EXPLANATIONS

TO ACCOMPANY

SHEETS 131 AND 132 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PART OF

THE COUNTY OF CLARE.

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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, or 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

OF SHEETS 131 AND 132 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The district included in these sheets of the map is a part of the western side of the county of Clare. The principal places in it are the towns of Ennis and Miltown-Malbay, and the villages of Doonbeg and Mullagh.

1. *Form of the Ground.*

The most remarkable physical features are Slieve Callan and the hills on its flanks, which, together, occupy a considerable tract N.W. of the centre of the district; the elevated table-land lying between these hills and the River Fergus; and the rocky hills about Ennis.

The summit of Slieve Callan is 1,282 feet above the sea-level; its outline, to a person looking at it from the west, presents the appearance of a flat-topped hill, with terraced sides.

East of Miltown-Malbay, and N.W. of Slieve Callan, the country is a hilly plateau, some points of which attain to an elevation of 800 feet, the average height being about 500 feet. This plateau slopes away very gradually towards Miltown-Malbay, and thence westward to the sea; but about two miles N. of the town, the high land terminates suddenly in a low range of hills, the mean height of which is about 270 feet, the slope on the western side being rather abrupt, ending at the shore in cliffs of from fifty to seventy feet in height.

The district south of Slieve Callan, and south-eastward towards the River Fergus, is an elevated undulating table-land, attaining in some places to a height of upwards of 700 feet above the sea-level. Doo lough (a fine sheet of water one mile and a half long, and nearly half-a-mile broad), three miles S.S.W. of the summit of Slieve Callan, has a water-level of 280 feet, and is surrounded by rocky abrupt hills, which give it a peculiarly wild and picturesque appearance. This plateau decreases in height towards the River Fergus, and terminates towards the S.E. in a rather steep slope, down to a low undulating ground, studded with rocky knolls from thirty to seventy feet in height, which is bordered by the wide alluvial flats of the river.

The hilly ground which surrounds Ennis on all sides except the east, is very rocky and craggy, its summits rising only from 200 to nearly 400 feet above the sea-level, but often seeming more lofty from their broken aspect and abrupt slopes.

The western portion of this district is drained by several streams, flowing nearly parallel to each other. The principal of these are the Annagh river, which, rising on the flanks of Slieve Callan, at an elevation of about 750 feet, flows into the sea about two miles S.W. of Miltown-Malbay; the Annageeragh river, which springs from Doo lough, at an elevation of 280 feet, and flows into the sea through the lagoon of Lough Donnell, which is sheltered from the encroachments of the Atlantic by a barrier of shingle, twenty-nine feet in height, thrown up from time to time by the waves; the Creegh river, which rises at Cahermurphy lough, at a height of 149 feet, and flows into the sea at the *White Strand*, one mile and a-half N.E. of Doonbeg; and lastly, the Doonbeg river, which, entering the southern edge of Sheet 131, at a height above the sea-level of twenty-six feet, flows into the southern end of Doonbeg bay.

The eastern side is drained by the River Fergus and its tributaries, the two principal of which are the Inch and Owenslieve rivers.

The Fergus is tidal as far as the west side of the town of Ennis, at *the mill*. At the point where it enters the district included in Sheet 132, it has an elevation of about twenty-eight feet above the sea-level. It flows thence in a nearly southern direction towards the town, being relieved in time of floods by a natural channel, which, leaving the parent stream at a point a little S. of Brookville, enters the district belonging to Sheet 133, in which direction the two courses unite again, thus making an island of a large tract of ground on which stands a considerable portion of the town of Ennis, with the College and the Union Workhouse.

The Inch or Claureen river joins the Fergus half-a-mile N.W. of Ennis; it rises at the north side of Lough Namina at an elevation of 560 feet, and in its course receives the waters of many small tributaries.

The Owenslieve river rises in the hills, two miles and a-half E. of Lough Namina, at a height of 600 feet above the sea, and after a circuitous route, in which many minor streams flow into it, it joins the Fergus at Ballycorick bridge, near the S.E. corner of the district.

Neap tides flow up the Owenslieve river as far as the stepping-stones, a little west of Ballycorick Castle.

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2. *Geological Formations, or Groups of Rocks entering into the structure of this District.*

		Colour on Map.
	Alluvium, Bog, or other superficial covering,	*Sepia.*
	Drift,	*Engraved dots.*
d^5	Coal Measures,	*Indian ink.*
d^4	Upper Limestone,	*Prussian blue.*

d^4. *Upper Limestone.*—The lowest beds seen in this district are a portion of this formation. They are for the most part thin-bedded, dark gray, sometimes nearly black, compact, and often crystalline limestones, with occasional bands and nodules of black or gray chert; the stratification is generally very distinctly marked, although in some places it is not determinable, either because there is an insuffi-

cient exposure of the rock, or because the rock is so weathered that its stratification is obscured. Near the top of the formation are some pale gray, crystalline, and crinoidal limestones, remarkably thick bedded, and generally over these pale beds, are dark gray, thin bedded, crystalline limestones, having bands and nodules of chert, and partings of black shale.

The thickness of as much of the Upper Limestone as occurs in this district is probably about 800 feet.

d^5. *Coal Measures.*—The beds last mentioned, viz., the dark thin limestones with shale partings, pass upwards into black and dark gray shales, the lowest of which are generally cherty; these beds are highly fossiliferous; they seem to vary considerably in thickness, but the average may be about 150 feet.

Over these shales are a series of brownish gray, or olive-coloured grits and flags, with curious track-like marks, alternating, as we ascend, with frequent beds of shale, and having a few thin beds of coal The total thickness of this group is about 2,850 feet.

These beds are separated from higher ones—consisting of alternating grits, flags, and shales, amounting in thickness to about 350 feet—by a band of hard, gray, impure limestone, from three to five inches thick, and abounding in fossils; this band was observed in two different localities, and is probably the same as that which occurs near Kilkee, running down towards Loophead;* it is consequently important as constituting a useful horizon in this formation. The general section, then, of the Coal Measures of the district may be given as follows:—

General Vertical Section of Coal Measures.

		Ft.	In.
5.	Alternating grits, flags, and shale, the shale having occasional seams of coal,	350	0
4.	Limestone band,	0	3
3.	Alternating grits, flags, and shale, with a few thin beds of coal,	2,000	0
2.	Grits and flags, *about*	850	0
1.	Dark shales, *highly fossiliferous*,	150	0
	Total thickness,	3,350	3

These thicknesses must only be considered as approximations, as the coast section does not expose the lowest beds, and the inland sections are too imperfect and unconnected for accurate calculation.

F. J. F.

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3. *Relation between the Form of the Ground and its Internal Structure.*

As is usually the case in the S. of Ireland, the Carboniferous Limestone, although a hard rock, makes the low ground, while the Coal Measures, consisting of softer but tougher materials, form higher land, which ends in a continuous and rather steep escarpment,

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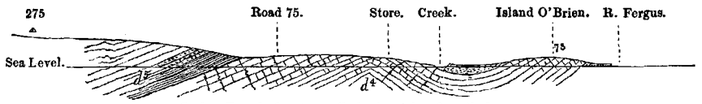
* See Explanation of Sheets 140 and 141.

overlooking the limestone plain (see figs. 1 and 2). Towards the northern part of the district, however, the Limestone rises into higher land, though still not equal to that of the Coal Measures.

Fig. 1.

Section N.W. from the River Fergus. S.E. corner of Sheet 132.

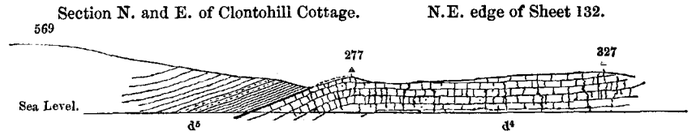


Scale—Four inches to a mile horizontal and vertical.

d^5 Coal Measures. d^4 Upper Limestone.

Fig. 2.

Section N. and E. of Clontohill Cottage. N.E. edge of Sheet 132.



Scale—Four inches to a mile horizontal and vertical.

d^5 Coal Measures. d^4 Upper Limestone.

There is a difference between the two formations, not merely in altitude, but also in aspect of ground. The limestone country is low, but often abruptly undulating, with steep little knolls and craggy hills rising from the plain, while the Coal Measure country, even where most lofty, rises and falls in long sweeping undulations, with gently sloping outlines, making wide open valleys, and round lumpy hills and ridges.

The Coal Measure country has commonly a barren and dreary aspect, while the limestone ground is generally more fertile and pleasant-looking, except where it is covered by bogs. Even where considerable spaces of bare limestone rock form the surface of the ground, its aspect, enlivened by the appearance of strips and tufts of grass, and little thickets of shrubs and bushes, is more interesting than that of the Coal Measures, although it may, in these places, be less valuable than even the thinly-soiled ground over the Coal Measures.

On examining the position of the rocks near the Coal Measure escarpment, it is at once evident that the Limestone rises up to the surface from beneath the Coal Measures, and that the beds of the latter end abruptly at the escarpment. It is clear that this abrupt termination of so great a thickness of beds can only be due to the fact that the former continuation of these beds has been cut off and removed by the action of denudation.

The limestone plain, then, was once covered by a great thickness of Coal Measures, which spread to an indefinite distance eastward of their present boundary; and the Limestone only appears now at the surface in consequence of the removal of that covering.

In like manner, the lower beds of the Limestone rise to the surface in consequence of the denudation that has removed the upper beds (see sections, figs. 1 and 2).

When, too, we follow out the superficial indications so as to determine the internal structure of the ground, we find that the undulations of the surface have no constant relation to the undulations of the beds below the surface. The summits of the hills are sometimes capped by higher beds than those that appear on their flanks; sometimes lower beds rise steeply out on the crest of a hill, and are covered on one or both sides by higher beds, which come in over them as they dip beneath the surface.

We know that all the rocks were originally deposited beneath the sea-level, and have been lifted up above it by the action of the internal forces of elevation, being variously bent and tilted during that operation. The altitude above the sea, then, which any particular part of any bed now stands at, is the result of elevation; but the form of the surface of the ground, and the comparative altitude above the sea of that part of any bed which comes to the surface at any particular spot, is determined by the greater or less amount of erosive action that has affected it. The hills are those parts that have been comparatively less worn down than the plains and valleys, no matter what may be the flexures and inclinations of the beds beneath the surface.

J. B. J. and F. J. F.

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4. *Palæontological Notes.*

Most of the fossils collected in this district were obtained by Mr. F. J. Foot from the Coal Measures, with a few from the Carboniferous Limestone, all being from localities in the County of Clare.

From the Coal Measures at Ballard Bay, County of Clare, $\frac{46}{2}$, Mr. Foot procured from the grit beds an impression of a discoid Nautilus, showing the septal divisions, which appears to resemble Nautilus falcatus (*Sowerby*).

On the coast, at Coosnabrien, near Killard Point, $\frac{46}{2}$, the "Seat Rock," which is immediately underneath a thin bed of coal, where exposed, presents a mass of uncompressed Stigmaria roots; these, with their long and numerous flattened rootlets attached, may be seen spreading in all directions over the surface of this grit bed, some of them measuring as much as seven feet in length.

At Coor Spa, near Ennis, in the bed of the Inch river, we found the lower shales of the Coal Measures to be full of fossils, consisting of plant stems, some of them very large, measuring two inches in diameter, and longitudinally ribbed. The *Aviculopecten papyraceus* was here very abundant, together with small examples of Posidonomya vetusta and Goniatites crenistria.

The Carboniferous Limestone, where it appears close to the road W. of Dangan Castle (see page 51), we found to be highly charged with fossils. The following species were observed on a very casual inspection:—

Mollusca Brachiopoda.

Orthis resupinata.
Spirifera glabra.
,, bisulcata.
,, imbricata.
Rhynchonella pleurodon.
Producta semireticulata.
,, Martini.

Conchifera.

Aviculopecten Murchisoni.
Avicula lunulata.

W. H. B.

Detailed Description.

[The area included in these maps was surveyed entirely by Mr. F. J. Foot, by whom the accompanying descriptions have been drawn up.—J. B. J.]

5.—Position and Lie of the Rocks.

We shall commence the description at the S.E. corner of the map 132.

Between Cornfield House and Fort Fergus are crags of dark gray compact limestone, and also some light gray. The surface is much weathered, and the stratification obscure, and in one or two places there is an apparent dip of S. 20° E. at 30°. N.W. of Cornfield House, at the N. side of the avenue of Fort Fergus are beds of granular, and also very compact dark gray limestones, both thick and thin bedded, dipping W. 25° N. at from 20° to 35°. These beds abound in fossils. On the east side of the Ennis road, opposite Dangan Castle, are pale gray compact limestones, full of fossils, and dipping S. 10° E. at 30°. These beds are only a little way below the base of the Coal Measures. At Knockboy Roman Catholic Chapel, and south of it, are highly fossiliferous beds of dark gray limestone, having a general dip of about 30° to the W.N.W. The beds east of Ballycorick Bridge, and between it and Bush Island, with some undulations, have a general dip of W. at about 30°. The principal joints are vertical, and have a direction N. and S. In some places these joints have the appearance of planes of stratification. Northward, at Island O'Brien, and north of it, beds of dark limestone exhibit a tolerably steady dip of W. 30° N. at 25°, for a distance of three-quarters of a mile. Between this and the Ennis road we meet the same beds contorted. E. of Island O'Brien, at "the Store," they dip S.E. at from 35° to 40°. While farther W., at the Ennis road, and extending for a mile along it, (its direction being that of the strike,) the dip is W. 25° N. at from 30° to 50°. These beds exhibit bands of black or gray chert in several places.

The tract between Drumquin Point and the Ennis road consists of almost bare limestone rock, the beds of which have a general dip of W. 20° N. at 10° to 15°. Some of these beds abound in fossils. They vary from a dark gray, very compact, or sometimes fine grained limestone, to a dull gray crystalline rock, generally decomposed, and extremely fetid when freshly fractured. There are occasional light gray crystalline beds. They are cleaved, the dip of the cleavage being S. 20° E. at 65°.

West of Cragbrien House the rocks also crop out in crags. They are generally light gray, compact, and crystalline limestone; the beds undulating. Fossils are to be met with in abundance. North of Termaclane House, and north-east of it, along the Ennis road, and at Buncraggy House, the beds of limestone, similar to, and apparently the same as those already described, are exposed in quarries and crags, and have a general dip of from 10° to 25° to W. 20° N.

West and north-west of Barntick House beds of gray and pale gray compact and granular limestone dip W. 25° N. at from 10 to 20°. At the eastern side of Killone lough, and all along the south-east shore of Ballybeg lough, and between it and the Ennis road, the beds of limestone form a craggy hill. They vary from a dark gray compact, or fine grained, to a dull gray crystalline fetid limestone. The strata appear undulating; at the shore of Killone lough they dip W. 15° N. at from 10° to 50°, becoming horizontal as we proceed northwards. At the top of the hill they are horizontal, and going from this in a direction N.E. for more than half-a-mile they show a general dip of S.W. at angles from 5° to 15°.

Between Ballybeg lough and Edenvale lough the beds form a very rugged and picturesque hill, intersected in some places by ravines, the sides of which are steep precipices; they are the same as the beds hitherto described. Immediately W. of the southern end of Ballybeg lough they are horizontal,

and form precipices, the sides of which are caused by vertical joints, which have a direction nearly N. and S.

Between this and Edenvale lough they are contorted, the very topmost beds forming basins, in which lie the lower beds of the Coal Measures.

Thus at a quarter of a mile N.E. of Newhall House the dip is S.E. at 30°. Between this and Edenvale lough the beds are horizontal; while at the west side of the latter, they dip N.W. at 10°. In a direction N.E. of Edenvale lough, and north of Ballybeg lough, the district may be said to be composed of almost bare limestone rock; the beds having a general dip to the W. of from 5° to 15°, and being horizontal in many places. The direction of the principal joint is N. 25° W.; and in several places small ravines are formed by the degradation of masses of rock between these joints. Fossils (principally corals and productæ) are locally abundant. A considerable tract, consisting of limestone crags, also lies to the N.W. of Edenvale, between the Inch river and the Ennis and Kilrush road.

About a quarter of a mile S.S.E. of *Coor House*, these crags attain a height of upwards of 200 feet above the sea level, and being traversed in a N. and S. direction by two ravines formed in the manner above described, assume the shape of three rocky hills, which form a conspicuous object in the landscape. The beds here undulate considerably, dipping in different directions, at angles varying in amount from 0° to 55°. At Coor House, and a little south of it, some cherty beds, and also a magnesian band, are exposed, dipping W. at 35°.

Between the Inch river and the road which leads from Ennis to Mahonburg the beds undulate at low angles to the W. and S.

At Beechpark Cottage, and south of it, along the eastern bank of the Inch river, are thick beds of gray compact limestone, dipping S. at from 5° to 10°.

N. of Inch bridge, a craggy hill, attaining to a height of 175 feet above the sea, is formed of beds of limestone, which dip in all directions, as follows:—On the east side, S.E. at 10° to 15°; on the south, S. at 10°; on the west, W. at 15°; on the north-west, to the N.W. at 40° to 50°; on the N. at from 5° to 15°; and are horizontal in the middle, or rather at the top of the hill. The beds vary in thickness and in character from a dark gray to pale gray very compact limestone. The latter description makes a valuable building stone, and has been much quarried here. The new Court-house at Ennis, and several other buildings in the neighbourhood, have been constructed of this stone.

At the north side of the hill, at the large quarry, a small subterranean stream issues from the rocks, and after flowing from W. to E. for about 200 yards, again disappears.

At the north side of the Inch river, and E. S. and W. of Shanvogh House, the beds of limestone also appear in crags, and are either horizontal, or have a general dip to the W. of from 5° to 10°.

To the N. of the town of Ennis, and between Shanvogh House and Cleggan lough, the rocks are much obscured by a considerable amount of local drift; but patches of limestone appear through the latter at intervals. South of Brookville is one of these patches of nearly bare rock, the beds of which have a general dip of S.W. at from 5° to 10°. Between Shanvogh House and Cleggan lough the land is strewn over with limestone boulders, some of which are of considerable size; they are the same in lithological character as the rocks which here and there appear *in situ* through the drift, and in all probability have not travelled very far. The general dip of any beds that do appear through this tract is W. at from 5° to 15°. They are the same as those hitherto described, being generally dark gray, compact, and thin-bedded.

The conspicuous hill, called Corrin Hill, N. of Bushypark House, on the west side of which stands Shallee Castle, and which attains to the height of 391 feet above the sea-level, is formed of the upper beds of the

limestone, which from the east to the west side of the hill, a distance of more than a mile, have a dip to the W. varying in amount from 5° to 15°. About a quarter of a mile S.S.W. of Shallee Castle, on the W. side of the old road, is a dripping cave, where the basal shales of the Coal Measures are seen lying on the topmost bed of the limestone, the dip being W. at 10°. East of this, on the road, there are chert bands in the limestone, and a little below the chert, a bed of brownish, decomposing, magnesian limestone.

This Corrin Hill is a fine specimen of a limestone hill, or "crag." It is traversed by large and deep fissures, abounding in vegetation, and which are caused by the weathering out of pieces of the rock between vertical joints, having a N. and S. direction, or more accurately N. 20° E. and S. 20° W. In many places the rock is grooved and hollowed out, as if by the action of water in motion.

Northwards of Corrin Hill, and to the W. of Fountan House, between the two roads, is another tract of "crags," the beds dipping S.W. at 10°, and W. and N.W. at 10° to 20°.

Somewhat less than half-a-mile S.W. of Shalleequarry House, in a small stream at the north side of the road, is seen the junction between the top bed of the limestone and the bottom of the Coal Measures, the dip being S.W. at 10°. From this another rocky hill extends to Magowna Castle, and thence eastwards as far as the road west of Toonagh House. The highest point of this hill is about a quarter of a mile S.E. of Magowna Castle, and is at an elevation of 309 feet above the sea-level. At this point, and a little south of it, the general dip of the beds of limestone is S. at 10° or 15°. Between Shalleequarry House and Magowna Castle they lie horizontally, or dip N.W. at 5° to 10°; while, at the east side of the hill, near the road west of Toonagh House, the dip is W. at 10° to 15°.

Another hill, the summit of which is 327 feet above the sea, and lies a little N. of "*Cahergurraun*," is composed of beds of limestone, which have a general dip towards the W. The beds E. and N.E. of the summit are dark gray compact, generally thin-bedded limestone, containing numerous fossils, dipping W.S.W. and N.W. at low angles from 5° to 15°. At the summit, and extending N. and S. of it, are cherty beds, dipping W. at 15°. At the west side of the hill the beds are horizontal, being either pale or dark gray compact, very cherty limestone. Both this hill and that last described are fissured in a manner similar to that of "*Corrin Hill*." The direction of the principal joints is N. and S. and E. and W.

Eastward, between this latter hill and Ballygriffy Castle, the country is covered with local drift and large boulders, with here and there the limestone rock protruding.

At Ballygriffy Castle, and for nearly a mile S. of it, along the eastern bank of the river, beds of dark gray compact limestone are exposed, dipping W. at from 10° to 15°.

Eastward at Keelaun lough, are cherty beds, dipping S.W. and W. at 10° to 15°.

At Licknaun lough the same beds are also exposed, and W. of this lough, and N.W. of it, beds similar in appearance, but lower in the series, are seen, having a general westerly dip of from 10° to 20°.

d^5. *Coal Measures.*—Commencing near the N.E. corner of the map (132), the basal shales of the Coal Measures are seen in the little stream bounding the townlands of Cloontohil and Knockaunanerrigal, a quarter of a mile S.E. of Cloontohil Cottage; they dip to the W. at an average angle of 10°. Fossils are abundant. Overlying these shales, on the hill at, and north of, Cloontohil Cottage, are beds of olive grits, flags, and sandy shale, dipping W. at from 0° to 10°. Southwards from this, and about a quarter of a mile S.W. and W. of Magowna, in the stream dividing the townlands of Magowna West and Caherbannagh, a very good section in the lower beds of the Coal Measures is exposed, the basal shales being seen to rest upon the top of the

limestone. This section is continuous for more than a quarter of a mile. The beds are nearly horizontal in places, but have a general dip to the W. of 5°.

The grits and flags are seen on the brow of the hill S. of this stream, lying nearly horizontal.

The junction of the limestone and Coal Measures is also seen in the little stream at the north side of the road, less than half-a-mile S.W. of Shalleequarry House, and also about a quarter of a mile S.S.W. of Shallee Castle, at the cave in the townland of Gortmore; the beds at the former dipping nearly S. at 10°, and at the latter W. at 10°.

On the brow of the escarpment, a little west of both these localities, and almost continuously between them, and for a mile S. of the latter place, the grits and flags above mentioned may be traced, lying either horizontal or dipping at low angles to the W. The basal shales are also well exposed, lying in a basin of the upper beds of the limestone, in the Inch river, a quarter of a mile S. of Beechpark Cottage. They are contorted, so much so, as, in one place, where near the limestone they dip E. 20° S. at 35°, to suggest the idea of a fault. This dip is, however, most probably, merely a local undulation, as the same beds are seen dipping W. at 20° on the side of the little road leading to Coor Spa Well, and evidently overlie the limestone in the usual manner.

This is an extremely good locality for fossils, such as Posidonomya, Goniatites, &c., &c.

About a mile south of this, in the townlands of Inchbeg and Kilmoraun, the superior beds of olive grits and flags form an escarpment, the beds being traceable along its brow for one mile in a direction nearly E. and W. Those nearest the limestone dip S. at 40° to 50°, but the amount of dip diminishes to 10° at about 200 yards to the south. About a quarter of a mile west of Edenvale House this escarpment terminates in a knoll of olive grits and sandy shale, which dip W. at 10°.

The same beds are also seen similarly situated in the following places, viz.:—on the side of the old avenue, about a quarter of a mile N.E. of Newhall House, where they are contorted: at, and extending for more than a quarter of a mile in a direction N.E. from Newhall House, and dipping S.E. at 5°: in the lawn at the west side of the avenue, west of Killone lough, where they are horizontal: on the side of the old road and in the wood half-a-mile west of Cragbrian House, dipping W. 20° S. at 45°: south-east of this on the brow of the hill, over Killea Holy Well, where they dip N.W. at 35°: less than half-a-mile south of Killea Holy Well, in the townland of Lisheen, the dip being W. 10° N. at from 30° to 50°.

In these three last-mentioned localities, part of the basal shales is to be seen under the grits and flags, although the junction with the limestone is not visible. Fossils are abundant in them. From the last locality the grits and flags are traceable along the brow of the escarpment for nearly a mile and a-half in a direction S.S.W., the general dip being W. 25° N. at from 20° to 30°. Here their continuity is broken, by the escarpment losing itself in the valley of the Owenslieve river.

In the bed of this river, just south of Ballycorick Castle, dark gray sandy shales are seen dipping N.W. at 25°. The grits and flags are again seen one-sixth of a mile west of Knockboy chapel, and are continuous S. of it to the southern edge of the map. Where no actual junctions were visible, the boundary between the Limestone and Coal Measures has been drawn provisionally, at the foot of this escarpment; as, wherever junctions were seen, this was their position. Springs occur at frequent intervals along this boundary.*

* The escarpment above alluded to is so prominent, that Mr. Francis Keane, of Ennis, remarked to me that it was probably used in former times as a boundary of properties, as the castles of Magowna, Inch, Shallee, Ballycorick, and Dangan (on Sheet 142), are ranged at intervals along it.

The principal sections in the superior beds of the Coal Measures must now be described. Proceeding westward along the road, which lies S. of Racket Hall and near the S.E. edge of Sheet 132, several quarries and crags exhibit beds of strong olive grit and flags, with occasional partings of sandy shale, sometimes undulating, but having a general dip to N.W. at from 10° to 25°.

The road N. of Racket Hall, and the Owenslieve river, also exhibit sections in the same beds, that in the latter being tolerably continuous, and showing the beds much contorted at low angles.

In this river, a quarter of a mile W. of Clondagad church, is a bed of dark shale full of fossils, such as Goniatites, Aviculopecten, and fragments of plants. In the stream, N. of the R. C. chapel, which is situated on the road side, one mile and a half W.N.W. of Clondagad church, are dark gray shales, over olive grits, dipping E. 20° S. at from 20° to 45°. At the west side of this stream, the beds become horizontal and then dip N.W., W., and S.W., at 5° to 10°, thus forming an anticlinal curve; thence to the road leading from Ennis to Kilrush, by Lough Achryane, several quarries exhibit beds of grits and flags, undulating at low angles.

Northwards from this, at Mulvohill House, east of it and along the old road south of it (which running in a direction nearly N.E. and S.W., joins the Ennis and Kilrush road), several quarries exhibit beds of olive gray flags, which, though locally contorted, have a general dip to N.W., at an average angle of 10°. In a quarry 300 yards S.E. of Mulvohill House, the flags exhibit the ripple or current mark, and one bed is full of fragments of plants; interstratified with the flags is a bed of nodular sandy shale.

In another quarry, 250 yards east of the house, the beds form a Qua-qua-versal elevation or dome, dipping in all directions at low angles.

At the west side of the Ennis and Kilrush road, about one mile and a half west of Mulvohill House, and in the townlands of Kyleatunna and Lismulbreeda, beds of strong olive quartzose grits, with some flags, are exposed in crags. At their eastern side, which is an abrupt cliff, they appear lying horizontal, but further W. they dip W. and N.W. at from 5° to 20°. These beds exhibit vertical planes of cleavage, the strike of which is about E. 20° N. and W. 20° S. Northwards, the Inch river from Mahonburg bridge, to Kilmaley bridge, (where it is called the Kilmaley river), exhibits a discontinuous section, showing the beds hitherto described contorted; and at both sides of the road which runs S. from Kilmaley bridge, and at the east side of Cregroe lough, are crags formed of beds of strong olive grit and flags, which have a general dip to W. of 10°.

About a quarter of a mile S. of the southern end of the road, where a stream runs through a ravine, are olive grits under dark gray shale containing bands of iron stone, dipping S. at 5° to 10°.

All along the N. or N.W. side of the Ennis and Kilrush road, from the crags west of Mulvohill House to where the road leaves the map S. of Lough Achryane, rocks are in many places exposed.

The best section may be seen in the stream, which flowing nearly N. and S. crosses the road a mile N.E. of "*the Police Barrack.*" This section shows contorted beds of olive grits, flags, and sandy shales; for about a quarter of a mile N. of the road, the beds dip S. at various angles, but taking the average at 25°, there is probably a thickness of nearly 600 feet. Of this thickness the flags constitute the largest portion; some are beautifully rippled, but most of them are covered with track-like marks, similar to those seen on the flags of Money Point, east of Kilrush. (*See Explanation of Sheet* 141, pp. 9 and 10). The flags are much used for roofing outhouses and other domestic purposes.

North of this stream, and about half-a-mile east of Lough Pibrum, is a ravine caused by a synclinal fold three-quarters of a mile in length, its direction being identical with the strike of the rocks, (viz. N.E. and S.W.) The beds forming it are grits, flags, and shales, probably the same as those seen in

the stream section, and caused by the contortion to be visible here. On the S.E. side they dip N.W. at 10° to 20°, and on the N.W., S.E at 10° to 20°. N. of *the Police Barrack*, and W. of Lough Pibrum, these grits and flags are seen in many places, cropping out through the heather in rocky knolls or crags, and dipping in various directions at low angles.

At Lough Acrow, which lies somewhat less than two miles N.N.W. of the Police Barrack, the beds form a synclinal fold, those at the north side dipping S. at from 5° to 10°; the same beds at the south side dipping N.W. at 5°, and at the eastern end lying horizontal. They consist of olive-gray grits, under black nodular splintery shale; the top bed of the grits is full of large stigmaria and stems of plants. There is, however, no trace of coal.

Over the extensive undulating table-land west of Lough Acrow, and which also extends W., N.W., and N.E. of Lough Namina, broken sections, in beds of olive grits, flags, and occasionally sandy shale, dipping in all directions at low angles, are exposed in the stream courses, or crop out through the heather in crags or ridges, the general direction of which is about N.E. and S.W., the amount of dip seldom exceeding 10°, the average being about 8°. It is unnecessary to enumerate all these outcrops: some of the principal ones shall be described. N.E. of Lough Namina, the streams which, uniting, form the Furoor river, afford tolerably good sections. A very interesting one may be seen about one mile and a quarter E.N.E. of the eastern end of Lough Namina, in one of these tributaries which flows from S. to N.

The following is the vertical section:—

(No. 1 is the lowest bed.)

		Ft.	In.
8.	Olive gray grit,	25	0
7.	Nodular gray shale,	2	0
6.	Black shale, with fossils,	10	0
5.	Black or dark gray nodular shale,	2	0
4.	Black soft shale, with fossils,	0	3
3.	Calcareous band, with fossils,	3	0
2.	Dark gray shale,		
1.	Olive grits and flags,		

No. 3 is the Limestone band mentioned in page 7. Half-a-mile S.E. of Slaghbooly lough, on the N. slope of the hill, and in quarries three-quarters of a mile east of the lough are gray flags, covered with the track-like marks above alluded to. In the former place (the hill) they dip N. and N. 30° W. at 10°; at the quarries they are horizontal.

One mile NE. 6° N. of these quarries, at the head of the Aughaglanna river, are gray flags dipping N 20° W. at 5°, and over them an olive grit bed containing Stigmaria. In the debris in the streams close at hand are fragments of coal and kelvy shale, so that in all probability this grit is the *seat** of a small bed of coal.

From the last-mentioned place to the northern edge of the Sheet 132, the rocks are much hidden by local drift and tracts of bog.

On the old road which runs S.E. of Lough Akit, beds of olive grits and flags with sandy shale, are seen lying horizontal, and at a distance of a quarter of a mile N. of Lough Akit, in two stream courses, are horizontal beds of gray concretionary shales, under olive flags, which are again covered by olive grit beds. Further north, on the road which runs westward from Inagh bridge, and cropping out in knolls on both sides of this road, are beds of olive grits and flags, generally horizontal or dipping N.W. and S.E., at from 5° to 15°.

On Slieve Callan the rocks are well exposed, both cropping out through the heather and in the numerous small streams which drain the mountain.

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* *Seat* is a term used by colliers to express the bed of rock immediately under the coal.

The beds are nearly horizontal. The best sections are seen in a little stream somewhat more than a quarter of a mile E. of Lough Boolynagreena, and in that which flows E.N.E., and W.S.W., a little N. of the *Hand Cross road.*

The vertical section of these beds, as obtained by actual measurement, is as follows :—

Vertical Section of the Beds of Slieve Callan, No. 1 *being the lowest of the series.*

		Ft.	In.
15.	Olive grits and flags, with occasional beds of sandy shale, about	400	0
14.	Black shale with fossils,	5	0
13.	Indurated clay,	2	0
12.	Olive grit,	2	0
11.	Gray and black shale,	6	0
10.	Olive gray flags, about	50	0
9.	Dark gray nodular shales, lower beds becoming flaggy, about	100	0
8.	Black shale, with fossils,	1	0
7.	Black gritty pyritic shale,	0	2
6.	Black kelvy shale,	0	6
5.	Impure coal or kelve,	0	2
4.	Olive grit, with irregular surface, and having stigmaria, about	4	0
3.	Olive gray flags, about	50	0
2.	Dark gray shale, with bands and nodules of ironstone, about	20	0
1.	Gray, and bluish gray, and olive flags,	? thickness.	

Nos. 4 and 5 are seen in the stream north of the road, a little west of the *Hand Cross road,* where the beds dip S. 15° W., at 10° to 25° ; also in the stream about half-a-mile N.N.E. of the "*Hand Cross road,*" where they lie horizontal or dip N.W. at 5°. The lower beds of No. 15 (olive-gray flags) are exposed around Lough Boolynagreena ; S. and E. of the lough they dip N.W., at from 10° to 30° ; N. of the lough, and a little S. of Conan's monument, N.W., at 35° ; while at the N.W. side, a contortion causes them to dip E. at 20°.

At Doo Lough the rocks seem to form an anticlinal curve, in which lies the lough. The beds are strong olive grits and flags. At the south side of the lough they dip N., at from 5° to 10° ; at the west side they dip E., at 10° ; while at the north they dip S., at 10° to 15°.

Somewhat less than a mile N. of Powerstown House, in the Aughaveema river, beds, probably the same as Nos. 4 and 5 of the Slieve Callan section, are seen dipping S. 25° E. at 25°.

Northwards of this, and up to the N. edge of the Sheet, beds similar to No. 1 of the same section, and also still lower, grits and flags are exposed in the Glendine and Silverhill rivers, where the general dip is S., at 5° ; and around the hills of Knockabullaunduff and Bealoughter, where it is S.E., at from 5° to 20°. Beds of olive grits and flags are to be seen in several other places cropping out at intervals, and dipping in different directions, generally N.W. or S.E. at low angles. It is unnecessary to describe each of the outcrops, as the sections already cited are sufficient to explain the structure of the district. The sea-shore section, however, the greater portion of which is on Sheet 131, must be described.

At the N.W. corner of Sheet 132, and at the N.W. side of *Poulacleavaun,* are beds of olive-gray flags, with the track-like markings. They are contorted—being horizontal at the cliffs, and then dipping S.E. at 40°, and S.W. at 10°. These flags also appear in several quarries a quarter of a mile S. of *Poulacleavaun.* In lithological character, and in the *tracks,* they closely resemble the Money Point flags east of Kilrush (see Explanation of Sheet 141).

Interstratified with the flags is a bed of thick black shale, which appears at and W. of *Poulacleavaun,* lying horizontal. Proceeding along the shore S.W. from *Poulacleavaun,* the flags are seen, undulating, sometimes horizontal, but having a general dip of from 5° to 15° to S. At *Illaunnagroga* they form a synclinal fold, dipping S. at 10°, and N. at 10°. Thence southwards, as far as *Cream Point,* the beds, which are olive grits and flags, with some beds of black shale, undulate N. and S., at low angles.

At Cream Point, and along the N. shore of the little bay which lies S. of the Coast-Guard Station, the dip is S. at 5°, and S.E. at 10°. On the southern shore of this bay, just N. of *Merville House,* the beds (apparently the same as those on the northern side) appear contorted, but have a general dip to N.W., at from 10° to 40° ; further south, at *Poulataggart,* the same set of beds dip S. at 5° to 10° ; thence, as far as *Poulnakirka,* a thick bed of black shale, over olive-gray grits and flags, is seen dipping S.E. at 5° 10′. At *Poulnakirka,* and thence to Spanish Point, these beds appear lying horizontal, and forming a large reef of rocks. At Spanish Point they undulate slightly. At the S.E. side of Spanish Point, proceeding S.E. along the shore, beds of rippled flags and black shale are seen undulating to the south, at from 0° to 20°. Some of the flags exhibit fragments and impressions of the stems of plants on their surfaces.

A little south of Sandfield Cottage the continuity of the section is interrupted by a sandy beach.

At the mouth of the Annagh river is a horizontal bed of thick black shale, with bands of ironstone. Eastward, at Stackpoole's bridge, the same shale is seen resting on a bed of olive grit, and dipping S.W. at 10°.

On the shore, a little N.W. of Cassino Lodge, a bed of coal is reported to exist.* I could not, however, find any trace of it. The following is the vertical section as obtained from actual measurement :—

Vertical Section of the beds on the shore N.W. of Cassino Lodge.

(No. 1 is the lowest bed in the series.)

		Ft.	In.
9.	Black shale, with ironstone,	? thickness.	
8.	Olive grit,	10	0
7.	Black shale, with ironstone,	100	0
6.	Olive flags,	3	0
5.	Black shale, with bands of grit and ironstone,	15	0
4.	Olive grit,	2	0
3.	Black shale, with ironstone,	20	0
2.	Olive gray grit,	50	0
1.	Dark gray shale,	? thickness.	

The beds here have an average dip to N. of from 5° to 15° ; thence to Caherrush Point lower beds, consisting of massive olive quartzose grits, with flags and shale, are seen undulating to N.W., at from 5° to 40°. For half-a-mile S. of Caherrush Point the same beds have a general dip to S., of from 5° to 20°.

At Emlagh Point the beds (flags and shale) are much contorted.

Carrickadav, west of Quilty, is a large reef formed by horizontal beds of olive grits and flags, with partings of sandy shale ; these same beds and other superior ones (rippled gray flags and shales), are traceable all along the shore from Quilty to the western point of *Mall Rock.* In this distance, which is upwards of two miles, the general dip is S. 20° E. at 10°. At the *Mall Rock* it is S. at 10°.

The beds composing the eastern end of Mutton Island, undulate to S.E., at from 5° to 40°. At the western side, the same beds form a flattened anticlinal curve, inasmuch as at the south-western point they dip S. at 20° to

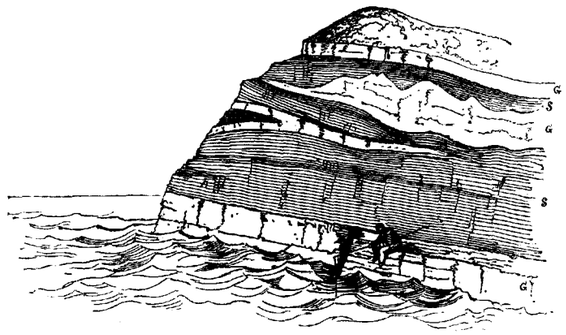
* See Sir R. Griffith's map.

30°, near the "*Watch-house*" they are horizontal, and at the north-west point exhibit a dip to N.E. or N. at from 5° to 10°.

At the south-western point of the island is a thick bed of black shale with irregular olive grit bands. The latter, in places, contain carbonised fragments and stems of plants.

The irregularity in form and sudden thinning out of some of these grit bands, see fig. 3, gives rather a singular appearance to the cliff, which is about 80 feet in height.

Fig. 3.



Irregular bedding in grits and shales, S.W. point of Mutton Island.

G Grit. S Shale.

At the north-western point of the island is a bed of black shale interstratified with grits and flags, and thinning out to nothing southwards; in it are numerous strings of coal varying in thickness, from 0·5 inch to 2 inches. They also thin out abruptly. A bed of shale, with a few small strings of coal, is also seen at the eastern side of the island at the cliffs a little north of the ruined church. The "*Seal Rock*" and "*Carrickaneelwar*," which lie to the N. of Mutton Island, are composed of beds of olive grits and flags, dipping S.E. at 15°.

Mattle Island, which lies somewhat more than one mile S. of Mutton Island, consists of olive-gray flags covered with track-like marks and undulating to the S. and S.E. at from 5° to 20°.

South of Lurga Point a tract of land destroys the continuity of the coast section.

At "*Carricknabuttoge*," are beds of rippled flags and shale, with ironstone bands, dipping S. 25° E. at 10°.

Southwards at "*Carricknola*," gray flags with some grits (probably the beds of Mattle Island), dip S. 25° E. at 10° to 15°.

Further south, and a little west of Cloghauninchy House, are olive flags and thin grits dipping S. at 50°, and above them flags dipping S. 25° E. at 15°; over these flags is a grit bed, which is the seat of a bed of impure coal, six inches thick, which is again covered by black shales. A quarter of a mile further south beds of olive-gray flags, apparently the same as some of those below the coal, undulate to N. 35° E. at from 5° to 45°.

At Carrowmore, a thickness of about 800 feet of alternating beds of grits, flags, and shales is exposed; N. and N.E. of the point, they dip N. 25° W. at 30° to 40°. South of it they undulate to about N. 15° W. at 10° to 45°, while less than a quarter of a mile from the point, and S.E. of it, they form a synclinal dipping N. and N. 20° W. at 5° to 10°, and S. 30° E. at 35° to 40°.

South of Carrowmore Point, the White Strand, more than a mile in length, obscures the rocks; but from its southern extremity to Magrath's Point, a distance of one mile and a quarter, alternating beds of grits, flags, and black shale, amounting to a thickness of about 1,200 feet, are seen dipping S. 10° E. at from 30° to 55°. At a quarter of a mile S.E. of Magrath's Point, and W. of Rayoganagh, the upper beds of this section form a synclinal curve dipping S. at 30°, and N. 20° W. at from 15° to 20°.

On the western shore of Doonbeg bay, the same beds as those last-mentioned appear much contorted, and then, for a distance of about a quarter of a mile, have a steady dip of S. 20° E. at 40°. At this distance they are again contorted, and then, as far as Killard Point, dip N. 30° W. at 25° to 30°. Here beds probably higher in the series than those last-mentioned appear.

The following is the vertical section of the beds at and N.W. of Killard Point, as obtained from actual measurement:—

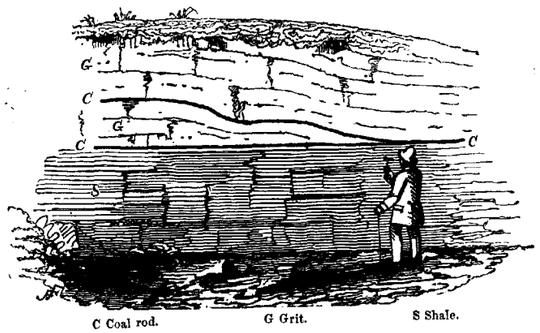
Vertical Section at and N.W. of Killard Point.

		Ft.	In.
17.	Thin grits with a few shale bands,	13	0
16.	Olive quartzose grits,	8	0
15.	Flaggy grits,	16	0
14.	Olive quartzose grits,	5	6
13.	Gray shale, with thin ironstone bands,	42	0
12.	Black shale, with nodules and bands of ironstone,	8	0
11.	Fine black shale,	0	11
10.	Sandy shale, with thin grit bands,	1	6
9.	Flaggy grit,	0	10
8.	Sandy shale, with thin grit bands,	0	10
7.	Blue flaggy grits,	0	10
6.	Coal, culm, and kelve,	2	7
5.	Blue fire-clay, with stigmaria (seat),	0	3
4.	Flaggy grits,	92	0
3.	Quartzose grit, with coal "*rod*" * (2 inches),	10	0
2.	Black shale, with thin grit bands,	10	4
1.	Olive grit,	?	

The beds of this section form a perfect synclinal fold; near Killard Point they dip N. 25° W. at 30°; and at "*the Cellar*" S. 25° E. at 30°. The section was measured at the south side of the synclinal. No. 3 is seen at Killard Point.

The coal "*rod*" in No. 3, divides into two seams, the under portion resting immediately on the top of the shale, No. 2, and the upper branch, traversing the grit bed in an irregular manner. See fig. 4.

Fig. 4.



C Coal rod. G Grit. S Shale.

* "*Coal Rod*" is a term used by colliers to express a small seam of coal.

Nos. 4, 5, 6, 7, are seen plainly at both sides of the synclinal. No. 6, however, which at the S. side is two feet seven inches thick, is three feet eight inches at "*the Cellar*" (north side), and between it and No. 5, is a band of black sandy shale, having remains of plants; and No. 7 is represented by a grit bed three feet thick, which, however, thins out eastward to a flag.

At the north side, the Killard Coal "*rod*" is wanting. No. 5 abounds in stigmaria, some of which attain a considerable size; one four inches in diameter had seven feet of its length exposed; another measured eight inches in diameter. They are equally abundant at both sides of the synclinal.

Proceeding from "*the Cellar*" westward as far as Pulleen bay, the beds are much contorted, and also faulted in many places. They are principally flags and grits, and some shale beds, and appear to be lower than those of the section last described. On the southern shore of Pulleen bay are olive grit beds obliquely laminated, over black shale, dipping S. at 30° to 35°. Above the grits is another shale bed. The beds may be the representatives of those of Killard Point and the "Cellar;" but this cannot be stated for a certainty, as the numerous small faults along the shore may have caused much displacement.

At the eastern side of Ballard bay, at the bottom of the cliff, the band of limestone formerly alluded to, and in all probability the same as that at Kilkee, is exposed. It lies nearly horizontal under black shales, which abound in fossils. The limestone band here varies from three to five inches in thickness, and is full of encrinite stems and goniatites. At the top of the cliff, and overlying the thick beds of shale, are olive grits, lying nearly horizontal; but at the "*Telegraph Station*" and Leamconnor Point they dip S.W. at 5° to 10°. Below the grits the underlying shales are visible, forming the sides of the little bay between Leamconnor and Donegal Point, and in it, at the S.E. extremity of this bay, fossils are to be had in abundance. S.E. of Donegal Point, all along the northern shore of Farrihy bay, the overlying grits and flags are seen dipping S.W. at 20° to 30°.

6. *Drift.*

North of Ennis the country is more or less strewn over with clay, gravel, and boulders, the local debris of the limestone rocks. This drift extends over the Coal Measures in places, more than a quarter of a mile west of the boundary line. It is probable that all, or at all events the greater part of, the Coal Measures of this district were once covered over by limestone gravel, as patches of it are seen in several places. The small hills around Drumcullaun lough, N.W. of Inagh bridge, (near the N. edge of 132), are all composed of limestone drift, more or less mixed up with the debris of Coal Measures, grits, and boulders, and pebbles from the Old Red sandstone. In the townland of Sileshaun West, a quarter of a mile N.E. of the lough, the limestone boulders are in sufficient quantity to render it worth while collecting them, for the purpose of burning for manure. Over the drift is a covering of stiff whitish clay, from which tolerably good bricks can be made.

There is also a small patch of limestone gravel and boulders at the north side of the Owenslieve river, a little east of Clondagad House, near the S.E. corner of Sheet 132.

At Licknaun and Cloonteen loughs, in the N.E. corner of Sheet 132, a bed of white or buff coloured calcareous marl occurs, of irregular thickness, overlying the limestone gravel. It seems to be principally formed of numerous fresh-water shells of existing species. The most abundant are

* Limnæa peregra,
Limnæa stagnalis,
Planorbis marginatus,
Cyclas cornea,
Valvata piscinalis,
Bithynia tentaculata,
Succinea putris.

In the marl there is also a considerable amount of vegetable fibre. Over the marl is a bed of soft peaty alluvium, full of vegetable fibre, occasional bones of birds and small animals, and all the above shells in abundance, with the addition of

Anodonta cygnæa and
Neritina fluviatilis.

Numerous large tracts of bog are scattered over the district. The principal are those around Drumcallaun lough, at the north; at and west of Achryane lough, at the south edge of the Sheet 132; and that south of Doonbeg, on Sheet 131. F. J. F.

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* Mr. Baily examined and determined these shells for me.—F. J. F.

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GEOLOGICAL SURVEY OF IRELAND

comp^d with "Pattern"

EXPLANATION
of
Geological Signs and Colours

Bog Alluvium

Post Pliocene Drift Deposits

Carboniferous Series

d^5 *Lower Coal Measures (Gannister Beds) black lines Coal Crops*

d^4 *Flagstone Series (Millstone Grit)*

d^3 *Shale Series (Yoredale Beds)*

↘ *Dips* *Inclination of the beds the figures expressing the angle below the horizon*

Contorted beds

++ *Vertical beds*

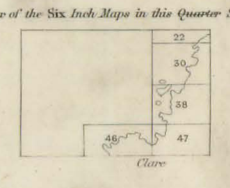
+ *Horizontal beds*

✱ *Fossil localities*

White lines are faults
Blue lines are calcareous bands

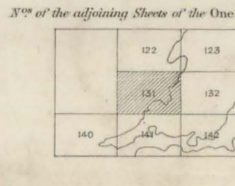
The Geology of this Map published May 1860
Sir R.I. Murchison F.R.S. *Director General*
J. Beete Jukes M.A.F.R.S. *Local Director*
Surveyed by F.J. Foot B.A.
Revised by W.F. Mitchell, 1882.

Index of the Six *Inch Maps in this Quarter Sheet.*



Scale of One Inch to a Statute Mile. $\frac{1}{63360}$

N^os of the adjoining Sheets of the One *Inch Map.*

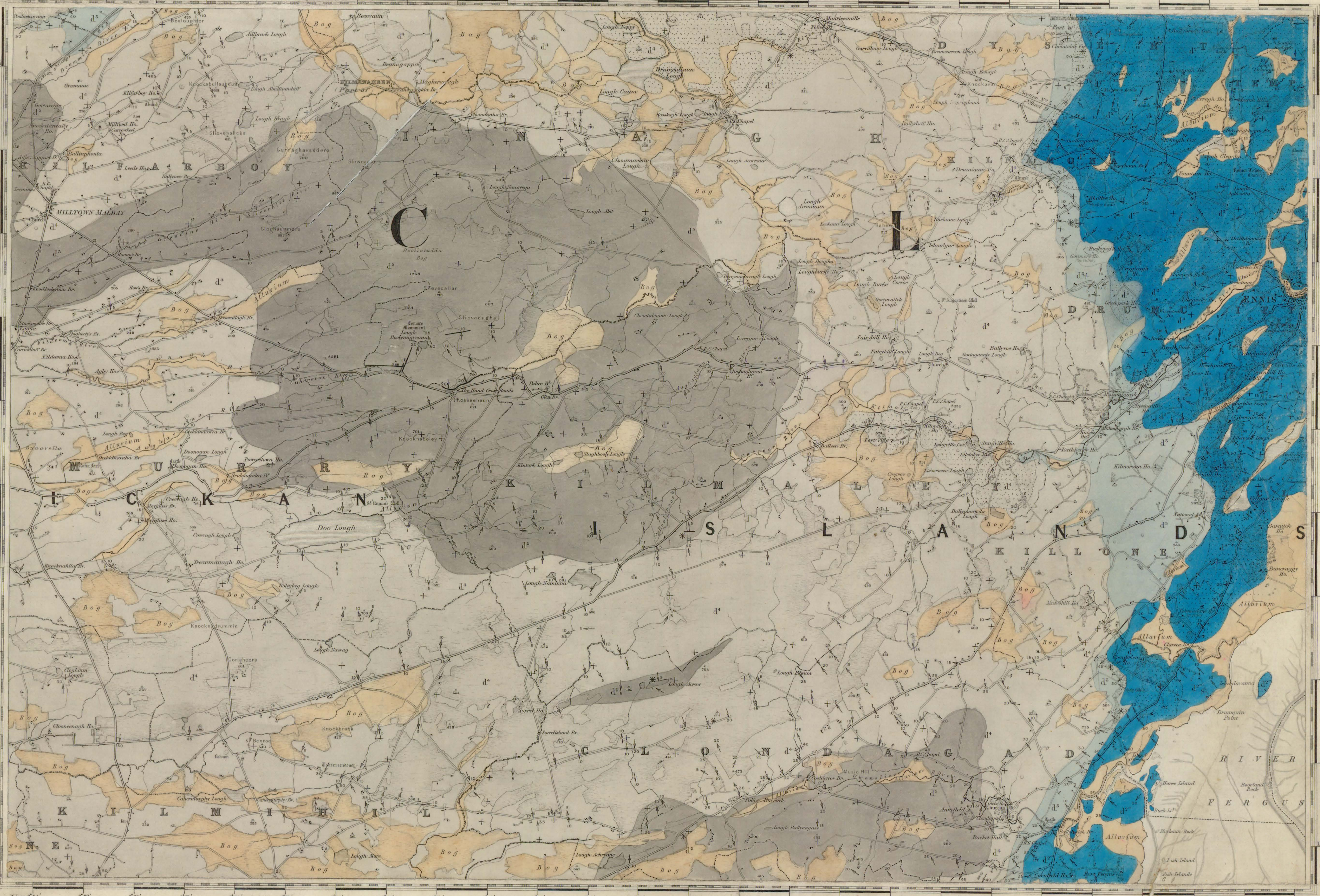


Engraved at the ORDNANCE SURVEY OFFICE *Dublin — under the direction of Captain Leach R.E.*
The Outline by Francis Kiernan. — the Writing by James Aikman. — the Ornament by Bernard Dunn.
Published by Lieu^t Colonel H. James R.E. F.R.S. M.R.I.A &c. Superintendent of the Ordnance Survey

ORDNANCE SURVEY OF IRELAND.

GEOLOGICAL SURVEY OF IRELAND

(Ennis) SHEET 132.



EXPLANATION of Geological Signs and Colours

Bog
Alluvium

Post Pliocene (Drift Deposits)

Carboniferous Series:

d5 Lower Coal Measures (Gannister Beds) Black lines Coal Crops

d4 Flagstone Series (Millstone Grit)

d3 Shale Series (Yoredale Beds)

d2''' Upper Limestone

Dips — Inclination of the beds the figures expressing the angle below the horizon

Contorted beds

+ Horizontal beds

++ Vertical beds

* Fossil localities

White lines are faults

Glacial Striæ

W.Lon. 9°24′ 9°23′ 9°22′ 9°21′ 9°20′ 9°19′ 9°18′ 9°17′ 9°16′ 9°15′ 9°14′ 9°13′ 9°12′ 9°11′ 9°10′ 9°9′ 9°8′ 9°7′ 9°6′ 9°5′ 9°4′ 9°3′ 9°2′ 9°1′ 9°0′ W.Lon. 8°59′

The Geology of this Map published June 1860
Sir R.I. Murchison F.R.S. *Director General*
J. Beete Jukes M.A. F.R.S. *Local Director*
Surveyed by F.J. Foot B.A.
Revised by W.F. Mitchell 1882.

Index to the Six Inch Maps in this Quarter Sheet.

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31	32	33
39	40	41
48	49	50

Clare

Scale of One Inch to a Statute Mile.

Nos. of the adjoining Sheets of the One Inch Map.

122	123	124
131	132	133
141	142	143

Engraved at the ORDNANCE SURVEY OFFICE *Dublin — under the direction of Captain Leach R.E.*
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