

EXPLANATIONS

TO ACCOMPANY

SHEET 173 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PART OF

THE COUNTY OF KERRY.



DUBLIN:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE:

PUBLISHED BY

ALEXANDER THOM AND 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.

---

DIRECTOR-GENERAL OF THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM :  
SIR RODERICK IMPEY MURCHISON,  
D.C.L., F.R.S., G.C.ST.S., &C., &C.  
*Geological Survey Office and Museum of Practical Geology, Jermyn-street, London.*

---

IRISH BRANCH.

*Office in the Museum of Irish Industry, 51, Stephen's-green, Dublin.*

LOCAL DIRECTOR:

J. BEETE JUKES, M.A., F.R.S., &C.

SENIOR GEOLOGISTS:

G. V. DU NOYER, M.R.I.A.; W. H. BALLY, F.G.S.; G. H. KINAHAN, Esq.

ASSISTANT GEOLOGISTS:

F. J. FOOT, M.A.; J. O'KELLY, M.A.; A. B. WYNNE, F.G.S.;  
J. KELLY, Esq.

COLLECTORS OF FOSSILS, &C.:

MR. C. GALVAN; MR. A. M'HENRY.

---

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.

---

AGENTS FOR THE SALE OF THE MAPS AND PUBLICATIONS:

Messrs. LONGMAN, GREEN, & Co., London;  
Messrs. HODGES, SMITH, & Co., Grafton-street, Dublin;  
Messrs. ALEX. THOM & SONS, Abbey-street, Dublin.

# EXPLANATIONS

TO ACCOMPANY

SHEET 173 OF THE MAPS

OF THE

## GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PART OF THE

COUNTY OF KERRY.

### GENERAL DESCRIPTION.

The whole of the area included in this sheet of the map lies in the county of Kerry. The principal places in it are, Killarney, Killorglin, and Milltown, with the small villages of Castlemaine, Currans, and Scartaglin.

#### 1. *Form of the Ground.*

The S. W. corner of the district is occupied by the southern slopes of the range of the Reeks of Macgillicuddy and Purple Mountain, the highest summits within the limits of the sheet being Skreghbeg, 1,883 feet, with many eminences a little above or below 1,000 feet between it and Lough Leane.

The N. W. corner of the district is occupied by a small portion of the southern slopes of the Tralee Mountains, the highest point included in that area being one of 1,542 feet. The ground lying between these two mountain ranges, especially that immediately at the foot of each, is low and undulating, having an average height above the sea of little more than 200 feet, with a few elevations, however, here and there, rising to about 400 or 450 feet.

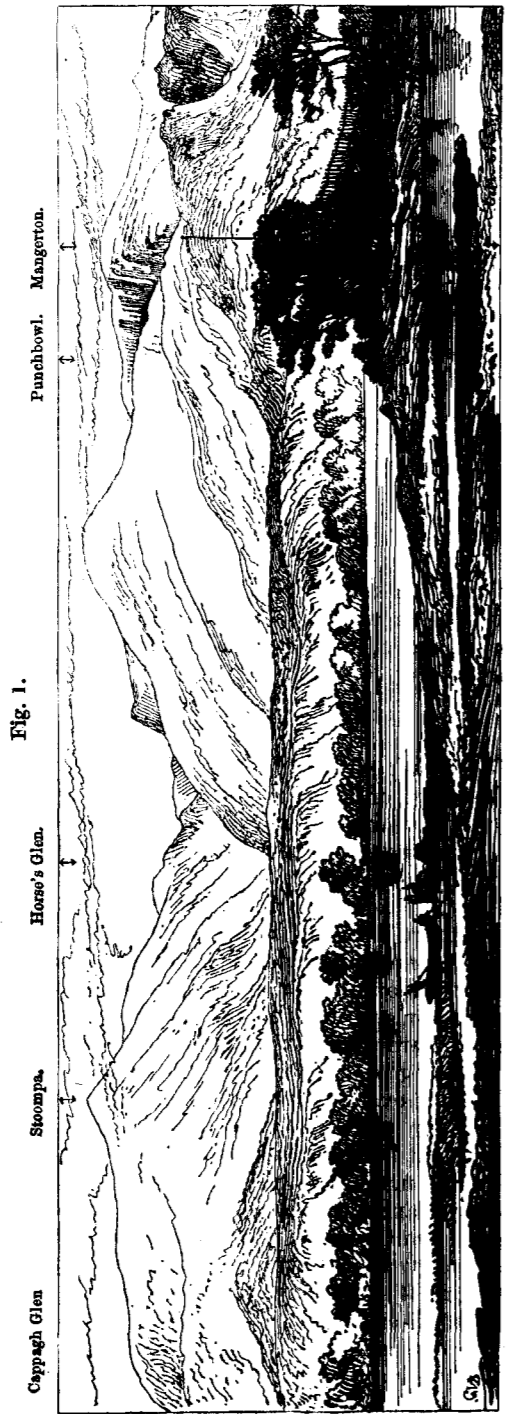
These elevations are in the central part of the district, on an undulating table-land that has a low but very distinct and steep escarpment both to the north and to the south.

On the north, this escarpment runs about E. N. E. and W. S. W. by Milltown, and forms the southern bank of the flat valley of the Maine River. On the south it is equally well marked, running just north of the road from Killorglin to Killarney, and forming the northern boundary of the flat land about Lough Leane (or the Lower Lake) and the River Laune.

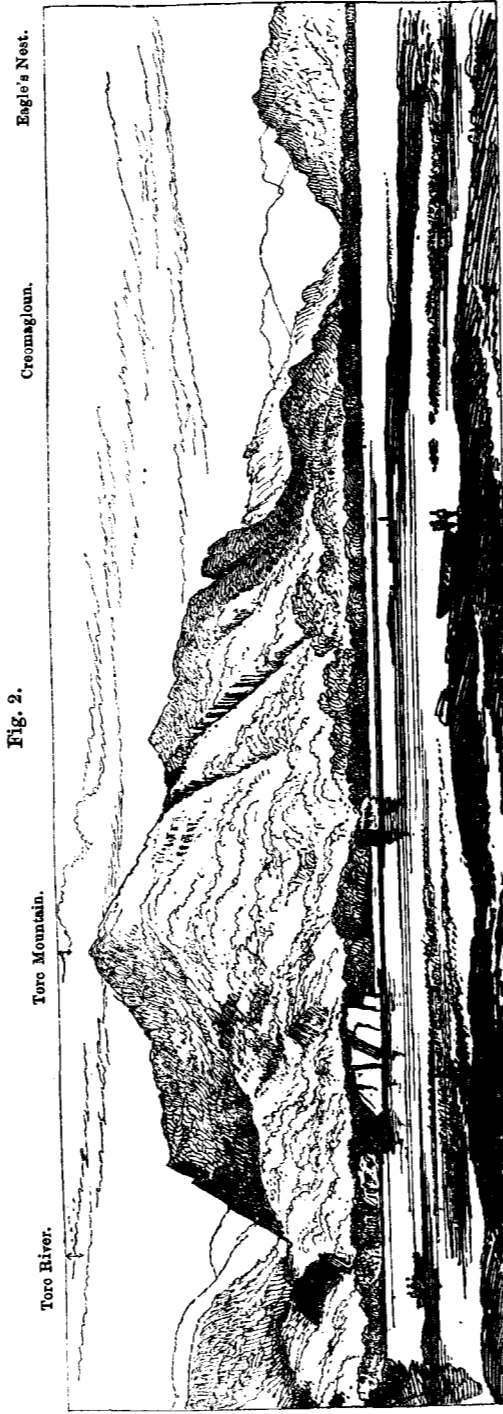
This central undulating district rises higher towards the east; so that between Killarney and Scartaglin it has two or three points over 1,000 feet in height, the highest being 1,085 feet.

The form of this ground, even where it rises to equal heights with the parts of the two mountain ranges before-mentioned, is nevertheless very different from theirs, and much less picturesque, the slopes being less steep and the ground being less broken, forming long, sweeping, barren-looking moorlands rather than mountains.

The river Flesk enters the district at its S.E. corner and falls into Lough Leane, a little S. of Killarney. It brings down into the lake the drainage of a large tract of mountain ground on each side of Glen Flesk, which is described in the Explanations of Sheets 184 and 185. This is the main feeder of the lake, though many small brooks contribute to it, either directly or through the medium of the Upper Lake. The largest of these brooks within the limits of the sheet is the Deenagh river, which falls into the lake a little west of Killarney. The level of the lake is stated on the Ordnance Maps to be sixty-five feet above the sea in summer, and seventy-one in winter. It is drained by the River Laune, which issues from its



View of the Mangerton Range from the Lake Hotel. Lower Lake, Killarney.



View of the Mangerton Range from the Lake Hotel. Lower Lake, Killarney.

western extremity and runs through flat land down to Castlemaine harbour, a little below Killorglin, receiving by the way several considerable brooks, both from the mountains on the south, and from the undulating table-land on the north.

The northern part of the district is drained by a large brook called the Brown Flesk river, which falls into the River Maine near Currans, where the Maine enters the district, and flows thence through the flat land past Castlemaine into the head of Castlemaine Harbour.

The so-called harbour of Castlemaine is choked with mud-flats and sandbanks, through which the rivers wind their way at low water.

The view of the Mangerton range of mountains, extending from Stoompa on the E. to the Eagle's Nest on the west, including Torc Mountain, as seen from the grounds of the Lake Hotel, at Castle Lough, is so striking that a sketch of it is given in the two accompanying figs. 1 and 2.

One of the most interesting geological features in this panoramic view (fig. 1) is the steep slope or es-

carpment of that great drift gravel and boulder deposit that rests against the northern base of the range. This forms the flat-topped bank which may be seen in fig. 1 to intervene between the lake and the foot of the mountains. This thick mass of drift conceals all the rocks along the base of Mangerton, Crohane, the Paps, and the Caherbarnagh Mountains, a distance of fully thirty miles. It seems to have been cleared away from the immediate margin of the lake, the flat land about Muckcross being nearly free from it, and the limestone surface coming out from under it. Neither does it appear on the islands in the lake, or on either of its shores; but it sets in again to the westward on each side of the Gap of Dunloe, and spreads thence very widely and deeply over the country between the mountains and Killorglin.

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

2. Formations, or Groups of Rocks entering into the Structure of the District.

AQUEOUS ROCKS.

	Name.	Colour on Map.
	Alluvium, Peat Bog, or other superficial covering,	<i>Pale burnt sienna.</i>
	Drift,	<i>Engraved Dots.</i>
Carboniferous.	d <sup>5</sup> . Coal Measures,	<i>Indian ink.</i>
	d <sup>4</sup> . Upper Limestone,	} <i>Prussian blue (pale).</i>
	d <sup>2</sup> . Lower Limestone,	
	d <sup>1</sup> . Lower Limestone shale,	<i>Prussian blue and Indian ink.</i>
Old Red Sandstone.	c <sup>3</sup> . Upper Old Red, or Yellow Sandstone,	<i>Indian red (dark).</i>
	c <sup>2</sup> . Old Red Sandstone,	<i>Indian red (pale).</i>

c<sup>2</sup>. *Old Red Sandstone.*—The rocks of this group which appear in the district consist of purplish red and liver-coloured sandstones, with hard shaly and slaty beds and a few conglomerates; the base of these latter being often calcareous, and approaching sometimes to an impure cornstone.

In the N.W. corner of the district cornstone bands, without the pebbles, occasionally appear amongst the thick purplish red and liver-coloured sandstones and shales. The thickness of the Old Red sandstone on the north is not ascertainable; but it has been computed at from 11,000 to 12,000 feet in the district lying to the south.\*

c<sup>3</sup>. The upper portion of the Old Red sandstone, to which the term "Yellow sandstone" has been given, consists of pale yellowish brown and brownish green flaggy, and sometimes quartzose grit, which, in the softer layers, are speckled with small, rusty particles, and pale greenish yellow, and dark purplish red shales. Plant impressions are common in the sandy slate layers of this group.

In the adjoining district to the north, Sheet 162, Mr. Foot takes the thickness of the Yellow sandstone at 600 feet. In that to the south, I have already estimated it at only 150 feet in Muckcross Demesne.†

\* See Explanation of Sheet 184, page 12.

† See Explanation of Sheet 184, page 21.

From the arbitrary nature of the lower boundary of this subdivision of the Old Red sandstone it is manifest that different estimates of its thickness must be formed by different persons. The characters which distinguish this group are merely a difference of colour from that of the Old Red sandstone and the occurrence in it of a few plant impressions.

d<sup>1</sup>. *Lower Limestone Shale.*—None of the beds of this group appear in the district at the surface, though a narrow band of them is represented as skirting along the top of the Yellow sandstone on the north of the map. These are introduced from inference, Mr. Foot having observed them at the eastern base of the Tralee Mountains, in the adjoining Sheet, 162, and described them as follows in his explanation to that map at pp. 8 and 11:—"The Lower Limestone shale consists of brownish sandy shale and greenish calcareous grits, much decomposed near the surface, and alternating with laminae of black shale. Its thickness appears to be as much as 400 feet. It abounds in Fenestellæ and some shells."

d<sup>2</sup>. *The Lower Limestone.*—This rock is generally compact and of a light gray colour; but here and there dark gray beds of granular limestone appear through it. In the southern part of the district the rock is pale gray, and often flaky in structure, an appearance which may possibly be due as much to a rude cleavage as to a fineness of lamination in the original deposition. At what appears to be the central portion of the deposit there occurs a band from fifty to seventy feet in thickness of pale pink, gray, and milky-white, thin, compact limestone laminae, divided from each other by purple and green, earthy, and non-calcareous shale, the whole forming a variegated-looking marble, and readily breaking up into thin, rough, flaggy masses. In some places the earthy portion of the deposit somewhat exceeds the calcareous part.

d<sup>4</sup>. *The Upper Limestone.*—The last 600 or 700 feet of the carboniferous limestone here is darker in colour than the lower portion, and often contains layers and nodules of black chert, especially in those beds nearest to the Coal Measures. Beds of dolomite, or masses of the rock metamorphosed into a magnesian limestone, also appear in this subdivision, and large Productæ are its characteristic fossils. The total thickness of all the limestone has been estimated by Mr. Foot, in his "Explanation of Sheet 162," at not less than from 1,500 to 2,000 feet; but, as he remarks, it is impossible to give the exact amount.

d<sup>5</sup>. *The Coal Measures.*—The beds of this group appearing in the district consist of black gray, and sometimes olive gray shales, which are very splintery, and often exhibit a distinct cleavage. Along with them are flaggy and occasionally thick olive-gray grits. The total thickness of these beds to the N.N.W. of Killarney may be about 1,000 to 1,200 feet; but, on the eastern margin of the map, they may increase to 1,500 feet.

3. Relations between the Form of the Ground and its Geological Structure.

The mountainous portions of the district on the N.W. and S.W. are formed of Old Red sandstone, the beds dipping generally towards each other, thus forming a wide and deep synclinal, in which rest,

first, the limestones, and then the Coal Measure. In the central part of this depression the limestones come to the surface, a result partly the effects of a local bulging of the rocks from beneath, and of the subsequent destruction of the Coal Measures, which once extended over this spot, by the effects of denudation. Without doubt this contortion in the limestone indicates the existence of a similar one in the Old Red sandstone beds beneath, and, therefore, the regularity of the great synclinal of those beds is here interrupted, and two smaller and nearly parallel synclinals formed. (See section, fig. 3.)

The occurrence of the Old Red sandstone on the N.W. and S.W. of the district is due, in the first instance, to forces of upheaval acting from below, which tilted up the beds over large areas, and subsequent forces of denudation acting on them for a long period have not only bared them of the Carboniferous rocks which once covered them, but eaten into the very centre of their mass. To this primary upheaval and long-continued subsequent denudation we owe the formation of the Tralee Mountains and those to the west of them, and the Reeks, Carrantuohill, and the entire mountain range which extends from them to the eastward.

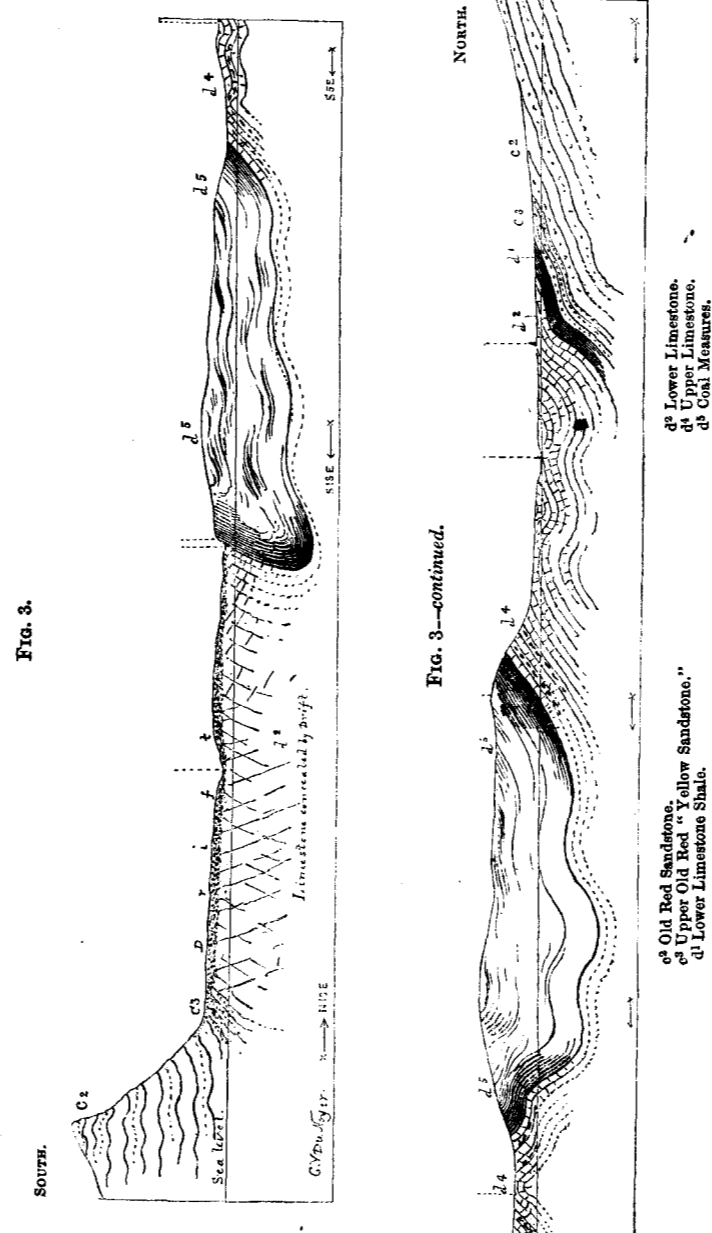
In this district, as elsewhere in Ireland, we find that the hard limestones have more readily yielded to the destructive action of the denudation than the more earthy, shaly, and slaty Coal Measures. The reason for this apparent anomaly is to be found in the fact, that rocks which are deposited in well-defined beds, and are compact and jointed, give way, in masses, to the action of tides, currents, and breakers; while slaty beds, like the Coal Measures, disintegrate by mere fragments at a time. This interesting fact in physical geology is more fully discussed in the Explanation to Sheet 101, p. 12. We, therefore, find that the Coal Measures, which occupy so large a space in the district, invariably form a well-escarped table-land, occupying a higher level than the subjacent limestones.

On the eastern side of the district its geological structure is more simple, being evidently only a wide and undulating trough in the limestones in which the Coal Measure beds rest.

The low but picturesque promontory of Ross, now converted into an island by the fosse of Ross Castle,\* and the various islands which stud the Lower Lake of Killarney, have been all excavated out of the Carboniferous Limestones. The low but, in some places, undulating ground which extends along the northern slopes of the Reeks, Carrantuohill, Purple Mountain, and Mangerton, as well as that extending around the northern and eastern side of Lough Leane, is covered by an enormous accumulation of local coarse boulder drift, with sand and gravel. In some places this deposit reaches an elevation of between 500 and 600 feet up the northern slopes of the mountains, and will be more fully described under the head of "Drift."

G. V. D.

\* Ross Castle is said to have been built by one of the O'Donohoes at the end of the fourteenth century. Of the original work only the keep now remains.



## DETAILED DESCRIPTIONS.

[The islands and shores of Lough Leane, or the Lower Lake of Killarney, and the entrance to the Gap of Dunloe, were surveyed by Mr. G. V. Du Noyer, and the rest of the district by Mr. F. J. Foot, with the exception of a portion of its S.W. corner, which was surveyed by Mr. A. B. Wynne. The following descriptions have been drawn up by Mr. Du Noyer, from his field notes, and those of the other observers.—J. B. J.]

## 5.—Position and Lie of the Rocks.

*The Old Red Sandstone.*—In the S.W. portion of the district, the principal exposure of these rocks occurs along the shore of the Lower Lake, at Stag and Burnt Island, and in the glen of the stream which forms O'Sullivan's Cascade. The beds here all dip to the S. at from 20° to 35°, and consist of purple grits and sandstones, through which are numerous conglomeritic concretionary bands, the pebbles being small well-rounded lumps of quartz and red siliceous grit, cemented in a sandy calcareous and ferruginous paste. These can be well seen at the two small rocky islands just named. At O'Sullivan's Cascade, and higher up the stream, the rocks are principally red, yellowish, and purplish brown sandstones, somewhat soft; from their lithological characters and their position these beds have, for the most part, been classed in the Yellow sandstone group. To the west of the entrance to the Gap of Dunloe, the cliffs which overhang the Black Lake on its west side, afford a tolerably good section through a part of the Old Red sandstone nearest to the Yellow sandstone, these consist of evenly-bedded purple grits and slates, many of the latter beds exhibiting a decided cleavage, and throughout all are a few beds of purple conglomerates, the pebbles of which are quartz, purplish gray grits, and a stray pebble of jasper. These beds, as a mass, all dip to the westward in gentle undulations, at angles varying from 15° to 35°, and the total vertical thickness of the exposed section, is about 600 feet. At the turn of the road leading to the gap above the last group of farm-houses, certain pale yellow sandy grits, with shales which are but imperfectly seen, are supposed to belong to the Upper Old Red group of beds, or the "Yellow sandstones." To the north of them, and likewise with a southern dip, are dull purple and light greenish brown sandstones, possibly forming a portion of the same group of beds.

To the E. of the entrance to the gap, a rugged and pinnacled spur from the flank of Purple Mountain, called Tomies Rock, presents itself. The beds of purple sandstone forming this mass are for the most part horizontal, though they have a wavy dip here and there of 30°. They are cut up by regular cross joints, to which fact we owe the present configuration of the mass. The summit of Tomies Rock is marked 1,455 feet, and therefore 1,121 feet above the level of the Black Lake, which lies at its western base, at a distance of 700 yards measured horizontally. At the southern extremity of the Black Lake, the purple beds are cut off by a fault, having a strike of W.N.W. across the valley, and causing a downthrow of the rocks on its N.E. side. By means of this dislocation the lower greenish gray conglomeritic grits, to which the term "Glengarriff grits" has been applied, appear in juxtaposition with the upper purple series of the Old Red which come in just beneath the Yellow sandstone, the former beds dipping to the W.S.W. at from 15° to 25°, and the latter, on the N.W. of the fault, dipping nearly due W. at from 15° to 25°. To any geologist examining this portion of the Gap of Dunloe, the feature just described will be very apparent. It is quite impossible to determine the absolute amount of displacement caused by this

fault; we have, however, local evidence to show that it must be over 1,700 feet, because we have the adjoining section afforded by Tomies Rock on the one hand, and that on the W. side of the Black Lake on the other, to make up this amount. If, however, we argue from the exposed section on the N.E. face of Carrantuohill, at the head of the Hag's Glen, we may suppose the amount to be nearer to 3,000 feet.

Carrantuohill is made up entirely of the purple beds, and its height is 3,414 feet above the sea; deduct from this the height of the Black Lake, to the level of which the lower green conglomeritic grits appear, and we have the number of feet stated above as the possible amount of downthrow in the Black Lake fault.

To the west of the entrance to the Gap of Dunloe, over the area of the Old Red sandstone included in the map, there are but very few spots where the rocks come to the surface. They may be observed in the Owenacullin River, a stream which flows past the little eminence called Knocknafreaghaun, 831 feet in elevation. Below the old Rath of Knocknatulla, those reddish purple grits appear, dipping to the southward at 15°. At the distance of half a mile lower down the stream similar beds occur dipping to the N.E. at 30°, and then to the S.E. at 40°. We have now to traverse a distance of nearly four miles to the westward of the last locality named, before we again find a Red sandstone *in situ*. These Mr. Wynne detected in the northern end of the townland of Glancuttaun Upper, where they are exposed by the stream running past the western base of Skregbeg Mountain, gray ferruginous, as well as purple reddish grits and slaty beds, which pass up into flaggy layers at the top of, or the northern end of the exposed section, the dip being S.S.E. at from 50° to 80°. The same observer has noticed bosses of purple and reddish sandstones and slates, to the west and south of the small lake of Nafanida, the apparent dip being to the southward, and to the N.W. at low angles. In the southern portion of the townland of Gortloughera, he again found dull purple grits and sandy slates dipping to the N., and curving suddenly round to the E. and in the adjoining townland to the S., called Goulnacapp and Coornagreena, over the rocky ground to the south of Lough Alcabaun, he found coarse-grained purplish and slightly conglomeritic grit, and a few slate beds, rolling to the N.N.W. and S.S.E. at apparently low angles.

Absolute evidence for the presence of the Upper Old Red or Yellow sandstone is entirely wanting over the district, with the exception of these beds at the entrance to the Gap of Dunloe, and their supposed occurrence at O'Sullivan's Cascade. It is necessary, however, that a line should be drawn to define the southern extent of the Killarney and Killorglin limestone. That on the map suggested itself by the form of the ground, and another parallel to it had to be drawn to define the supposed superficial width of the Yellow sandstones. In the adjoining map to the S., No. 184, at Torc Waterfall, the exposed sandstones closely resemble the acknowledged Upper Old Red beds occurring on the north-west of the district, and as these must be continuous to the west along the base of the Reeks and Carrantuohill, the direction given to them will be received as sufficiently accurate.

In the north-west of the district, the Old Red sandstone has been carefully examined by Mr. Foot, and he has observed many short sections of some local value in the different stream-courses which there traverse the southern slopes of the mountains. The most westerly of these appears in the Langdon River, which runs down the townland of Shanahill; the lowest exposed beds, as those at the north end of the section, consist of thick purple conglomerates, having above them thick purple sandstone and grits, succeeded by flaggy purple grits and slates, the dip of all being southwards at from 10° to 25°. These beds eventually become interstratified with pale yellowish

brown, and pale green grits and shales, with red shaly beds, forming the Upper Old Red or Yellow sandstone. Mr. Foot has noticed a few yellow sandstones in the lower end of the stream which runs alongside of the section to the east, in the townland of Shanahill East, the dip of the beds being to the southwards at 25°. The next section through the Old Red sandstones occurs in the stream which divides the townlands of Caherfealane and Gortaneden, and nearly parallel to the former. The exposed section is nearly the same as that first detailed, the difference being the occurrence of a few beds of coarse-grained purple sandstones at and below the Mill of Gortanedin, and an apparent increase of dip in the beds at the central portion of the section. The Yellow sandstones are concealed in the alluvial land which skirts the base of the mountains.

Other sections quite similar to those just alluded to, occur in the lower portion of the stream passing through the townlands of Lassaboy, Boolteens West, and between Boolteens East and Farna, as well as between this last-named townland and Killeenafinnane, the succession of beds at the latter place being introduced in the engraved section in this explanation. The lower part of this section commences with purple conglomerates, containing jasper pebbles, succeeded by purple grits, all dipping southwards at 15° to 20°. These are overlaid by purple slates, grits, and felspathic sandstones. A few Upper Old Red beds appear at the termination of the three adjoining sections to the W. Throughout the various sections just enumerated, a few concretion bands occur.

*Lower Limestone Shale.*—The band of these rocks which is represented in the N.W. corner of the map as skirting the Yellow sandstones, has been introduced by Mr. Foot from his acquaintance with the country lying to the N. and N.E.; where these beds may be seen at the eastern base of the Tralee Mountains, as a band 400 feet in thickness. (See Explanation to Sheet 162, at pp. 8 and 11). These rocks are omitted on the S.W. portion of the district, as I believe that there they thin out, or become merged into the lower beds of the Carboniferous Limestone.\*

d<sup>2</sup>. *The Lower Limestone.*—The lowest beds belonging to this group which appear on the northern margin of the map, are described by Mr. Foot as gray and light gray, compact, and sometimes fetid; while in the middle portion of the deposit there are some thin black shaly beds with a few chert layers which are supposed to indicate the basal boundary of that portion of the whole set of beds called Upper Limestone.

The principal localities where these beds appear and are worked is as follows:—In the neighbourhood of Castlemaine, townland of Ardeanaght, there are three quarries described as dark gray granular limestone, the dip of the beds in the northern quarry, below the Dingle road, being to the westward at 30°; and in that to the southward, near the farm-house to the S.E., at 25°. At the village of Castlemaine, hard gray compact limestone appears, dipping S.E. at 35°, and to the N. of this at Kiltallagh, gray fossiliferous and fetid limestone is well exposed, having here at one time yielded argentiferous lead, the search for which has long been abandoned. At the distance of half a mile to the eastward of Kiltallagh Church, the dark gray Lower Limestone yielded a small lode of argentiferous lead, not worked at present. At both these metalliferous localities, the dip of the beds is to the southward at from 45° to 65°.

Along the western side of the townland of Ballygamboon Lower, the gray limestone appears in many places, the most northerly showing the beds hori-

\* See Explanation for Sheet 184, where the Lower Limestone shale dipping in Muckross Demesne, is stated to be only 150 feet in thickness.

zontal, while at the other places they dip to the S.E. at 60°; and near Ballygamboon House, at only 5° to the S.S.W.; on the opposite side of the River Maine, some dark gray limestone, the uppermost beds of this group appear dipping S. at 20°. From the foregoing facts it is evident that the limestones have been subjected to a considerable amount of crumpling, whereby a thickness of a few hundreds of feet of rock would be sufficient to cover a very large superficial extent of ground.

Close to the northern limit of the map, and about one quarter of a mile west from Ballyfinnane Bridge, a quarry exposes dark gray limestone, with numerous crystals of dark carbonate of lime, the dip of the beds being to the S. at 25°. Southward and S.E. of this point, between the E. bounds of the townland of Dromreagh and Molahiff Castle, a distance of one mile and a-half, a great many quarries have been opened in the uppermost beds of the Lower Limestone. The rock is described as hard gray and compact, and the bedding is only apparent at two localities on the road side north of the police station, in the townland of Gortnaglogh, adjoining the school-house, where it is stated to dip to the S. at 30° to 35°.

d<sup>4</sup>. *The Upper Limestone.*\*—The beds which best represent the Upper Limestone, are to be seen near Molahiff Mills, townland of Killahane, and they are described as "Soft, shaly, thin-bedded, and uniform limestones, underlying a hard gray compact bed, the dip being to the southwards at 40° to 45°. At the branch roads close to Ferries, S.W. of the last locality, large quarries have been opened in gray limestone, the beds of which appear to be horizontal. As these are near the boundary of the Coal Measures, they must belong to the uppermost part of the limestone.

To the S. of Ferries along the stream which forms the parish boundary, hard gray compact limestones occur, which are also horizontal, or with a rolling dip of 5° to 10° to the S. and E. At the old Castle of Ferries, the beds dip to the southward at 20°, and in this manner they pass beneath the Coal Measures which appear on the slope of the rising ground as we approach Batterfield House.

Along the northern margin of the map to the E. of Gortanock, near Currans, five quarries have been opened in the Upper Limestone, in the distance of about one mile and a-half; that on the N.E. slope of the little eminence of Gortanock exposes light gray thin-bedded limestone, having a dip of 30° to the E.; those near Kifelim Old Church, expose light gray, compact, and fossiliferous beds, dipping southwards at 10°; and the most eastern quarry of all which is on the side of the by-road near the eastern limit of the townland of Cloonelough, affords black gray granular limestones, the bedding of which appears to lie to the S.E. at 25°.

To the S. of this locality, and on the left bank of the River Maine, beyond Flesk Bridge, dark gray limestones appear, the bedding of which is obscure. These, however, must be the uppermost beds of the deposit, because the Coal Measures come to the surface at a short distance to the S. of them.

The two last localities, at the N.E. corner of the map, where the Upper Limestones are exposed, is at the farm-houses in the central portion of Coolnagerah townland, the rock being described as thin-bedded, dark gray, and compact, dipping S. at from 15° to 20°, beneath the adjoining Coal Measures; and lastly, in the boggy ground on the N.E. of the main road which

\* The division of the Carboniferous Limestone into two or more groups is everywhere arbitrary. It was attempted in the Sheets north of this, to divide it into an Upper and Lower Limestone, but it is impossible to carry out that subdivision in the Killarney district, and the boundary is, therefore, supposed to die away towards the south.—J. B. J.



bounds this townland at that side, where we find dark gray compact and granular limestones dipping to the S.E. at from 20° to 30°.

If we now return to the neighbourhood of Castlemaine and Milltown we find but one quarry to the W. of the latter place, close to Killagh Abbey, which probably exposed Upper Limestone beds, as the Coal Measures appear at the distance of half-a-mile to the S. of it.

Before we meet with another quarry in the Upper Limestone we have to traverse a distance of nearly two miles to the eastward of Milltown. Here, in the northern end of the townland of Ardmelode, and to the E. of Killaclohane Wood, we find dark gray compact limestones, with a band of decomposed limestones and white carbonate of lime dipping S.S.E. at 30°, and close to the Coal Measures. None of the Upper Limestones show at the surface to the eastward of this locality for the distance of one mile and a-half, till we reach the small pool called Creasane Lough, where a few dark gray beds appear, belonging to the very topmost portion of the group.

At the distance of not quite an English mile to the E. of this, and on the northern slope of the rise of ground at Kilnanare Wood, we find dark gray compact limestones dipping S. at 20°, and directly underlying the Coal Measures which crop out on the slope of the adjoining hill, marked 344 feet in elevation and S.W. of the Wood. The space coloured as limestone, between Milltown and Killorglin, lying at the mouth of the River Laune, is, with the exception of three quarries on the right side of the river, close to Killorglin, and one quarry about three-quarters of a mile to the N.E., in the townland of Stealroe, entirely covered with drift, and the rock completely concealed. The form of the ground, however, and the continuation of the Coal Measure escarpment to the south, along with the occurrence of the limestones at the quarries just alluded to, has induced Mr. Foot and Mr. Wynne to suppose that its rock-floor is limestone.

The latter gentleman has described the limestone quarries to the E. of Killorglin as "dark gray and variegated gray, generally compact, and full of fossils; dark bluish-gray, compact, and slightly crystalline," the dip of the beds being very obscure, but probably to the S.E. The amount of inclination not stated.

The quarry to the N.E. is described by Mr. Foot; it exposes hard gray granular limestone, nearly horizontal, the Coal Measures appearing close to it on the western escarpment of the ground, which here rises to form the small knoll marked 350 feet in height.

Over the long, narrow strip of Upper Limestone which appears in the midst of the Coal Measures a few quarries only are seen here and there; but they determine with sufficient accuracy the nature of the stone and its superficial extent. Aided in the latter respect by the presence of the Coal Measure escarpment which surrounds it, the limestone is supposed to extend for the distance of nearly seven miles from E. to W., with a maximum width of one mile and a-quarter at the western extremity, narrowing to half a-mile at the eastern. Close to the old church of Kilcredaun the rock is described as dark bluish-gray and compact, with layers of chert and shale partings, dipping S. at 30° to 40°, the Coal Measures appearing to the E. at the distance of half a-mile. From this locality westwards for the distance of over three miles no rock comes to the surface; the level, open character of the ground above suggesting the presence of the limestone. It is not till we enter the townland of Kilnarovanagh that the rock again appears; and it is but imperfectly exposed in two old and disused quarries. To the W. of this, at the N.E. end of the adjoining townland of Listry, a large quarry exposes light gray thin-bedded limestone, with impure shaly layers between the beds. The lowest exposed beds are dark gray and granular, with chert layers, and all dip to the N. at 20°, but soon curve round anticlinally so as to dip to the S.S.W. at 15°.

On the northern bank of the Gweestin River, in the adjoining townland of Lissavane East, two quarries at the E. of the townland, and one to the W., expose thin-bedded, gray, impure, shaly limestone, the respective dip of the beds being S. 55°, and N.W. angle of inclination not stated. The quarries which are supposed to define the western limit of this limestone plain occur on the north bank of the Kealbrogeen stream; one of them in the S.W. corner of the townland of Knockreagh, and the other close to it in the S.E. corner of the townland of Ballyvirrane. They are both now abandoned, and no record has been made of the nature or quality of the stone; it is highly probable, however, that it is the same as that occurring at the extreme eastern limit of this run of limestone, close to the old church of Kilcredaun, in the townland of Kilkneedan, and before described.

The limestones which occupy the valley of the River Laune, between Killorglin and the Lower Lake of Killarney, or Lough Leane, appear but in three quarries on the south side of the river, between Gortnaskarry House and Meanus Bridge, in the townland of Tubbrid and Meanus. These have been examined by Mr. Wynne, who thus describes them:—"The limestone in these quarries (townland of Tubbrid) seems generally impure. There are a few dark-coloured crystalline beds which look magnesian, but are strongly affected by acid. It is generally thin-bedded, varying in colour from black to bluish-gray. Some of the paler gray compact beds look concretionary, or contain patches of different textures; it is all somewhat foetid, and has shale partings, with one remarkable bed of black shale (in the centre of the quarry). In the adjoining smaller quarry (to the S.W. of the one just described) the rock is thin-bedded, and there is a large proportion of one side of the excavation quite decayed and sandy. In the larger quarry the beds all dip to the S.E. at 55°, but they flatten in the smaller quarry to the S.W. to 10°."

In the quarry, in the townland of Meanus, which is distant about half a mile to the S.W. of those just described, we have "dark, compact, earthy limestone, with shale beds and partings." The beds are here contorted, so that at the northern end of the quarry the dip is to the S.E. at from 65° to 70°; but at the southern, the dip is to the S.S.W.; and on the western side of the excavation the beds are inclined to the N.N.E. Between these localities and the western shore of the Lower Lake of Killarney, a distance of six miles, there is not a single exposure of limestone to be seen, the surface of the country being thickly covered with local drift, gravel, sand, and boulders. It is impossible, therefore, to subdivide this band of limestone into Upper or Lower, as has been attempted in the north of the district.

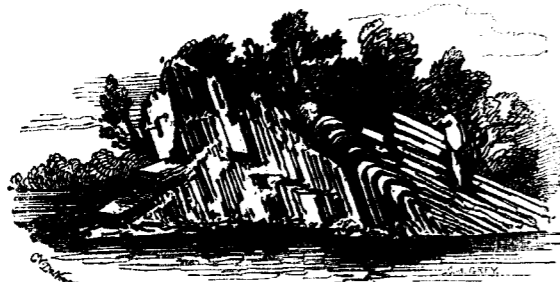
The limestones which form Ross Island and the islands adjoining it, in the Lower Lake of Killarney, are well exposed; but owing to their detached position with reference to the Old Red sandstone on the south and the Coal Measures on the north, we have merely lithological evidences to guide us in determining their geological positions.

On Innisfallen Island we have beds which, from their flagginess and containing chert beds and being interstratified with dark gray shales, may possibly belong to the base of the Lower Limestone, just above the lower shales. The general dip of the beds here is either to the N. or S., at angles varying from 20° to 80°, and frequently they are vertical. From the amazing amount of contortion to which these beds have been subjected, a thickness of 100 feet of them would be sufficient to form the island.

Brown, or Rabbit Island, which lies to the W.N.W. of Innisfallen, at the distance of 700 yards in a straight line, is formed of a similar group of beds to those last described. On the S.W. shore of the island some of the beds are gray and compact, and contain very evenly deposited layers of black chert, and one of earthy gray shale, which weathers to a pink colour. At the N.W. end of the island the beds are greatly contorted.

Along the western shores of Ross Island and the opposite coast of Ross Bay, in Lord Kenmare's demesne, we find beds of dark gray, thin, and flaggy limestone, with evenly deposited chert layers and beds of black shales, quite the same as those observed on Ross Island. They all dip to the southwards; but in many instances they are reversed and inverted in sharp curves. Fig. 4 represents these layers at the N.W. point of the island, at a spot called O'Donohoe's Library, the alternate layers of chert and limestone weathering out unequally, give the broken fragments of the rock, when seen from some distance, an appearance not unlike that of a lot of large books tumbled about.

Fig. 4.



O'Donohoe's Library.

At a point a short way to the south of this similar beds to those last noticed appear bent synclinally.

These shaly and cherty flags disappear near the S.W. corner of Ross Island, and we there find some amorphous, pale gray, compact limestone, which I suppose from its lithological character to be part of the Lower Limestone.

As we examine the shore of the island still further to the southwards the limestone is light gray, evenly bedded, and often finely laminated and free from black shale. In the most northerly of the three bays which indent the shore of Ross Island to the N.W. of the old copper mine, we find beds which measure about thirty-eight feet in thickness of that peculiar "marble," noticed in the general description of the rocks of the district, and described in detail in the Explanation to Sheet 184, p. 22. This deposit consists of thin lenticular laminae of very compact white and pink marble, or opaque and earthy carbonate of lime, held together by green argillaceous shale, which is not at all calcareous; it dips to the S. at  $45^\circ$ , flattening to  $20^\circ$ , and in this way overlying a thick deposit of light gray, massive, finely-laminated limestone.

At the southern end of the short exposed section, these marble layers are inverted, so that, under such circumstances, it is difficult to determine with accuracy their absolute relation to the beds on the north and south of them.

The limestones which appear along the shore, immediately to the south of this singular "marble," are thin irregularly bedded and semi-calcareous, dipping to the S.E. at from  $20^\circ$  to  $30^\circ$ , and many of them weather out from the softer earthy portions like chert. These are overlaid by a thick bed of light greenish gray schistose shale, of a slaty structure, and not calcareous, which appears on the S. side of the point, due W. of the old copper mine. I think this is a distinct bed from the argillaceous "marble;" but it is difficult to define any one geological horizon in a set of rocks so contorted as those of Ross Island.

As we approach the old copper mine the limestone is thin-bedded and gray, with numerous thin semi-calcareous layers weathering out like chert, and dipping to the S.E. at  $30^\circ$ , flattening to  $10^\circ$  as we near the mine.

On the W. side of the mine the rock is gray and compact; and on E., gray and crystalline; in both instances, amorphous. The dip here may be guessed at by finding that some beds which are beneath this amorphous mass dip to the N.E. and N. at  $10^\circ$ . The ore, which consisted of copper, lead, and zinc, appears to have been disseminated through the mass of the rock; and along some of the main N. and S. joints, malachite and black oxide of copper was found.

To the E. of the river quay the limestone is gray and crystalline, dipping S.E. at  $30^\circ$ ; and further to the E., at the point of the island, we again find a thick band of the "marble layers," similar in every respect to that previously noticed; we may suppose, therefore, that they are on the same geological horizon. Wherever the limestone shows elsewhere over Ross Island it is thin-bedded compact gray, and contains layers and nodules of black chert. Occasionally the beds are divided by partings of gray shale.

If we cross over to Rough Island, distant about 300 yards to the S.E. of the River quay, we find that one-half of its northern portion consists of those singular marble layers previously alluded to; they here, however, appear to have received the addition of thin layers of white chert, but the green and purple argillaceous and non-calcareous cementing material remains the same.

Above these layers are a few gray, compact, cherty limestones, succeeded by thin gray limestones containing very numerous layers of gray and white chert, the average dip of the whole suit of beds just described being to the southwards at from  $30^\circ$  to  $40^\circ$ . As we pass from the northern to the southern portion of the island, these beds are bent synclinally, and therefore repeated; they now dip to the N.N.E. at  $60^\circ$ . As we follow them in descending order, we find they terminate at the southern end of the island, in a short series of gray thin-bedded layers, containing irregular bands of pinkish chert, separated by thin shaly partings.

Yew Island, which is another mass of limestone, lies at the distance of 430 yards nearly due E. of the southern end of Rough Island; it consists principally of light gray and finely-laminated limestone, dipping to the N.E. at  $20^\circ$ .

Cow Island, which is only fifty feet distant from the east side of Yew Island, consists, at its northern half, of thin irregular layers of gray lumpy and shaly-looking limestone, full of crinoid fragments, and thin irregular layers of chert; and at its southern end, these beds pass down into the same layers which form the Yew Island, both sets of beds having the same dip and strike.

The bare rugged rocky masses called Crow Island, Otter Island, Jackdaw Rock, Table Rock, and Elephant Rock, all of which lie in a cluster at the distance of about 400 yards N. of Cow Island, are formed of pale gray compact limestone, dipping to the S.S.E. at  $20^\circ$ . Hence, it follows, if this dip can be relied on, that these beds occupy a higher geological position than those forming Cow Island and Rough Island.

Traces of copper have been found in the limestone of Crow Island.

The limestone which appears on the mainland at Cahernane Demesne, and that which forms those two large bosses of rock, which rise from out the alluvial land on the W. of the River Flesk at its embouchure, have all a steady dip to the S.S.E. at from  $20^\circ$  to  $40^\circ$ . When we consider the singular amount of contortion to which the rocks forming Ross Island have been subjected, this absence of disturbance in the adjoining Cahernane beds, and those rising from out the neighbouring alluvial flats, is very remarkable.

On the N. side of the out-offices attached to Cahernane House, we once more find "marble" layers similar to those before noticed at Ross Island and Rough Island. Here, however, the purple colour predominates, both in the argillaceous and calcareous layers; the band is about fifty feet in thickness, and its dip agrees with that of all the other limestones in the demesne, being to the S.S.E. at  $40^\circ$ . The beds just above this "marble" are light gray

and finely laminated. In the flat ground on the opposite side of the Flesk River to Cahernane, there is a rough boss of limestone, the beds of which are directly in the line of strike with the marble layers, and with the same dip; they are, however, gray, thin-bedded, cherty limestones, with shale partings, and differ in every respect from the Cahernane beds, which are apparently on the same horizon.

<sup>d</sup>*The Coal Measures.*—Along the northern boundary given to these rocks between Milltown on the W., and Dick's Grove on the E., a distance of about ten miles, the invariable dip of the beds is to the southwards at from 20° to 50°, or away from the subjacent limestones which occupy the flat land through which the Brown Flesk River and the River Maine run. In the neighbourhood of Milltown, at Fort Agnes, and in the lands of Glen Ellen, these beds consist, at the first locality, of dark gray shales, dipping to the S. at 10°; but at the latter, they are interstratified with beds of olive gray grits, and their dip is to the S.E. at from 20° to 50°. Fossils are stated to have been found here by Mr. Foot.

We have to traverse a distance of nearly two and a-half miles to the E. of Glen Ellen before we again find any of the Coal Measure rocks at the surface; here, however, they appear along the southern boundary of the townland of Mount Henry, and consist of dark gray shales, and olive grits which dip to the S. at 30°. At the distance of nearly half a mile to the E. of this, and at the extreme northern point of the townland of Lecarhoo, just south of the small pool called Creasane Lough, we again find some decomposed dark gray shales.

On the western side of Kilnanare Wood, three-quarters of a mile E. of the last locality, some olive grits, with dark gray shale partings, appear dipping S. at 30°. This exposure of the Coal Measures is here of some geological value, as at the base of the escarpment on which they appear, and distant only 150 yards from, we find a quarry of dark gray compact limestone.

On the main road at Butlerfield House, we find dark gray shales, and thin rocks appear at several places to the S. on the same road. Near the N.E. corner of the townland of Ballyvane, and close to the probable boundary of the Upper Limestones, we find olive gray grits and shales, dipping S. at 25°, and these same beds can be traced easterly into the adjoining townland of Dromore, where they occupy the same relative position with regard to the limestones, though they dip at a higher angle than before, or 55°. On the main road leading from Flesk Bridge to the eastward of Dick's Grove, olive gray grits and dark gray grits and shales appear, dipping S. at 50°; these also form part of the basal portion of the Coal Measures. For the distance of three miles to the E. of this, the Coal Measures appear only on the banks of the Brown Flesk River, presenting a general dip to the southward of 30° to 40°; the supposed boundary of the limestone being distant one mile from them on the N.

As we enter the townland of Coolnageeragh, we find decomposed brown grit and sandy shale, dipping S. at 25° to 35°, as the lowest exposed beds of the Coal Measures; the limestones appearing in the flat land to the northward, at the distance of about 450 yards from them.

Along the boundary of the Coal Measures, between Milltown and Killorglin, the beds come to the surface but at three localities; the most northerly is on the road-side W. of Dromin House, in the townland of Tinnahally, where a few olive gray grits appear; next to this, in the above-named townland, N. of the knoll marked 350 feet, where olive grits and dark gray shales appear, dipping westward at 30°; and lastly around the knoll just alluded to, where the shale beds exhibit a rude cleavage, the plane of which is inclined to the S.S.E. at 50°.

In the neighbourhood of Killorglin, the evidence is very scanty. To the

west of the village we have to travel a mile and a-quarter to the townland of Laharan, on the very cut of the map, before we find a trace of their shales; but to the E. we find these rocks appearing on the right bank of the River Laune, close to and above the Bridge of Killorglin. These beds, which are gray and rusty looking shales, Mr. Wynne remarks, "are very curiously contorted."

To the eastward of this the Coal Measures appear between the glebe-house of Killorglin and Lissmacfynnin House; they are described as black and dark blue splinty shales. At the S.W. angle of the above-named townland, we find dark bluish gray grits with splinty shale partings, and gray and olive grits, and dark gray shales, all dipping to the N.E. at 25°.

From this locality eastwards to the vicinity of the Old Church of Aghadoe, a distance of fully eight miles, the base of the Coal Measure escarpment has been taken as the probable boundary between these rocks and the limestones in the valley of the Laune.

From the road-side close to the Round Castle of Aghadoe, to the Deer Park N.E. of Killarney, a distance of two miles and a-half, we find that the Coal Measures consist of dark gray earthy shales, and thin gray grits, dipping invariably to the southward, that is, to the limestone instead of from it, at from 25° to 50°. This is a singular fact, because it shows the beds dipping in the opposite direction to their true normal inclination and the order of their superposition, and appearing to pass beneath the limestones, while in reality they rest upon them. It is true that a space of fully one mile and a-quarter intervenes between the place where the Coal Measures are last seen at the foot of the escarpment, between Aghadoe and Killarney, and the nearest limestone at Lamb Island in the Lower Lake; but when we come to trace both the rocks to the eastward along the base of Crohane Mountain, the Paps, Musheramore, and Caherbarnagh Mountains, and from these on to beyond Mallow, we find the same fact apparent. The Coal Measures, the limestones, and the Yellow sandstone itself, wherever they can be clearly seen, are invariably found to be inverted, or bent over in such a way as to dip to the southward, their true position being directly the opposite.\* (See section, fig. 3.)

A tolerably good exposure of dark gray shales and gray as well as olive gray grits, may be observed on the southern slope of the rise of ground, N. of Gortroe Lodge, near Aghadoe; again, on the banks of the Deenagh River in the Deer Park north of Killarney; and lastly, below Dooneen Cottage. Similar beds appear outside the Deer Park to the southward of its N.E. corner; here it is probable that the Coal Measures approach to within 500 or 600 yards of the limestone. The observed dips in the Coal Measures are again to the southward at from 45° to 50°.

On the N. side of the flat elongated boss of limestone which appears in the midst of the Coal Measures in the centre of the district, the best exposure of these latter rocks occurs along the road leading from Lisheennashingane eastwards to near Rockfield Bridge, and along the stream which divides the townlands of Laharan and Rockfield Middle; these consist of dark gray and gray shales which are sometimes cleaved in planes, dipping S. 5°, and 15° E., inclined 60° to 70° to the southwards, and olive gray grits, occasionally micaceous. The dip of the beds along the road east of the cottage at Lisheennashingane, appears to the northward at from 30° to 45°; but along the stream which flows from the northward past this road to join the Gweestin River near Kilnarevanagh it is to the S.E. at from 50° to 60°. Mr. Foot notes fossils

\* The fact just stated can be verified by an examination of the cliff section at Dromaneen Castle, on the S. bank of the Blackwater, a few miles above Mallow, where the Yellow sandstone and the limestone exposed in junction are reversed in their order of superposition. See Explanation of Sheet 175.

from this locality. Some very instructive and rather extensive exposures of the Coal Measures are to be seen along the banks of the head waters of the Gweestin River, commencing at its northern branch which drains the western slopes of the summit marked 1,085, and terminating at Barry's Glyn; and also here and there along the road leading from Dooneen Bridge to Fieries:

Commencing at Barry's Glyn, we find in the road cutting, on the east side of the river, dark gray shale with traces of impure coal, and gray grits, dipping to the E. at from 15° to 40°. The fact here recorded by Mr. Foot, of finding impure coal within 700 feet or so of the limestones is interesting, for in the Castlecomer Coal Measures, the first coal seam is not reached till 1,200 feet of unproductive shales with thin grits, is passed through.—(See Explanation for Sheet 137, page 10.) As we proceed up the glen, we find dark gray shales, and gray as well as olive gray grits, on the N. bank of the stream, curved anticlinally, dipping to the southwards just above the bridge near Dromadesert House; and to the northwards, as we trace them higher up the river, the angle of dip varying from 30° to 70°.

To the N.W. of Dooneen Bridge the same set of beds, which we have just noticed, are seen folded synclinally at 70° to the S., disappearing on the road-side, with a dip to the N. at 70°; and on the N.E. of the bridge they are suddenly contorted and doubled back on each other.

In that portion of the stream to the E. of Dooneen Cottage we find dark gray shales and gray, as well as olive gray grit bands, dipping, for the most part, to the S. at from 30° to 40°, and sometimes as high as 70°. A cleavage is stated to be present in the shale beds here, the average dip of which is 50° to the S. Where the stream is crossed by the road leading northwards from Mount Prospect, the Coal Measures are observed to be suddenly contorted so as to dip to the E. at from 20° to 30°. In the distance of about 120 yards these beds regain their former direction of E. and W., with a dip to the S. at from 30° to 50°, and as high as 80°; the last observed beds of the section dipping to the E.N.E. at 25°.

As the course which I have just indicated from Barry's Glyn was more or less in the direction of the strike of the beds, I do not think that more than 400 or 500 feet of rock has been presented in section.

South of Ardagh House, on the S. bank of the Glanooragh River, dark gray shales and olive grits appear at intervals along the new line of road, the beds dipping to the S.S.E., S., or S.S.W., at from 40° to 70°.

On the main road passing from Aghadoe northwards to Rockfield Bridge we find on the N.W. slopes of the low hill of Knockornaght, 466 feet high, the usual dark gray shales and olive grits. The beds, which appear nearest the summit of the hill, at the cross-roads of Barlymount, dip to the S. at 60°. Further north, at the farm-road branching to the W., they dip N. at 20°; and lastly, in the townland of Coolroe East, they dip S. at 75°, thus showing in the distance of two-thirds of a mile, an anticlinal and a synclinal curve. From such observations as these it is clear that over this district occupied by the Coal Measures we have not any great thickness of these rocks; probably not more than 1,200 feet.

The best exposures of the Coal Measures lying to the N.E. of Killarney are to be seen at the following localities:—On the banks of the stream which divides the townlands of Teernaboul and Tullig, at the N.W. corner of the former, and close to the Spa Well; here we find dark and light gray thin-bedded grits and dark gray shales, dipping to the N.N.W. at 30°, and then curving round to the W. anticlinally at 10° so as eventually to dip to the S.W. at 20°; the total thickness of rock exposed being about 200 feet. To the north of this, along the stream forming the parish boundary, S. of Kilbrecan Lough, we find a few beds of dark gray shale and light gray grit dipping S.S.W. at 10° to 45°.

In the lands attached to the houses of Farmhill, on the N. bank of the Deenagh river, a few beds of olive grits and dark gray shales appear dipping southwards at from 40° to 60°. Alternating beds of dark gray shale and gray and olive gray grit can be observed along the road which leads northwards from Mount Prospect House, principally in the townland of Clashnagarrane; the dip of the beds not determinable.

#### 6. The Drift.

One of the most remarkable depositions of drift in the district occurs at the northern entrance to the Gap of Dunloe, and at the distance of about one mile from it. It consists of three lunet-shaped mounds of local boulder drift, sand, and gravel, arranged in a rude, concentric form, one beyond the other, across the mouth of the Gap; the two entire mounds measuring, fully one mile in length by about 100 yards in width. These are evidently the moraines of those ancient glaciers which, at what geologists call "The Glacial period," blocked up the gorge, now called "The Gap of Dunloe." The S.E. termination of the two outer moraines rests on the flank of Purple Mountain, at an elevation of about 400 feet, descending to a level of about 162 feet at their eastern limit, in the W. corner of the townland of Tomies West. The inner mound measures only 650 yards in length by 150 in width; and it is cut through in its central part by the river Loe, which issues from out the Gap to a depth of 84 feet, the elevation above the sea of the mound at this spot being 224 feet. The road from Killarney to the Gap passes through the cutting.

On the W. side of the river the inner morrain has a direction of N.E. and S.W., measuring 700 yards in length by about 200 in width. All traces of the longer, outer mound are lost on this side of the stream, drift action subsequent to the glaciers, having very likely swept this portion of them away.

On the E. side of the entrance to the Gap, and at the base of Tomies Rock, the drift is arranged in massive mounds. These have been steeply escarped at an angle of fully 30° to the W. The two last deposits left by the glacier, as the local climate became warmer, may now be seen on the northern flanks of Tomies Rock and at the north end of the Black Lake; the greatest height attained by the former being close on 800 feet; and of the latter, 512 feet, or 178 feet above the waters of the lake.

Here and there in the heart of the Gap of Dunloe, and in its northern end, glacial striæ are observable on many rounded and smoothed rock surfaces, the direction of the scratches being parallel with that of the Glen, or about N. and S.

On the northern flank of Tomies Mountain, above O'Sullivan's Cascade, there is a wide amphitheatre, which terminates on the N. in a small marshy flat, the bed apparently of a shallow mountain lake. This is bounded along its N.E. margin by a mound of coarse boulder drift, like a great dam, through which O'Sullivan's River has now cut its way.

The large accumulation of coarse boulder drift which lies along the northern slopes of the Reeks and Mangerton, and the range of mountains extending to the E. reaches in some places on the flank of the mountains an elevation of 600 feet, the northern limit of the deposit being tolerably well defined by the Coal Measure escarpment along the northern side of the valley of the River Laune. It is singular that no such deposition of water and sea-borne materials exists on the northern side of the district along the southern slopes of the Tralee Mountains, while it is found on the northern side of the same hills (see Explanation of Sheet 162). Along the E. side of the road leading from Killarney to Muckross and Torc Waterfall the main mass of this boulder drift has been escarped in a N. and S. direction, possibly by the

waters of the Lower Lake, when the land stood at a lower level than at present, and when the lake was consequently much more extensive than now.

The local elevation of the land now occupied by the Lower Lake of Killarney, and a large extent of its shores in very recent geological times, is not a mere supposition; it is clearly demonstrated by the fact, that we find some of the limestone bosses in the pasture land of the southern part of Cahernane Demesne very much water-worn at the base.

The illustration, fig. 5, shows this well. The peculiar way in which the

Fig. 5.



rock has been smoothly eaten away into symmetrical arched cavities, is in every respect similar to the present corroding of such masses of limestone as Elephant Rock, by the existing action of the water of Lough Leane.

The panoramic view of the Tore and Mangerton range of mountains, taken from the shore of Castle Lough Bay, p. 6, shows the escarped portion of the drift to which I have just alluded. Travellers by the railway from Killarney to Mallow cannot but be struck by the wild and rugged look which this roughly piled drift gives to the district through which the River Flesk runs from Brewsterfield House to beyond Flesk Castle; the line of railway itself being excavated out of this deposit from the curve S. of Clasheens House, to the head of the river north of Flesk Castle.

The drift which appears over the Coal Measure plateau is entirely local, and made up of Coal Measure debris. A similar fact in the distribution of the drift appears on the southern flanks of the Tralee Hills; it is there also found upon the local rocks, and like that over the Coal Measures, free from any limestone pebbles.

#### 7. Mines and Minerals.

In the list of the several localities in Ireland where mines or metalliferous indications have hitherto been discovered, published by Sir Richard Griffith, bart., in the year 1854, it is stated that in the townland of Annagh East, near Castlemaine, argentiferous lead with zinc was discovered in the year 1789, on the Godfrey estate. The rock here is Lower Limestone of a gray colour and foetid, dipping to the S. at 65°; the direction of the lode being marked as E.N.E. and W.S.W. In the adjoining townland to the E., Cloonassan, and in a small quarry on the roadside S. of the Roman Catholic Chapel, Mr. Foot records a small lode of argentiferous lead, occurring in dark gray Lower Limestone, the direction given to it being the same as that last alluded

to; but the dip of the limestone is not recorded, the beds probably not being well exposed.

In Sir Richard Griffith's list, mentioned above, a locality for lead is stated to occur in the townland of Meanus, post town Castlemaine, Sheet 47, of the six-inch maps. This is probably a misprint for 57, in which sheet the townland of Meanus occurs, and contains a quarry in dark gray compact earthy limestone.

In the townland of Ballybrack, Sheet 47, fourth quarter, at the distance of three miles and a-half in a direct line E.N.E. of Milltown, Mr. Foot observed "a small lode of argentiferous lead," occurring in hard dark gray limestone. As the quarry has been long abandoned, the stratification of the beds is not clearly exposed. It has most probably, however, a dip to the S.S.E. at 60°.

In Cahernane Demesne, south of Killarney, argentiferous lead is stated to occur, and to have been reported on by Mr. Raspe, in the year 1761.

In Ross Island, the mine there yielded copper and lead with zinc, and in the broken up fragments of limestone scattered around the base of the rock, on which are the remains of Castle Island Castle, small crystals of lead can be clearly detected. These fragments are stated to have come from the adjoining rock, but at the time I examined the locality I could not detect any trace of it. I think it possible they may in reality be some of the fragments quarried at either Ross Island or Muckcross, and which have been dropped here from the boats which probably used this locality as a landing place for the ore.

G. V. D.

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