EXPLANATIONS

TO ACCOMPANY

SHEETS 185 AND 186 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PARTS OF

THE COUNTIES OF KERRY AND CORK.

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The observations made in the course of the Geological Survey, are entered, in the first instance, on the Maps of the Ordnance Townland Survey, which are on the scale of six inches to the mile. By means of marks, writing, and colours, the nature, extent, direction, and geological formation of all portions of rock visible at the surface are laid down on these maps, which are preserved as data maps and geological records in the office in Dublin.

The results of the Survey are published by means of coloured copies of the one-inch map of the Ordnance Survey, accompanied by printed explanations.

Longitudinal sections, on the scale of six inches to the mile, and vertical sections of coal-pits, &c., on the scale of forty feet to the inch, are also published, and in preparation.

Condensed memoirs on particular districts will also eventually appear.

The heights mentioned in these explanations are all taken from the Ordnance Maps.

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EXPLANATIONS

TO ACCOMPANY

SHEETS 185 AND 186 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The district included in the two sheets of the map numbered 185 and 186, belongs to the county of Cork, except the western portion of Sheet 185, which lies in county Kerry. The suburb of Macroom, called Massytown, and the hamlets of Ballyvourny and Ballymakeery are the only groups of houses within the area of 185. The principal places in 186 are the town of Macroom, and the villages of Coachford, Dripsey, Blarney, and Ballincollig.

1. *Form of the Ground.*

The district is chiefly occupied by the basin of the River Lee and its tributaries, and the ridge of high mountainous ground which separates that basin from those of the rivers Roughty, Flesk, and Blackwater.

This ridge enters the district near the S.W. corner of Sheet 185, proceeding from the high ground that sweeps round the head of Bantry Bay, Lough Gouganebarra, the source of the Lee, lying in a hollow of it, only a mile S. of the limits of the Sheet. The ridge runs nearly due N. for about six miles, with a general elevation of 1,500 or 1,600 feet, when it coalesces with a similar ridge that runs nearly E. and W., and goes by the name of the Derrynasaggart Mountains. The highest point about their junction is one of 1,670 feet, called Coomagearlahy, about three miles S. of that. The ridge is crossed by the road from Macroom to Kenmare, with a summit level of 1,063 feet above the sea, near a rocky gorge called Cummeenawaddera.

The Derrynasaggart Mountains are separated from those which, in Sheet 184, run along the northern side of the Kenmare valley, by the deep glen which, just at the junction of Sheets 184 and 185, extends northwards from the rocky margin of the Roughty River through the heart of the mountains into Glen Flesk. The floor of this glen is remarkably level, and there is no perceptible rise of ground to form the watershed between the point of the road which looks down on the falls of the Roughty and the marshy flat from which a sluggish stream drains into the Lod River, which joins the

Flesk at Poulgorm Bridge. That point of the road has an altitude of only 320 feet above the sea.*

From Coomagearlahy the Derrynasaggart Mountains run about nine miles to the E.N.E., where they attain a height of 2,133 feet, in a hill called Mullaghanish. They are crossed about midway by a pass, through which runs the road from Macroom to Killarney, the highest point of which is about 950 feet above the sea. About four miles E. of Mullaghanish the glen of Carriganimmy cuts across the range, through which runs the road from Macroom to Millstreet, with a summit level of 680 feet above the sea.

From the neighbourhood of Mullaghanish a ridge strikes N. and then turns due W., surrounding the Clydagh valley, in which rises the Clydagh River, which at Poulgorm Bridge takes the name of the River Flesk. The ridge N. of the Clydagh valley forms the highest ground in the district, being capped by the symmetrically conical hills known as the Paps, of which the eastern is 2,284 and the western 2,268 feet above the sea.

Fig. 1.

The Paps and Rogers' Rock from the South, the latter being the craggy eminence in the middle distance, above the figures.

The ridge of the Paps is separated from the mass of Crohane Mountain, the conical summit of which rises to 2,102 feet, by the deep gorge of Glen Flesk, with its flat floor, the general level of which thereabouts is only 230 feet above the sea.

From a point of 1,958 feet, about a mile E. of the Paps, proceeds the spur that carries the line of watershed into the low ground between the tributaries of the Blackwater and those of the Flesk.—(See *Explanation*, 163 and 174).

To the E. of Carriganimmy Glen, the main ridge again rises up to a round-backed hill called Musheramore, 2,118 feet, a little to the

* This level, gently winding glen, cutting so deeply through the heart of the mountains that lie between the Kenmare valley and the low land about Killarney, seems to me to be a very noteworthy feature in this district. When the magnificent harbour of Bearhaven assumes the importance for which it seems by nature to be destined, as the station commanding the entrance to the English Channel, and the point of connexion between Europe and America, there will be no difficulty in carrying a railway through this glen, from the present Mallow and Killarney line down the S. side of Kenmare valley to the pass, of not more than 300 feet in height, which lies at the back of Castletown-Bearhaven.—(See *Explanation* 198, &c.)—J. B. J.

east of which it enters the limits of Sheet 186, and is continued along the northern margin of that, with a gently sinuous line to near its N.E. corner. The height of the summit of the ridge gradually declines towards the east to about 1,200 feet, the road from Coachford to Kanturk crossing it at about 1,100, between eminences of 1,240 feet; but a mile or two east of this the highest points are only about 700 or 800 feet above the sea. The ridge is crossed there by several roads, and lastly by the shallow valley which gives passage to the Great Southern and Western Railway, in which the watershed, a little N. of the limits of the map, occurs at an altitude of about 450 feet. This part of the watershed, which forms the northern boundary of the basin of the Lee, lies just within the limits of Sheet 175 (see *Explanation*, 175); but with the exception of one little curve round the head of the Beenalaght River, its line runs thence wholly within our two Sheets, up to the neighbourhood of Lough Gouganebarra, in the S.W. corner of Sheet 185, traversing the summits of the ridge and the highest points of the passes above described.

The part of the line of watershed lying between Gouganebarra and the point of 1,958 feet, a mile E. of the Paps, is a portion of the main watershed of Ireland, to the west of which lie the basins of the Roughty and the Flesk, while those of the Lee and the Blackwater lie to the east of it.

The River Lee issues from Lough Gouganebarra (in Sheet 193), with an altitude of 520 feet above the sea; it enters the limits of Sheet 185 near its S.E. corner at Dromcarra Bridge, where it has a height of 223 feet, and it has fallen to a level of 25 feet, when it leaves the limit of Sheet 186, a little below Ballincollig.

The south-eastern drainage of the Derrynasaggart and Mushera Mountains forms the Sullane and Laney Rivers, which unite a little to the east of Macroom, and in a mile and a half from their junction fall into the Lee at a level of about 190 feet. The ridge east of Musheramore sends its southern drainage into the Lee, by means of many brooks, of which the Dripsey and those which unite in the valley of Blarney to form the Blarney River are the chief.

The only considerable affluent of the Lee, coming from the south, is the River Bride, which forms a distinct little basin of its own between that of the Lee and that of the Bandon River, and falls into the Lee at Inishcarra, where it has a level of about 50 feet above the sea.

The valley of the Bride River is, in fact, the true western termination of the valley in which Cork lies, and which runs in a nearly due east line from Crookstown out to Youghal, having always a well defined ridge, sloping steeply to the south, along its northern side. This ridge is, however, cut by many transverse valleys or gorges, by means of which the drainage of other valleys to the northward are conveyed into it.

Within the limits of Sheet 186 there are the three valleys of Blarney, Ardmore, and Coachford, arranged along a line that runs about E. by N. and W. by S., and lying to the north of the ridge above mentioned; and if this line be continued westward, it runs directly into the valley in which the Anahalla Bog lies, a short distance S.W. of Macroom. These four valleys are now separated

from each other by intervening portions of ground, which are neither so lofty nor so wide and massive as that of the ridge which separates them from the valley of the Bride. The river Lee enters the district by means of a deep gorge which has been cut through part of this ridge, issuing from which it crosses the open valley in which Anahalla Bog lies. It spreads there in a multitude of channels, among numerous bushy islets, but collects its waters into one stream again at Macloneigh, and thence follows a very winding course in a deep and often picturesque valley by Carrigadrohid to Coachford. The road from Macroom to Carrigadrohid, however, follows a much more direct valley than that of the river, forming, indeed, a chord to one of its largest curves, and running directly in the line between the Anahalla and Coachford valleys. In one part this valley forms a deep and narrow gorge, with Glencaun Wood on its northern slopes, strongly suggesting the idea of the drainage of the country to the west, having, in some former rather different arrangement of the surface, run eastward by means of this direct channel, and having been afterwards diverted into the present winding valley of the Lee.

When, too, the Lee has entered the Coachford valley, instead of continuing along it as the present road does, it cuts into the higher land to the south of it, and gradually works its way through that till it breaks out at Inishcarra into the valley of the Bride, and thus the Lee rather falls into the Bride, whose proper valley this is, than the Bride into it.

The deep transverse gorge across the ridge which separates the valley of Cork from that of Blarney, through which issue the united waters of the brooks that make the Blarney River, is another example of the same singular form of the ground.

These features add much to the picturesque beauty of the country, though their origin is not very easy to determine.*

J. B. J.

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2. *Formations and Groups of Rocks entering into the Structure of the District.*

Aqueous Rocks.

	Name.	Colour on Map.
	Alluvium, Bog, or other superficial covering,	*Pale Sepia.*
Carboniferous.	d². Lower Limestone,	*Pale Prussian blue.*
	d¹. Lower Limestone Shale,	*Indian ink and Prussian blue.*
Old Red Sandstone.	c³. Upper Old Red Sandstone,	*Indian red (dark).*
	c². Old Red Sandstone,	*Indian red (light).*
	c¹. "Glengarriff Grits,"	*Indian red (light).*

Igneous Rocks.

Fs.	Felstone Ash,	*Pale scarlet, with dots.*

Aqueous Rocks.

Old Red Sandstone.

* Cork harbour and the valley of the Blackwater, between Cappoquin and Youghal are examples of the same phenomenon on a still larger scale.

At one time it was proposed to call the lower portion of the Old Red sandstone by the name of "Glengarriff grits," as it was believed that it could be separated from the rest as a distinct group; further examination not having supported this supposition, the term "Glengarriff grit" is now retained, as merely descriptive of a certain lithological character. It is applied to beds which are very massive in their construction and obliquely laminated, most usually of a pale greenish-gray colour, but sometimes a dull grayish-purple, consisting of coarse gritty grains in an earthy base.

The other beds in the Old Red are massive dark purplish red or liver-coloured sandstones, with beds of shale similarly coloured, sometimes cleaved into coarse slates, and sometimes not. Occasionally through the sandstones there are thin layers of fine conglomerate, the pebbles of which are quartz and red grit. Thin calcareous bands, which become rusty and rapidly decompose, are not unusual in these sandstones; to these the name of "cornstone" has been given, as they agree with the cornstone bands of the Old Red sandstone of Herefordshire and S. Wales.

Throughout these dark red and liver-coloured beds, bands of pale greenish gray and dull grayish purple grits and slates frequently occur, but never in any great thickness. In many parts of the district there are sections more or less continuous or well exposed, which affords thicknesses of over 3,000 feet; and in the adjoining district to the W. in Sheet 185, I have estimated some which amount to fully 13,000 feet.

c³. *Upper Old Red Sandstone.*—This group of the Old Red sandstone is characterized by the occurrence of evenly bedded, thin, pale brownish, red or yellowish, compact grits, with soft shales and thin slate bands, which are either dark purple or of a similar colour to the grits. Impressions of plants are frequently found in the yellowish shales of this group. Its total thickness may be from 400 to 500 feet.

d¹. *Lower Limestone Shale.*—These beds consist of dark gray evenly bedded thin grits and soft shales, and slaty layers, the latter sometimes very dark gray in colour, thickness possibly 250 feet.

d². *Lower Limestone.*—This is usually of a pale gray colour, close grained, sometimes crystalline, the bedding frequently not well seen or not at all, the rock very massive in its structure, and cut up by numerous joints; these are often very regular in their strike and inclination, and look like stratification. This massive bedded or amorphous portion of the limestone is frequently finely laminated or else cleaved, it being difficult to say which.

The thickness of this group is not ascertainable, but scarcely over 700 feet in this district.

Fs. *Felstone Ash.*—Pale apple green in colour, compact and siliceous, containing small embedded crystals of pale yellowish felspar, the angles of which are partially rounded; occasionally the ash is nodular or pisolitic in its structure; in the former case the nodules vary from the size of a pigeon's egg up to irregular spheroids of six or seven inches in diameter; these consist of a thick outer crust of felstone, hollow in the centre, which is filled either completely or in part with quartz, often perfectly crystallized in the centre of the geode. The pisolitic portion is most usually of a milk-white colour,

the result of the decomposition of the felspar; the nodules vary from the size of a pigeon's egg down to that of a small pea, and are embedded in the decomposed felstone; when broken they are semi-transparent in the centre, and crystallized. The upper portion of the deposit most usually exhibits this structure.

The lower part of the ash is often quite sandy in texture, and the embedded crystals of feldspar very numerous. It is here affected by the cleavage which most usually pervades the underlying Old Red sandstone if the beds happen to be earthy or shaly.

In the lower and central portion of the deposit, the rock is often so compact and siliceous that but for its containing extraneous crystals of feldspar it would be regarded as a true felstone, with a porphyritic structure; from the fact, however, that these crystals are really embedded fragments of another rock, rounded more or less at their angles by fusion or attrition, we are forced to the conclusion that no matter how compact or siliceous the mass of the rock may be, it is yet an aqueous deposit, which may possibly have been subsequently semi-fused, or at least greatly modified by heat. In most localities where the ash forms cliffs, it closely resembles a thick-bedded Glengarriff grit, exhibiting oblique lamination in its mode of formation, and hardly to be distinguished from a sandstone by its mere outward appearance. The cleavage which pervades the associated Old Red sandstone, passes through this deposit of ash, and is especially well developed in it at its lower portion. In thickness the Crohane and Clydagh ash beds may be estimated at from 600 to 700 feet. G. V. D.

3.—*Relations between the Form of the Ground and its Geological Structure, with General Sketch of the latter.*

The consideration of the district included in the two sheets, confirmed by that of the south-west of Ireland in general (see Longitudinal Sections, Sheet 4), leads us directly to the conclusion that all the stratified rocks in it were originally horizontal, and that the Carboniferous Limestone extended in continuous sheets over the whole of the Old Red sandstone.

We are even induced to believe that not only did the uppermost beds of limestone form a level floor over the whole area, but that that was at one time covered by the Coal Measures, no part of which is now visible within the limits of the two sheets.

Subsequently to the deposition of the rocks they have been acted on by movements of unequal elevation, which threw them into many long anticlinal and synclinal folds, whose axes, or lines of direction, run about E. by N. and W. by S. These folds are very numerous, and some of them are regular and continuous for long distances, while others are much shorter and more interrupted, the rocks forming oval basins, or oval dome-shaped elevations in different places.

Since the rocks were thus disturbed they have been acted on, to a vast extent, by denudation, so that the whole of the Coal Measures have been swept away from off the country, and by far the larger portion of the carboniferous limestone. The latter rock

is now to be found only in those synclinal troughs and basins beneath which the upper surface of the Old Red sandstone dips to some depth beneath the present surface of the ground.

This occurs in the Cork valley, and in that of Blarney and Anahalla certainly; and it is possible, perhaps, that a small piece of limestone may come in in the centre of the Coachford valley also.

The ridge that runs between the Cork valley and the line of valleys that extend from Blarney to Anahalla, consists of Old Red sandstone bent into an anticlinal fold, so that its beds dip N. on the N. side, and S. on the S. side.

This anticlinal ridge extends through the district included in these two sheets of the map, and also through the two next sheets to the eastward, 187 and 188, past Cork and Youghal to Ardmore Head; we may therefore speak of it as "the Cork and Youghal anticlinal."

The synclinal fold on the south of it, which we may call the Cork and Castlemartyr synclinal, similarly extends from near Crookstown, in Sheet 194, to Youghal Bay, in Sheet 188.

The synclinal fold to the north of it, though equally extensive, is more interrupted, its axis rising and falling along its extension. We may speak of the part in these two sheets as "the Blarney and Anahalla synclinal."*

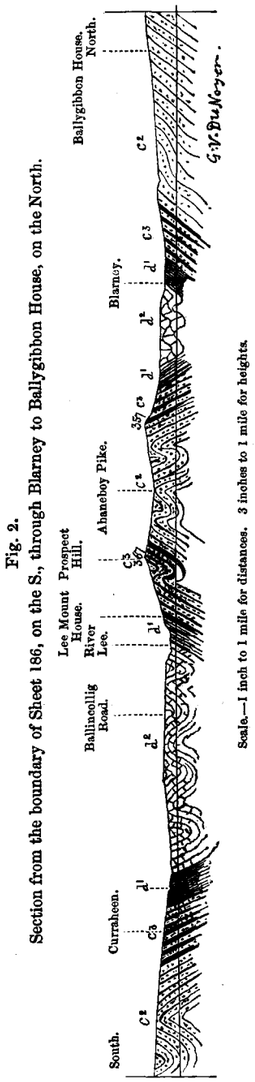
The Old Red sandstone north of this gradually rises, with many minor undulations, flexures, and contortions, into a broad anticlinal ridge, the main axis of which runs somewhere along the northern margin of our two sheets, passing, probably, through Musheramore and the Clydagh valley and Crohane.

It is impossible to decide upon its exact position, because the beds on its northern arm are inverted, so as to dip S., and thus pass apparently under those of its southern arm.

From the crests of the Derrynasaggart Mountains the beds are exposed, in an almost continuous section of more than five miles from S. to N., in the bed of the

Fig. 2.

Section from the boundary of Sheet 186, on the S., through Blarney to Ballygibbon House, on the North.



* This corresponds with the Ardmore synclinal in Sheet 188.

Owgarriff river, and on each side of Glenflesk. For the whole distance the prevailing dip is to the southward, at high angles; and it is only when the beds come to be very closely and accurately traced that minor folds and contortions can be seen, having inclinations in other directions. These minor crumplings are in some places rather numerous on the summits of the hills from the Paps to Crohane, and their existence is evidence of the probable anticlinal folding of the rocks; though as no one predominate fold can be traced, it is impossible to fix precisely the position of the main axis.

This broad anticlinal ridge not only traverses the district included in these two sheets of the map, but extends right across the S. of Ireland from the neighbourhood of Doulas Head, on the coast of Kerry, to Mine Head and Helvick Head, on the coast of Waterford. It is proposed to speak of it as the Mangerton anticlinal, that being the best known of the many eminences upon it.

If the reader will imagine that along the neighbourhood of the main axis above described, the lowest rocks to be seen in the district rise up and form the crests of the loftiest hills, while as these rocks dip or descend into the earth, both northwards and southwards, they are covered by newer and newer beds, the whole being bent into many minor folds, and that the ground-surface has been formed by the carving and graving action, called denudation, working on these undulating materials, he will get a good general notion of the relations between the form of the surface and the subterranean structure of the interior.

The higher grounds are formed of the lower beds, notwithstanding the fact that the amount of denudation has been greater over them than over the lower grounds, because the lower beds are the most massive, and best calculated to resist erosion. Had they been soft and yielding, a valley would probably have been excavated along their edges.

It is, however, difficult, if not impossible, to give any reliable geological reason for some of the minor features of the ground—such, for instance, as the excavation of the winding valley of the Lee gradually cutting across the ridge of the Youghal anticlinal.

J. B. J. and G. V. D.

The district was surveyed partly by Mr. W. L. Willson, now of the Geological Survey of India; partly by Mr. A. Wyley, late Government Geologist to the Cape Colony; and partly by Messrs. G. V. Du Noyer and F. J. Foot. The following details have been drawn up by Mr. G. V. Du Noyer, from his own notes and those of the other observers.

J. B. J.

Detailed Description.

4.—*Position and Lie of the Rocks.*

The Great Mangerton Anticlinal.—The best exposures of the lowest portion of the Old Red sandstone, that in which the Glengariff grits lie, is to be seen in the Glen of Carriganimmy, south of Millstreet, and in the mountainous district lying to the W. of Ballyvourney. At the former place the exposed section, though inconsiderable, extending in a N. and S. direction for only three-quarters of a mile, brings to view beds which may be considered typical of the group to which they belong. At the northern extremity of the townland of Aherdowney, where the section commences, it consists of green and greenish gray compact, and sometimes massive bedded, grits, occasionally slightly calcareous, with green and purple, or dark liver-coloured earthy slates. Here the dip is to the southwards from 70° to 80° for the distance of about 200 yards, when all the beds are reversed at similar high angles. As they are followed southwards, however, they soon roll over again, and dip to the S.E. at from 30° to 50°. Distinct rusty cornstones or calcareous layers now make their appearance amongst the beds. Near the middle of the glen beds of green and greenish gray grits and purple and green slates were observed, vertical with an E. and W. strike; some of the latter cleaved beds are here quarried for roofing slates, of which they yield an inferior quality. Still further southwards, the beds of grits and slate were observed to be sharply contorted to the N. and S., a succession of such rolls terminating the section. Nowhere in Carriganimmy Glen is there a continuous section of more than 500 feet of rock exposed at any one locality. On the summit of Musheramore there appears a tolerably continuous section through purple grits and slates, for the distance of 1,100 yards, or nearly three-quarters of a mile; the dip of all the beds is to the northwards, at from 20° to 60°, and the aggregate thickness of the rocks thus exposed may possibly be 1,800 feet. On the northern flank of the mountain the greenish gray and green grits, with purple and green slates, appear in the S.W. corner of the townland of Brookpark, and their dip is exactly the reverse of the beds last described, that is, to the southwards. Along the northern flanks of this as well as the range of the Pap Mountains to the W., a very good section, which shows the lowest beds of the Old Red sandstone, may be observed in the stream course which runs northwards out of the map, on its northern margin from Comeenatrush Lough; around the margin of the Lough the green grits, which are there most abundant, all dip to the S.S.E., at from 35° to 45°. At the distance of 700 yards north of the Lough are green grits, purple slates, and purplish and gray gritty flags, with an occasional cornstone band, all dipping S. at from 70° to 80°. On the rise of ground to the east of this stream, marked 964 on the map, a few beds of purple slates and green grits are supposed to dip to the N. at 40°; but this is very doubtful, as in the middle of the short, exposed section, the beds are vertical, and it is possible that their apparent turn over to the N. is merely a bending of the top of beds which are vertical at a short depth below the surface. Over the hilly ground which extends from the S. of Carriganimmy along the west side of the Foherish River, where that stream falls into the Sullane River below Carrigaphooka Bridge, there are many and excellent exposures through the lower Old Red beds; one of the best is that seen in the hill to the S. of the head waters of the Foherish River, marked 1,092 feet on the map, in the townland of Curraleigh. Here the rocks are all purple and green grits and slates, which around the northern and eastern flanks of the hill are very much contorted, and similar beds are observed over the hilly ground to the E. in the townland of Carrigonirtane and the townland S. of that called Cabragh; they dip with tolerable steadiness to the W. and S.W. generally speaking at low angles, though dips of 40°

may be frequently observed amongst them. As these beds pass to the S. into the townland of Killmountain, they curve so as to dip to the N.E. at angles of 60° ; this occurs near the summit marked 915 feet on the map. The beds shortly, however, curve round again, so as to be inclined to the southwards for a short distance, and then as they are traced still further to the S. towards Garrane, they become much contorted, dipping suddenly to the northwards and southwards in well defined contortions. As they approach Garrane, the beds become more steady in their dip, which for the most part is to the south, and just to the north of Bridgemount, in the townland of Caherkeegan, we lose the lower Old Red beds, which consist chiefly of Glengariff grits, and enter on the middle or purple group of the formation. These are well seen on the high grounds both to the E. and W. of Garrane, the dip being to the southwards at from 40° to 55°.

To the W. of Ballyvourney, and N. of the summit of Cummeenteige, adjoining the boundary of the counties of Cork and Kerry, there are several remarkably continuous sections through the lower beds of the Old Red sandstone. One, which I have myself observed, extends northwards from the summit just named for the distance of nearly a mile; the dip of the beds being to the S. at an average angle of 35°, which gives a total aggregate thickness of about 3,000 feet. At the summit of Cummeenteige these beds are crumpled and curved round so as to dip to the westward at angles varying from 15° to 30° ; and further southwards of this point the mass of the rocks dip to the N.W. at 50° as an average angle, in this way repeating the beds which are shown in the continuous section on the N. In the adjoining portion of the county Kerry which lies to the N. of the summit called Coomagearlahy, Mr. Foot has noted an apparently continuous section through the lower Old Red beds for the distance of fully three miles and three quarters, commencing from the summit just named, and traceable along the stream courses which form the head waters of the Owgarriv river, as well as along the course of that stream to where it falls into the Clydagh river at Poulgorm Bridge, and from that point up the southern base of what may be called Clydagh Mountain. The dip of all the beds for the entire distance just named, is to the southwards, at angles varying from 30° to 70°, the average being at least 45°. We have here then an apparent stratigraphical thickness of rock of not less than 13,000 feet, neither the top or bottom of the deposit having been reached.* The lowest observed beds in this series are chiefly greenish gray grits (Glengariff) and slates, with brownish purple grits and purple slate beds through them. As the section is followed southwards, the upper portion, which forms the northern slopes of Coomagearlahy mountain, consists almost entirely of purple grits and slates, through which may be observed occasional green or greenish gray beds. and a few cornstone bands.

Continuous sections through the basal portion of the Old Red may be seen in the county of Kerry to the W. of the one last mentioned, extending for the distance of fully three miles from N. to S., commencing at Failaduam Lough, past the eastern and southern flanks of Carrigawadera mountain into the valley of the Loo river, from that up the northern slopes of Freaghanagh Hill, past Lough Aclaurig and the Doo Loughs to the first branch of the Thureehouma stream, and from that to the E. of the summit marked 1,224 on the map, at the spot where the two arrows pointing southerly, with a dip of 30, is engraved. Throughout this section the dip of all the beds is to the southwards, at angles varying from 30° to 60° ; if, therefore, an average of 45° be allowed, we have an apparent stratigraphical thickness of something like 11,100. This section was examined independently by both Mr. Willson and Mr. Foot, and the rocks appear at the surface in bold and continuous

* See Mr. O'Kelly's statement as to the observed thickness of a portion of the lower and middle Old Red sandstone in explanation of Sheet 184.

masses. In the rocky valley of the Roughty river and at the southern extremity of this section, the Old Red sandstones have been subjected to an enormous amount of sudden and sharp contortions. This may be observed in the cliffs along the road which skirts the river from Inch bridge to the mouth of the Thureehouma stream, the beds throughout consisting mostly of thick purple grits and slates, with occasional green and greenish gray beds.

At the extreme western extension of Killeen mountain, and at the eastern side of the entrance to Glen Flesk, the beds are all for the most part greenish gray grits and thin slates. They dip as a mass to the S., but are much contorted, and also believed to be as a mass inverted.

On the opposite or western side of Glen Flesk the beds of Old Red which appear over the rugged slopes of Crohane mountain on its N.E. flanks, dip also for the most part to the southwards (see fig. 3), so that the contortion just alluded to is not local, but part of a great inversion of the beds of the Old Red,

Fig. 3.

Entrance to Glen Flesk, looking East, showing contorted and inverted beds of Old Red sandstone.

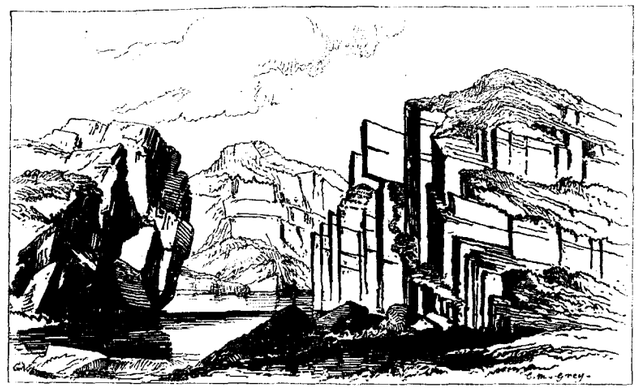
which may be observed for many miles in an E. and W. direction along the N. flanks of the mountains which extend from Mill-street to Torc mountain. That what is here stated must be true is evident from the fact that close to the northern base of the range of hills just indicated, the Carboniferous limestone, with its overlying Coal Measures, appear in the flats either vertical or dipping south, and so near to the Old Red rocks as to preclude the possibility of their occurrence in that position, except on the hypothesis of a great inversion.

In the mountainous district which occupies the S.W. corner of Sheet 185, at the head of the Roughty river, and in that portion of the adjoining county of Cork which includes the district around Ballyfinnane bridge, and the hills of Failanumera and Mweelin, there are many lengthy and well exposed sections through the Old Red sandstone ; none, however, are so unbroken and well exposed as those before alluded to, the rocks there being generally more contorted and otherwise disturbed than in the district to the N. ; their lithological character is the same as before, and cornstone bands are still observed here and there through them. As we approach the eastern and S. eastern side of the map, the sandstones become more purple, and the purple slate beds are more numerous amongst them.

In the section through the beds afforded by the river Foherish, above Carrigaphooka bridge, the beds were observed to be cut up by very regular N. and S. joints, which give the rock a rude columnar look. (See Fig. 4.)

This illustration is also of interest as showing the amount of denudation caused simply by the erosive action of the river on massive beds of hard sandstone.

Fig. 4.



Old Red sandstone rocks on the River Foherish, above Carrigaphooka Bridge. The vertical lines are the joints, the beds dipping at a low angle towards the right hand of the spectator.

In the eastern map, No. 186, there are several lengthy and continuous sections in the middle portion of the Old Red Sandstone; one of the best is that which occurs along the ridge of ground extending southwards from Knockrour house on the north to near the farm-houses south of the point marked 710 (W.S.W. of Aghabulloge Church), through the townland of Knockrour, and along its eastern boundary into the townland of Leckaneen. For the distance of one mile and a half the rocks are chiefly purple grits and slates, with an occasional bed of green slate; the dip is to all appearance steady to the S., and varying from 60° to 40°, and at the southern extremity as low as 5°, the central portion of the section not being so well exposed as at the extremities.

Along the left bank of the Dripsey river, between Beechmount, on the N., and where it joins the river Sullan, near Inishleena Abbey, on the S., there is an instructive section through the middle and upper portions of the Old Red sandstone. It is not easy to determine the correct stratigraphical thickness here obtained, as in the upper part of the section the beds are repeatedly rolled over, and thus the section is superficially lengthened without its absolute thickness being increased. Purple grits and slates constitute the main mass of the rocks. The Lyardaun stream, which forms the boundary between the parishes of Donaghmore and Grenagh, affords a tolerably good section, through a portion of the middle Old Red beds; for the southern half of its course, these are almost all dark purplish red grits and slates, with here and there beds of green grit and slates between them. At the northern end of the section in the townland of Courtbrack, the dip is to the S. at 50° for the distance of about 500 yards; after this the central portion of the section is made up, apparently, of massive beds of red slate, cleaved either vertically in an E. and W. direction, or the cleavage plane dipping to the S. at 80°. At the southern end of the section the beds dip to the westwards at 60°, the strike of the cleavage being E. 15°, N. vertical. In that portion of the Shournagh river which runs N.W. from below the elevation marked 387 to Ballycraheen bridge, where it receives the Lyardaun stream, a broken section may be observed in beds quite similar in every respect to those we have just described, these dip to the northwards and southwards at various angles, and, if prolonged, would be found to be the same beds as those which appeared at the southern end of the Lyardaun stream.

A tolerably good and continuous section, through the Old Red rocks may be observed in the cuttings of the Great Southern and Western Railway and the banks of the River Martin. Commencing at the north, the first cutting on the railway, in the townlands of Ballygrogan and Rathduff, exposes at first purple grits and slates dipping to the N.E., rapidly curving round to the S.E. at high angles; these beds are then cut off by a fault, which has a direction of N.E. and S.W. and is inclined at an angle of 30° to the N.W., towards which point of the compass it causes a downthrow of the beds first observed. On the opposite or southern side of the fault, the edges of hard green grits, with purple beds and slate layers are presented at an angle of 60° to the N.E. against the surface of the beds first noticed. From this point, as we follow the greenish gray grit series southerly, they are much contorted, rolling in greater or lesser curves to the N.E. and S.E. at angles varying from 45° to 70°, and disappearing at the distance of 550 yards from the fault. As we proceed south along the river we find a short section in the road which passes at the west side of the stream, in the townlands of Grenagh South and Ballyfireen. The rocks here consist of alternations of thin bedded gray grits and shales, with narrow bands of purple slate, the dip of all being to the S. at 45° to 50°. At the south-east corner of the townland of Ballyfireen the dark purple slate-beds, which are associated with greenish grits and sandstones, are cleaved vertically; here also the dip is to the S. In the adjoining townland of Ballyvaloon, and in that to the S. of it, the road and stream expose beds of hard gray and greenish sandstones and slates, with dark red or liver-coloured slate-beds, the more earthy layers, whether green or purple, being cleaved in an E. and W. direction vertically. The road now crosses the stream close to Birchhill Cottage, and runs along its eastern bank, for the distance of about two miles, affording a tolerably continuous section through the Old Red sandstone; the railway also, which runs along the brow of the high ground skirting the river on the east, exposes the sandstones in two short cuttings, thus filling up the gaps in the section afforded by the road and river. The rocks are red and yellowish green grits and slates, with dark purple slate beds mostly slates. The dip is invariably to the S. at from 35° to 65°; so that as we proceed southwards we, of course, pass on to beds which are higher and higher in the series. As these are reached we find that they become more and more red, and the green beds of less frequent occurrence amongst them. A tolerably good section, through these red beds, is to be seen on the road-side, west of the river and below Putland's bridge, and at the southern extremity of the townland of Knocknasuf, where the dip is again to the S. at angles varying from 15° to 65°. These beds pass up into the upper Old Red series, which consist of hard greenish brown and yellow grits, with gray, greenish, and purple slates and shales.

The Cork and Youghal Anticlinal.—The ridge of the Youghal anticlinal affords here and there some good sections through the Old Red beds.

The most easterly of these sections occurs on either bank of the Shournagh river, between Tower bridge and Leemount, the beds being chiefly red sandstones and shales, dipping to the N. and S. at various angles.

On either bank of the river Lee, to the west of Church hill, beds like those last described come to the surface, forming rocky bosses, and similar exposures in the Old Red sandstone occur all along the banks of the river to Rooves bridge, south of Coachford.

To the N. and S. of Carrigadrohid, and midway between that place and Macroom, the rocks are often exposed in large bosses and short detached sections; they are invariably much contorted and crumpled into long undulating rolls, by which means the same beds are brought again and again to the surface; a thickness of a few hundreds of feet of rock being thus made

to cover a large extent of surface. The chief localities where these contortions occur, and can be most readily observed, are at Mashanaglass wood, east of Macroom; on the rocky ground to the north of Oak Grove; near Carrigadroghid; the immediate neighbourhood of Lehenagh House; and between that place and the river Buingea. Speaking generally, for a distance of about ten miles along this part of the Youghal anticlinal, from the part where it is cut through by the Blarney to the S.W. corner of sheet 186, the rocks are regularly folded, so as to be inclined to the N.N.W. and S.S.E., the direction of their strike being thus parallel with the axis of the anticlinal.

There are few districts in the county Cork where contorted rocks can be better seen than in that which lies to the west of Macroom and to the south of Ballyvourney.

On the hilly ground, north of the river Douglass, the contortions of large rock masses is remarkably well seen at the following localities, viz., the rugged country south of the end of the Bardinch river, where it joins the river Sullane; along the eastern limits of the townland of Derreenaculling; in the northern part of the townland to the south of this called Derree; in the northern portion of the adjoining townland of Gortnascarty; and along the farm road which crosses the middle of the neighbouring townland of Rath East; the rocky portion of the district cut through by the Sullane river; at the distance of over a mile to the S.E. of the village of Ballymakeary; the hilly ground in the southern portion of the townland of Coolavokig, through which the main road from Macroom to Ballyvourney passes; and the hill to the south of this, which bounds the alluvial flat of the Sullane, at the west of Sullane bridge; in the southern end of the townland of Carrignamaddry, traversed by the main road from Macroom to Ballyvourney; and, lastly, as we approach Macroom, in the rocky ground which lies to the north of Carrigaphooka bridge, along the western bank of the Foherish river.

At the north-western margin of the limestone valley of Anahalla, or, as it appears on the one-inch map, the Boggy flats of the Toon river, there are several continuous sections exposed of the Old Red sandstone; the most westerly of these occurs in the southern end of the townlands of Kylefinchin, and extends into the adjoining townland on the S. called Knockroe, the dip of all the beds being to the S. at from 10° to 60°, and as they are followed down the slope of the hill towards the alluvial land, they become horizontal at one place, and eventually are curved, so as to be inclined to the eastwards, at an average dip of 20°; these beds can be followed easterly into the southern extremity of the adjoining townland of Dromreague, where they dip to the S.S.E. at from 30° to 45°, and so pass under the limestones of the valley, at the southern base of the hill. The most continuous section, however, through those beds, is that which occurs principally in the townland of Dundareirke, to the westwards of Kilnamartery Church; the total length of the exposed section, from N. to S. is 1,000 yards, and the dip throughout is steady to the S.S.E. at 50°; we have here, therefore, a stratigraphical thickness of rock of 2,280 feet.

Upper Old Red Sandstone (*"The Yellow Sandstone"*).—In every instance where the Old Red sandstones approach to the Carboniferous shales or limestones a slight gradual change in the lithological character of the strata may be observed; evenly bedded, thin, hard, green or greenish gray, or brown grit, with yellowish, brown, or greenish shales and slates, interstratified with occasional beds of bright liver-coloured purple sandstone and shale or slate, begin to make their appearance. The division, however, between this group and the main mass of the Old Red sandstone is entirely an arbitrary one, and the line of boundary is introduced on the maps solely as a guide to the colourer.

The Blarney and Anahalla Synclinal.—The Upper Old Red beds which surround the basin of Carboniferous rocks in the Valley of Anahalla, to the S. of Macroom, are but very imperfectly seen, in the N.E. corner of the townland of Dromkeen, and in the northern portion of the adjoining townland of Inchisine, on the south side of the basin. In the former locality an old quarry on the road side, exposes purple and brownish red slates, with occasional beds of hard quartzose brownish red sandstones, the beds appearing to be vertical. In the centre of the quarry are layers of light yellowish green felspathic and glossy shale, resembling the well-known "Kiltorkan" shale from the county Kilkenny, which contains impressions of ferns. Dark purple red slates appear on the road side to the east of these beds, the apparent dip of which is to the northwards at 75°.

The beds which form the upper subdivision of the Old Red can be tolerably well seen in the eastern part of Nettleville Demesne, W. of Coachford, where they dip towards each other from both N. and S. at from 40° to 50°, and thus form the W. termination of the Coachford part of this synclinal. Some of the same beds, followed in their line of strike, may be observed on the farm-road leading past Clontead House, E. of Coachford, and again at Dripsey. Over the rocky ground to the S. of the village, above the road to Cork, on the opposite side of the synclinal at Riversdale, hard red or liver-coloured slates and slaty sandstones appear, dipping northwards from 60° to 80°, the exposed section being, however, very imperfect. To the east of Dripsey, as the beds are followed in their line of strike, they become well exposed in the glen, N. of Dripsey Lodge; they consist of red and green slates and grits, which, though contorted, yet, as a mass, are formed into a synclinal curve. The same beds appear close to Dripsey Lodge. Similar beds to those last described appear on the N. and S. sides of the flats of Ardrum, and dipping so as to form the continuation of the Coachford synclinal. South of Tower village, on the E. bank of the Shournagh river, green, greenish gray, and yellowish gray grits and slates appear, dipping north at 75°, thus forming part of the southern side of the Blarney synclinal.

In the neighbourhood of Blarney the Upper Old Red appears in many places the most westerly being on the road at Stains, N. of Willison's bridge, where greenish gray grits and red slates come to the surface. The fault which is supposed to traverse the western end of the Blarney synclinal in a N.N.E. direction, passing close to the W. side of Blarney lake, probably cuts off those beds in the extension to the east. Beds similar in aspect to these, however, appear on the road side in Monacnapa wood, near the branch road to Killowen, and again at the distance of a few perches further N. at the sudden turn in the same road, the dip appearing to be to the S. In the glen of the river Martin, north of Blarney, a tolerably good section through these beds is obtained; it exposes brown and yellow grit and slates, hard greenish grit, dark brownish gray grits, and gray slates, and at the base of the section bands of gray rotten stone and red shale, the dip throughout being to the southwards at from 15° to 75°. The section, which is singularly free from purple beds, measures close on half a-mile from N. to S.; and, if we suppose the average dip of the beds to be only 35°, we have an aggregate thickness of something about 740 feet; it is possible, however, that this is not the absolute total thickness here of this upper part of the Old Red sandstone, for some yellow grits and greenish gray gritty slates, beds which, from their appearance, should be included in this group, occur to the eastward of the section in such a position as to indicate that, if prolonged in their strike, they would be above all the beds included in the section just alluded to, and would add 200 feet, at least, to its thickness.

The Cork and Castlemartyr Synclinal.—The Upper Old Red beds which bound this synclinal on the N. and S. are the same beds as those we have been describing. They may be best seen along the bank of the river Lee, opposite to Prospect Hill, and to the N. of Gawsworth. Here red shale and sandstones with hard green grits appear in masses projecting above the

soil, the beds, though rolling, having a general tendency to dip to the S. If we attempt to follow these beds westerly from this locality, we find that the Yellow Sandstone appears here and there in detached masses along the north side of the river Lee; first near the Farm House in the townland of Lackenshoneen, where they are represented by red slate; again in the S.W. angle of this townland, on the brink of the river, where green grits and red slates appear, and to the W. of this in the adjoining townland of Coolyduff, where red slates appear on the road-side. In the adjoining townland of Garravagh red slates and sandy shales, with occasional greenish grits and greenish brown shales, represent these rocks. The same beds are now traceable westerly across the river Lee into the townland of Curraghbeg.

In the neighbourhood of Springmount, one mile N.W. of the Ovens, and between that place and Mullaghroe House, these beds appear here and there over the surface, and are slightly cut into by the old road which passes westerly from Ovens. Here, in the townland of Lackenareague, some dips were obtained in them, which show that they are inclined to the southwards at from 45° to 70°. Westwards from this, for the distance of two miles, there is scarcely a bed of this group of rock seen, with the exception of some, which appear in the parish boundary in the southern end of the townlands of Clashanure and Ballineadig, where red slates and sandstones, dipping to the N. at 85° and to the S. at 75°, appear above the ground. The same or similar beds are tolerably well exposed on the road-side and in the plantations close to and W. of Currahaly cross-roads. Here we find red and green grits and slates rolling to the N. and S. at angles varying from 35° to 75°, being sometimes vertical. The apparent thickness of these beds at this locality is very trifling as compared to that which they exhibited directly to the N. of Blarney. From Currahaly cross-roads to where this band of Yellow Sandstone passes out of the map, the rocks are completely concealed by the drift, and the geological boundary drawn from inference and the form of the ground.

On the south side of this synclinal the band of Upper Old Red, or "Yellow Sandstone," is tolerably well defined, the rocks appearing in various small stream courses and road-cuttings which lead from the high ground just out of the limits of the map into the Ballincollig Valley.

Yellowish gray grits and shales, nearly vertical, may be seen on the road-side between Ballinaspig Cottage and Curraheen. Red slates occur by the side of the Mill-race leading to Curraheen Corn Mill.

Beds of the same group appear still further to the W. in the townland of Ballynora, consisting of gray, red, and yellow slates, and thin grits, the dip of which, when seen in the bye-road S. of Maglin Bridge, is to the N., but the angle of inclination not stated. As we follow these beds in their line of strike westerly some of them again appear in the stream forming the boundary between the townlands of Grange and Kilnaglory, which is also a parish boundary. They consist of a few beds of yellow coloured sandstone and slate, which have a dip to the S. of 65°. We have here indications of a small anticlinal, which extends in an E. and W. direction for about a mile and a-half. This is proved by the examination of similar beds to those last observed, where they occur near Killumney, on the E. side of the stream-course bounding the townland of Grange on the W., also a parish boundary. Here at the south end of the section the beds dip to the N., at from 55° to 75°, but in a short distance they are inclined to the southwards at 70°. The same contortion is observed in the adjoining stream-course still more to the W., forming the boundary between the townlands of Killumney and Ballygroman, Lower, where yellow gray and red slates and thin grits all dip to the southwards, or away from the Carboniferous rocks which appear close to them lower down the stream. The Upper Old Red Sandstone once more appears still further to the W. at the end of the stream-course forming the boundary between the townlands of Ballygroman Lower, and Knockaneamealgulla, just above the road. The beds, which consist of red and yellow slate and sandstone, dip to the northwards at 80°.

Lower Limestone Shale of the Blarney and Anahalla Synclinal.—In the Anahalla district these rocks do not in any place appear at the surface, and they have been introduced on the map on purely theoretical grounds.

They occur in the Coachford basin, which is a continuation to the east of that forming the Valley of Anahalla, and, therefore, though the two troughs are separated by a space of nearly six miles, which is occupied by Old Red Sandstone, the beds which rest in them immediately above the Old Red are doubtless alike.

The Lower Limestone shale of the Coachford basin appears on the banks and in the bed of the River Lee, close to Leemount House. It consists, in the lowermost part, of gray and greenish ripple-marked sandstones, with some micaceous grits and blackish gray shales; these pass up into blackish gray thin shales and grits containing fossils; and in the bed of the river thin gray limestones are said to have been raised. All these beds dip to the S. at angles from 30° to 60°. The continuation of these shales for the distance of two miles and a-quarter to the eastward of Leemount is determined partly by the dip of certain Upper Old Red beds in the neighbourhood of Clonteal House and Oldtown House, on each side of the valley, and the occurrence of dark gray crinoidal slates and gray and greenish brown grits which appear on the roadside below Ellen Ville, dipping S. from 45° to 60°, and on the opposite side of the glen in the townland of Fergus, along the side of the road to Oldtown House.

To the east of Leemount House, adjoining the boundary of the townlands of Knockancowen and Nadrid, and between it and the road leading S. from Coachford, are several large conical pits, some of them twenty to thirty feet in depth, which Mr. Wyley, with every probability, supposes to have been formed by the sinking of the ground into caves in the subjacent limestone,* the roofs of which were broken through by the superincumbent weight of gravel and clay; he has, accordingly, introduced that rock into the map at this locality. No trials for limestone, have ever, so far as I am aware of, been made either in these pits or their neighbourhood, though it is very likely that this rock would be found there if the drift were to be sank through, though it is hardly likely that it could be worked with profit.

The Lower Limestone shale which occupies the flats of Ardrum, between Coachford and Blarney, is precisely similar in lithological character to that last described. It is very imperfectly seen in this basin, the best exposure of it being on its northern side in the lower part of the stream which runs through the old Deer Park of Ardrum. The rocks here consist of dark gray and dark brownish gray slates and grits, dipping to the S. at 70°, above which are bluish gray slates and hard grits, nearly vertical; and the section terminates with dark gray slates and brown grits and yellowish and gray slates. The superficial exposure of these beds is about 500 feet across, and their possible stratigraphical thickness about 450 feet. To the east of Ardrum House, near the R. C. Chapel in the townland of Currabeha, dark gray and gray grits and sandy shales appear at either side of the River Gearagh. Those on the N., in the ground of Inchbeg House, dip to the southwards at 55°, and to the opposite direction on the other side of the valley, where they appear on the roadside above the Chapel, a few beds only being seen at either locality.

The Lower Limestone shale which occurs in the Blarney basin to the W. of the fault appears in the small plantations on the bank of the Shanruagh River in the townland of Bawnnafinny; and from the fact of these beds

* See Explanation of Sheet 184, page 35.

not being prolonged in their line of strike into the Demesne of Blarney, on the north of the Lake, which is entirely occupied by limestone, the N. and S. fault, as defined on the map, has been determined by Mr. Wyley.

On the north of the village of Blarney the Lower Limestone shale appears in road-cuttings at either side of the mouth of the glen of the Martin River. It consists of gray and yellowish brown slates and grits, which dip southwards at 75°. To the east of this locality greenish gray gritty slate and yellowish grits occur on the roadside in the N.E. corner of the townland of Shean Lower, also dipping to the southwards; and further to the east, close to the very edge of the map, in the S.W. corner of the townland of Clogheen, a few beds of coarse gray grits and sandy shales appear dipping to the S. at 75°.

On the opposite side of the glen of the Blarney River, to the E. of Starch Hill, as the ground rises from the alluvial flats, the Lower Limestone shale again appears. It consists of dark blue and gray shales, which frequently contain crinoid fragments and thin gray calcareous layers, as well as thick ripple-marked grits. These beds being on the south side of the synclinal dip to the N.W.W. at 60°. From this point westerly for the distance of a mile and a-half past Blarney Lake, these beds are concealed, but their position as indicated on the map, is evidenced by the presence of the Upper Old Red Sandstone on one side and the Lower Limestone on the other.

Lower Limestone Shale of the Cork and Castlemartyr Synclinal.—The Lower Limestone shale which skirts the southern side of the Ballincollig basin, is not, so far as I am aware, seen anywhere over the space which it is supposed to occupy on the map. As it appears, however, on the northern side of the synclinal, it must be present on the southern. Where these beds show most on the north side of the valley is in the neighbourhood of Surmount, to the north of Ovens, along the bye-road which leads from Springmount to Surmount and Ovens. The exposed section here consists of smooth gray shale with thin bands of red slate, thin brown grits and gray shales, greenish and gray shale with micaceous grits. In a band of smooth gray shale which appears crossing the bye-road at the distance of 500 feet southwards of Surmount, numerous, though badly preserved, plant impressions are to be found. The general dip of these beds is to the southward at from 50° to 85°.

To the east of Surmount dark gray and brown fossiliferous and calcareous shales and sandy grits appear here and there in lane and ditch-cuttings, and around the summit of the rise of ground marked 436 feet on the map, as far as the right bank of the River Lee below Bunbreeda.

As we proceed from this place southwards to the N. bank of the River Bride, we soon lose these gray slates, and get on a series of red and purple slates, with greenish gray grits, which may be some of the Upper Old Red beds bulged up in the centre of the band of Lower Limestone shale we are describing. This, however, has not been indicated on the map, as it is a doubtful point.

On the S. bank of the River Bride, below Classes House, and in the plantations which skirt the River Lee from that place to the Ballincollig road, we find blackish gray slate and dark gray and brown ripple-marked gritty flags, the latter often conglomeritic; and at Classes House are gray grits, slates, and shales, all the beds being characteristic of the group to which they belong. The general dip is to the northwards, along the bank of the Lee; but the beds curve back below Classes House, and thus dip beneath the limestone of the Ballincollig Valley.

The extension, as shown on the map, of the Lower Limestone shale to the E. and W. from the neighbourhood which I have just alluded to, is entirely theoretical, and determined by the evidence afforded by the Upper Old Red beds on one side, which form a feature in the ground, and the limestones on the other, which are found here and there in the valley E. of Ballincollig, or between Ovens and Killrea.

d°. *Lower Limestone of the Cork and Castlemartyr Synclinal.*—The Lower Limestone, which occupies the valley of Ballincollig, appears in many places both as bosses of rock, and in quarries near Carrigrohane, to the E. of Ballincollig, on the S. bank of the Lee, this rock appears in high cliffs, and is described by Mr. Willson as "gray compact limestone, with nearly vertical parallel planes striking E. and W. like bedding." In the midst of these are brown shaly beds, to which a dip of 65° N. has been given. Further to the W. near Leebank, there are thin laminated argillaceous shales, with gray compact limestones, all dipping to the N. at 70°, as an average. Some of the lower beds in the section being described as "bluish gray, compact, and massive." The dip assigned to these beds is to the N., a direction the opposite to that in which we should have expected them to incline, as it is towards the boundary which is not far from them, but in beds so highly inclined and greatly contorted the mere local dips are not of much consequence.

In the flats to the S. of Ballincollig village the limestone appears in many places, occurring as large escarped bosses like that on which the old castle of Ballincollig has been built, or in quarries. On the road side near West village, it is described as "gray and compact, divided by parallel planes like that of Carrigrohane Castle, looking very like beds, but probably joints or cleavage." In the southern portion of the townland of Ballincollig it is bluish gray and flaky, much jointed, and the bedding not discernible.

In the adjoining townland of Maglin, the rock is gray, flaggy, and brownish, and at the western corner of the townland is supposed to dip to the N., though the amount of the angle is not stated. This is very likely its true inclination here, as the upper Old Red beds come to the surface at a short distance to the S. On the road-side near Maglin bridge light gray flaggy limestone, crystalline in parts and flaky, appears in a quarry adjoining Carriganara cottage on the S. and in the same townland, that of Carrigrohane, is another quarry in the south central part of the townland, adjoining the townland of Curraheen. Between West village and Ovens, the lower limestone has been extensively quarried in the lands on the N. and S. side of the main road from Ballincollig; the rock is described as bluish gray, light, and sometimes dark in colour, compact, and with a flaky structure. At West village the dip is stated to be 85° N. and 80° S. These same beds, in their extension to the W., have been extensively worked in the townland of Ulasses, where the beds are, for the most part, vertical, with a strike of E. 10° to 15° N. The same rocks are well exposed in the bank over the river Bride, between Carrigane Church and Ovens. A few quarries of Limestone have been opened in the townland of Lisheens, between Lisheens House and the old Church of Kilnaglory.

In the lower part of the stream course which divides the townlands of Ballygroman Lower and Killumney, which is also a parish boundary, Mr. Willson describes "siliceous limestone decomposing into yellow clay and rotten stone, not unlike the Rostellan silex, except in colour." These beds are the lowest exposed of the series and are only removed from the yellow and gray slates of the Lower Limestone shale by a space of 100 yards. There is no dip given to them; they are overlaid by a gray, compact limestone which is exposed for the distance of 225 yards, no dip being discernible in it. As these layers occur on the south side of the synclinal, they, doubtless are inclined to the northwards, possibly at high angles.

To the S. of Kilcrea House, and on the E. side of the road which crosses the flats of the river Bride from Currahaly cross roads, and just out of the limit of the map a large quarry has been opened in the lower limestone, the rock being light gray, compact, or slightly crystalline, very solid and massive, and not exhibiting bedding. In the drift at this locality, Mr. Wyley detected small boulders of ironstone.

Lower Limestone of the Blarney and Anahalla Synclinal.—The Lower Limestone of the Blarney Valley is quite the same in lithological character

and mode of occurrence as that of the Ballincollig basin; it is pale gray, compact, and flaky; this structure appears to be the result either of a delicate cleavage or else a fine lamination, of which the planes have a direction of E. 10° to 15° N. inclined sometimes 10° to the southwards. The rock appears all through the demesne attached to Blarney Castle, as in a few quarries on the N. side of Starch Hill, on the E. of the demesne.

The limestone in the Anahalla Valley, which is extensively quarried for burning, is a pale gray compact rock, cleaved vertically in E. and W. planes, no bedding being discernible in it. Fossils are of rare occurrence, and these chiefly fragments of Encrinites.

Felstone Ash.—In the account already published of the trap rocks of the adjoining district to the W., in Sheet 184, Crohane Mountain was the last locality named as the place where the felspathic ash beds of Cappagh were again well developed, and here I shall resume the account of these rocks.

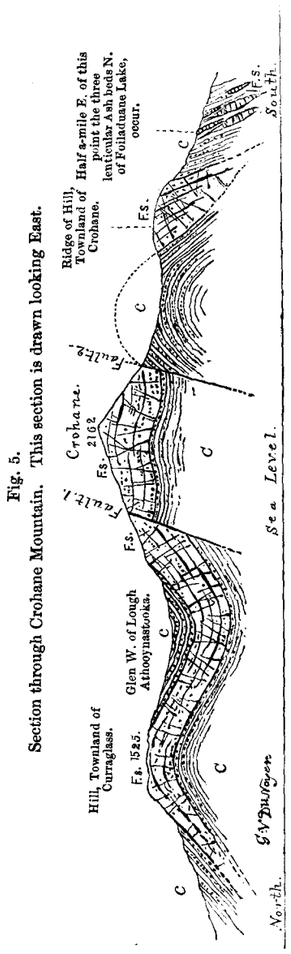


Fig. 5.
Section through Crohane Mountain. This section is drawn looking East.

The summit and main mass of Crohane Mountain is formed by the thick bed of greenish-gray or apple-green siliceo-felspathic ash. If we cross this ash in a southerly direction from the summit of the mountain, we find that at the distance of 200 yards we suddenly lose it, and come on a series of dark liver-coloured or purple obliquely laminated grits, and purple slate bands, which dip at the ash, or to the N. at 60°, thus indicating the presence of a fault. These grit beds as they are followed in their line of strike to the east, are observed to curve rapidly round so as to dip E. at from 20° to 30°, and they can then be traced sweeping round to the S.S.E. at 40°, thus forming an anticlinal curve, the axis of which runs nearly E. and W., but is inclined to the E., so that the beds curving over it are also inclined at an angle of 20° to the E. It is clear that as the ash bed which forms the summit of Crohane rests conformably on the grit and slates just described, that it ought to be found following their line of strike as they curve to the E. and S.E. This is not the case, and, consequently, the existence of the fault previously alluded to, about 250 yards S. of the summit of the hill, producing a downthrow of the ash to the N. as shown in the section, *Fig. 5, Fault No. 2*, is apparent to any geologist visiting the ground. The amount of displacement caused by this fault is probably about 300 feet.

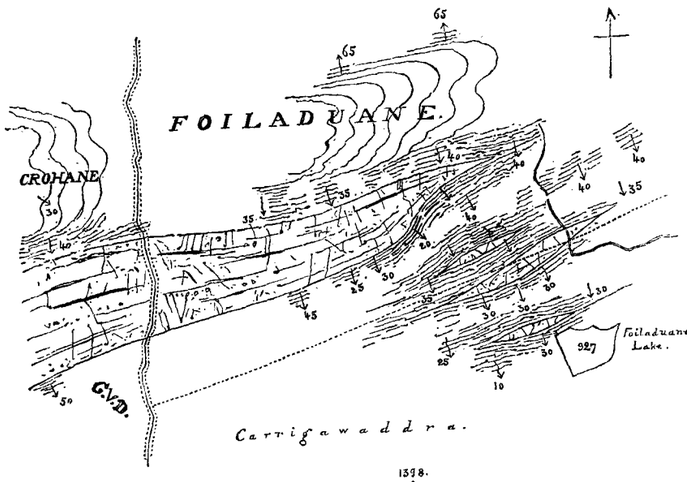
On the S. side of the tilted anticlinal, in the underlying Old Red beds, at a minimum distance of 350 yards from the fault, the ash bed is again observed exposed superficially for the distance of

225 yards, and measuring about 500 feet in thickness, being then concealed by the overlying sandstones. This is the southern and final extension in that direction of the Crohane ash bed.

This portion of the Crohane ash is very well exposed throughout its entire extent, forming a well-marked rugged ridge, terminating midway in a bold precipice on the western side of the small glen, through which the stream dividing the lands of Crohane and Foiladuane runs, and at the distance of half a mile W. of Foiladuane Lake. (See the Sketch Map, Fig. 6.)

At the distance of 325 yards N. of the summit of Crohane, the ash bed is again faulted, the direction of the dislocation being nearly N.W. and S.E. (see fault No. 1, Fig. 5), and it forms a well-marked feature in the landscape (see Explanation of Sheet 184, Fig. 11, p. 31, dotted line below summit of Crohane Mountain). This, like the former fault, is a downthrow to the N., the amount of displacement being greater than the former, and probably about 400 feet; and the result produced is, to lessen the superficial width of the ash very considerably, and allow of the overlying Old Red beds to come to the surface and abut against the main mass of the ash. These beds may be observed at the head of the small stream which runs down the north-western flank of the hill to the entrance of the Nabroda Valley.

Fig. 6.



The fine continuous parallel lines represent the beds of Old Red Sandstone, the felstone ash being indicated by wider lines with cross lines and dots. The arrows indicate the dip of the beds.

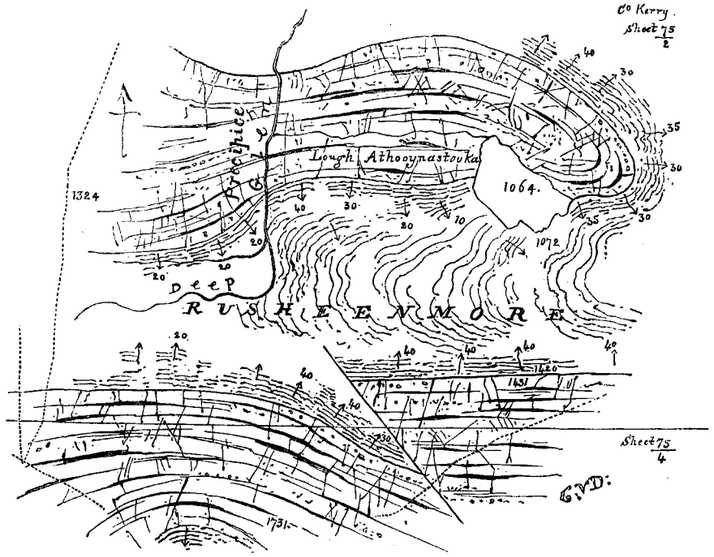
The upper surface of the ash is here pale greenish gray, nodular and pisolitic. The nodules being formed of a thick outer crust of siliceous-looking greenish gray felspar, enclosing a nucleus of quartz, which is semi-transparent and often crystallized on the surface of the cavity. The pea-like nodules more nearly resemble semi-transparent quartz enclosed in a matrix of whitish and sometimes soft felspar.

On the E., or downthrow side of the fault No. 1, the main ash bed curves

round to the eastward, forming the crest of the mountain for the distance of about one mile and a quarter, when it becomes concealed by the overlying sandstones. Between this point and the fault last noticed the continuity of the ash is broken by a third fault, which has a direction of about N.W. and S.E., the downthrow being on the S.W. side. The existence of this fault is readily proved by an examination of the S. side of the small but deep glen which lies to the W. of Lough Athooynastooka, where, over its S.E. corner, the red sandstones are seen dipping to the N.E. at 40°, and then abutting against a wall of ash which faces the S.W. (See Map, Fig. 7.)

The remainder of the main ash bed, towards Glenflesk, is clearly defined. On the northern side of the ash the sandstone dips to the north at 40°. At its eastern end, where it becomes narrow, the dip is to the eastwards at 15°, and along the southern side the dip is to the S.S.E. at 40°, where both ash and gritty sandstones are cleaved in the direction of E. 20° N., the planes of cleavage being inclined 55° to the southwards. Along its northern boundary the ash is nodular, and pisolitic—a structure which is clearly local, for along the opposite boundary it is sandy in texture and cleaved into rough slates.

Fig. 7.



Scale—6 inches to 1 mile.

The different rocks are represented as in Fig. 6.

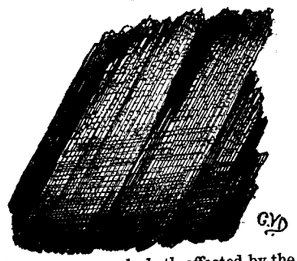
As the sandstones which overlie the ash on the northern flanks of the crest of the mountain, are followed northwards down the hill, they are rapidly bent into a synclinal curve, by which means the underlying ash is again brought to the surface, and forms a large outlier of that rock on the northern flank of the mountain, similar in position, though not in mode of occurrence, to the southern extension of the ash bed, west of Foiladuane Lough (see section, fig. 5, Hill W. of Curraglass, and plan, fig. 7). This northern outlier from the main ash measures in superficial extent over one mile from E. to W., with a width varying from 250 to 450 yards: its outline is well

marked, and nearly midway it is traversed by a deep glen, which receives the drainage of part of the northern slopes of the central portion of the mountain and that of Lough Athooynastooka (see plan, fig. 7). On the western side of this glen the ash is well exposed in a bold precipice. The overlying sandstones, which appear on the southern side of this glen, and between it and the Lough just named, all dip to the southward at angles from 10° to 40°, and are well exposed.

The northern shores of the small Lake of Athooynastooka are formed out of this ash, while the southern consist of the overlying Red sandstone, which dip to the S.E. at an average angle of 35° (see plan, fig. 7). At the distance of about 150 yards to the E. of this Lough the ash disappears beneath the Red sandstone, which dips to the E. at from 30° to 40°, and soon are observed to curve round so as to be inclined to the N.E. at 40°. From this point the outline of the ash along its northern boundary is determined by the form of the ground, the rock being quite concealed by a thick covering of local drift. In the southern end of the townland of Curraglass, as the ground rises to form the mountain, we again find the overlying sandstones in junction with the ash, both dipping to the N.W. at 40°; and at the summit above this in the western boundary of the townland, and at the point marked 1,505 feet on the six-inch map (Kerry, No. 75, second quarter), we find these same sandstone beds dipping away from the ash to the S. at 45°, the former rock having suddenly lessened the superficial width to only 75 feet or so in the distance named. If we now cross the mountain to Foiladuane Lake, we find that between it and the eastern termination of the southern outlier of the Crohane ash, there are three small lenticular beds of ash in the purple grits and slates of the Old Red sandstone: the largest is in the centre, and measures about 300 yards from E. to W. by about 100 feet in its widest part, the dip of all the ashes and sandstones being to the S.E. at from 30° to 35° (see map, fig. 6). From the mode of occurrence of these beds they clearly occupy a higher horizon than that of the great ash bed of Crohane. (See fig. 5, southern end of section).

In one locality, in Sheet 184, where it appears on the W. side of Crohane Mountain, close to the fault which extends E. and W. past the summit of the hill on the south, the base of the ash is seen to rest on a bed of purple slate, and to be of a gritty sandy texture, very largely made up of small and partially rounded crystals of felspar. The cleavage traverses both the underlying slate and the superimposed ash; and a hand specimen of both rocks, showing their junction, may be readily procured. The cleavage dips S. 25° E. at 70°, the dip of both ash and slate being to the N.E. at 10°, or horizontal.

Fig. 8.

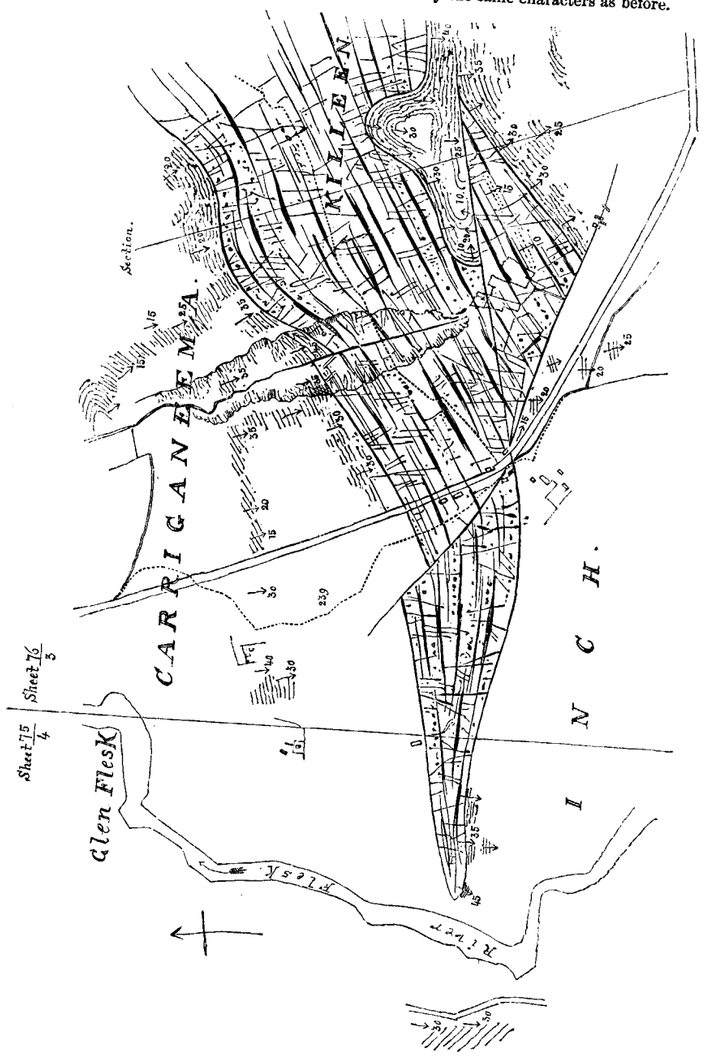


Purple slate passing up into pale gray ash, both affected by the same cleavage. Hand specimen, about nine inches thick, from the basal bed of the Crohane ash.

To the north of this the dip of both rocks is to the S.E. at 40°, and as they are followed still further to the N.E. or higher up the side of the mountain

Fig. 9.

Plan of the western extremity of the Clydagh Mountain and Rogers' Rock Ash bed, county Kerry. The two rocks are represented by the same characters as before.



Scale—6 inches to 1 mile.

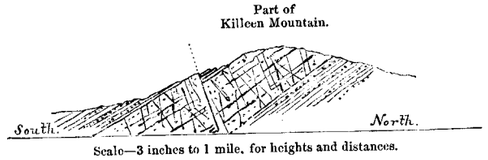
they curve round so as to dip to the E. at from 30° to 40°, in which way they are eventually brought to abut against the overlying sandstones which appear at the surface, on the N.W. side of the hill, by means of the fault marked No. 2, on the section, fig. 5, which traverses the northern side of the mountain in a N.W. and S.E. direction.

A similar bed of hard greenish gray siliceo-felspathic ash to that just described appears over the Killeen Mountain, opposite to Crohane, on the east side of Glenflesk. It first makes its appearance in the alluvial flats of the river Flesk, in the townland of Inch, rising from below a series of green and purple slates, and thin grits which dip to the S. at from 35° to 45° (See plan, fig. 9). That this ash is not the same bed as that described over Crohane is evident from the fact, that on the opposite side of the River Flesk, to where it is stated to have first come to the surface, and in what would be its line of strike, we find a series of purple and green grits and slates, all dipping to the S. at 30°; and these, if prolonged in their strike to the westwards, would come to the surface somewhere to the S. of Failaduane Lough; thus, in my opinion, the Clydagh ash, as it may be called, would be above that of Crohane, and separated from it by a thickness of at least 1,000 feet of Old Red sandstone beds.

As we follow the Clydagh ash easterly, we find that it rapidly widens from a mere point to a mass 225 yards in width, in a distance of something less than half a-mile, when it is cut off by a fault which has a W.N.W. and E.S.E. direction, causing a downthrow of the beds on its southern side. On the opposite or eastern side of the fault, more than double the width of ash first stated appears at the surface. This sudden widening of the ash has evidently enabled it to bear the wear and tear of the denuding forces, which planed down the thinner part in the alluvial flats of the river Flesk. It now presents a precipitous rugged face to the S. and W., along the line of the fault, and the sandstones are brought to abut against it in the low ground at various angles from 20° to 50°. This is very apparent to any geologist who examines the locality along the main road in the glen, between the forge and Poulgorm Bridge. The amount of displacement in the ash caused by this fault is here not very considerable, possibly about 70 or 80 feet.

The extent of the ash along the northern side of this fault is fully 650 yards: this measurement, however, will not guide us in estimating the true thickness of the bed at this locality, as the lowness of its dip (from 10° to 30°) has allowed its superficial width to be considerably increased by a small fault which strikes in an E.N.E. direction up the southern side of the hill, thus causing the ash to be spread out on the southern side of the fault, by means of a downthrow on that side (See Plan, fig. 9). The true angle of dip of the

Fig. 10.



Scale—3 inches to 1 mile, for heights and distances.

Section looking W. across the western end of the Clydagh Ash, along the straight line drawn through Killeen, in Fig. 9.

ash here, as determined by that of the over and underlying sandstones, is at a maximum only 30°; and as the total superficial width of the ash, undisturbed by any dislocation, is about 1,100, we may estimate its maximum thickness at 550 feet. As we follow the ash up the side of the mountain, in the townlands

of Killeen and Carriganeema, we find the underlying sandstones well exposed in the latter townland; they all dip to the S.E. at from 20° to 30°, gradually curving round so as to be inclined to the E. at 20°, as they are followed higher and higher up the rugged face of the mountain on its western side.

When a point marked 1,403 is reached, about 200 yards west of the summit of Killeen Mountain, the underlying grits and slates are suddenly thrown into a vertical position and strike in the direction of E. 10° N. As these beds are followed westerly they are found to terminate against a fault which strikes in the direction of about E. 10° to 20° N., from close to the summit of the hill, on its northern side down into the flats of the Flesk river. On the north side of this fault the edges of alternating beds of ash and sandstones strike against the vertical beds at angles of dip to the S.E. of from 10° to 30°; and these extend continuously from near the summit of the mountain westerly into the flats of the river Flesk. As we follow these alternating beds of ash and sandstone across their strike, or in a northerly direction from the fault against which they abut, we find that the ashy beds terminate, one after the other, on the southern side of the stream course which runs down Killeen Mountain into the flats of the river Flesk, forming the boundary between the townlands of Killeen and Coolcurtogh, the beds of sandstone and the lower beds of the ash being now bent up into a vertical position, or inclined to the S.S.E. at angles of from 75° to 85°. These beds are again cut off by a fault which runs nearly parallel to the former, and with the stream course just alluded to; and the underlying purple grits and slates of the Killeen ash bed on the N. side of this dislocation, abut against it at right angles, by dipping to the E. from 10° to 20°. It is impossible by mere words to explain clearly the nature of such geological phenomena as may be seen at the locality to which I allude, and a reference to the six-inch maps, or those which I constructed in the field, would be required for this purpose. The map on the scale of one mile to the inch is too minute to show accurately what I have attempted to explain.

The northern boundary of the ash, westerly to Rogers' Rock, is tolerably well exposed. An interesting section, through the basal portion of the deposit, is to be seen on this line at the head of the little stream which divides the townlands of Annaghmore and Coolcurtogh, where the arrow for dip to the S. at 90° is engraved on the map, the ascending section exposes, first, thin. fine-grained, greenish gray grit, followed by gray ashy slate: above this is a band of very dark purple slate, then pale gray slaty ash, and dull brownish purple slates, succeeded by pale gray slaty ash, which merges imperceptibly into the pale greenish gray, hard, siliceo-felspathic ash, which constitutes the main mass of that rock in this locality.

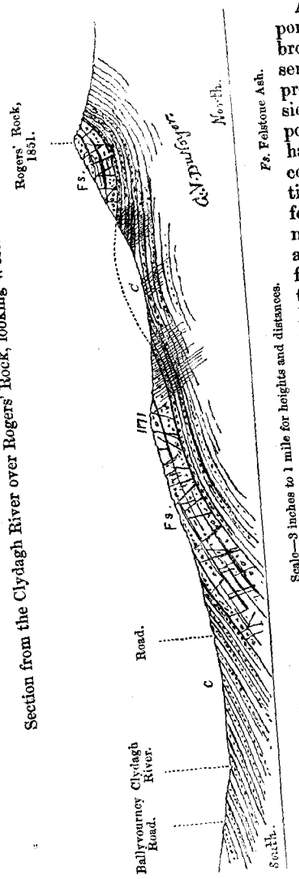
To the W. of this point, at the distance of 700 yards, the continuity of the ash is broken by a small fault, which has a direction of N.W. and S.E., producing a downthrow on its E. side, by which means the boundary of the ash is thrown to the N. for the distance of probably 150 yards.

To the E. of this, at the distance of about 400 yards, another and similar fault may be observed, which determines the extent of that portion of the ash described as having been dropped down to the N. At the summit called Rogers' Rock (1,851 feet in elevation), to the E. of the faults just described, the ash bed is escarped on the N.E., the E., and S., by which means its width is lessened to 350 yards, and the underlying purple slates and sandstones appear from below it. Near its northern boundary the ash is nodular and pisolitic, the nodules consisting of a thick outer coating of pale apple green siliceous looking felstone, containing a nucleus of quartz, which is often hollow, the internal surface of the cavity frequently exhibiting crystals of quartz, and the external coat of felstone containing partially rounded crystals of pale yellow feldspar. This structure in the ash is not perceptible near its southern boundary where it is friable, sandy, and cleaved like the

purple slate on which it rests; the dip of the cleavage which thus affects both rocks is S. 30° E. at 60°. To the S. of Rogers' Rock the brownish purple grits and purple slates which underlie the ash, appear for the distance of about 500 yards along the summit ridge of the mountain. On the southern slope of the hill the ash again makes its appearance, forming the rugged knoll to the S. of Rogers' Rock, and midway between that point and the bend in the Clydagh River, to the W. of Clydagh Lodge, marked 1171 in section, fig. 11.

Fig. 11.

Section from the Clydagh River over Rogers' Rock, looking West.



At this point the ash in its lower portion is again soft and friable, pale brown in colour, and cleaved, thus resembling the appearance which it presented at its boundary on the south side of Rogers' Rock. The central portion of the ash is exceedingly hard and compact, of a pale pink colour, and contains numerous partially-rounded crystals of pale yellow felspar. On the southern slope of the mountain to the W. of this knoll, along the E. bank of the small stream forming the boundary between the townlands of Derrymaclavlode and Killeen, the compact pink felspathic ash forms rugged precipices and exhibits a decided bedding, the planes of which are inclined to the S. at 30°. (See section fig. 11.)

On the banks of the Clydagh river, at the distance of nearly one mile W. of Clydagh Lodge, the ash, at its south-eastern extension, disappears in consequence of a fault which has a direction of N.W. and S.E. This is clearly proved by the fact that on the E. side of the fault the purple grit and slates of the Old Red sandstone strike at the mass of the ash, the beds dipping to the S.E. at 35°. The thickness of the ash at this locality, where it is traversed by the Clydagh river, has been estimated at about 575 feet, an amount which, of course, must be less than that of the downthrow of the sandstones at the fault which here cut it off.

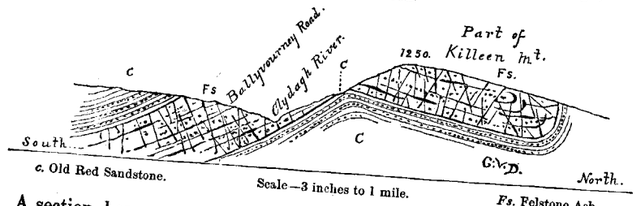
The junction between the ash and the overlying purple grits and slates is here well seen on the banks of the river, the dip of both rocks being to the S.E. at 35°. From this point the ash can be traced westerly for the distance of two miles and a-half in a gently curving line which crosses the course of the Clydagh river in two places, to the E. and W. of Clydagh bridge. At the former place the dip of the overlying sandstone is nearly S. at 20°, at the latter the angle of inclination appears to be 75°; this is, however, only a local upheaval, as the overlying beds, which appear lower down in the bed of the river, have a southerly dip of only 45°.

The manner in which the ash terminates towards the S.W., will be at once apparent by consulting the engraved sketch map, to the scale of six inches to one mile.—(See Fig. 9.)

At the distance of 300 yards, directly N.W. of the sharp turn in the river northwards from Clydagh bridge and above the group of farm-houses in the townland of Killeen, the mass of the ash bed has suffered so much from the force of denudation that I believe it is quite worn through, and the underlying purplish gray grits and slaty layers make their appearance. This conclusion is founded on the occurrence of a number of large and angular masses and blocks of sandstone at this particular locality. The section, Fig. 12, taken in a N. and S. direction across Killeen Mountain, and through this eroded spot, extending from the townland of Coolcurtogh on the north, through Killeen to Cloonkeen on the south, will more fully explain this.

Fig. 12.

Section looking W. across the Clydagh Ash, Townlands of Coolcurtogh, Killeen and Cloonkeen.



A section, however, could be drawn on the same line which would make these detached angular masses of sandstone portions of the overlying beds. To this supposition there is this objection, that it is not at all likely that the denudation which hollowed out this side of the mountain would have carried away all the overlying mass of sandstone, leaving merely this small group of blocks at this locality.

5. *Cleavage.*

All over the S.W. of Ireland in the Old Red sandstone districts the slaty cleavage is more or less well developed. It presents many interesting peculiarities, of which the following occur in this district.

In the neighbourhood of Macroom, especially along the southern margin of that district which is included in these two sheets of the map, no matter how or in what direction the grits and slate beds may be contorted, the cleavage strikes through them either E. and W., or E. 10°, 15°, or 20° N., and its dip most usually is to the southwards, sometimes at as low an angle as 55° or 60°, the average being about 75°. Sometimes the dip of the cleavage is to the northwards at from 60° to 75°, a fact which can be well observed in the green and purple gritty beds and slates which appear at either side of the road passing between Delacour Villa (on the southern margin of the map, at the S.W. corner) and the old church of Dunisky. Here the dip of the beds is to the eastwards at from 30° to 40°, the strike of the cleavage being about E. 10° to 15° N., dipping to the northwards at from 70° to 80°.

To the N.E. of this locality, at the distance of a mile and a-half, in the townland of Ballytrasna, a band of purple grits and slates, having an average width of two miles and a-half, and running from the neighbourhood of the R. C. chapel S. of Carrigadroghid, to about three-quarters of a mile S. of Warren's Grove, in a N.E. and S.W. direction, and from the neighbourhood of Delacour Villa, past Shandangan House and Old Fort, to the E. limit of

Sheets 71 and 83 of the six-inch maps, shows the dip of the cleavage steady to the northwards at angles sometimes as low as 45°,* but averaging from 60° to 80°. When it varies from this, which is very rare, it is vertical. The beds of Old Red Sandstone through which this cleavage passes dip locally to every point of the compass, and at every angle. but as a mass, they dip to the N.N.W. and S.S.E.

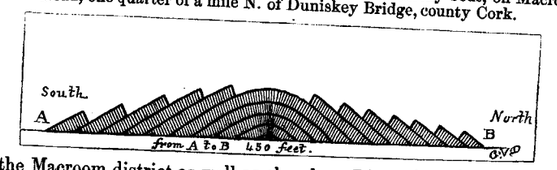
In the centre of this area of northern cleavage, however, there is a band of sandstones and slates, the cleavage in which is inclined to the S.; the extent of these beds being about two miles and a-half, with an average width of less than half a-mile, commencing on the S.W. side of Upper Forest Demesne, and ending at the distance of about a quarter of a-mile to the S.W. of Spring Hill, near Shandangan.

In no locality in the district can this northern dip of the cleavage be better seen and studied than in the townland of Dunmarklun, which lies on the W. of Warrenscourt Demesne, just out of the limits of the map, on its southern margin. Two knolls of rock, between which the mainroad runs, S. of the cross-roads on the borders of this townland and that of Teereeven, show beds of purple slates and grits, which are contorted to the W., S., and N.W., at angles of dip varying from 20° to 60°. Through all these the cleavage strikes in the direction of E. 15° N., inclined 70° to the N. To the W. of this locality beds which are rapidly curved round so as to dip from N.N.W. to W., and then to S.S.W. at 30°, are, in like manner, cleaved E. 15° N., the planes of the cleavage being inclined 65° to N. And again, still further to the W. of this spot, in the extreme N.W. corner of the townland, beds of purple and green grits, and beds and slates, which dip steadily to the S.S.E. at from 40° to 70°, are cleaved E. 15° to 20° N., the cleavage inclined 60° to the N. Between the last two localities is a mass of rock on the S. side of the road, the beds in which are contorted and rolling to the W. at from 10° to 20°, and cleaved vertically in the direction of E. 15° N.

On the road-side, one quarter of a mile N. of Dunisky Bridge, a ridge of purple and green slates and sandy beds extends in an E.N.E. direction for the distance of a quarter of a mile. All the beds are bent anticlinally, so as to dip to the N.N.E. at 30° to 40°, and to the S.S.E. at from 35° to 45°, but each in succession depressed to the E. Throughout this mass of rock a remarkable arrangement is observed in the cleavage. In the beds which dip to the northwards the strike of the cleavage nearly follows that of the beds, but its planes are inclined to the southwards; while in those which dip to the southwards, the cleavage also follows the line of strike of the beds, but is inclined to the northwards, thus showing a fan-like or radiating arrangement in its planes, as illustrated in Fig. 13.

Fig. 13.

Radiating cleavage in green, gray, and purple sandy and earthy beds, on Macroom Road, one quarter of a mile N. of Duniskey Bridge, county Cork.



In the Macroom district as well as elsewhere I have invariably found that the hardness of the bed influenced the direction of the cleavage. The softer

* This rare example of such a low dip of the cleavage to the northwards can be seen in the purple slates which appear in the small plantation on the side of the main-road and at the entrance of the carriage-drive to Old Fort House, Sheet 71.—G.V.D.

the rock the more acute the angle of cleavage with the planes of the bedding; the harder the bed the more obtuse the angle.

Fig. 14.

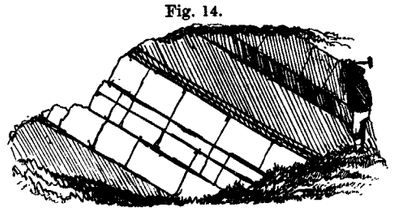


Diagram to illustrate the change in the cleavage, according to the hardness or coarseness of the rocks.

When the rock was a hard, compact, siliceous grit, the cleavage, though showing well in the argillaceous or arenaceous beds immediately above or below it, was, to all appearance, quite lost in the hard layers; or, if it had really produced any re-arrangement of the particles forming the bed, it assumed the aspect of ordinary joints, which, in this case, would probably be more numerous than if the surrounding mass of rock had not been cleaved.

6. *The Drift.*

The highest elevation at which the local drift, gravelly clay, was observed in the district is on the south-eastern slope of the summit of Mullaghanish Mount, at an elevation of about 2,050 feet. The southern slopes of Lackabaun Mount, up to an elevation of 1,500 feet, are dotted over with numerous large angular and evidently ice-borne boulders of purple grits and slates similar to the local rocks.

Numerous large angular blocks of hard green and greenish gray grits may be observed strewn over the southern slopes of the summit of Loughabooma Hill, up to a height of 1,270 feet above the sea, if not over the very summit of the hill; and large accumulations of gravel and boulders occur at elevations of 1,000 feet in the various glens and river-valleys along the northern margin of Sheet 186.

On the banks of the River Laney, around Carrigagulla Bridge, there is a great accumulation of gravel and sand, formed by the debris of local rocks, which has since been cut into by the river to the depth of twenty-eight feet in some places, and at others worn by the same means into rounded mounds. This deposit rests at an elevation of 200 feet above the sea. The head waters of this stream expose drift up to a height of close on 1,000 feet.

On the southern side of the hills, to the N. of the village of Stuack, the drift gravel and clay has been deposited in what are now the river-valleys up to an elevation of 1,060 feet, above which level the surface of the ground is thinly covered with local detritus, the result of atmospheric action on the rocks beneath. The boundary of the glacial drift over this district is defined by a contour line which seldom reaches beyond the height last mentioned. The low but well-defined hill, marked 756 feet, to the N.E. of Rich Hill (Sheet 186), is quite covered with numerous angular blocks of the local greenish gray grits and purple slates.

It is remarkable that many rocky eminences and ridges which do not reach much over 1,060 feet of elevation are quite free from the clay and gravel drift which is seen up to 2,000 feet, and over it, in the northern portion of the district. Such, for example, is the case at the Hill of Carrignaspirroge, in the extreme west of the county Cork, in Sheet 185, and to the N. of the head of the Bardinch River, the drift which I am describing occupying the valleys at either side of the ridge. Without doubt this deposit once was spread over all the rock surfaces up to even a higher elevation than it is now found at, and its present partial removal from various lower levels is due to local causes which influenced the direction and forces of the tides and currents of the glacial sea, while the land was being slowly elevated above the level of the water to that position which it at present maintains.

It has already been stated that in the drift to the S. of Kilcrea Mr. Wyley detected small boulders of ironstone.

G. V. D.

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