EXPLANATIONS

TO ACCOMPANY

SHEETS 182, 183, 190, AND PARTS OF 172 AND 191,

OF

THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING THE PART OF THE

COUNTY OF KERRY,

CONTAINING THE

PROMONTORY OF IVERAGH AND DUNKERRON.

DUBLIN:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE.
PUBLISHED BY
ALEXANDER THOM & SONS, 87 & 88, ABBEY-STREET;
HODGES, SMITH, & CO., 104, GRAFTON-STREET.

LONDON:
LONGMAN, GREEN, LONGMAN, AND ROBERTS.

1861.

THE

GEOLOGICAL SURVEY OF THE UNITED KINGDOM

IS CONDUCTED UNDER THE POWERS OF THE

8TH & 9TH VICT., CHAP. 63.—31ST JULY, 1845.

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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 182, 183, 190, AND PARTS OF 172 AND 191,

OF THE MAPS OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING A PORTION OF THE

COUNTY OF KERRY.

General Description.

The district included in these sheets belongs entirely to the county of Kerry, and forms the promontory of Iveragh and Dunkerron, between Dingle Bay and Kenmare Bay. The principal places in it are the small towns of Caherciveen and Sneem, with the villages of Knights-town, Portmagee, Waterville, and Caherdaniel.

1. *Form of the Ground.*

The ground, which is chiefly mountainous, has almost every variety of shape, presenting high peaks and cliffs, deep pockets or cleughs, narrow passes and glens, or lofty and sometimes rugged mountain chains, frequently indented by rocky coombs with precipitous sides, overlooking small tarns. Long open valleys, too, between which these mountains rise, extend from the interior to the sea, containing in their lower parts streams, lakes, or flat boggy keels, and generally terminating in bays, harbours, or sounds.

The mountains of this district are continuous with those of Killarney and Kenmare, but are in some degree separated from them by the gap called the Pass of Ballaghabeama, and the valleys of the Blackwater and Glencarr.

They are naturally arranged into four principal but irregular ridges. Three of these ridges run nearly in E.N.E. and W.S.W. lines parallel to each other and to the N. and S. shores of the promontory; but the fourth crosses them transversely and connects them together.

This latter ridge may be said to commence near Drung Hill on the N., and with several points of elevation exceeding 2,100 feet, passes S. of the Coomasaharn lakes, by the Colly Mountains and Knocknagapple, to Ballaghisheen gap, where it declines to a height of 997 feet, and then again ascends by Knocknacusha and Ballytrusk to a height of over 2,000 feet at the uneven plateau of Finnaragoff, above the crags of Coolyvrack, whence sweeping round the southern end of Glencarr, it runs from the remarkable peak called Beown down to the shores of Kenmare Bay, between Coongar Harbour and the mouth of the Blackwater.

The most northerly of the other ridges runs along the south shore of Dingle Bay, from Rossbehy to Valencia, rising at Drung Hill and

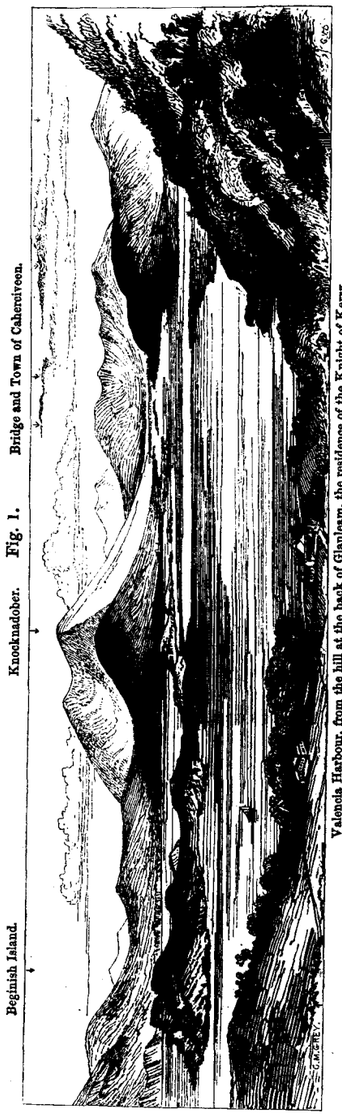

Fig. 1.

Knockadober to heights of over 2,000 feet. It makes Doulus Headland to the W., at which place it is interrupted by the sea forming the entrance to Valencia Harbour, but afterwards reappears in the Island of Valencia, terminating in Bray Head, a cliff of 588 feet. This ridge has no well marked spurs, and although its sides are steep and it is crossed by deep hollows, its crest is not anywhere very sharp.

The next rises from the lower end of Caragh Lough, where some rugged elevations have precipitous faces to the north, and runs along to the cliffs of Coomeeneragh and Coomasaharn, where the highest point in the promontory will be found at one of its elevations called Coomcarrea, 2,542 feet above the sea; it thence descends by Caunoge (1,632 feet) to 945 feet at Keelnagore, rising again to Knockavohaun and Foilclogh (1,635 feet), and then descending to the bog S. of Kilpeacon cross-roads, rising, however, again on the other side of it, and continuing towards the Killemlagh Mountains, which have heights of over a thousand feet. Here it divides so as to form the headlands of Canduff on Puffin Island, and Bolus and Ducalla Heads, the former lying to the N. and the two latter to the S. of St. Finan's Bay. Two or three considerable spurs project from the northern side of this ridge into the Caherciveen valley.

The last and most picturesque of these ranges extends from Ballaghabeama Pass by the Pocket of Coomlimminy and Beown* Mountain to Finneraghgoff, where it widens into an elevated plateau, about 2,000 feet high, and sends off the long spur which runs be-

* From the Irish word signifying the gable of a house.

tween the valleys of the Inny and Cummeragh rivers. The main ridge continues between the cliffs of Coomassig and Foilnageeragh, passing above those of Coom[na]cothcun to Coomecallee Mountain (2,134 feet), at which place the lofty spur called Knockyline, running out to the N.E. of Lough Currane, leaves it; near Coomcallee it becomes narrow and rugged, but extends by Esknalahoge, the Eagle's Nest and Windygap to Coomakista, and terminates at Hog's Head. Several other spurs as well as those above-mentioned branch from this ridge; such as that forming Lamb's Head, and that between the Sneem and Westcove valleys.

Each of these ridges forms a continuous water-shed, the transverse connecting ridge, separating the basins of the Blackwater, Glencarr, and Behy, on the E., from those of Sneem, the Cummeragh, the Inny, and the Ferta on the W.

The most remarkable of these basins are the central ones on each side of the ridge above-mentioned, namely, that of Glencarr, on the east, and the double basin of the Inny and Cummeragh on the west. The Cummeragh river passes through a succession of beautiful lakes, of which Derriana (381 feet above the sea), and Currane are the largest, and also receives the drainage of Cloonaghlin and other smaller lakes of which Lough Coomnacothcun, almost entirely surrounded by lofty, nearly vertical cliffs, is the strangest and most picturesque. This valley is only separated by a small narrow ridge from that of the Inny, in which there is not a single lake. The two rivers run side by side and within two miles of each other for about twelve miles, and discharge their waters at that distance apart into Ballinskelligs Bay.*

Glencarr is a still more remarkable valley, a deep irregular hollow six or eight miles across, surrounded by an almost unbroken ring of wild and rugged hills; the Carrantuohill hills, or range of the Reeks, on the one side, and the other mountains just mentioned on the other. No pass for a road leads into it with a less altitude than nearly a thousand feet above the sea, except the road by Lough Acoose, which traverses ground 500 feet, and that due N. by Lough Nambrackdarrig, which goes over ground 700 feet high. The only natural outlet from this valley is by the lake (Lough Caragh, fifty-seven feet above the sea), the upper part of which is narrow and winds between hills of several hundred feet, with often perpendicular cliffs, till it issues out on the low ground, north of the mountains.

This, the only low ground in the district, except some boggy flats in the bottom of some of the valleys, consists of a large bog-covered plain, so low in places as to be covered by the sea at high tides, except where some undulating ground between Lough Yganavan and Killorglin rises from it to heights of 165 and 180 feet above the sea. Parts of this flat forming two long spits, projecting into the sea northwards, are covered with blown sand.

The coast line of this district in the neighbourhoods of Rosbehy, Caherciveen, and Aghadda, within the bays of Ballinskelligs and Darrynanane, and in some places along the Kenmare river, is low, muddy, and sandy, or edged by a gravelly beach; but in other more

* The part of the Cummeragh river between Lough Currane and the sea, is locally spoken of as the Waterville river.

exposed places it is high and rocky, or rises into abrupt precipices as near Hog's Head, at the seaward side of Scarriff Island, between Bolus Head and Ballynabloun, at Puffin Island, and from thence to Portmagee where there are some cliffs so high as 867 feet, round the western shores of Valencia Island, from Bray Head to Reenadrolaun Point (near the latter of which places the Fogher Cliffs are about 700 feet high), on the W. side of Beginish Island, and from Doulus Head to beyond Kells Bay.

The surface of the ground is in many places covered by "drift" and detrital deposits, and, except in some of the more precipitous parts, it is thickly coated with bog and peat. The "drift" sometimes occurs in the form of low hills and mounds, resembling the eskers of the interior of Ireland.*

J. B. J. & A. B. W.

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2. *Formations or Groups of Rock entering into the Structure of the District.*

Aqueous Rocks.

	Name.	Colour on Map.
	Peat, Bog, or Alluvium in the low grounds.	*Pale sepia.*
	Drift.	*Engraved dots.*
Carboniferous	d^5 Coal Measures.	*Indian Ink.*
	d Carboniferous Limestone.	*Prussian blue.*
	d^1 Lower Limestone Shale or Carboniferous Slate.	*Prussian blue & Indian Ink.*
Old Red Sandstone.	c^3 Upper Old Red Sandstone.	*Indian red (dark.)*
	c^2 Old Red Sandstone, containing the Glengarriff Grits marked c^1.	*Indian red (pale.)*

Igneous Rocks.

D.	Greenstone.	*Crimson.*
Ds.	Greenstone Ash.	*Crimson with dark dots.*
F.	Felstone.	*Bright red.*

Aqueous Rocks.

Old Red Sandstone.—The Old Red sandstone of this district consists of a quantity of hard siliceous and slightly micaceous green and purple grits (or fine sandstones), with many intercalated beds of purple and green indurated mud rocks, transformed by cleavage into slates. What appears to be the lowest part of these rocks is distinguished by containing a greater quantity of the thick green grits, which have received the name of Glengarriff grits. Some of the beds are highly micaceous, and many of the grits are brecciated or conglomeritic, containing scattered pebbles of white quartz. The upper portion of these rocks contains a preponderance of red and purple beds, and seems to have associated with it a greater quantity of slate rocks. In some parts of the promontory conglomerates are found, the pebbles of which are chiefly well-rounded pieces of white quartz, sometimes over three inches in their longest diameters. Calcareous beds are also met with, which yield readily to the action of the atmosphere.

The very highest portion of the Old Red sandstone contains some beds of red slate, and a few pale hard whitish grits, by means of which it has been separated from the rocks immediately below it, as Upper Old Red or Yellow sandstone.

Where the Old Red rocks are in proximity to the Igneous ones, they are often altered into a rock resembling hornstone;* but some of the slates close to the dykes seem to be merely changed in colour, and rendered more liable to disintegration by the atmosphere.

Although green and purple are the two prominent colours of these Old Red rocks, they seem, in some instances, to be so undecided or blended that the rock has a dull grayish tint, sometimes greenish, sometimes purplish, and sometimes simply gray. The gray rocks are not restricted to any particular horizon; and some reddish and brown sandstones also occur scattered through the upper part of the formation.

The weather† affects the Old Red rocks differently according to their colour, so that this can be perceived sometimes at a considerable distance; and where the prevailing tint is purple, it is so little altered that it can be recognised wherever the rocks are much exposed at a distance of several miles.

Traces of fossils, consisting of the imperfectly preserved stems of large plants, have been found even among what appear to be some of the lowest of the grayish green Glengarriff grit rocks. Upon the bedding faces of some purple slate rocks in the Island of Valencia, tracks that may be crustacean were detected by Mr. G. H. Kinahan. Appearances that might be supposed to be annelidan or molluscan tracks were also found in some of the purple grits.

It is impossible to say what may be the thickness of these Old Red rocks, or even to form a correct idea of it, as no lower beds than themselves appear; but there are sections in the neighbourhood of Sneem

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* The description of the form of the ground, above given, applies to it, when it is considered as a separate district. When viewed in connexion with the rest of Ireland we find that the different ridges mentioned above are but the separate parts of a small but distinctly formed mountain chain, stretching across Ireland from Dungarvan Bay, on the E., to the coast of Kerry, on the W. This has but one principal ridge from Dungarvan to the borders of Kerry where it becomes more complicated. The Mangerton ridge and that of the Reeks and Carrantuohill, are two parallel cordilleras, connected by the transverse spur at the head of the valleys which drain into the Upper Lake.

The transverse ridge spoken of above as running from Drung Mountain to Kenmare Bay is another spur, beyond which the hills divide into three small parallel cordilleras, or four if we reckon the ridge between the Inny and Cummeragh as one. Between the two spurs indicated above lie two large transverse valleys, that of Glencarr, on the north of the watershed, and that of the Blackwater on the S. of it, while the other large valleys are longitudinal valleys between the parallel cordilleras.

We thus have in the mountains of Kerry, diminutive as they are when compared with a great mountain chain, a model on a small scale of the structure of the Andes themselves.—J. B. J.

* G. H. Kinahan.

† The following note on the weathered colour of these rocks is by Mr. Kinahan:—Along the coast the weather seems to have most affected the red colouring matter of the rocks, as the purple ones are weathered to a whitish blue, while the green ones are only rendered brighter. Inland the purple rocks are generally weathered red and the green ones yellow. So that here the weather had the power to remove the blue part of the colouring matter.

which give apparent stratigraphical thicknesses of 13,000 feet, without showing either faults or contortions by which the same beds might be repeated.*

The Carboniferous Group is represented by three of its sub-divisions.

d^1. *Lower Limestone Shale and Carboniferous Slate.*—The true Lower Limestone shale, or the beds immediately beneath the Lower Limestone, is nowhere seen in the district; but of their local expansion —the carboniferous slate, some beds immediately above the Old Red sandstone are to be seen. They are represented by some blackish or dark-coloured slates and slaty shales, interstratified with gray or whitish grits, which have received the name of Coomhola grits. They are usually so much contorted that their real thickness is concealed, and where they have most regularity of dip and strike they form islands, so that besides what is seen of them there, much more may be concealed by the sea. A thickness of 600 or 700 feet, however, may be actually observed in the district.

$d^{2,3,4}$. *The Carboniferous Limestone* is not seen within this district, but it is supposed to underlie a large portion of the flat ground to the N.E., and limestone was stated to have been found in an old

* All the purple and green grits and slates, of which the peninsula of Iveragh and Dunkerron and other adjacent parts of Kerry and Cork are composed, are included by us in the Old Red sandstone. Sir Richard Griffith considers the lower part of them to belong rather to a Silurian formation and the upper part only to be Old Red sandstone. His conclusion is based, I believe, on the structure of the Dingle promontory, where our maps and his are nearly identical. In the Dingle promontory there is a large mass of red and green rocks with great bands of conglomerate, which lie above beds containing Ludlow fossils, and have a thickness of several thousand feet. These we have in our maps called the Dingle beds, and coloured them of a different tint from either the Silurian or Old Red sandstone formations. In the Dingle promontory these are surmounted quite unconformably by red sandstones and conglomerates, 3,000 or 4,000 feet thick, which lie conformably with the Carboniferous rocks above, and which are considered by us to be the undoubted Old Red sandstone. It is easy in that district to draw the boundary between this Old Red sandstone and the Dingle beds below it, on account of the unconformable position of the two formations.

In the Iveragh and Dunkerron promontory, however, we found it impossible to discover any boundary line below the Carboniferous formation which would enable us to separate the rocks into two distinct groups. Red and purple slates, red and green and variously coloured grits, with slightly varying lithological characters, occur throughout, and a few beds of conglomerate occur in some places on the north side of the promontory. Sandstones of the kind we have called Glengarriff grits, occur both in the Iveragh and Dunkerron promontory, and in the "Dingle beds" of the Dingle promontory. It is possible that some of the lower beds in what we have called the Old Red sandstone of Cork and Kerry may be the "Dingle beds." Even if that be the case, however, we found it impossible, except in the Dingle promontory to discover any well-marked characteristics (lithological, petrological, or palæontological), which would enable us to draw a continuous boundary between them and the beds above.

I, therefore, thought it best not to prejudge the question, but to colour each district in accordance with what we knew of its structure, mapping the "Dingle beds" as a distinct group in that district where their distinctness could be proved, and not attempting to make distinctions in another district, where no undoubted evidence for it was to be found.

It is possible that, either from the discovery of fossils or from a re-examination of the physical evidence, it may hereafter be deemed expedient to draw a boundary in that which we have called Old Red sandstone in Cork and Kerry, and to include the lower parts of it with the "Dingle beds," as a separate formation, intermediate between the true Old Red sandstone and the Ludlow beds, and belonging to the Silurian below rather than to the beds above it. This is the interpretation of the rocks adopted by Sir R. Griffith—an interpretation which is theoretically the better of the two, though we have only been partially able to carry it out in practice.—J. B. J.

closed up quarry, where the blue colour occurs on Sheet 172, near the middle of its eastern side.

d^5. *Coal Measures.*—Very little of these rocks is seen, but in one or two places in the same sheet black and bluish, much contorted, shales occur. A. B. W.

Igneous Rocks.

D. *Greenstone.*—Much of this greenstone is very felspathic, so that it is doubtful whether it should be called greenstone or felstone. It is sometimes highly crystalline, and contains veins of various minerals. A columnar structure is observable in most of it, and in some places the columns are very well defined.

Ds. *Greenstone Ash.*—This ash is in some places fine grained, and in others brecciated or conglomeritic. When fine grained it is of a pale green colour, and fuses readily before the blow-pipe. The brecciated or conglomeritic part has a purple or green base, and contains fragments of grit, slate, greenstone, felstone, and other kinds of rock, some of which are more than three feet in diameter.

F. *Felstone.*—This is a greenish-gray, blue, or blackish rock, generally compact. In some places the slate beneath it is altered into a kind of hornstone which resembles it so much as not to be easily distinguished from it. It has sometimes a columnar structure, and is usually interstratified with the aqueous rocks. G. H. K.

3. *Palæontological Notes.*

Very few traces of fossils were observed in the rocks included within the boundaries of these Sheets; there are in some localities pretty certain evidence of plants (stems only); in others, obscure markings which may be either the remains of fucoids or tracks of marine animals. The markings observed by Mr. G. H. Kinahan, on the surface of a bed of compact purple slate at Valencia Island, are interesting, and most probably of animal origin; they may have been caused by crustacea, but it is impossible to say with any degree of certainty to what marine animal they owe their origin. The appearance they present is that of a double row of small indentations, each about a quarter of an inch in length, pointed at one end and slightly curved, occurring at regular distances of about the eighth of an inch apart, forming a continuous series and nearly a straight line, which can be traced for more than sixteen inches on the slab collected by the Geological Survey, and now in the Palæontological Gallery of the Museum of Irish Industry. The variation in breadth and appearance they exhibit on different portions of the slab, may probably be due to the effect of cleavage; their usual breadth is about the third of an inch.

The following are the localities from which specimens were collected by Mr. Charles Galvan, all being in the Old Red sandstone:—

Sheet 182.

Co. Kerry, $\frac{79}{5}$.—From rocks on shore W. side of Fort Point and Light House, Valencia Island, in compact purple slate.

Tracks probably crustacean.

Co. Kerry, $\frac{79}{2}$.—From Rocks on shore, Valencia River, between Cahersiveen Bridge and Ballycarberry, in purple slates.

Obscure markings, of doubtful origin, may be either fucoidal or tracks of marine animals.

Co. Kerry, $\frac{79}{5}$.—From rocks on shore, Beginish Island, S. side, in purple slate.

Obscure plant-like markings or tracks of marine animals, straight and branching.

Co. Kerry, $\frac{96}{1}$.—From rocks on shore, opposite Puffin Island, in purple slates.

Obscure plant-like markings.

SHEET 183.

Co. Kerry, $\frac{71}{5}$.—W. side of Coomasaharn Lake, in compact gray micaceous grit (see p. 17).

Plant stems, some of them $1\frac{1}{4}$-inch in diameter, and irregularly ribbed in a longitudinal direction.

September 4, 1860. W. H. B.

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4. *Relations between the Form of the Ground and its Geological Structure.*

The low ground on the S. side of Castlemaine Harbour is believed to be underlaid by the Carboniferous limestone, and the rising ground to the eastward is formed of the Coal Measure rocks, the termination in this direction of the Munster Coal Field.

Part of two small basins of Carboniferous slate, resting on the upper beds of the Old Red sandstone, occur near Sneem, on the shores of Kenmare Bay.

All the rest of the district is formed of the rocks included by us in the Old Red sandstone, the beds forming one great anticlinal curve between Kenmare and Dingle Bays, complicated by numerous minor undulations by which the beds are bent into many anticlinal and synclinal curves, and often into closely folded contortions.

The general strike of the Old Red sandstone rocks coincides with the direction of the longest mountain ranges which have been before described, and consequently with that of the longitudinal valleys which lie between them. In the lateral valleys, however, such as those of Sneem, of the River Blackwater, and of Glencarr, the beds will be found to run obliquely across them.

At the summit elevations of many of the mountain ranges, the beds are very generally contorted, but not there only, for contortions occur in nearly all the depressions as well, and may be frequently seen along the coast line. Some magnificent cliff sections of these contortions, nearly at right angles to the strike of the beds, are exhibited in the mountain glens and precipices.

A section across the promontory from Kenmare River to Dingle Bay, coinciding with the transverse range, and the Eskine or Coomeana spur would exhibit little more than a succession of such contortions, having little or no relation to the shape of the surface of the hills or valleys. This being the case, it appears that something else must be

taken into consideration to account for the very varied form which the ground presents.

Now if any of the islands near the shore be examined, where faults do not exist, their bedded rocks will be found to resemble more or less in dip and direction those of the adjacent mainland; and even in the distant Skelligs the strike of the beds has the same general direction as that of the rocks of which the whole promontory is composed. From this it appears that the rocks forming these islands were once in continuation with those of the land, and are even now connected with them by intermediate portions beneath the sea, some of which have projections still above its surface, such as the Lemon Rock between the Skelligs and the shore, Beginish with the adjacent islands in Valencia Harbour, and those lying between Scarriff and Deenish, at the northern entrance to Kenmare River and not far from Lamb Head, near Derrynane.

It was the gradual but ceaseless action of the sea-breakers which cut off the islands from the mainland, and it was a similar action of erosion, exerted upon the rocks now forming this mountainous promontory, as they were gradually rising above the level of the sea, which scooped out its valleys, and taking advantage of the numerous joints and master-joints found in all stratified rocks, formed all the cliffs and principal features of the ground, which have since that time been modified to some extent by atmospheric influences, and by the glaciers which have left their marks in so many of the glens.

The supposition that the wearing action of the sea is sufficiently powerful to have produced these results, is much strengthened by considering the force with which this coast is assailed by the storm waves of the Atlantic Ocean. An examination of the shore line will show that they have produced cliffs of a bolder character, though not of so great a height as some of those which occur inland; while in some instances they have undercut the hard rocks forming these cliffs, and have removed portions of them, so that the rest overhangs the sea; and in other places caves and long fissures have been worn beyond the coast line far into the land.*

It is easy to see that if the land were depressed some 2,400 feet, the sea would then surround the mountain tops, transforming them in time into islands like the Skelligs, and that if, as the ground arose from the sea, the elevating action occasionally ceased, or went on very slowly, the mountain cliffs and steeper declivities would be formed by an action precisely similar to that which is acting on the present coast.

A. B. W.

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* As an illustration of the fury with which the breakers act upon this coast, it may be mentioned that during an autumnal gale from the N.W., I have seen the sea break clean over Lamb Island, in Valencia Harbour, which has a height of 78 feet above low water, and then run down its eastern slope in sheets of foam and spray. It is stated, too, that water tanks or butts near the Upper Light House, on the Great Skellig Rock, close to which a height of 380 feet is marked upon the Ordnance six-inch map, have been washed from their places in the course of severe gales; and that the Horse Island, at the W. side of Ballinskelligs Bay, has not been very long separated from the land.

A little to the N. of this island, the shore of the bay, there composed of "drift," has, within the historic period, been so much worn and carried away by the sea, that the foundation has been washed from under part of the ruined Abbey of Ballinskelligs, which was probably built at some distance from the water's edge, and the skeletons of people buried in the adjoining graveyard exposed.—A. B. W.

Detailed Descriptions.

[The district included in this Sheet was examined by Messrs. G. H. Kinahan, J. O'Kelly, and A. B. Wynne, from whose field notes most of the following detailed descriptions have been compiled by Mr. Wynne.—J. B. J.]

5. *Position and Lie of the Rocks.*

The Old Red Sandstone rocks are so frequently and so much exposed in this peninsula, that it would be difficult to say where they are best seen. Sections of the beds are exhibited in many places along the coast, particularly along the Kenmare river, from Lamb's Head to Hog's Head, from the Horse Island to Ballynabloun House, from Puffin Island to Portmagee, and thence round the outside of Valencia by Beginish Island, Doulus Head, Canglass Point, and Foyleye, to beyond O'Connell's Bridge. They also appear in many cliff sections amongst the mountains from Ballaghabeama to Coomakista, in the precipices of Coomsaharn, at the head of Glanbehy, and in the neighbourhood of as well as overlooking Lough Caragh. Nearly every stream gives a section in the upper part of its course; and the rocks on the mountains' sides have frequently nothing more to conceal them than a little peat and heather, and very often not even this; while in many of the valleys also the rocks project above the surface of their boggy covering.

The Sneem District.—A great anticlinal curve in the beds was traced by Mr. O'Kelly and myself from near the celebrated antiquity, called Staigue Fort, at the S. side of the promontory, and S.E. of Isknagghinny Lake, its axis crossing the Sneem valley N. of the town in a direction of about 40° N. of E., and passing out of the map S. of Coomlimminy. The beds on the S. side of this curve dip steadily S.E. at an average angle of 60°, giving a thickness of rocks amounting to 12,600 feet, as measured by Mr. O'Kelly, on the ridge which separates the Sneem valley from that of the Blackwater, and the rocky mountain in which it terminates, called Knocknafreaghane. The river below Sneem, and thence to Sneem harbour, as well as Garinish and Illaunslea, with the adjacent islands, and also the mountain between Sneem and the Westcove country, exhibit steady sections in these beds inclining in the same direction, with nearly the same angle, and giving even a greater stratigraphical thickness of rocks.* These beds consist chiefly of purple grits and slates, containing, however, numerous green, grayish-green, and gray beds.

Amongst the upper beds of these sections are those of the islands of Inishkeragh, Illaunandan, and Rossdohan; but unlike the rest, they present a series of small contortions dipping *en masse* towards the E. and S., and are overlaid by some other equally contorted beds, which curve round the shore from near Drongaun Lough by the Yellow Rock, Rossdohan Harbour, and Derryquin Castle, to where the latter part of the name Askive Cottage is engraved upon the map, the dips being low, generally towards the interior of the curve, and the rocks consisting chiefly of hard gray grits and slates, among which, however, purple beds frequently occur.

These upper beds are interrupted towards the N.E. by a fault which produces a very marked feature in the ground in part of its course. This fault is an upthrow to the N.E., and as the beds dip to the S.E., it produces the appearance of a lateral shift to the S.E. in the outcrop of the beds. Two miles farther to the S.E. is another similar fault. Over these some other beds, believed to represent the Carboniferous slate rocks, occur, which will be described farther on (p. 24).

* These great thicknesses, observed in this part very carefully by Mr. J. O'Kelly, are often to be seen in this district, as merely *portions* of the formation that happens to be exposed here or there.—J. B. J.

At the N. side of this, which may be called the Kilcrohane anticlinal, a mass of gray, purple, and green grits and slates will be found to incline in an exactly opposite direction from those at the south, and to form the mountains, with their magnificent precipices, coombs, and glens, which bound the Sneem valley on the N.W. and N. Extending north-eastward by Coomcallee, Dromtine Lough, Coomeen Lough (always called Coomeenthna), River Hill, and Knockcarrig, this general north-westerly dip will be found having an average angle of 55°; but it must be said that it is neither so steady nor so continuous as the inclination on the S. side of the anticlinal axis.

In the ridge running from Esknalahoge to Beown and Mullaghanattin, the rocks consist principally of massive thick-bedded green, gray, and purple grits and slates, bent into a variety of contortions, sometimes undulating in a nearly horizontal plane, and sometimes inclining in one direction, and sometimes in another, generally striking E. 35° N., but sometimes curving round so as to dip at low angles to the S.W.

Both sides of Coomeentharna, W. of Coomnahorna, exhibit fine cliff sections, particularly the one in which the elevated pocket containing Coomcallee Lake occurs; and great cuboidal masses have in places fallen from the cliffs there, which now lie at the bottom of the glen, near the place called the "Stairs."

Cliff sections in these strong purple and green grits and slates occur also to the S. of Loughs Isknamacteery and Nambrackdarrig, round Coomnacothquin Lake, where they are nearly 600 feet high, in the neighbourhood of Slievenashaska, and from this to the place called Gloragh.

Foilnageeragh is a long narrow glen, excavated in the strike of some of these green, gray, and purple rocks. Its character differs considerably from that of those coombs which have been hollowed out in a contrary direction with regard to the bedding, the sides of the latter being generally more nearly vertical.

At a distance of less than a mile S.E. of the end of Foilnageeragh Glen, on the other side of the ridge, are the cliffs of Coomanassig (or the Coom of the Eagle), over Eagle's Lough, from which the Sneem river issues. These present a perpendicular cliff section of more than 1,100 feet, through contorted coarse green and purple grits, which dip W. at different angles from nearly horizontal to 35°. At the E. side of the lake the rocks consist of coarse green conglomeritic grits, with calcareous patches full of pebbles of quartz and purple grit.

This glen presents an example of a double coomb, somewhat similar to that of Coomeentharna. The upper of the two coombs is smaller and shallower than the other, but in continuation with it; and the lake which it contains, situated at a height of 1,500 feet above the sea, sheds its surplus water by means of a steep rocky cascade, down a precipice of 460 feet, into Eagle's Lough (1,000 feet), at the bottom of the lower coomb. It is a remarkable circumstance that the difference between the levels of these two lakes is within thirty feet of being the same as that between Coomcallee Lake and the point where its overflow reaches the headwaters of the Owreagh river, in Coomeentharna. Large erratic masses of grit lie piled together at the E. side of Eagle's Lough, and the rocks at the upper end of the small coomb are grooved and furrowed by glacial markings.

Not far to the eastward of Coomanassig is another coomb or pocket containing Lough Coomnacronia, a little tarn, surrounded on three sides by cliffs 850 feet high. These cliffs seem to be composed of the lowest part of the green and purple rocks seen in Coomanassig. Several long open fissures containing streams in wet weather, descend from the tops of the cliffs nearly to the lake, and the largest of these which was descended was found to incline to the E. at about 65°, and seemed to have been excavated along a fault, the E. wall of

which overhung so considerably that when in the fissure, and looking upwards, the small portion of the sky which could be seen appeared towards the W., instead of being exactly overhead.

To the N.E. of Coomnacronia the ridge which divides the Sneem valley from Glencarr becomes narrow and rocky, exhibiting many contorted green and purple grits, which have a tendency to incline generally to the W. On its S. side are the cliffs over Coomeenthna, and on the N. those of Coolyvrack, said to be the wildest spot in the peninsula. The former present steep and in some places vertical sections of over 1,500 feet in height, the rocks of which, although contorted, have a decided inclination northwards, while in the cliffs of Coolyvrack there is a dip of 50° to the S., through a thickness of 2,500 feet in purple, gray, and greenish beds.

From this place eastwards to the edge of Sheet 183, the ridge which runs along in that direction, having in the map the barony and parish boundary marked upon it, presents a variety of cliff and other rocky sections in similar green, gray, and purple contorted slates and grits, some of the latter of which are in places micaceous.

The north side of the ridge is the most rocky, and the beds which compose it have very frequently southerly inclinations.

On the south side of this part of the ridge, between the summits of the two peaks called Beown and Mullaghanattin, is Coomlimminy Pocket. This singular little valley is surrounded on all sides by steeply-sloping mountains, except at the south, where a narrow opening allows the head of the River Blackwater to escape. On the west, it is overlooked by lofty cliffs exhibiting a contorted mass of purple and greenish grits, with a general dip to the N., and having the northern sides of their anticlinal curves the most steep, as if the beds had been pushed over in that direction.

To the N. of the Pocket the cliff of Eskfaun, overlooking Glencarr, exposes in its upper part another mass of contorted grits and slates, while below, the beds appear to have more dips to the south than in any other direction.

The Glencarr Valley.—Ballaghabeama Gap is an excavation of about 600 feet deep, crossing the ridge between Glencarr and Lough Brin, and affording access for foot passengers from one side of the promontory to the other. The rocks through which it passes are almost all gray and purple grits, conglomeritic in places, with a general dip to the S. of 40°; but just below them, at the N. entrance to the gap, some green beds occur.

In Glencarr the rocks are seen in many places. In the neighbourhood of Cloon Lough, north of Mullaghalisse fort, and in the townlands of Cankoogheda and Garrane, some contorted purple grits and slates appear, the mass being strangely fissured in some places.

More of these rocks occur on the opposite side of the glen, at Beendarrig and Beenbane; and further north, between this and Coarrwoolia, a steady dip of 40° to the S., gives a thickness of 3,000 feet in green and purple grits. At the last-named place some undulations in coarse greenish conglomeritic grits occur, but to the northward of these there is again a steady dip of 30° S. in similar beds.

The rocks are seen on both sides of Lough Caragh. On the E. side, at its upper end, a small cliff above a wood exposes coarse, hard, purple grits, slightly conglomeritic, with some beds of purple slate, the cleavage in which dips S. at low angles. At a little distance to the N. of these, reddish purple conglomeritic grits occur, dipping to the S.E. at 35°, and near to them some purple grits and slates form a small peninsula in the lake. On the opposite side of the lake are a quantity of coarse and fine contorted purple grits, the general inclination of which is in a contrary direction to that of those last described. These rocks are in places much smoothed and marked by glacial action.

Some of the beds to the W. of this, in the stream S.E. of the Giant's Grave,

are formed of a fine gravelly conglomerate, and associated with them occur some beds of red and purple slate.

Near the lower end of the lake, and within the curve formed by it and the Lower Caragh River, are some bright purple and reddish thin-cleaved grits, with a general dip to the S. of 30° to 40°, the cleavage dipping in the same direction at 80°; and similar rocks occur again to the westward in the small stream above Carraheen Bridge.

To the north of this the country is all covered with drift and bog, and in no place is the dip of these beds towards the Carboniferous limestone and the Killorglin termination of the Coal Measures seen.

Glenbehy.—About the lower parts too of Glanbehy Glen the rocks are concealed but at intervals along the W. side of the Seefin, Coolroe, and Beenreagh ridge they may be seen, as for instance, at Cummergorm Glen, below Windy Gap, where some dull purple and brownish grits dip to the S.E. Further S., near Beenreagh, the rocks are chiefly green and gray, with some purple beds.

In the glens, in which the lakes of Coomnacronia, Coomaglaslaw, Coomasaharn, and Coomeeneragh lie, green, gray, and purple grits are exposed by their steeply sloping sides and nearly vertical cliffs, some of which have elevations of almost 2,000 feet above the water of the lakes, but others are not more than half that height. In the Coomnacronia Glen the rocks are chiefly purple, while in those to the S.E., wherever they could be examined, they were found to be almost always green or gray; but purple beds again appear in the cliffs of Coomnagrossaun and Coomeeneragh.

Below a place called Keamconneragh, in the Coomasaharn Glen, W. of the lake, and close by a stream which is not engraved upon the map, but runs to the eastward of the symbol "+," Mr. Galvan obtained, in fine greenish grits, apparently among the lowest beds of the formation, impressions of large plants, some of the few fossils hitherto found in the Old Red sandstone of this peninsula. All the beds in this and the neighbouring glens are very much contorted: too much so indeed, to form any fair estimate of their thickness, which must, however, at least exceed 2,000 feet.

To the south of this place is Ballaghisheen Pass, between Glencarr and the Valley of the Inny. Here, as well as in the neighbourhood of the adjacent mountains of Colly, Knockagapple, and Knocknacusha, the rocks are frequently seen. They consist chiefly of purple, purplish gray, and reddish purple, grits and slates, with occasional calcareous beds, forming apparently a synclinal curve between the old and new roads leading from one glen into the other. A curious E. and W. fissure, which branches into two, occurs just at the gap, and at its east side masses of the neighbouring rocks lie broken up and confusedly heaped together.

The Northern Coast line.—At the abrupt eastern termination of the high ground which runs from near Rossbehy to Valencia, the rocks are seen in two quarries near Lady Headly's Bathing-lodges; in both places they have a southerly dip at about 30°*, and consist of thin bright purple sandy grits. Westward from this place to Kells Bay, the shore section, and the small stream courses which run down the north side of the steep ground, expose bright purple, purplish gray, and reddish sandy grits, often much broken and cut up by joints. Underneath Knockatuma, Knockboy, and Drung Hill, they generally dip to the S.; but near Kells Bay they are very much contorted.†

* It may be doubted whether the southerly dip along this part of the shore is not due to inversion.—J. B. J.

† Some peculiar gullies into which the sea runs, called Coosafadda and Cooslarbaun, occur between Carriglea and Kells Bay, formed probably along master-joints. If the ground were elevated here very slowly, but still more rapidly than the rate at which the sea could wear away the rocks, sloping fissures would be formed much like in character to those which traverse the mountain slopes in many places inland, as for instance near Roads Lough, further to the west, and at Coomnacronia, north of Sneem.

There appears to be a north and south fault running from near Darby's Bridge to Kells Bay, for in a wood at the west side of the bridge strong conglomerates are found nearly vertical and divided by a set of joint planes bearing about 10° W. of N., and dipping E. at 80°; while directly in their strike, at the other side of the stream, are purple and green grits and slates. Below this, on both sides of the river, and near the National School, purple and reddish sandy grits and slates, with an occasional bed of shale, and some conglomerates, having a high dip to the southward, occur. Excluding contorted portions of these rocks, the rest, on the east side of the river, give sections of 4,000 feet in thickness. In one place, on the east shore of Kells Bay, two current marks, crossing each other obliquely, with a thickness of only a few inches of rock between them, were observed by Mr. Kinahan, who surveyed all the neighbourhood of Caherciveen and Valencia.

Some of the rocks in this neighbourhood have a nearly east and west cleavage, dipping S. 20° E. at 50°; and some exhibit on their worn surfaces glacial striae running in a north and south direction.

To the south-east, over the Beenmore spur, and in its vicinity, purple grits and slates, striking E.N.E., project from the surface of the ground in several places; and still further south, along the River Ferta, and on the high ground which it leaves to the east, similar grits and slaty rocks are frequently seen. Near a calcareous band occurring in these, and marked upon the map a little to the southward of the height 1,640, some nearly vertical cleavage was observed to strike N. 40° E.

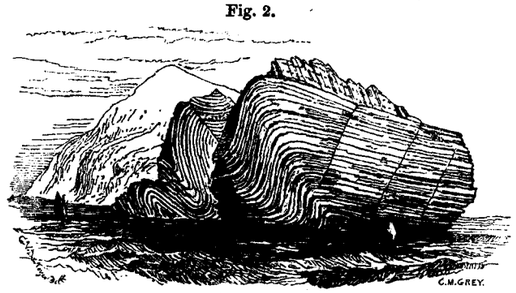
Along the south-east flanks of Knockadober purple grits and slates, with some conglomerates, were also seen; to the eastward, and on the north side of the same part of the ridge, over the Glendalough Lakes and Roads Lough, reddish purple thin grits, slates, and slaty grits, occur.

The shore section, at the base of this mountain, from Kells Bay westward, runs very much along the strike of similar rocks, nearly all of which are greatly contorted, and do not exhibit any great thickness of the beds. Some curious contortions and breaks, however, are exposed, as, for instance, in Cooseatemple, between Foyleye and the Gull rocks looking to the west; and a little to the south-west of the latter place, at Coosnabarnagh, there is, what appears to have been an open fault filled with very compact grit rock.*

The contortions appear to increase in number and peculiarity towards the west, as if the rocks in this direction had been subjected to the most violent lateral pressure.

Purple grits and slates, with a general strike of about E. 25°, are seen on the mountain slopes, on both sides of the road from Caherciveen to Coomnahincha and Coonanna harbour; and the continuation of the ridge from this to Doulus Head exposes along the line of sea cliffs to the north, and round Doulus

Fig. 2.



Doulus Head.

* G. H. Kinahan.

Head to Laght Point, a series of remarkable contortions, in reddish purple grits, amongst which are some slate beds. Some of these contortions are seen in the annexed sketch of Doulus Head from the west. One of the beds is a massive coarse conglomerate. They are cut by an east and west fault, having an upthrow to the north. The conglomerate can be traced inland, forming the highest part of the headland eastward of the point marked 921; but in its strike (W. 25° S.), at the bottom of the Doulus Head cliff, the beds consist of reddish purple grit. A north and south fissure crosses the headland where the figures 10 to 70 are engraved upon the map between the points marked 355 and 921. At the south end of this, and running inward along it, is the Doulus Cave, and at the north end a displacement of the rocks occurs. This break, it will be observed, has a general resemblance to that occurring at Coosnabarnagh to the east which has been already noticed.

The conglomerate at the top of Doulus Head cliff exhibits glacial striae, and at intervals along the coast from this place nearly to Caherciveen fucoidal or other plant impressions have been found in some of the purple slaty grits. Greenish slates are sometimes met with among the purple beds between Castlequin House and the Valencia River, and near Ballycarbery Castle, a bed of calcareous breccia was observed. In the vicinity of the Castle, too, a N. and S. fault occurs, shifting the outcrop of some purple grits and slates, containing an interstratified mass of greenstone and breccia, which with the trap rocks to the westward, and those of Beginish Island and Valencia, will be described further on. A good bed of purple slate was formerly worked at the top of the bay, due west of Ballycarbery Castle.

Valencia Island and Harbour.—Underneath the igneous rocks of Beginish Island are purple grits and slates containing some green beds. At the west side of the Island generally the dips are to the S.E. at 35°; but opposite to Fort Point the beds curve and undulate, so as to dip E.N.E. One bed at this part of the Island affords the best roofing slate in the district; but it is too limited to allow of an extensive working.*

In the neighbourhood of Fish Point, a synclinal curve in purple grits and slates, with dips on the N. side to the S.E. at 30°, and on the S., to the N. at 70°, forms a trough filled with greenstone. Underneath the purple beds at the S. side of the synclinal are strong green grits and slates, with some purple beds, and one bed of calcareous grit, all dipping N. at 40° to 70°. Close to Cruppaunroe there is a bed of purple slate, full of cherty-looking nodules, arranged in lines parallel to the cleavage, which strikes E. 10° N., and gives a false appearance of bedding to the rock, which really dips to the N.E. at 30°. Some fucoidal impressions have been found in the purple and green gritty slates at the south side of this island.

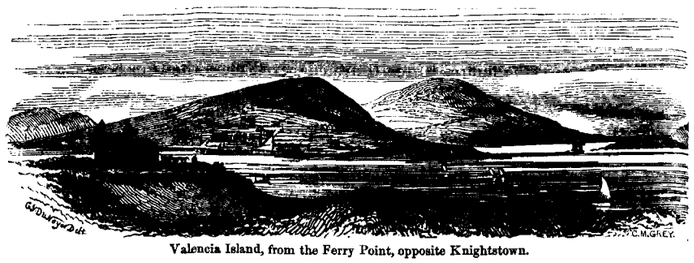
There are some purple and green grits and slates seen at the S.E. side of Lamb Island; but the largest portion of the island is composed of trap rock.

On the island of Valencia, Fort Point is composed of green and purple slates, with some beds of grit. They all undulate, the axes of the contortions having a general dip to the E. at a low angle. Upon one of the purple beds, at the west of Cromwell's Fort, the crustacean tracks which have been already mentioned were found. (A trap dyke occurs near this place, for its description see page 26). Lower beds than these are seen south-east of Glanleam, consisting of green slate and breccia, with a few grits. Some of the breccia is like a trappean ash, and several of the slates are so micaceous, that a hand specimen might easily be mistaken for a piece of mica schist. All along the north-west of the island the same or similar beds are found to undulate in such a way, that they frequently appear at the surface of the ground. Due west of Glanleam is the hill called Geokaun, rising to the

* Slates are occasionally quarried here, but only at low tides, as the best part of the bed is below high water mark.

height of 888 feet above the sea, and presenting to the north-west the bold sea cliffs of Fogher, which are some of the finest of the kind in the whole district, being nearly 700 feet in height. All along the N.W. coast of the

Fig. 3.



Valencia Island, from the Ferry Point, opposite Knightstown.

island, from near the Fogher Cliffs to Bray Head, the rocks undulate, with sharp curves in places; but they seem to have a general dip to the N.N.W. They consist of purple and green slates and grits and a few beds of fine breccia;* but the latter occur less frequently than at the N. side of the island. From Bray Head to Clynacartan the rocks are principally purple gritty slates, with a general dip to the N. of from 50° to 87°; the rest of the beds seen along the S. coast of the island consist of purple and green slates, generally much contorted. A remarkably hard, highly micaceous grit occurs at a point called Quaybrack, W.S.W. of Coorhabeg House. This bed is also seen on the coast of the mainland at a place having the same bearing from the above-named house.

The Valencia Slate Quarries.—Upon this hill are situated the quarries belonging to the *Valencia Flag Company*, of which the following is Mr. Kinahan's description:—"Their principal workings are on the east face of the hill, where the beds strike N. 10° E., and dip towards the W. and N.W. at 5°, 10°, and 25°. The cleavage strikes N. 40° E., and dips S.E., in the slates at 20°, and in the more gritty beds at from 30° to 45°. The workings have been carried for some distance from the face of the hill horizontally towards its interior in a direction a little W. of S., and are bounded by the surfaces of two joint planes; one of these runs N. 50° E., dipping at 10° to the S.S.E.; and the other, at the N.N.W. side of the excavation, has a general direction of N. 20° E., dipping W. 20° N. at 10°. The latter, which is called a saw-joint, is produced by the intersections of two parallel master-joints with the cleavage, and a number of minor parallel joints which run obliquely to the others, and thus form a compound fracture, the transverse section of which resembles the toothed edge of a saw. As the cleavage passes through the part of the rock included between the two parallel master-joints its inclination to the S.E. makes a slightly lower angle with the horizon than it does in the adjacent portion of the slate.

"Some other joints also occur having a more or less N. and S. direction. One of these, which dipped to the N.W., ran up through the two beds forming the roof of the excavation, and there meeting the inclined joint, by which its S.E. wall is formed, caused the fall of an immense mass of the superincumbent grit rock, under which no support had been left.†

* Some of these are very ashy in appearance.—G. H. K.

† This fortunately occurred at night, otherwise great sacrifice of life would have resulted; as it was, very considerable damage was done.

"A corbal of about twenty feet wide is now allowed to remain, so as to support the roof on the S.E. side; and the works are being carried on to the N. of the saw-joint, which is considered safe; but another N. and S. joint occurring here might be attended with a similar disaster. In order to get out the slate rock, drivings are made on two overlying beds of purple gritty slate, called by the quarrymen *greenstone*, in consequence of particles of silex which they contain having a greenish hue. The slate underneath these is then removed. Thin partings of quartz occur between the two grit beds, and also between the lowest of them and the underlying bed of slate, which is nine feet thick, and furnishes the best slabs. Underneath this bed is another composed of gritty slate rock, and immediately below it are two more beds of slate which are also worked, and have the respective thicknesses of fifteen and twelve feet.

"The following note concerning this quarry was kindly furnished by Robert J. Lecky, Esq., Resident Engineer to the Works:—

"'Our best bed for blocks is over nine feet thick in a vertical line; this gives us blocks fourteen feet in length of good slate, and our widths are limited by the natural joints which run nearly magnetic N. and S. Under this nine foot bed is one thirty feet thick,* of a softer and better description of slate, more suitable for making roofing slates; but it has diagonal cross-joints, which are a serious injury to the blocks. Towards the bottom of this the joints are not so frequent, and here are raised some very good stones. Between these beds is a stratum of *greenstone*, an impure slate with much more silex through it.'

"None of these beds furnish good roofing slates, the cleavage not being well developed, thereby causing great expense and loss in splitting, and when split they are heavy and coarse. What these quarries excel in are slabs, which can be got of nearly any dimension. The blocks are first shifted out of their natural position by gunpowder and hand-work; they are then lifted by a travelling crane which is supported from the roof of the quarry, and put on waggons for carriage to the squaring house, where they are placed under two different sets of parallel saws, one set for squaring the ends, and the other the sides. After which they are carried in carts to the machinery yard at Knightstown, where the faces of the blocks are planed smooth; they are then fit for being cut into slabs, which is done by means of sets of parallel saws. Besides being sold as flags, they are manufactured into water-cisterns, chimney-pieces, tables, chairs, book-cases, &c., &c. They bear a slight polish, which could be improved by turf tar, as seen in the chimney-pieces where they are affected by turf smoke."

"Mr. O'Driscoll, the clerk of the works, states that—'The manufacture of roofing slates at Valencia has recently been on the increase, the sizes manufactured being generally twenty-four inches by twenty-two inches, and eighteen inches by sixteen inches; but the width of the slates is not always uniform. Slabs are cut of various sizes, the largest being about twelve feet by six feet; but at Lord Kenmare's house, near Killarney, there are some which came from these quarries twenty feet long. The quantity of slate exported annually is about 2,000 tons; and of this, the portion exported in the form of flags and slabs in 1860 amounted to 1,600 tons. The workmen are nearly all Irishmen, and the markets at which the slabs are sold are various, most of them being sent to London, but some have been recently shipped over to Bahia, in South America, for use on the St. Salvador Railway.'†

"To the S.W. of the Geokaun is Tinnies Upper, where there are two small

* This is in reality composed of two beds, which, according to my measurement, were fifteen feet and twelve feet, or twenty-seven in all. It is in the upper bed that numerous oblique joints occur.—G. H. K.

† Information communicated in the summer of 1860.—A. B. W.

workings in purple slate rocks. The beds dip slightly E.N.E., but are nearly horizontal, and the cleavage changes its angle in passing from an overlying five feet thick bed of grit, slightly impregnated with gray copper ore, where it dips S.S.E. at 80° to 25°, in the same direction in the underlying slate. More to the S.W. there is another working, in the townland of Coole East, in purple slates, which undulate nearly horizontally, with a slight inclination towards the E. The best roofing slates on the island are obtained from this quarry. The three last-named places are not now being worked.

"All the quarries seem to have been opened on nearly the same bed, as a certain breccia is found passing under the hill upon which they are situated, both on the E. and W. sides of it; but the undulation of the rocks, coupled with a want of data, renders it impossible to trace the beds distinctly."

The District S. of Caherciveen.—From Mr. Kinahan's notes it appears that a great anticlinal curve in the Old Red rocks run with an E. and W. axis along the S. side of the Caherciveen valley. The beds on the S. side of this curve, with southerly dips varying from 30° to 70°, appear to form the highest ground on the ridge which runs from the hill called Aghatubrid to Caunoge as well as the adjacent slopes of the valley of the Inny, while the Caherciveen valley, and the spurs which project into it from the ridge, are formed of the beds belonging to the N. side of the anticlinal; the dip of these is not, however, nearly so regular as on the other side of the curve, many undulations and contrary dips occurring in them, which conceal the thickness of the rocks on this side; but on the other there are sections near Knockavohaun and Foilclogh, which measure from 6,000 to 9,000 feet. The rocks all over the high ground consist of promiscuously interstratified purple, reddish purple, and green grits, sandy grits, and gritty slates, with sometimes a calcareous band; they are often intersected by cleavage planes striking E. 20° or 30° N., and either vertical or dipping at such high angles as 70°, 75°, or 80°, to the N. A good deal of purple and gray slate dipping to the N. occurs in the neighbourhood of Caherciveen, and on both sides of the river there the cleavage dips S. 20 E. at 60° and 70°.

All round the coast from Aghagadda, by Portmagee, to Dromgour, contorted purple and green slates are frequently seen, having, however, an undulating general dip to the S.E.

In the cliff to the S. of Dromgour, which is the highest sea-cliff in this district, being 867 feet above the level of the sea, there is a mass of rock that looks like a greenstone dyke. Puffin Island is chiefly composed of purple gritty slates, which are well exhibited in the cliffs all round it.

From Puffin Sound to Pointanaranna the rocks are almost entirely green and purple slates, having some curves and undulations, but still a general dip to the S.E. at from 40° to 60°. Eastward of this are more purple and green slates, with some grit beds and a few beds of trap-rock. To the southward of these, as far as Reenacashlane, the beds seem to consist entirely of purple slates, with an occasional grit bed, and an interbedded mass of greenstone; but still further S. than the place above-named, gray and green grits occur. Near this, too, there is a vein of quartz, two feet six inches thick, running with the beds. Farther southward purple and gray slates predominate, with one or two beds near Cangarriff Point, which appear to be of igneous origin. To the S.E. of Cangarriff Point the tracks apparently of crustacea were observed in some purple gritty slate rocks; and the cleavage in the slates, which here was nearly vertical, was found to strike N. 25° E. To the S. of Ducalla Head there are some undulations in the beds, and from this in a south-easterly direction; the rocks on both sides of and forming Bolus Head are purple and purplish-gray slaty grits, with a number of calcareous beds. The latter are usually brecciated, containing pieces of purple

and red grit and slate in a calcareous base. From this along the S.E. coast of the headland, and even on to Dungeagan, including the Horse Island, reddish and purple grits and slates, with some beds of calcareous breccia, are the only rocks to be seen.

From Bolus and Canuig Mountains northwards, nearly to Kilkeaveragh, a vast thickness of purple grits and slates, with occasional green bands, seems to be exposed, with steady dips to the southward of 50°, 60°, 70°, and even 80°, so that there is an apparent thickness of 13,000 feet. Here, however, this appearance is certainly deceptive, for on the shore the beds may be seen to be thrown into numerous contortions with inclined axes, so that the beds are frequently inverted.

From Kilkeavearagh eastwards the lower portion of these beds appears to run steadily on by Teeraneeragh and Derreen Bridge (where, however, their strike changes a little,) to Kilpeacon cross-roads, and on to Aghatubrid.

The Skellig Rocks.—The Skelligs exhibit the general inclination of their beds, even from a very considerable distance. On a nearer approach, however, according to Mr. Kinahan's observations, these will be found to undulate, and to be cut up by faults. At the landing-steps on the Great Skellig there are green and purple grits lying nearly horizontal, but with a slight dip to the N., underneath these, are green and purple gritty slates dipping N.N.E. at 20°; and in the purple beds among these there are annelid tracks about as thick as whipcord. South of this the beds flatten, and at Crosscove they dip to the S. at 50°, consisting of green and purple gritty slates. In this cove there is an E. and W. fault, and to the S. of the fault are some good purple slates, dipping S.W. at 10°. To the N. of Blue Man's Rock there is another fault which runs nearly N. and S. Westward of this fault, and to the N. of the Lower Lighthouse, there are purple slates full of calcareous layers and patches, some of which look likely to contain fossils. To the S. of the Upper Lighthouse these beds turn over in an anticlinal curve, the axis of which runs nearly E. and W. Under the Lighthouse there is a synclinal curve, and a little to the N., at Glengarriff, is another anticlinal fold. At the Spit the beds dip S. at 50°. The cleavage at this place in purple gritty slate is nearly vertical, its strike being E. 25° N. Nearly at the summit of the eastern portion of the Great Skellig are two springs which rise on the line of a fault, a catchment being formed for them by the trough of a synclinal fold. The fault seems to be the same as that which runs to the S.W. from Blind Man's Cove.

In the Little Skellig the rocks are of the same description as those of the Great Skellig. At the N.W. corner of the island a natural arch is formed by an anticlinal curve in the rocks, the inside beds of the curve having been carried away by the action of the sea. At the S. of the island, near the landing-place, one bed is full of specks of copper ore, and the face of the cliff in which it occurs is stained by the green carbonate of copper.

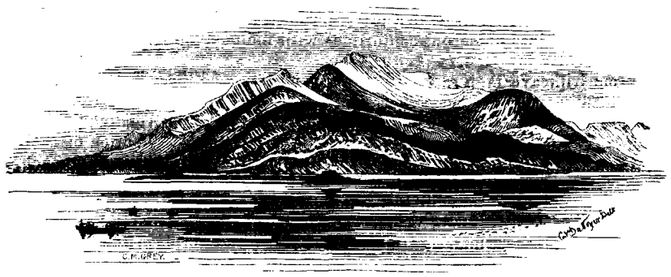
Lemon Rock is formed of purple grits dipping to the W.N.W. at 50°.

The Inny and Cummeragh Valleys.—The narrow ridge between the valley of the Inny River and that of the Cummeragh River is, according to Mr. O'Kelly, composed almost entirely of purple and reddish-purple grits and gritty slates, with some greenish beds. They undulate a good deal at its S.W. end; but further up, in the neighbourhood of Coomduff Mountain, their direction corresponds with that of the ridge, and they dip to the N. at various angles. On each side of this ridge the rocks are concealed under great accumulations of local drift, forming widely-spread undulating mounds.

The Darrynane District.—From Mr. O'Kelly's observations on this district it appears that at the S.W. termination of the Coomakista ridge the rocks make a bold sweep curving from the W. to the S., and then to the E., their inclination changing with their strike from a south-westerly dip, which they have at the S. side of Lough Currane, at Lough Dreenaun, on Trusk Mountain, Cooma-

kista, Beenarourke, and at Hog's Head, as well as from the latter to Darrynane Abbey and Caherdaniel, to a south-east and easterly inclination, which they exhibit in Lamb's Head, and thence over all the country about Westcove, and from that place to the country about Sneem which has been already described. The beds consist entirely of purple grits and gritty slates. On Lamb's Head, and along the shore to Knocknaskullig, they are a good deal

Fig. 4.



View on Lough Currane, looking east.

contorted, but dip generally to the eastward. On Scarriff and Deenish Islands the rocks are chiefly purple slate and coarse purple grit, with some hard green beds, and the occurrence of a number of calcareous bands in the fine cliffs at its S.W. side, together with a similarity of dip and strike, would lead to the conclusion that these are continuations of the beds forming Bolus Head. To the E. of Castlecove, on the mountain above Liss Cottage, and upon Coad Mountain, the rocks are chiefly purple grits, with very few green beds; they undulate a great deal, but may be said to have a general dip to the E. of S.

About Coomrooanig Lake, which is shut in on all sides but the N.E. by high cliffs, near Windy Gap and Eagle's Nest, and from thence to Esknalahoge, similar rocks are to be seen.

Knockeeline Mountain, between Loughs Currane and Isknamackteery, is formed of strong purple grits, with some beds of dark purple and green slate, making a great synclinal curve. On the N. side of the mountain the dip is to the S.S.E., and on its S. side in an opposite direction, while to the eastward and in the neighbouring glen the beds have a low inclination to the W.

Having now mentioned in detail the principal exposures of these rocks all over the district, the *Carboniferous slate* rocks near Sneem will next be described, and then the Coal Measure rocks to the north.

Carboniferous Slate.—Lying conformably on and within the basin formed by the Upper Old Red sandstone rocks around Coongar Harbour, east of Sneem, are a quantity of gray, dark gray, greenish, and blue, siliceous grits, with some gray and ferruginous flagstones, and beds of much cleaved splintery black slate, the whole being folded and bent into a number of contortions. Some of the siliceous grits when contorted exhibit bold curves; a remarkable example of one of which occurs at Lough Fadda, close to the east margin of the map. For the length of nearly half a mile along the north side of the lake the same bed may be distinctly seen, quite uncovered by any others, bent into a curve, so as to resemble the side of a great ship, keel uppermost. After making two open curves in contrary directions, it dips vertically into the lake. A small fault seems to cross the run of this contortion at its western end.

Small rusty cavities and concretions are numerous in these rocks, and some fragmentary impressions of plants were obtained from the river above Tahilla Bridge. They occurred in dark bluish gray sandstone, and were only observed where, owing to a bend in the rocks, the cleavage and stratification appeared to coincide. The whitish grits in this basin are obviously the same as those which have been called the Coomhola grits, near Bantry. Wherever a steady section could be observed, the succession in a descending order from these gray beds to the Old Red sandstone was found to be as follows :—

Carboniferous Slate, thickness unknown,	Blackish blue slates and dark gray grits. Greenish and blue grits and slates, with gray ferruginous grits. Olive gray and blue grits and slates. Strong greenish gray grits.
Upper Old Red sandstone, about 1,200 feet,	Gray grits. Purple slates. Gray and greenish siliceous grits, with calcareous patches and beds. Greenish speckled grits, with purple slates and reddish purple slates. Gray siliceous grits.
Old Red sandstone, thickness unknown, but over 12,000 feet,	Purple sandy slates, with some greenish grits and slates. Strong purple grit and dark purple slate, with an occasional green bed.

The fault, with a downthrow to the W., previously mentioned, cuts off the eastern end of the basin, bringing its contorted beds against the strike of the purple grits of the Old Red sandstone, (part of this fault only is seen within the limits of Sheet 191); while the western end of the basin is made suddenly wider by the occurrence of another fault,* with a downthrow to the W. running through the Roman Catholic Chapel W. of Tahilla.

These rocks occur again to the south-westward, forming Sherkey and three other islands between it and the shore. On Sherkey Island the dips are chiefly to the N.W. at high angles. The central and highest part of it is composed of a few vertical beds of gray siliceous grit, forming what is called the Cannon-ball Rock, upon which a large mark is shown, said to have been made by a cannon-shot from a Man-of-War lying in the river outside the island, which failed to shatter this natural wall, although it is in this part comparatively thin, being only composed of a few beds of rock, some of which have separated from the others in consequence of the action of the weather. Contortions occur in several places round the shore, and the beds are chiefly grits of a gray or greenish gray tint, with beds of dark gray, bluish, and black slate. Ribband slates also occur, and some of the grits contain calcareous patches, and patches of black slate. In some pale muddy-looking beds at the E. end of the island plant impressions were found; and the markings of annelids or molluscs were observed in some flags along its north shore.

Between Sherkey Island and Illaunandan a fault is proved to exist by the contrary dip of the beds, and the fact, that in the latter they consist entirely of purple, reddish purple, and purplish gray grits and slates, with beds of calcareous breccia, containing patches of cleaved purple slates. A fault or faults is also supposed to exist beneath the sea between the other three islands and the mainland, and Garinish and Potato Island: as in neither position nor lithological character do their beds correspond with those on the mainland and the two last-named islands. No higher beds than these are seen at this side of the district; but a rock called the Maiden Rock, near the middle of the river, off Rossmore Bullig Point, is said to be composed of limestone.

d^2. *Carboniferous Limestone.*—This is believed to underlie a large portion of the flat country about Lough Yganavan, on the south side of Castlemaine

* This fault seems to be continued to the northward, along a peculiar feature or small cliff, along the face of Askive Mountain.

Harbour, as it occurs in continuation with some low country to the east, in which Carboniferous Limestone is known to exist. At one place, where the blue colour appears on Map 172, a large filled-up quarry was said to have been opened in the limestone.

d^{s}. *Coal Measures.*—These rocks form some high ground in the vicinity of the place last indicated. They were seen in two places close to where the road from Tullig joins that from Caherciveen, and consist of dark blue and gray gritty shales, which are contorted, but have a dip in one of these places to the W. at 40°. In the other they seem to dip more towards the S. at a high angle. The beds are black shale, such as always, in the S. of Ireland, form the bottom shales of the Coal Measures, resting immediately on the limestone.

A. B. W.

Igneous Rocks.

D. *Greenstone.*—The igneous rock is found only about Valencia Harbour, and a few other points along the west side of the district.

Upon the mainland and a part of Beginish it is contemporaneous, and on the rest of this and the island of Valencia it is intrusive. The lowest place stratigraphically at which it was observed is Coosnatarabaunia, south of Beennakyraka Head, on the west side of the island of Valencia. It is only seen on the coast here cutting through the aqueous rocks, which undulate nearly horizontally, with a slight general dip to the E.N.E.

Farther eastward, at Trawnagaunaun Bay, between Reenadrolaun Point and Valencia Harbour, a dyke of greenstone, perhaps in continuation with that just named, occurs close to Lacknabau, and may be traced at low tides across the bay, and from thence eastward to the sea cliff at the N. wall of Glanleam demesne. The greenstone of all these localities is very much alike in composition and appearance. At Lacknabau the slates to the S. of the dyke are nearly horizontal, and close to the trap they are more or less altered. The N. side of the dyke is very much weathered, but when it is broken into, the greenstone is found to be ashy-looking and of a light green colour. Towards the centre of the dyke it is more compact, with scoriaceous patches and quartz veins, while at the S. side it contains patches of slate caught up in it. At Glanleam the trap is generally compact and dark, but in places lighter coloured. It contains partings of black hornblende. The horizontal slates on the N. side, adjacent to the trap, are much altered, and the dyke crosses them nearly at right angles, lying partially on the top of some of their beds. A smaller dyke of ashy greenstone leaves the main one at its S. side, just S. of Trawnagaunaun Bay.

The traps on Beginish Island show a general succession of six different beds of rock, as will appear from the following general sectional table: the rock occupying the lowest position having the first number attached to it.

General Table.

VI. Trappean breccia.
V. Felstone.
IV. Greenstone (Felspathic).
III. Felstone.
II. Greenstone ash.
I. Felstone.

At the west side of Beginish, and E.N.E. of Cloghavallig rocks, under the greenstone (No. IV.) a large mass of altered slate, about twenty feet in stratigraphical thickness is seen. This is changed into a rock closely resembling a hornstone.

Further on to the north of the island the following section occurs :—

Section 1.*

6. Large mass of greenstone, No. IV.
5. Altered slate, a sort of hornstone.
4. Greenish white felstone, No. III.
3. Slate slightly altered, in which there is a thin irregular *dyke* of greenstone about nine inches wide.
2. Greenstone ash, No. II.
1. Purple and green slate.

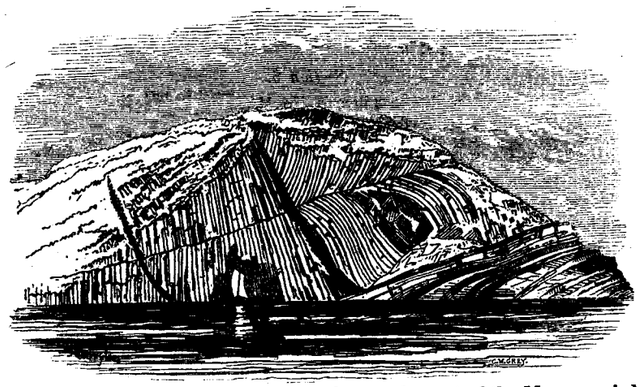
South-east of this, on the coast at Mulleen, the order of succession in these rocks is as follows :—

Section 2.

7. Bedded greenstone, No. IV.
6. Altered slate.
5. Nearly black compact felstone, No. III.
4. Greenstone ash, No. II.
3. Altered slate, a sort of hornstone.
2. Greenish compact felstone, No. I.
1. Altered slates and grits.
Intrusive greenstone.

Between these two places, the greenstone (No. IV.) is columnar, the columns being generally parallel, but also curved in places, so that in the cliff section they sometimes present obliquely their broken ends, and sometimes their sides to the spectator, while for a considerable space they radiate slightly from a point at the top of the cliff, being in places nearly vertical, as seen in the annexed sketch, which was taken from the sea westward of Lamb Island.

Fig. 5.



Near where the C of Caher is engraved upon the part of the Map occupied by this island, the following succession is seen at a place called Goats' Rock :—

Section 3.

5. Large bed of greenstone, No. IV.
4. Altered slate.
3. Greenish felstone, No. III.
2. Greenstone ash, No. II.
1. Slates and grits.

* In these sections the rocks are placed in order of super-position and numbered in order of time.

At the east end of the island, and east of the point marked 102, the following section occurs :—

Section 4.

6. Purple slate.
5. Greenstone ash, No. II. ?
4. Altered slate.
3. Whitish blue felstone, No. III. ?
2. Altered slate.
1. Large bed of greenstone, No. IV.

In none of these sections, except the last, are there found any beds above the greenstone (No. IV.), and, indeed, no higher beds seem to occur upon the island ; those which appear to overlie it in the last section being quite similar to the underlying ones with the same numbers in the other sections, where the rocks are conformable, and being apparently brought into their present position by a sharply inverted fold. Should this, however, not be the case, they will probably be the representatives of the traps, Nos. V. and VI. in section No. 6.

On the mainland, at Laght Point, the traps are interstratified with the Old Red rocks, in the way shown in .

Section 5.

5. Purple and green slate.
4. Felstone, No. V.
3. Altered Slate.
2. Large bed of greenstone, No. IV.
1. Altered slate.

These beds dip at a very high angle to the north, and half a mile to the north of Laght Point the same traps are again met with, rising from beneath the Old Red sandstone beds at an equally high angle, and sharply bent and contorted. They consist of

Section 6.

4. Trappean breccia, No. VI.
3. Compact felstone, No. V.
2. Greenstone, No. IV.
1. Columnar bluish compact felstone, No. III.

Two similar sections, without the lower felstone No. III., are shown among the contortions at the N. side of Bealtra Bay, and N. of Sampson's Rock.

The greenstone at the S. side of the mass occurring at Laght Point is very crystalline, containing minute crystals of iron pyrites. A little to the N. it becomes still more crystalline, and at the N. side of the exposure changes into a beautiful porphyry, becoming ashy as it approaches the slates, which are altered for a vertical thickness of about fourteen feet.

Upon the shore at the N. side of Bealtra Bay, and N. of Sampson's Rock, trap No. IV. is found near Coosheenboy, forming the interior of an anticlinal curve. The lowest part of it seen is generally very compact, and contains small scales of black hornblende, veins of asbestos, and crystals of iron pyrites. Besides these there are patches of a light green colour, some of which have a marked oolitic structure. The upper part of this greenstone is very ashy looking. Overlying it there occurs a bed of flaky and ashy hornblendic felstone (No. V.), which is very well seen on the S. side of the curve at low tide. Next in an ascending order is a bed of trappean breccia (No. VI.), the lowest portion of which has the appearance of a reddish purple conglomeritic grit. Above this are purple and green grits and slates. A little to the S. the same beds of trap are again seen in another anticlinal curve; but what is at the N. side of the last a hornblendic felstone has here become changed into a compact felstone, with a nearly vertical dip to the N., while the breccia

which underlies it on the opposite side of the contortion dips S.E. at 25°. The traps last mentioned cannot be seen except at low tide.

At the south of Bealtra all the beds seen are well developed. The trappean breccia (No. VI.), seems to be thicker than usual; but this may be owing to its lying at a low angle; the felstone No. V. has a thickness of about twelve feet; the greenstone No. IV. one of about 200 feet; and the felstone No. III. is fifteen feet thick. The trappean breccia contains pieces of felstone, greenstone, slate, and grit, and is intersected by quartz veins. The trap No. V. is a whitish blue compact felstone; and the greenstone No. IV. is very like that on Beginish, &c.; but here there are in places pieces of altered slate caught up in the mass—it is slightly columnar. The felstone No. III. is of a light blue colour, compact in its texture, and markedly columnar. Overlying all these beds are green and purple slates. The great difference between this section and those on Beginish Island is that the greenstone here lies immediately on the felstone, while in all the other sections altered slate intervenes between the two. The greenstone and breccia can be traced eastward to the N. of Ballycarbery Castle, till they are concealed by a bog; but neither of the felstones are to be found except on the shore, and seem indeed to die out within a short space, as they are not met with afterwards. The outcrop of the bed of greenstone and breccia is shifted about 400 feet to the S. by a N. and S. fault, which runs up the valley to the west of Ballycarbery Castle.

At the north of White Strand there is a patch of trappean breccia, which seems to be local, and to blend with or pass into the purple slate.

The traps at the east end of Beginish are believed to be the continuation of those on the mainland at Laght Point, and at the south of Bealtra. They are perhaps situated at the end of an inverted curve ; the lower bed of felstone No. III., and the bed of greenstone ash No. II., lying uppermost, and dipping east at an angle of from 15° to 20° ; the mass of the greenstone is very like that on the mainland, and is more or less columnar. The felstone, at its southern extremity, seems to change into a breccia full of quartz pebbles. At the south of this part of the greenstone No. IV., and to the N.N.W. of Canganniv, there is a bed of ash, which must either be No. II. or the representative of No. VI.

There are two reasons for supposing it to be identical with No. II. First, if, as was just now supposed, the beds lying on the top of the greenstone No. IV. are those which ought to underlie it, in the absence of a contortion, then the greenstone ash may occur here in its proper place, and a true succession be represented in an inverted order. Secondly, these beds may be the representatives of Nos. V. and VI., and the ash be thus in its proper position. This greenstone ash might also, with equal probability, represent No. VI., if it were here supposed to be turned undermost by an inverted curve.*

Three dykes cross the mass of trap on Beginish Island ; two running from the N., in a south-easterly direction, and one running nearly E. and W. through and out of the trap into the altered slate before mentioned.

Besides these, there is a trap dyke in the altered rocks at the N.W. of the island, and a little to the S. of it a wedge-shaped mass of trap seems to have

* It is clear, from an examination of these igneous rocks and their derivative breccias and ashes, that they were injected into the Old Red sandstone during its formation, some of them being ejected on to the floor of the sea and covered by other subsequently deposited beds of Old Red sandstone. They have since suffered from all the accidents of disturbance that have affected the formation, and been bent into contortions and broken by faults with it. The trap beds of Laght Point and the point to the north are certainly in a synclinal trough, the sides of which are nearly vertical, and the traps of Beginish are the bottom of that trough rising out towards the west, and dipping at a gentle angle towards the east. It seems to me to be more likely that occasional irregularities should occur in the order of the beds than that the beds at the east end of Beginish should be inverted, even if inversions do take place on the opposite coast.—J. B. J.

been injected into the lower beds. All these appear to have been contemporaneous with the large bed of greenstone No. IV., and what seem to be dykes running through the mass are probably places where cracks occurred in the parts which first consolidated; these cracks being afterwards filled by fluid igneous matter from below, which may have cooled at a different rate and with a different consistency from that of the containing rock. These dyke-like portions are about 18 inches wide, and are filled with a nodular greenstone. The other dykes would appear to be cracks and fissures filled by the molten matter, of which the large bed is formed.

At the N.W. of Coarhacooin there is the following section in beds which are nearly horizontal:—

Section No. 7.

6. Greenstone, No. IV.
5. Altered slate.
4. Light green felstone, No. III.
3. Altered slate.
2. Greenstone ash, about five feet thick, No. II.
1. Purple gritty slate.

Between Coarhacooin and Goats' Rock the trap has been denuded away across the island, exposing the under beds. On the south side of the trap which occurs next, north of Fish Point, the slate seems to dip under it at an angle of about 75°, but the junction of the greenstone with the slate is not perceptible. On the north side of the trap the rocks occur in the following order:—

Section No. 8.

4. Greenstone, No. IV.
3. Altered slate, about ten feet.
2. Greenish white felstone, four feet, No. III.
1. Purple slate.

The rest of the section is concealed by surface deposits, coarse gravel, &c. The greenstone here has all the appearance of being the same as that on the opposite coast of Valencia Island, north of Glanleam.

The bed of greenstone No. IV., contains a variety of minerals, especially to the W. of Beginish, and on the mainland, such, for instance, as quartz, hornblende, asbestos, wavellite, partings of opal, and iron and copper pyrites.

The following is a summary of the traps ejected at the different periods of igneous action, which have been in operation in this neighbourhood:—

First.—A greenish white compact felstone; this must have been very local, as it is only met with at Mulleen.

Second.—Greenstone ash, which was widely distributed, as it is found east and south of Canroe, Mulleen, all along the north of Beginish, at Coarhacooin, and at Goats' Rock, The only places in which it has no representatives are at the north of Fish Point, and on the mainland.

Third.—Felstone; this is of different colours in the several places where it was met with; it is generally separated from the last, No. II., by a bed of altered slate, but sometimes it lies on the top of No. II. without anything intervening. Over it a bed of altered slate is always to be found, except at the south of Bealtra, where it is of a blue colour. At Mulleen it is nearly black, and at all the other places it has either a light greenish or a flesh colour. On Beginish, and the mainland, wherever there was a section of the lower beds, this one was found.

Fourth.—A greenstone, more or less feldspathic. This formed the greatest mass of matter erupted; and its centre of ejection seems to have been somewhere between Lamb Island, the Black Rocks, and Mulleen, at the east of

Beginish. The former eruptions would also appear to have proceeded from near this place, as all their flows are represented in the section south of Mulleen, and in no other section were the whole of them met together.

Fifth.—A felstone, which is found lying on the top of the greenstone, at the localities to the north and south of Bealtra, but is not found inland. At one place north of Bealtra, as before mentioned, it is hornblendic, but everywhere else it is a compact dark bluish or purplish felstone.

Sixth.—The ash or trappean breccia which was spread over the top of the last.

Besides these traps, there is a bed to the west of Trawnagaunaun at Lacknabau. It is of a very slaty nature, and a light green colour, having much the appearance of an altered slate. It may be seen at three places; at Lacknabau, and twice between that point and Reengarriv.

Two beds of trap, one a greenstone and the other a felstone, occur on the north coast of St. Finan's Bay. The felstone lies north of Keel Point, and is of a whitish blue colour, with a thickness of twelve feet. Inland, at about half a mile to the N.N.E. of the Roman Catholic Chapel, this bed was again found, differing slightly, however, from where it was first observed, and being at the top of the bed flaky ashy, and, in places, very like Serpentine, having a bluish olive-green colour. The slates beneath this bed are slightly altered. This felstone is not traceable, either to the S.W. or N.E., the ground in these directions being covered by superficial deposits.

A greenstone bed is situated nearly half way between Pointanaranna and Keel Point; it is best seen in the face of the cliff. Westward of this, near Puffin Sound, there is what appears to be a greenstone dyke; it could only be found in the cliff over Ferry Rock.

A mass of greenstone also occurs north of Cangarriff at the E. side of St. Finan's Bay.

A small dyke of what was believed to be ashy greenstone, occurs about a mile and a half N. of Aghatubrid, and between Lough Rehill and Caherciveen, along a line running about E.N.E. and W.S.W.

G. H. K.

6.—*Drift, Bog, and other Superficial Deposits.*

Drift.—The drift of this district is composed of the intermingled *débris* of the local rocks, in the form of boulders, gravel, sand, and clay. Its distribution and thickness are both irregular and inconstant, but a large portion of the mountain country is covered with it, and it will be found spread over all the flat ground at the N.E. corner of the district, in the bottom of Glanbehy, and on the lower slopes of the surrounding mountains. It will also be found in similar positions in the valley of the Inny, and at the openings of many of the mountain glens, as well as near Waterville, at the south sides of the Beenarourke and Coomakista mountains, and upon the island of Scariff.

About Rossbehy the drift can be seen in many gullies and streamcourses near the bases of the mountains, and some sections in it are exposed by the low sea-cliffs of this neighbourhood. As usual, it is found to be composed of a variety of fragments, with some large boulders, many coarse grains of quartz, and a large amount of clay. Many of the "*running field-stones*" found on the ground, coloured upon the Sheet 172 as Coal Measures, are composed of the hard grayish grit rocks so common in that formation.

Along the beach, at the foot of Knockatinna and Knockboy mountains, westward of Lady Headly's Bathing-lodges, many boulders of limestone are scattered amongst the ordinary grit ones of which the beach is composed. The drift in the Old Red sandstone districts consists chiefly, if not solely, of fragments of that formation. It is believed, therefore, that the drift deposits of this district are almost entirely of local origin.

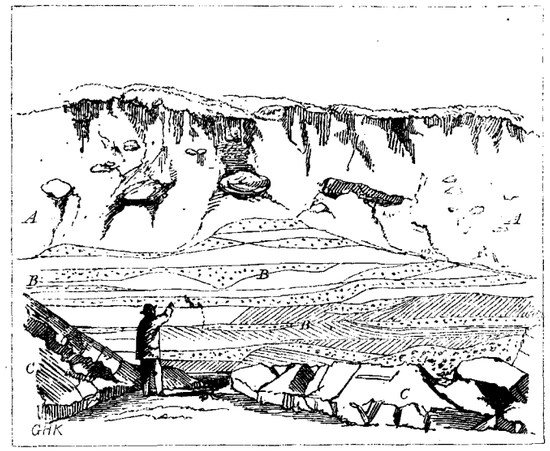
Eastward of Reenard Point and the Valencia Ferry, at the west foot of Beentee mountain, the drift is over twenty-five feet deep, but in other places it is much more shallow.

Upon the mainland at Laght Point, and also upon Beginish Island, there occur deposits of fine drift sand, traces of which are also to be found on the Island of Valencia.

On the shore, at the north side of Ballinskellig Bay, near where the height of thirty-eight feet is marked, a low cliff section of the drift is exposed, which there consists of an obliquely laminated recent conglomeritic sandstone, B, B, over six feet thick, lying upon the grit rocks, and underlying twelve feet of the usual boulder, clay, and gravel, A, A, which forms the drift of the country.

The annexed figure is from a sketch taken by Mr. Kinahan at this locality, looking towards the west.

Fig. 6.



The stratification of the conglomeritic sandstone is nearly horizontal, the beds appearing to have been under the influence of a denuding agency after they were deposited, as they sometimes end suddenly, their place being taken by local drift of the same kind as the unstratified overlying deposit.

Sections in the drift also occur on the coast near Waterville, between Lough Currane and the sea, to the N.W. of Darrynane Harbour; on Scarriff Island, and on the W. side of Rossdohan Island to the S. of Sneem. In the latter place it presents a precipitous escarpment to the W., having a height of nearly 120 feet; and, being apparently the portion left by erosion of a large local mound of drift, such as that on which the Glebe House, near Sneem, is built, or that from which Dunkilla Fort overlooks the narrow strait by which the sea enters Drongaun Lough, near Coongar Harbour. A small morraine-like mound of drift occurs in the pocket of Coomliminy; and at other places there are local accumulations of large masses of rock, such as those near Lough Eagle in Coomanassig, which are piled confusedly together in such a way as to render their having been brought by the agency of ice a very strong probability; and, indeed, more than a probability, when it is stated that glacial smoothings and striæ occur upon the surfaces of the rocks, in the latter Coomb higher up than these transported masses. The traces of glacial

action are to be found in many other parts of the district, as on the W. side of Caragh Lough, to the N. of Glanleam on Valencia Island, and to the N. of Formoyle Castle, near Emlaghmore House, where the rocks are scored in more or less nearly N. and S. directions. A transported boulder, too, weighing, perhaps, fifteen tons, and consisting of greenstone, which is not there the local rock, and which was probably borne to its present site by floating ice, lies on the W. face of Coomcarrea mountain, near the end of an old farm road, which terminates at one of the tributaries to the river Ferta.

In the neighbourhood of Caherciveen, and along the N. side of the promontory, the mountain slopes are frequently covered by a deposit consisting of angular shingle, derived from the wearing down of the slaty rocks of the neighbourhood rather than by the more finely pulverized and mixed deposit of clay and gravel, containing boulders which constitutes the ordinary drift.

Bog.—Over most of this district there extends a covering of peat which varies from a few inches in thickness upon some of the mountains to a depth of fourteen or fifteen feet in the valleys, and is sometimes observed to be even deeper on the tops of the hills than on their sides. The bogs often contain the fallen trunks, branches, and also numerous roots of large trees. Two layers of the latter occur in a small bog to the E. of Ballycarbery Castle, between Caherciveen and Valencia, showing that sufficient time had elapsed to allow a thickness of one foot six inches of peat to accumulate over the first, before the second layer began to grow.* A similar fact was noticed at the S. side of Valencia Harbour, opposite to Reennagappal.

In a bog on the island of Valencia, a stratum of white peat was observed underneath the brown turf which had the consistency of soap, and when dry was sufficiently bituminous to burn with a clear bright white flame. It was very local, and has been entirely cut away.

The turf cut upon the hills is generally rich in tar, particularly that on the tops of those adjoining Dingle Bay.†

The surface of the country round Sneem is stated once to have been a smooth turf bog, but this having been drained, the bog sunk, so that ridges of the rocks corresponding in direction with the strike of the beds, now project above its surface. Subsequently to the deposition of the drift and accumulation of the bogs, two actions, one of elevation and the other of depression, seem to have occurred in parts of the district, if not over the whole of it. In consequence of the former, a thin bed of oyster and other shells has been raised from beneath the sea to above high-water mark, along some of the shores of the Kenmare River (not within the limits of Sheet 191), and on the Island of Garinish, near Sneem, a somewhat similar bed occurs close to the landing place. Owing to the latter action, the sea at Reenagappal, in Valencia Harbour, flows at every tide over part of the bog which so extensively covers the mainland. This could not have been formed in the situation it now occupies, beneath the sand at low-water mark, but must have grown above high-water mark, thereby showing a depression of at least twenty-five feet to have taken place. A portion of the boggy flat at the N.W. corner of the map, as has been already stated, is laid under water by the higher tides.

Two kinds of sand occur along the shores of the district; the one a fine blowing sand, such as that forming the sandhills upon the two long spits

* A tradition exists in this country to the effect that it was all at one time densely wooded; and it is stated that any part of the mountains would still, if enclosed, naturally produce small timber, consisting of oak, holly, &c., &c., although in many places along the coast it is difficult to rear even the most hardy trees.

† I have observed, when turf was being cut on these bogs, little streams of tar, which had replaced the interiors of small tubes formed by the decay of the roots of plants, oozing and trickling out of the freshly made faces of the banks.—G. H. K.

which project into Dingle Bay and Castlemaine Harbour, and the other a coarser kind, containing, and, in a great part consisting of, commuted fragments of shells, such as that found at the White Strand between Westcove and Darrynane. Bluish muddy and white coral sand also is dredged in the Kenmare River, at the S. side of the district.

7. *Minerals, &c.*

The principal mineral occurring, distinct from the usual component parts of the rocks in this district, is quartz, which is frequently found in veins and strings, having generally the common white semi-opaque appearance of that mineral.

Cubes of iron pyrites, two inches square, have been found in some of the green gritty slates of Valencia Island, and of the mainland to the S.

On the island in the E. slate quarry of Tinnies Upper, the slate is overlaid by a bed of grit, five feet thick, containing a considerable quantity of disseminated gray copper ore. Another similar bed occurs again to the W., at Oughquick, N. of Beennakyraka Head. To the E. of Bray Head also indications of copper occur in the face of a cliff, and weather stains of green carbonate of copper were observed in a similar situation, near Clynacartan. Half-a-mile S.S.E. of this a large quartz vein, called Quaybrack, contains specks of copper ore. Unsuccessful trials were made upon a vein of quartz in search of copper at Garranearagh, W.S.W. of Beentee Mountain. Traces of copper also occur at Lamb's Head, and on the Little Skellig Island.

Specular iron ore occurs in a number of the quartz veins of the W. part of the district, and a very rich looking lode of this ore is situated on the coast to the N. of Ballycarbery Castle. Several minerals have been already stated to occur in the greenstone of Beginish Island.

8. *Mines.*

The only attempt at mining known to have been made in this district was at St. Crohan's hermitage, on the Coomakista ridge, between Lough Currane and Westcove which were examined by Mr. O'Kelly. There is here a quartz vein, eight feet wide, bearing E. 10° N., underlying N.N.W. at about 80°, and enclosing a number of fragments of purple grit, with spots of yellow and gray copper thickly interspersed through the quartz. This vein or lode may be traced in the above direction for a distance of nearly two miles, but is not, however, of equal size, nor does it always underlie in the same way throughout its course. At the most westerly of two old shafts, it underlies to the S. at 80°, having here a thickness of seven feet, while in some places the thickness is reduced to nine inches. Quartz veins are common in its neighbourhood. A little to the N. of this lode there is another, which appears to be very similar, has the same direction, and underlies to the N. also. Some Malachite is stated to have been found in these mines.

At Blackstones, near the S. end of Caragh Lough, are the ruins of a once extensive iron foundry, but where the ore came from does not appear.

A. B. W.

DUBLIN: Printed by ALEX. THOM & SONS, 87 & 88, Abbey-street,
For Her Majesty's Stationery Office.