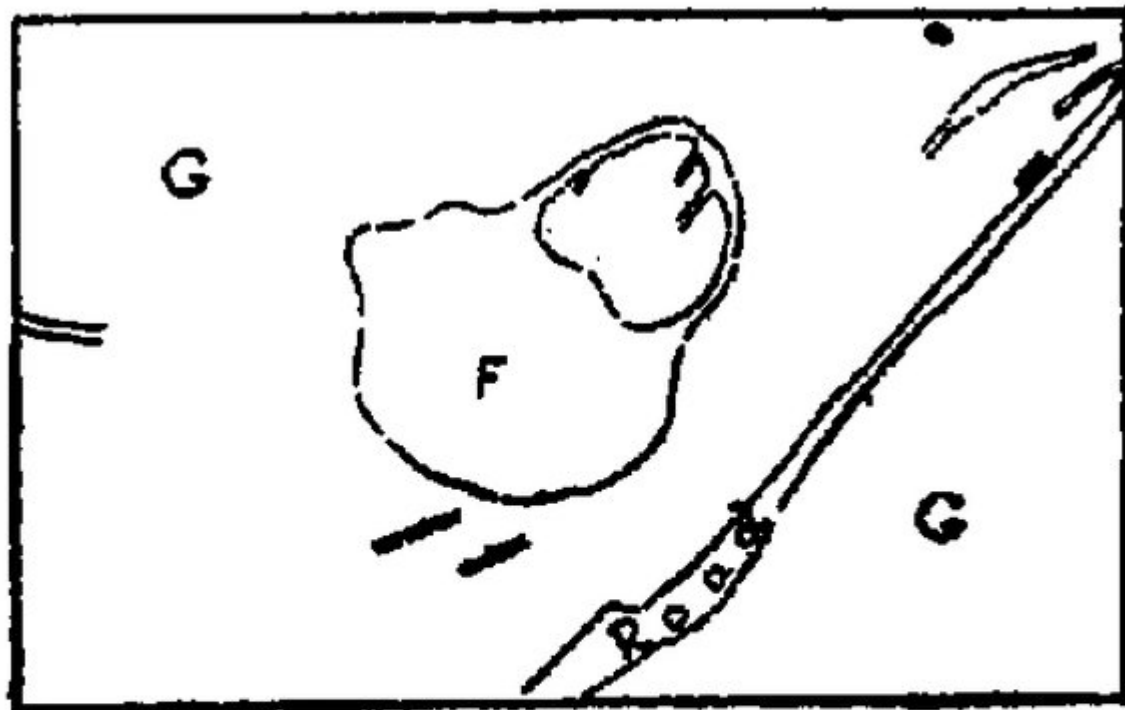


FIG. 242.

# FELSITE SHEET WITH GRANITE OUTLIER AT BRYN TWROG.

(Figure 242) Felsite sheet with Granite outlier at Bryn Twrog. From the six-inch map.



FIG. 238.

# FELSITE DYKE, YNYS-FAWR.

(Figure 238) Felsite dyke, Ynys-fawr. Nine yards wide.



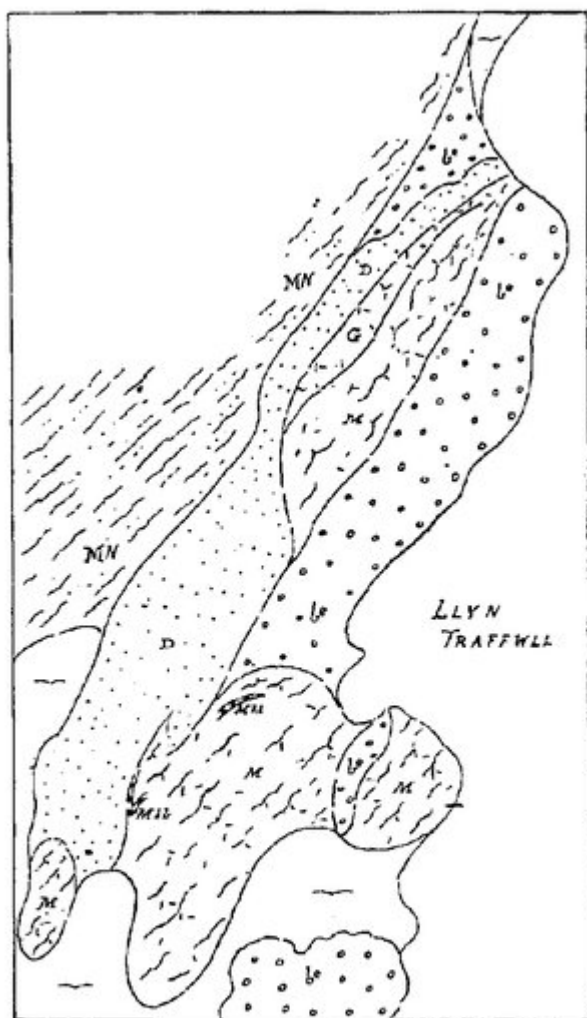


FIG. 202.—THE COMPLEX AT LLYN TRAFFWLL.

Scale .0004 or 1:2500.

M = Gneiss. Mhb = Basic Gneiss.  
 G = Granite. MN = New Harbour Beds.  
 be = Conglomerate of Extensus Zone.  
 D = Diabase. [Alluvium symbol] = Lacustrine Alluvium.

(Figure 202) The complex at Llyn Traffwll. Scale .0004 or 1:2500. M = Gneiss. Mhb = Basic Gneiss. G = Granite. MN = New Harbour Beds. be = Conglomerate of Extensus Zone. D = Diabase. [Alluvium symbol] = Lacustrine Alluvium.

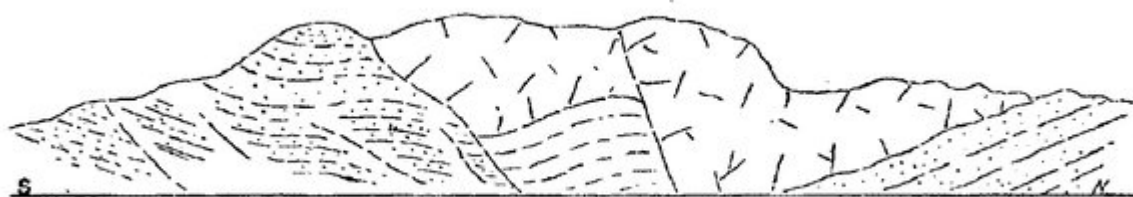


FIG. 247.—FAULTED BASIC SILL AT LLANERCHYMEDD STATION.

(Figure 247) Faulted basic sill at Llanerchymedd Station. Not measured, but height about 20 feet.

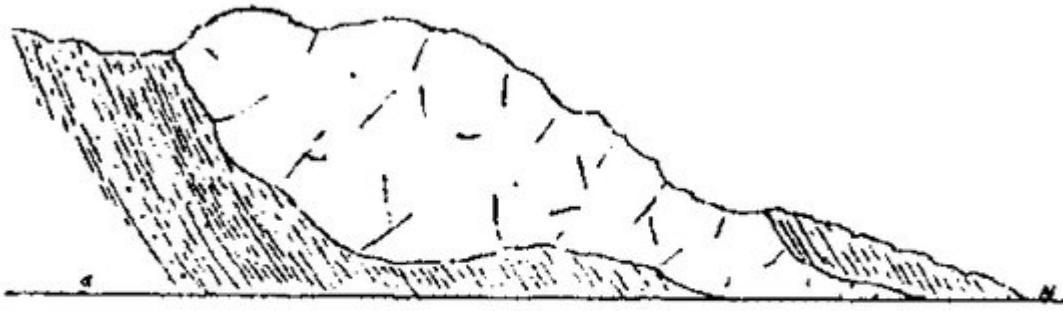


FIG. 248.

SILL OF DIABASE IN LLANVIRN SHALES.

(Figure 248) Sill of diabase in Llanvirm Shales. 166 yards north-east of bathing house, Dulas Bay. Height, 15 feet.



FIG. 249.

TONGUES FROM BASIC  
SILL. OGO-FAWR.

(Figure 249) Tongues from basic sill. Ogo-fawr.

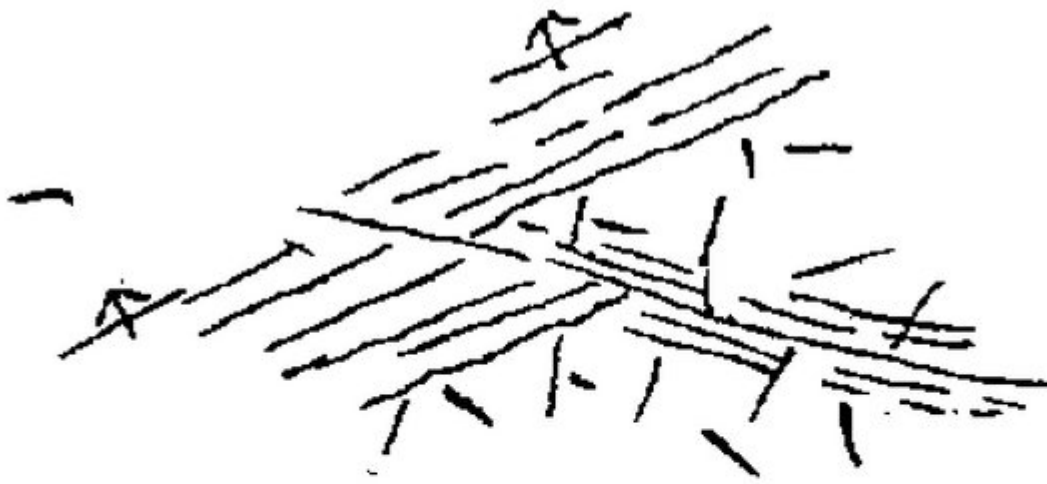


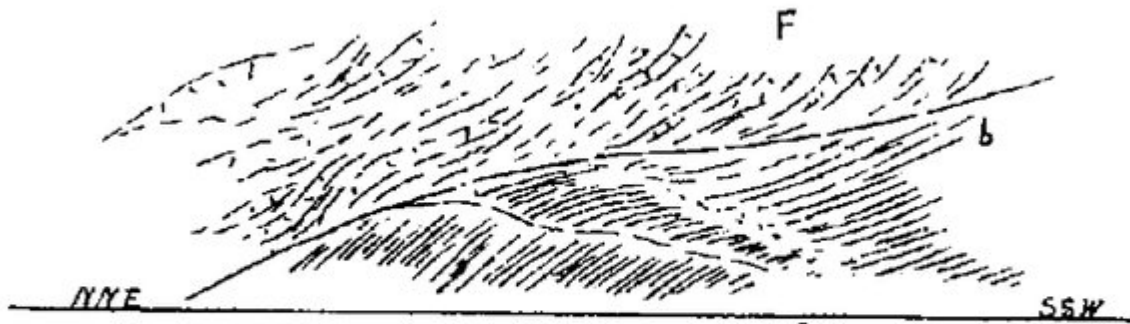
FIG. 252.

SHIFT OF MARGIN OF  
BASIC SILL, OGO-FAWR.

*(Figure 252) Shift of margin of basic sill, Ogo-fawr.*

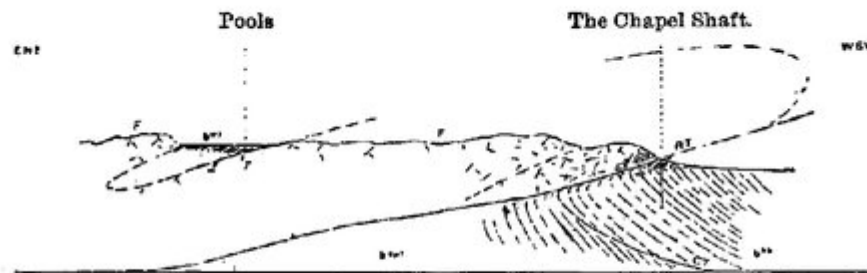


(Figure 250) Basic sill on lighthouse crag, The Skerries. Height about 20 feet.



**FIG. 212.—THE RHWNC THRUST-PLANE AT RHWNC.**

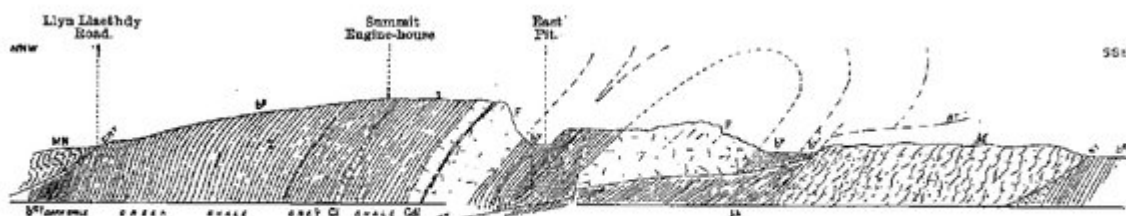
(Figure 212) The Rhwnc Thrust-plane at Rhwnc. Height about 10 feet. F = Sheared felsite. b = Arenig shales.



**FIG. 213.—SECTION THROUGH THE WEST END OF PARYS MOUNTAIN.**  
Scale—eight inches = one mile.

bhb = *Phyllograptus* and adjacent Shales. bcp = Hartfell Shales. bv = Llandovery Shales.  
F = Felsite. CT = Chapel Thrust-plane. RT = Rhwnc Thrust-plane.

(Figure 213) Section through the west end of Parys Mountain. Scale eight inches = one mile. bhb = *Phyllograptus* and adjacent Shales. bcp = Hartfell Shales. bv = Llandovery Shales F = Felsite. CT = Chapel Thrust-plane. RT = Rhwnc Thrust-plane.



**FIG. 214.—SECTION THROUGH THE CENTRAL PARTS OF PARYS MOUNTAIN.**

Scale—7.5 inches = one mile.

MN = Amlwch Beds } Mona  
M = Gneiss } Complex.  
be = Zone of *Did. extensus*.  
bb = Zone of *Did. bifidus*.  
bc = Zone of *Dicran. clingani*.  
bp = Parys Green shales.  
bv = Llandovery shales.  
bv■ = Tarannon shales.  
F = Felsite.  
Cl = Charlotte's lode (on strike of North Discovery lode).  
Cdl = Careg-y-doll lode.  
NT = Nebo Thrust-plane.  
RT = Rhwnc Thrust-plane.  
CHT = Carmel Head Thrust-plane.

(Figure 214) Section through the central parts of Parys Mountain. Scale 7.5 inches = one mile. MN = Amlwch Beds, Mona Complex, M=Gneiss, Mona Complex Be = Zone of *Did. extensus*. bb = Zone of *Did. bifidus*. bc = Zone of *Dicran. clingani*. bp = Parys Green shales. bv = Llandovery Shales. bv■ = Tarannon shales. F = Felsite. Cl = Charlotte's Lode (on strike of north discovery lode) Cdl = Careg-y-doll lode. NT = Nebo Thrust-plane. RT = Rhwnc Thrust-plane. CHT = Carmel Head Thrust-plane.

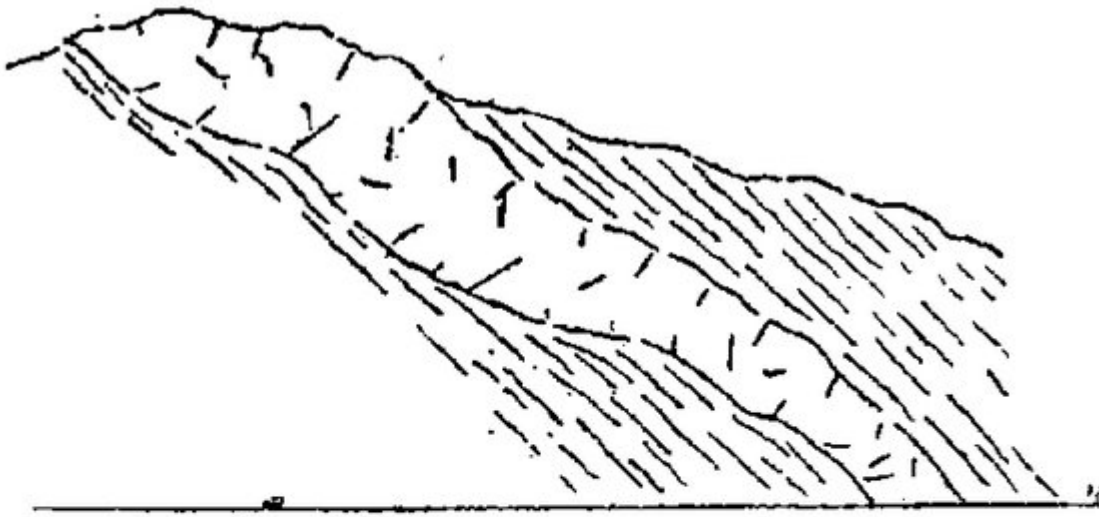


FIG. 251.

FELSITE SILL.

70 yards south of Ogo-fawr.

Height about 60 feet.

*(Figure 251) Felsite sill. 70 yards south of Ogo-fawr. Height about 60 feet.*