EXPLANATIONS

TO ACCOMPANY

SHEETS 163, 174, AND PART OF 175 OF THE MAPS,

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PARTS OF THE

COUNTIES OF LIMERICK, KERRY, AND CORK.

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

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

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

Condensed memoirs on particular districts will also eventually appear.

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

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EXPLANATIONS

OF

SHEETS 163 AND 174 AND THAT PART OF 175

THAT

LIES ON THE WEST OF THE RIVER ALLOW.

General Description.

The area included within the limits of the district now to be described, comprises parts of three counties,—Limerick, Kerry, and Cork. The part belonging to the county of Limerick is an irregular tract, containing about fifty square miles in the north-eastern portion of Sheet 163; a strip running along the western side of both 163 and 174 belongs to the county of Kerry; while all the rest forms part of the county of Cork. The places of most note in the district are the small towns of Newmarket, Kanturk, and Millstreet, and the villages of Boherboy and Meelin, which all belong to Cork; and the small villages of Broadford in Limerick, and Gneevgullia in Kerry.

1. *Form of the Ground.*

Along the southern margin of the district there runs a continuous range of high land, sloping steeply to the north. This is part of the ridge which, from the town of Cappoquin in the county of Waterford, to the hill of Caherbarnagh on the borders of county Kerry, forms the southern boundary of the valley of the River Blackwater, and is continued beyond those points in each direction, terminating on the east in the cliffs S. of Dungarvan Harbour, while on the west it runs through Mangerton and the Killarney Mountains, and out to the headlands S. of Valentia. It forms a continuous watershed for the whole of that distance, except in the neighbourhood of Cappoquin, where it is is cut through by the curious ravine that traverses it at right angles to its general course, and allows of the escape of the River Blackwater into Youghal Harbour, instead of along the valley which is continued to Dungarvan. The ridge, however, although continuous, is often deeply cut into by valleys which cross its crest without destroying its character of a watershed, or indent its sides without lowering its crest. Of these we have examples in this district in the Owenbaun River, in the south-east corner of Sheet 174, and the Finnow River in the Millstreet Valley, both tributaries to the Blackwater, as also in the brook called the Beheenagh River, near the S.W. corner of Sheet 174, which is a tributary to the Flesk.

Caherbarnagh, 2,239 feet high, is the loftiest point of the ridge hereabouts, and just comes within the limit of Sheet 174.

At the foot of this ridge there runs a long straight open valley

which is quite as continuous as the ridge from the mouth of Glen Flesk, near Killarney, to Dungarvan on the coast of Waterford. The part of this valley which comes within this district, is drained by the river Blackwater and its tributary brooks to the eastward of the hamlet of Knockacappul, but to the west of that by brooks which are tributaries to the Flesk River, which runs into the Lake of Killarney, and thence into Dingle Bay. The division between the tributaries of the Blackwater and Flesk, is a scarcely perceptible rise of ground, covered principally with large bogs, and having a height of about 500 or 600 feet above the sea.*

To the northward of this valley, the ground rises with a very gentle slope up to some hilly moorlands of a singularly dreary and monotonous character, that run thence northwards as far as the Shannon. This ground is gently undulating, often covered with bog or heather, with wide shallow winding valleys, the summits of the hills gradually attaining a height of 1,000 or 1,200 feet, about the junction of Sheets 163 and 174. Many hills of those altitudes are included in the Sheet 163. The loftiest of these are two eminences near its S.W. corner, called Knockanefune, 1,141, and Mount Eagle, 1,417 feet. The latter seems to be the best known name, the hills about it being often spoken of as the Mount Eagle Mountains. From the neighbourhood of these hills, a range of heights of about 1,200 or 1,300 feet runs off to the N.E., up to one called Mullaghareirk Mountain, 1,341 feet, which lies about four miles W.S.W. of Broadford. A similar range is extended for several miles W.N.W. of this, having the name of the Mullaghareirk Mountains.

The range between Mullaghareirk and Knockanefune forms the watershed between the valleys of the Blackwater and Feale Rivers, the latter of which runs into the Atlantic a little to the S. of the mouth of the Shannon. This is part of the main watershed of Ireland. It is continued to the east from Mullaghareirk, between some brooks running past Broadford which fall into the Deel, a tributary of the Shannon, and the Glashawee brook that falls into the Blackwater, while S. of Knockanefune, it runs directly across Sheet 174, to the southern ridge a little west of Caherbarnagh separating the waters belonging to the Blackwater River, from these of the Brown Flesk and the Flesk, which drain into Dingle Bay.

The water of the Feale River at the point where it leaves the district, near the N.W. corner of Sheet 163, is not more than 190 feet above the sea.

The Blackwater River rises on the southern slope of Knockanefune, and runs nearly due S. for ten miles, to the foot of the Caherbarnagh range, where it turns at right angles and runs nearly due east, having a height of 231 feet above the sea, where it leaves the district south of Kanturk.

The river Flesk where it cuts across the extreme S.W. corner of Sheet 174, has a height of 200 feet above the sea, and the Brown Flesk leaves it with a height of 330 feet.

* In such a flat boggy district, with so many artificial ditches and such a large rainfall, it is sometimes difficult to decide on the place of the actual watershed. The highest point hereabouts, on the road from Mallow to Killarney, is one of 546 feet due S. of Freemount.

The little river Bunoke in the N.W. corner of Sheet 163, has a height of 227 feet where it passes out of the limits of the map.

These obviously give us the lowest points to be found in their respective neighbourhoods, the level of the Feale, at the northern margin of Sheet 163, being the lowest ground of the whole district.

J. B. J. and G. H. K.

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

Aqueous Rocks.

	Name.	Colour on Map.
	Bog and Alluvium,	*Pale Sepia.*
	Drift,	*Engraved Dots.*
Carboniferous.	d^5. Coal Measures,	*Indian ink.*
	d^4. Upper Limestone,*	*Prussian blue (dark).*
	d. Lower Limestone,*	*Prussian blue (light).*
Old Red.	c^3. Upper Old Red Sandstone,	*Indian red (dark).*
	c^2. Old Red Sandstone,	*Indian red (light).*

c^2. *Old Red Sandstone.*—This group consists of purple gray, green, brown, purplish, and greenish grits, and purple and green slates. Some of the grits are flaggy, in which case the beds are from one and a-half inches to three in thickness, all the other grits are traversed by a coarse cleavage, the bearing of the cleavage strike ranging from E. 10° N. to E. 25° N.

c^3. *Upper Old Red Sandstone.*—In this division the rocks are yellow, brown, and gray grits, sandstones, and flags, and yellow, red, and purple slates. Some of the grits, especially those of a yellow colour, are full of particles of feldspar.

d or d^4. *Carboniferous Limestone.*—The lower beds of this formation are only seen in a few places, where they are of a gray colour, with the bedding much obscured by joints and cleavage. Fossils are said to be abundant in some places. The upper beds of the limestone appear in various localities, often protruding through the basal shales of the Coal Measures. Only a very few hundred feet of them are exposed, and consist of dark blue stratified argillaceous fetid limestones, that generally have red, black, or gray shale, or clay partings between the beds, and in their uppermost portion, immediately under the Coal Measures, are usually full of layers and nodules of chert, sometimes in such quantities as nearly to replace all the limestone. In one place, however, as will be seen in the *Detailed description*, the cherty beds are entirely wanting.

d^5. *Coal Measures.*—These, as elsewhere, consist of alternations of grits, sandstones, flags, and shales of different texture and hardness, having beds, or as they are locally called *veins* of coal, fire clay, and clunch in the upper part of the series.

* Distinctive colours are introduced into these sheets of the map, for the purpose merely of making them agree with those to the northward, it being impossible to draw any boundary in the Carboniferous Limestone of this district.

The northern part of the district seems to have a *General section*, similar to that of the district included within the limits of Sheet 152, which joins this on the north—(*see Explanation of Sheet* 152, *page* 7), while at the south the strata are so confused that it would be impossible to estimate the thickness of the measures between the limestone and the lowest coal, if it were not for a section exposed in the railway cutting on the north of Mallow.—(*See Explanation of Sheet* 175). With the help of this section, which is the key to the south part of the district, the following general section has been arranged.

*General Section.**

	Ft.	In.		Ft.	In.
7. Upper beds,†			*not known.*		
VI. Coal, *South or Harris's Bulk,*	1	6	to	5	0
6. Intermediate beds,				120	0
V. Coal, *Bulk vein,*	1	6	to	7	0
5. Intermediate beds,				125	0
IV. Coal, *Rock vein,*	0	6	to	2	0
4. Intermediate beds,	100	0	to	120	0
III. Coal, *Coal or Sweet vein,*	1	0	to	2	0
3. Intermediate beds,	200	0	to	240	0
II. Coal, *Fourpenny or Finnane's vein,*	1	0	to	1	6
2. Intermediate beds,				104	0
I. Coal, *Morgan's or Castle vein,*				0	10
1. Lower or non coal-bearing measures,‡	*about*			1,600	0
	over			2,327	4

No. I.—Immediately over the limestone, the rocks are principally shales, among which are a few grits; over these are grits, some of which are good flags,§ and a few shale beds; and above these grits and shales are found to alternate with, here and there, beds of fire-clay and clunch; Nos. 2, 3, 4, 5, 6 and 7, are alternations of grits and shales, in some places, with beds of fire-clay, clunch, and coal; the last are very thin, and are only found in a few places, and locally are called *riders.*‖

No. I. Coal.—*Morgan's or Castle vein*, has received its name of Morgan's, from a man by whom it was first worked, and Castle, from having been worked under Dromagh Castle. It is a *pindy*,¶ and therefore was never extensively worked.

* The beds are numbered in the order of the age of deposit, that is, the first formed or oldest bed has the lowest number.

† In No. 7 there may be some coal or coals; but as there is no section exposed that proves that the coals which are seen are above No. VI. coal, it has been thought advisable not to put them in the general section, but they will be described in the respective places in which they occur. There are other small coals which occur in other parts of the section in different collieries. These are locally called riders, and are not inserted in this section as they are not general in all the sections, and are usually unprofitable, being only a few inches in thickness. They will be mentioned in the sections in which they occur.

‡ No. 1 in this section, includes the series marked 1, 2, and 3, in the general section before referred to.—(*See Explanation of Sheet* 152, *page* 7.)

§ These flags are quarried at Garraunawarrig Lower, about two miles S.E. of Newmarket, where the surfaces of the beds are marked with tracks similar to those on the "Carlow flags."—See Explanation of Sheet 128.

‖ Between some of the coals there are more grits than shales, in others more shales than grits, and in some, nearly all the intervening rocks are shales; but as records of none of the measures cut in driving "cross-cuts" are kept, and as there are no natural sections exposed, I am unable to give them in detail.

¶ Pindy is the local name for an argillaceous culm, or carbonaceous shale, it is also applied to a coal smut. Local terms are nearly always printed in *Italics*, and their meanings are given at the end of this Explanation.

No. II. Coal.—*Fourpenny or Finnane's vein.*—This bed is usually coal, impregnated with iron pyrites; and, running through the centre of this coal vein, there is nearly always a thin bed of clunch, locally called a *dog* (see fig. 4, p. 23). Its cover rock is an olive grit, and it lies on a bed of fire-clay, underneath which is clunch. Between the fire-clay and the clunch, there is often a bed of argillaceous pindy, which is so impregnated with iron pyrites, that on exposure to the atmosphere, it immediately turns quite yellow, and is found not worth the expense of working.* In the fire-clay there are stems and rootlets of stigmaria.

No. III. Coal.—*The Coal or Sweet vein.*—So called because the part first discovered was nearly free from iron pyrites, and entirely coal. It is usually a coal; when not a coal, it is a "good strong culm." It has a *clearing* from two to four inches thick, and lies on a *seat* that is from two to four feet thick, the upper part of which is black fire-clay, the rest dark gray clunch, all of which is full of the rootlets of stigmaria, that are locally called *spars.* In the fire-clay are also stems of the stigmaria, and balls of pyritous clay ironstone. When the bed of coal is thick, the *seat* is said, by the colliers, to lessen in thickness.

No. IV. Coal.—*Rock vein.*—This bed has usually a *rock roof*, from whence its name. It is generally a culm, but sometimes partly coal. Through this vein there is also a *dog* (a pyritous, carbonaceous, black shale), that runs irregularly in the bed, seldom keeping at an equal distance from the roof and seat for any great length. It lies on a seat about two feet thick, similar to that of the Sweet vein, except that it generally is without the balls of pyritous clay ironstone.

No. V. Coal.—*The Bulk vein.*—This is a most curious bed, or rather beds, as two or more coals form the *bulk*, from whence its name. These coals, at their several outcrops, when they do not bulk at the surface of the ground, are called *arms.* The most northern of these, or the *main arm*, always lies on a *seat* (fire-clay and clunch), and has over it, except on rare occasions, a *slate roof* (black shale), while the other arms have always a *slate* (shale) under and over them. Between the Rock vein and the Main arm there is generally about the same thickness of intervening rock, while the distance between the outcrop of the main arm of the bulk and those of the other arms, always varies, in one place being only a few yards apart, and overlapping one another, while a few yards farther on there is three or four times that distance between them, the small arms dipping the same way at a higher angle, or standing perpendicular, or even, as is often the case, dipping at the main arm (see fig. 5, p. 24); but the angle of direction of the dip never being the same for two consecutive yards. The small arms are of various thickness, the Main arm generally about two or three feet; but when they bulk, the vein varies from six to ten, and in places has been found as much as twenty or thirty feet thick. In the deep workings, the beds, though all culm, are of various qualities, and the culm of the different arms can be recognised in the *bulk.*

* This coal is remarkable for the separated beds of fire-clay and clunch under it, as in all the other coals that I examined, the fire-clay gradually changed into a clunch, the lower part of the *seat* always being the latter rock.

No. VI. Coal.—*South Harris's bulk.*—When first discovered this was supposed to be an *arm* of the Bulk vein, but afterwards, when it was found to be a different bed of coal, it was called after its discoverer. It varies from eighteen inches to five feet in thickness; but as yet no arm has been discovered, and it lies on a *seat* (fire-clay and clunch), about two feet in thickness. There is not much known about this coal, as it has not been extensively worked.

G. H. K.

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3. *Relations between the External Form of the Ground and its Internal Structure, and general account of the latter.*

The high ground that forms so prominent a feature on the south of the valley of the Blackwater, in the vicinity of Mill-street, is formed of grits, slates, and shales belonging to the Old Red sandstone formation. The high land which lies to the north of this valley, is also composed of grits, shales, &c., except a few detached protruding masses of limestone on the N.W. of Newmarket, but these grits and shales are of a much newer age, being part of the Coal Measures. The low ground at the N.E. has limestone under it, bounded, as is usually the case in the south of Ireland, with abrupt escarpments of the Coal Measure rocks. Besides the low ground just mentioned, there is the Blackwater valley, occupied partly by rocks of the limestone and partly by rocks of the Coal Measures.

From the inclination of the beds of these three groups, as seen in the streams and other natural sections in the south part of this district, it would appear as if the Coal Measures would underlie the Limestone, and that lie under the Old Red sandstone; but this position is apparent only as, in the northern part of this area, and in numerous other places in the neighbourhood, sections are exposed that show the Limestone and Coal Measure in juxtaposition, where the latter is always above the former. From this it is obvious that the beds hereabouts must be *inverted;* that is to say, not only tilted up, so as to be perpendicular, but actually pushed over, so as to have their under sides uppermost. This inversion, however, would extend only for a short distance, as the beds must suddenly turn up again to allow of the appearance of the Limestone at the surface further north. (*See Longitudinal Sections, Sheet* 4, *last line, North end.*)

This inversion is of great extent, as in the Old Red sandstone near Millstreet the beds dip to the southward with scarcely an exception, and this southerly inclination is continued as far as Glen Flesk, every bed appearing to dip away from the Carboniferous Limestone. The angle of dip is sometimes as low as 30°. Neither does there seem to be much crumpling or repetition of beds in the Old Red sandstone, since beds that seem to belong to a low part of that series make their appearance a little S. of Millstreet, and in the Caherbarnagh hills hanging over the Blackwater valley. A little further south, however, undulations of the beds are numerous. Similar inversion seems to prevail also to the eastward, in the country S. of Mallow, and even as far as Fermoy.—(*See Explanations, No.* 175 *and* 176).

The limestone seems to make one bold plunge without any crumpling, and to be as nearly vertical as possible, the width of the band being about 3,000 feet, which is the probable thickness of the limestone.

Its upward curve to the north, however, must be sharp, since it reappears at the surface in about five miles, near Quarry Lodge, in the middle of Sheet 174, and again in two or three places in the southern half of Sheet 163.

This re-appearance of the Carboniferous Limestone through the Coal Measures gives indication of numerous flexures in the latter, and assures us that their thickness is not so great as would appear from mere observation of the outcrop of the beds. They are found accordingly in the workings of the coal beds to be sometimes inverted, and always greatly disturbed.

This disturbance and contortion is indeed carried to such an extent as to render any general conclusions as to thickness very untrustworthy, especially in the parts in which actual mining operations have not been carried on.

The outcrop of the Limestone about Quarry Lodge seems to form a dome-shaped elevation, but it probably indicates the existence of one main anticlinal axis running through it, and near Boherboy, parallel to the Old Red sandstone ridge on the south.

Another parallel anticlinal axis certainly runs from Kilmurry (near Castleisland), through the hill called Taur and the village of Meelin, as shown by the appearance of the Limestone at several places along that line.

Along these two bands of country none but the Lower Coal Measures will be found, the Upper Coal-bearing Measures occurring in the synclinal troughs on each side of them.

There is nothing in the dips of the Coal Measure shales themselves perhaps to indicate the existence of these parallel anticlinal and synclinal curves; and, indeed, the "dips" observed, and marked on the map, seem rather to go against their existence; but that is of little consequence, since here, as elsewhere, the inclinations of scattered outcrops of soft beds, such as the Coal Measure shales, are never to be trusted in disturbed districts. These softer beds are usually so crumpled as to entirely mislead the observer, who will act most safely in disregarding them, and fixing his attention on the "lie and position" of the great groups of rock only.

There is then one anticlinal along the Caherbarnagh ridge, the northern flank of which is actually inverted, and the two other anticlinal curves just mentioned, which run parallel to it; besides these, there are numerous, perhaps we might say innumerable, lesser anticlinal and synclinal ridges and troughs in the Coal Measures, continually interrupted and passing into each other with every imaginable variety of contortion, but all having their axes running parallel to that of the main axis of the country, that is in a direction about E.N.E. and W.S.W.

The Drift.—Along the foot of the Caherbarnagh range, west of Millstreet, there is such a vast accumulation of coarse gravel and sand as entirely to conceal the rocks over a band of country about two miles in width, spreading from the flanks of the Old Red sandstone hills for some distance over the Coal Measures. This drift then especially covers, and that to a depth apparently of 100 or 200 feet, the tract in which

the Carboniferous Limestone would naturally lie. This great bank of drift spreads over the country S. of Killarney up to the base of Mangerton, and ends in a steep escarpment a little S. of the road to Muckross. (See Explanation of 173.) The Limestone makes its appearance directly at the foot of this drift escarpment. It appears then that the Limestone goes under it near Millstreet, and appears from under it again near Killarney—that is, it is seen in its natural position as soon as the drift ends in each direction. We, therefore, conclude that it continues between those two points, although no Limestone, nor any other solid rock, can be seen for a distance of eighteen or twenty miles between them. J. B. J. and G. H. K.

Detailed Description.

[Different parts of the district were surveyed by Mr. W. L. Willson (now of the Geological Survey of India), and Messrs. Kinahan, Foot, and Wynne. The following detailed descriptions have been drawn up by Mr. G. H. Kinahan, from his own notes and those of the other observers, with the addition of any information that he has since obtained.—J. B. J.]

As rocks belonging to the Coal Measures occupy the principal part of this area, it is considered most expedient to describe the older rocks by themselves, we shall therefore begin with the Old Red sandstone.

Old Red Sandstone.—This formation occurs only along the southern margin of the district, and is well seen in some of the stream sections. Near the S.W. corner in the hill on the south of Lisnagarve Cottage, the beds consist of alternations of purple, green, and gray grits and slates, and a few conglomerates. They all apparently dip south, at angles varying from 15° to 30°, although in a few places there are local undulations and curves. The same kind of rocks under similar conditions are found from this to Caherbarnagh, and also to the east of that peak, but in the latter place the inclination of the strata is greater, as it varies from 35° to 70°. To the south of Mill-street similar rocks dip S.E. and E. at from 20° to 60°, and may be well seen in the little brook between Mill-street and Altamount, dipping S.S.E. at from 30° to 50°. In the Owenbaun River, a mile or two east of Mill-street, they undulate, dipping W. and N., as well as S., at angles varying from 10° to 50°.

Upper Old Red Sandstone.—Rocks that belong to this division of the Old Red sandstone formation, although dipping apparently under the lower beds, are exposed in the vicinity of Mill-street, and on the S.E. and E. of the Penitential Station, which lies about eight miles to the W. of Mill-street. They consist of greenish and brownish grits and sandstones, and purple and green slates. All of these dip S. and S.S.E. at angles varying from 25° to 70.° At one or two localities large plants have been found in these beds, as is usually the case with the uppermost beds of the Old Red sandstone.

Carboniferous Limestone.—In the vicinity of Drishane Castle, which lies about two miles to the N.E. of Mill-street, there are quarries in gray limestones. The dip of the strata is N.W. at about 80°.* The rock is also seen in the bed of the river near Drishane, and also in the bed of the Blackwater to the north of it. There is another limestone quarry situated two and a-half miles to the N.E. of the Castle. These are the only places in which the rock is exposed in the strip of limestone near the south of the district.

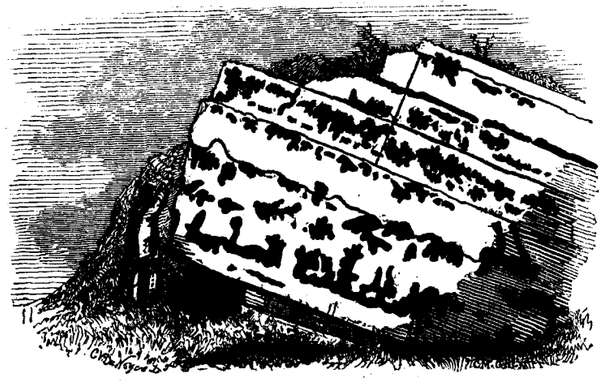
* There are various planes in this quarry which might possibly be those of stratification, but the set mentioned above appeared to me to be those most trustworthy.—J. B. J.

All the rest of the limestones that are found in the district are undeniably part of the representatives of the upper division of the limestone, and occur frequently in protrusions through the Coal Measures. The first of them which will be here mentioned is that which lies about Quarry Lodge, ten miles to the N.W. of Millstreet, where the rock is well seen and extensively worked in the *Carraundulkeen Quarries.* The beds seen incline W., with a dip of 15°. The limestone is of a dark gray colour, having veins of pale spar and yellow crystals; and in the quarry at the cross roads there is a N. and S. dyke of dolomite.

Another exposure of limestone is in the vicinity of Kilmurry House, which is situated about six miles to the N.W. of the last, near the S.W. corner of Sheet 163. It is a dark blue or gray limestone that dips N. at 10°. A mile to the S.E. of Kilmurry House, near an old castle, it was also quarried, where it dips E. at a similar angle. This is the eastern termination of the limestone which runs from Tralee to Castleisland.

Nearly east of this and some miles to the N. and N.W. of Newmarket, at Meelin and Taur, are four protrusions of limestone, where marked on the map (Sheet 163).* The limestones are of a dark blue or gray colour, the highest beds, or those immediately under the Coal Measures, being full of layers and nodules of chert, as is usual in the south of Ireland. The accompanying sketch of some of these upper beds at Taur, by Mr. Du Noyer, shows the peculiar way in which the chert sometimes appears. The limestone in these four places appears at the surface in quaquaversal elongated domes, the major axes of which bear about E. 15° N. All of them, as also the patch of limestone previously mentioned as occupying a space near the S.W. corner of Sheet 163, appear on the line of the axis of an anticlinal curve which runs across the centre of this district, and forms a ridge of high peaks, part of which, as before mentioned, is the principal watershed of the district. (From notes by W. L. W. and F. J. F.)

Fig. 1.



Chert in Upper Limestone, N. of Newmarket.

* Mr. Willson, who examined this part of the district, considers that limestone may occupy two small patches on the W. of Knockaunavarrig, which lies half way between Taur and Meelin.

The N.E. corner of the district also has limestone as its subjacent rock, which is well seen at Broadford, Glenduff House, and a little to the N.W. of Ashford and Ballagh. At Broadford and the last-named place the limestone is inclined to be cavernous. At Ballagh, a cave about 400 yards long was discovered in working the quarry in that place, and is now used for draining the quarry, although no outlet can be seen in it for the water. This cave was carefully examined by Mr. Wynne and myself for fossil remains, but without success.

These limestones are similar to those just described, being full of chert immediately under the Coal Measure shales, except in the Ashford quarry, where a good section is seen of the uppermost beds of the limestone, and the lowest beds of the Coal Measures, where the following beds were noted.*

Fig. 2.

Junction between the Limestone and Coal Measures, Ashford, County Limerick.

Section, No. 1.

(Measured by G. H. K. and A. B. W.)

	Ft.	In.
30. Drift,	3	0
29. Indurated black shale,	0	5
28. Gritty clay and rotten shale,	1	4
27. Black siliceous limestone, in places nearly a chert,	1	6
26. Fine black shale,	0	9
25. Black grit,	0	3
24. Black shale,	1	2
23. Oolitic rusty bed, that looks like decomposed wavellite,	0	3
22. Similar to bed No. 27,	0	5
21. Black shale,	0	4
20. Black calcareous grit,	0	1½
19. Black shale,	0	1
18. Similar to bed No. 27,	0	4

* In this place, as is seen in the sketch, the top of the limestone (bed No. 1), seems to have been water-worn previous to the deposition of the overlying bed of shale. This appearance may be due to water containing acid that has percolated through the shales and eaten away the limestone, as over some of them the shales are bent.

	Ft.	In.
17. Black shale,	0	2
16. Similar to bed No. 27,	0	3
15. Shale parting,	0	0½
14. Similar to 23,	0	1
13. Black shale,	0	4
12. Similar to bed No. 27,	0	2
11. Black shale,	0	1
10. Similar to bed No. 27,	0	4
9. Black shale,	0	5
8. Indurated sandy calcareous shale, weathered to a rust colour,	0	2
7. Rotten black shale,	0	2
6. Similar to bed No. 27,	0	4
5. Rotten black shale,	0	6
4. Similar to bed 27,	0	2
3. Black rotten shale, with thin layers of yellow ochreous clay,	1	6
2. Yellow and blue clay,	0	8
1. Blue limestone, with a few thin cherty layers, *over*	8	6
Total,	23	10

Coal Measures.—The rocks belonging to this division of the Carboniferous series are twisted and contorted, the same groups of beds appearing frequently at the surface of the ground, as the beds undulate in sharp or gentle curves. The axes of all the principal curves have a general bearing nearly east and west, although there are numerous other curves, the axes of which run in other directions, but they are of minor importance compared with those first mentioned. Many sections of the beds are exposed in the streams, rivers, and crags; but as they are generally so much alike, being series of the same grits, shales, &c., it will be unnecessary to record them unless when coal or culm occur.

Near the centre of the district, a little above the line of juncture of the maps (Sheets 163 and 174), there is a compound anticlinal curve of greater magnitude than any of the rest, which runs, with a general bearing of E. 10° N., through the protrusions of limestone before mentioned, and from them may be called the *Taur and Meelin Anticlinal*, which brings up limestone, the basal shales of the Coal Measures and the grits immediately above them (*No.* 1 *of the General Section, page* 8).

To the north of the "Taur and Meelin Anticlinal," numerous coal crops have been proved, but few of them are of any considerable thickness, generally being less than nine or ten inches. They seem to be the crops of the same series of coals brought up to the surface of the ground by the numerous flexures. The beds appear, as a general rule, to lie in a regular geological succession, although in one place, as will be hereafter seen, an inverted curve is proved by the "seat clay" being found lying on a small coal.*

Coals N. of the Taur and Meelin Anticlinal.—Near the N.W. of the district, a little to the east of Glennashrone foxcover, Mr. Foot noted the following section in a small stream :—

Section No. 2.

5. Olive Grits.
4. *Pencil*, black shale.
3. Culm, two inches.
2. *Seat.* Black clunch, two inches.
1. *Seat rock.* Olive grit.

The dip of the beds is N.W. at an angle of 30°.

About half a mile on the west of this, in the small stream that flows under

* In the county of Limerick, the fire clay under the coal is locally called *clay* or *seat clay*, the clunch under the clay the *coal seat*, and the grit under the clunch the *seat rock*.

the road at that place, he records the following, the beds dipping S. at an angle of 45° :—

Section No. 3.

		Ft.	In.
5. *Pencil* (black shale), with olive grit bands, *binders*,	*over*	100	0
4. Coal,		0	4
3. Dark gray clay clunch,		2	0
2. Black shale,	*about*	9	0
1. Strong olive grits,		—	
Total,		111	4

One mile and six furlongs due south of the last section mentioned, near the village of Caherline, Mr. Foot also notes a coal smut, which is exposed in the road-cutting on the west of the river Feale, as in the following section :—

Section No. 4.

		Ft.	In.
7. Thick black nodular shale,	*over*	10	0
6. Olive grit,		1	0
5. Olive flaggy shale,		5	0
4. Coal smut,		0	2
3. Bluish clay,		2	0
2. Gray nodular shale,	*about*	30	0
1. Olive grits,		—	
Total,		48	2

The rocks in this section incline N. at an angle of 25°. Sir R. Griffith, Bart.,* in his MS. map, records the N. out-crop of a coal which may be of that just now spoken of. About half-way between this and the village of Kilkinlea, in the bank of the river Feale, he also mentions an outcrop of a bed of culm under the village of Caherlane. About four miles in a south-westerly direction from Caherlane there are two *bassets* of coals seen, one in a tributary of the Owvey River above or to the S.W. of Talbot Bridge; and the other, which is very insignificant, seemingly being more a *kelve*, or carbonaceous shale, than a coal, is exposed in the Owvey River, a little above or to the southward of Owvey Bridge. Mr. Foot gives the following as the order of the rocks in the stream to the S.W. of Talbot's Bridge :—

Section No. 5.

4. Black shale.
3. Culm and coal, six inches.
2. Clunch, or *seat*.
1. Black shale.

This bed is what is locally called a *standing vein*, as it rises to the S. at an angle of 80°. Where the kelve is exposed in the Owvey River the rocks incline S. at an angle of 50°.

To the S.E. of Caherlane there are numerous smuts of small coals exposed in the tributaries of the river Feale. At and to the east of Crag Wood, on the river Feale, two miles to the S.E. of Caherlane, the rocks roll in gentle undulations, bringing up to the surface what seems to be the same coal in several places. Half a mile to the east of the northern extremity of the wood a coal is recorded in a small stream by Sir R. Griffith. From this it runs towards the west, where it was remarked by Mr. Foot in the stream immediately N. of the wood, from which it runs in an easterly direction;

* We are indebted to Sir R. Griffith, Bart., for putting at our disposal his maps of this district, from which we took many of the coal crops of the old collieries, all traces of which are long since obliterated; and of small coals, of which the outcrops are not now visible.—J. B. J.

and from thence across the road to the second stream, where it curves to the S.W. across the Feale River, when it again turns and goes nearly east, being exposed in a small stream at a hamlet that is situated about a mile to the east of the river. Mr. Foot has noted the position and thickness of the beds in the last place named and at the basset of the coal immediately north of Crag Wood. They are as follows :—

Section No. 6.

(At the northern extremity of Crag Wood, by F. J. F.)

	Ft.	In.
5. Olive shale, with plants,	—	
4. Culm,	0	3
3. Bluish clay,	0	1
2. Bluish gray grit band,	0	8
1. Fine olive grit, or sandy shale,	—	
Total,	1	0

Section No. 7.

(F. J. F.)

	Ft.	In.
9. Black shale,	—	
8. Olive grit,	—	
7. Yellow clay,	0	3
6. Fire-clay,	0	3
5. Coal smut,	0	4
4. Fire-clay,	0	5
3. Pyritous iron-stone band,	0	7
2. Black clunch,	0	4
1. Olive grit bands,	—	
Total,	2	2

In the Caher River, which flows into the Feale a little farther south, coal smuts were remarked in four places, which appear to be of one bed, as the rocks are undulating, and of the same coal as that mentioned in the Sections Nos. 6 and 7. Mr. Foot has noted the following section of the beds where the river flows under the road, the beds having a dip of 30° to the N.

Section No. 8.

(F. J. F.)

	Ft.	In.
16. Black shale,	—	
15. Culm,	0	3
14. Olive grit and clay,	—	
13. Olive clay,	3	0
12. Olive grit,	2	0
11. Blue clay,	0	2
10. Olive grit,	2	0
9. Blue clay,	0	8
8. Olive grit,	0	6
7. Black clay,	1	2
6. Olive grit,	0	6
5. Fire-clay,	0	3
4. Olive grit,	0	10
3. Fire-clay,	0	4
2. Coal smut?	0	1
1. Olive grit,	—	

To the south of this, in the river Feale, a little above where the A, and under where the L in Feale, are engraved on the one-inch map, Sir R. Griffith records the N. and S. outcrops of a culm. The N. outcrop dips nearly N. at 65°, and the south S. at 70. Due west of these, in the stream that divides Limerick and Cork, Mr. Foot remarked a coal smut six inches thick on a bed of fire-clay.

Further south, in the Feale and its tributaries, Sir R. Griffith has four coal crops recorded; one in Kishkeam River dips S. at 50°, and the following section is noted—

Section No. 9.

	Ft.	In.
3. Culm,	0	6
2. Fire-clay,	0	6
1. Seat,	3	0
Total,	4	0

Another coal in the Feale River due south of the village of Knockatooan dips S. at 70°, and is four inches thick. That which is seen about a mile to the S.E. of the same village dips N. at 80°, and is five inches; while that a little to the N.W. of Knockatooan dips N. at 70°. All these may be parts of the outcrop of one coal.

Four miles to the S.S.W. of Knockatooan, on the eastern slope of Forehane, Sir R. Griffith records culm as having been found; but the exact place is not mentioned. About three miles E.N.E., in the streams on the N. and N.E. of the R.C. chapel there situated, there are also two coals mentioned by the same authority respectively three and four inches thick. There is a coal ten inches thick at its basset, where marked on the map, two and a-half miles on the south-east of Knockatooan, which was formerly worked a little for culm. Mr. W. L. Willson, who examined this part of the district, describes it as a very poor *Pindy*.*

Five miles due north of Knockatooan is situated Dromtrasna Bridge, in the vicinity of which Mr. Foot remarked the north and south basset of a coal on each side of an anticlinal curve. The northern outcrop dips N.N.W. at 30°, and the other S. at 50°. In each case he noted the sections, which are as follows:—

Section No. 10.

(To the northward of Dromtrasna Bridge. F. J. F.)

		Ft.	In.
9. Olive grit,		—	
8. Black shale,	*over*	20	0
7. Culm and coal,		1	6
6. Flaggy gray clunch,		2	0
5. Gray grits,		6	0
4. Gray shales,		4	0
3. Olive gray grits,		20	0
2. Alternating beds of olive flags and shales,	*about*	20	0
1. Black shales,		—	
Total,		73	6

Section No. 11.

(To the southward of Dromtrasna Bridge. F. J. F.)

	Ft.	I.
6. Black shale,	—	
5. Coal and culm,	1	6
4. Clunch,	0	4
3. Gray flaggy shale,	1	6
2. Indurated shale,	—	
1. Gray grits,	—	
Total,	3	4

Two miles and a-half E.N.E. of Dromtrasna Bridge, in the Allaghan River, half way between the Roman Catholic chapel and Tour Bridge, there is a thin

* *Pindy*, a local name for a carbonaceous shale, or an argillaceous culm. In Kilkenny and the Queen's counties this kind of coal is called *kelve* when it is useless, and *kennel coal* if it can be used as a fuel; while in the county of Limerick it is generally called *slaty culm*.

bed of coal, which is remarkable, as the strata are inverted at this particular place, the fire-clay being now over instead of under the coal.* The beds dip N. at about 30°.

Section No. 12.

		Ft.	In.
4. Olive grits,		8	0
3. Fire-clay,		2	0
2. Coal,		0	7
1. Black shale,	*over*	8	0
Total,		18	7

In the stream that flows north to the Roman Catholic chapel just mentioned there are two coal crops; that which is farthest south being at least 900 feet above the other, unless a fault that was not remarked, lies between them. An excellent section of the intervening measures is seen, and they all dip S. at about 55°. The highest coal is six inches thick at its crop, and rests on a bed of clunch three feet in thickness. About 400 feet above this there may be another coal. The rock in this place inclines in the same direction at an angle of 35°. A quarter of a mile to the S.S.E., in a stream in the mountain bog, Mr. Maurice Wren† pointed out a section in which the crops of three small culm beds are exposed. The strata here incline in the opposite direction to that of the rocks just mentioned, dipping N. at 45°.

Section No. 13.

	Ft.	In.
14. Olive shale,	—	
13. Black shale,	15	0
12. Fine black shale,	3	0
11. Culm,	0	3
10. Olive shale,	1	9
9. Culm,	0	2
8. Olive sandy shale,	12	0
7. Culm,	1	1
6. Clunch,	3	0
5. Olive sandy shale,	150	0
4. Black shale,	20	0
3. Fire-clay,	3	0
2. Olive grit,	2	6
1. Olive shale,	—	
Total,	211	9

A little to the south-east of this, near the most northern part of the portion of county of Cork that lies within the limits of this district, there is a curious section exposed of grits and beds of culm alternating.

Section 14.

	Ft.	In.
9. Black shales,	—	
8. Grits and shales,	15	0
7. Sandy culm and thin grits alternating,	4	0
6. Grits,	3	0
5. Culm,	0	2
4. Grit,	1	0
3. Culm,	0	4
2. Grit,	0	7
1. Orange sand,	3	0
Total,	27	1

* The mere occurrence of a fire-clay over a coal, however, and its absence from beneath it, does not prove that the coal is inverted. Coals sometimes have a fire-clay roof, and a shale or rock seat.—J. B. J.

† See note, page 21, Explanation of Sheet 152.

The rocks at this place dip N. at 30°; and these coals, although the measures in which they are found are so unlike those in Section 13, yet from their position on the ground seem to be the continuation to the east of the coals mentioned in that section.

About three miles on the eastward of the last section there is a thin seam of culm that dips southward at 70°. It seems to be No. 1 coal of the general section in the Explanations of Sheet 152 (*see that Explanation, page* 7). Due south of Mount Plummer, which lies about three miles to the east, there are three outcrops of a coal, all of which were slightly worked with basset pits for culm. About these workings no information could be obtained, therefore the thickness of the bed cannot be recorded. The most northern crop dips S. at 45°, while the others dip N. at 75° and S. at 75°.

Two miles on the south of these Mr. Wynne has recorded two beds of culm that are brought to the surface several times as the rocks hereabouts undulate in both sharp and gentle curves. One of these beds is said to be two feet thick, composed of culm and pindy,* while the other is not more than four or five inches; and from the *debris* at the basset trials, seems to be a coal.

Glencollin Colliery.—This is the only place where coal is known between the Taur and Meelin anticlinal and that which runs through Quarry Lodge and Boherboy. It is about a mile S. of Kingwilliamstown, and two coals were formerly worked; they dip north at angles varying from 70° to 80°. Sir R. Griffith has recorded the thickness of their outcrops at the river Blackwater as follows:—

Section No. 15.

	Ft.	In.
Coal,	0	3
Fire-clay,	2	6
Total,	2	9

Section No. 16.

	Ft.	In.
Coal,	0	2
Fire-clay,	2	0
Total,	2	2

They were worked along their outcrop for about half a mile to the east; and the upper coal was a pindy.†

Two miles on the N.W. of Kanturk pindy is found in two streams half a mile apart. It may be two outcrops of the same bed.

From Notes by W. L. W.

Coals S. of the Quarry Lodge and Boherboy Anticlinal.—The collieries that are situated to the S.W. of Kanturk, and to the N. and N.E. of Millstreet, are found to lie in two sets or *ranges*, following two lines of strike, that have a general bearing of W.S.W. and E.N.E., and may be called the "Lisnacon and Dromagh ranges."‡ The collieries in the northern or Lisnacon *range* will be first described, beginning towards the east, and going westward.

* Mr. Gorman, the Mining Company's agent at Lisnacon colliery, informed me that he opened some of the old pits to examine this bed, and found that there is only five inches of "clean culm," the rest being an impure pindy.

† A coal is reported to have been proved in the neighbourhood of Newmarket, but the exact locality was not ascertained.

‡ On looking at the map, it will be seen that these ranges are in nearly parallel lines, and that the beds in each dip towards the south, excepting the coals at Dernagree. As the same series of coal beds occur in both, it becomes a question whether this succession is caused by a fault or an inverted curve. It may be by an inversion, as the measures hereabouts are much compressed and dislocated, and in a few places contorted; besides, the older rocks that lie on the south are known to be inverted; but if this is the case, the coals are all *squeezed* out of the inverted side of the curve, as all the coals are found lying on *seats*, and generally dip southward. But it seems to me that this could not be the case, as nowhere have the measures been proved to be inverted, except for a few yards in some of the workings; but in all the levels and trials that are recorded, the rocks were found in the geological succession that is usual in this part of Ireland. It appears to me that they are divided by a large fault, a downthrow to the south, that runs nearly east and west along the small valley on the N. of Dromagh Castle and Dernagree. The way the coals occur at Dernagree seems to point at a fault somewhere in this line, as the coals are found lying on an anticlinal curve, and dipping both N. and S. But when the coals that lie on the north side of the curve are traced east, at about a mile they suddenly disappear, along with all the beds that have a northern inclination. If a fault follows the line mentioned, it ought, about this place, to cross obliquely the axis of the anticlinal curve, and cut off all the beds that dip towards the N. Besides this, the coals that dip to the N. at Dernagree are reported to have been cut off at a depth of forty yards.—G. H. K.

Garravesoge or Fairy Hill Colliery.—Two miles S.W. of Kanturk, and a little to the S.W. of Fairy Hill (Sheet 175), there is an old colliery, in which there are a number of small, and one large bed of coal. This latter coal was supposed to be the Bulk vein, and formed a basin half a mile W.S.W. of Fairy Hill. The northern outcrop, or *north arm*,* dips S. at 60°, while the southern, or *south arm*, dips N. at 75°, the lowest part of the synclinal curve being twenty yards from the surface of the ground. This basin ended towards the east, where marked on the map, but from its western extremity there proceeds a coal that has been proved and worked for some distance. This coal is most remarkable, coming out of a basin of coal, as it does, besides being cut off, at a perpendicular depth of fifty-one feet, by a nearly horizontal fault. It was one foot two inches thick in the arm that ran towards the west, while in the basin it sometimes reached the thickness of fourteen feet; under it was a *seat*, and over it a *slate*,† similar measures being over and under the culm in the basin and the culm that extended towards the west. Immediately north of this there are two small beds of culm, which lie below this coal at the respective depths of sixty and 115 feet. Due north of these, at the parish boundary, there is another, which has been proved or worked in various places between this and Fairy Hill. This coal is about 280 feet lower than the north culm bed, and may be the representative of No I. coal of the General Section; the others being Nos. III., IV., and V. Besides these, between the last coal mentioned and the basin, there are numerous thin coals, locally called *strings*. These are all on the N. of the road that runs S.W. from Fairy Hill. To the south of this road another coal was proved and slightly worked. All these, with the exception of the *south arm* of the basin, dip south at angles varying from 50° to 75°.

A mile due west of this there are the N. and S. crops of a bed of culm that has been worked a little by basset pits, and its outcrop proved for some distance. What coal it represents it is hard to say, but they are said to be divided from the Garravesoge colliery by one or two checks,‡ downthrows to the east.

Coolclogh and Gurteen Colliery.—In this colliery, which is situated nearly a mile due south of Garravesoge, four beds of coal have been worked—viz., Nos. I., III., IV., and V., or *Morgan's*, *Sweet*, *Rock*, and *Bulk veins*. Immediately W. of Mineville Cottage the Sweet and Rock veins swelled to an amazing thickness, or as it is locally called, *bulked*, cutting out all the intervening measures, except the seat of the Rock vein. They then thinned

* When a coal forms a basin, the outcrops are locally called *arms*.

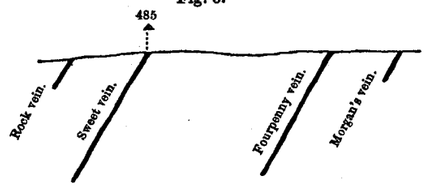
† The following are some of the local names used by the colliers:—*Seat*, fire-clay and clunch. *Soft seat*, fire-clay. *Hard seat*, clunch. *Roof* or *Cover Rock*, the bed immediately over a coal. *The Rock*, the grit under the seat. Shales are always called *Slates*, and grits *Rocks* or *Stones*. It may be here mentioned, that in all these collieries good coal is rarely found, it being usually culm.

‡ *Check* is a common term used in these collieries. It usually signifies a fault, but is also used when there is a sudden twist in the coal, caused either by a curve or a bend in the strata. It is sometimes used to denote what is called a *trouble* in the Queen's county collieries. A *trouble* is when the seat and roof of a coal come together, cutting out the coal, or when foreign matter appears in the coal, and deteriorates its value. The horizontal throw of a *check* is called the *jump*.

again, going west, and under the road were eighteen and fifteen inches respectively. To the W. of the road they again *bulked*, and "went down headlong" to the *check* which cuts off the colliery on the west. On the east of Mineville Cottage the Sweet vein was from fourteen to eighteen inches thick, till it came near the *check* which cuts off the colliery on the east, where it *bulked* in a slight degree. The Rock vein at the east of Mineville Cottage was two feet thick, with a *dog* of an inch; it did not *bulk* at the east *check*. Over it, as is usually the case, there was a rock roof, except at the east of the cottage, where it was a slate. The *Bulk vein* was from eight to fourteen feet thick, and had a rock roof at the west of Mineville Cottage, and a slate on the east. It *bulked* to the west somewhat similarly to the veins just mentioned, but to the east the coal did not continue farther than the boundary of Coolclogh, as from that to the east *check* the roof and seat were nearly together, only a thin seam of culm being between them. Morgan's vein was only proved, and no information about it, except its outcrop, can now be obtained. The *check* that bounds this colliery on the west is a downthrow to the east, but the amount of throw, or *jump* has never been proved. It runs nearly N. and S. The *check* at the east bears nearly N.E. and S.W.

Lisnacon and Killinane Colliery.—A mile and a-half to the west of Coolclogh the Mining Company of Ireland are at present (August, 1860) working in this colliery,* at their present pit, which is situated half a mile from the west margin of the map (Sheet 174). Mr. Gorman furnished me with the following section of the coals, with their intervening measures in horizontal distances, as shown in fig. 3:—

Fig. 3.



Scale—240 feet to one inch.

N. and S. Section through the Lisnacon Colliery, from measurements communicated by Mr. Gorman.

Section 17.

	Ft.
7. *Rock vein*, No. IV. coal,	—
6. Intervening beds,	120
5. *Sweet vein*, No. III. coal,	—
4. Intervening beds,	285
3. *Fourpenny vein*, No. II. coal,	—
2. Intervening beds,	120
1. *Morgan's vein*, No. I. coal,	—
	525

As these beds dip S. at 60°, the following will be the vertical thicknesses of the measures between the coals:—

Section No. 18.†

	Ft.	In.
13. *Rock vein*—No. IV. coal,	0	6
12. *Hard seat*—clunch,	2	0
11. Intervening beds,	101	0
10. *Roof*—black shale, locally called *slate*,	0	9

* I should here mention, that Mr. Thomas Gorman, the resident agent of that Company, afforded me much information about all the old working in this neighbourhood, and kindly placed at my disposal any of his old colliers who could give me the information I required.

† In this section the average thickness of the several beds of coal are added, which

	Ft.	In.
9. *Sweet vein*—No. III. coal,	0 6 to 0	11
8. *Seat*—fire-clay and clunch, with nodules of pyritous clay ironstone,	3 0 to 4	0
7. Intervening beds,	242	0
6. *Roof*—olive grit,	1	0
5. *Fourpenny vein*—No. II. coal,	1	2
4. *Seat and Connemara*—fire-clay, clunch, and impure pindy,	2	3
3. Intervening beds,	102	0
2. *Morgan's vein*—No. I. coal,	0	6
1. *Seat*—fire-clay,	2	0
	460	1

Morgan's vein is a pindy, and has never been worked, except along its outcrop, by the country people.

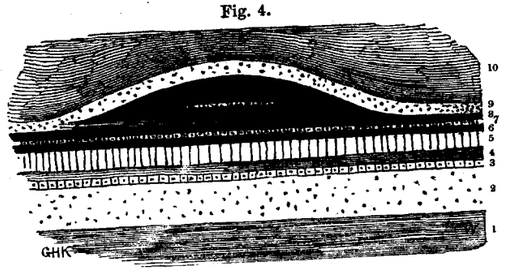
The Fourpenny vein is coal, with a *dog* in the centre of it that varies from two to four inches in thickness. When the vein thickens, the *dog* thickens. The following is a section which I noted, along with Mr. Gorman, of the coal and its associated measures, 317 yards on the west of where the fault is engraved on the one-inch map:—

Section No. 19.

	Ft.	In.
9. *Slate*, black shale,	1	0
8. *Stone*—"roof," olive grit,	0	5
7. Coal,	0	3
6. *Dog*—pyritous clunch,	0	6
5. Coal,	1	3
4. *Seat*—fire-clay,	0	6
3. *Connemara**—pyritous, impure pindy,	0	6
2. *Hard Seat*—clunch,	3	0
1. *Rock*—gray grit,	7	5

Fifteen yards on the east of where the last section was measured, a mass of coal came in between the regular coal and the roof. It ran obliquely across the dip of the bed, being seven yards wide, and was worked from the surface to the present level. The accompanying longitudinal section (see Fig. 4) is taken from the actual measurements given me by Mr. Gorman:—

Fig. 4.



Scale—Ten feet to one inch.

"Swell" in the "Roof" of the "Fourpenny Vein."

10. *Slate*—black shale.
9. *Roof*—gray grit.
8. Coal.
7. *Dog*—clunch.
6. Coal.
5. *Seat*—fire-clay.
4. *Connemara*—impure pindy.
3. *Hard Seat*—clunch.
2. *Rock*—olive grit.
1. *Slate*—black shale.

makes the total thickness greater than it would be if only the intermediate beds were given, as in Section No. 17.

* *Connemara* is the local term for a very impure pyritous pindy, mixed with fire-clay. It seems to be the same as what is called *Buddagh* in the Queen's county collieries.

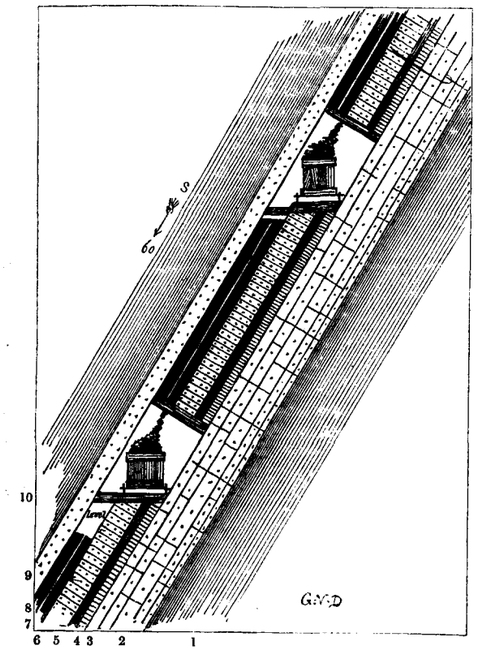
Three feet from where this coal began, a thin shale bed set in between the coals, which gradually blends into the rock roof; a *dog* was also found in this coal similar to the Fourpenny *dog*.

The Sweet vein is all "strong culm." Its seat is very remarkable, as the upper part is fire-clay and the lower part clunch, and yet there is no perceptible division between them.

These coals are worked by the long level method, two parallel galleries being excavated along the strike of the beds, dividing the coals between the level and old workings into two portions, as shown in Fig. 5; the coal being shot down, as soon as excavated, into the waggons on the various leads, and from thence hurried to the pit's bottom.

The Rock vein is only proved, and not much is known about it.

Fig. 5.



Lisnacon Colliery—"Fourpenny Vein."

		Ft.	In.
10.	*Slate*—black shale,	—	
9.	*Roof*—gray grit,	1	0
8.	Coal,	0	5
7.	*Dog*—clunch,	0	3
6.	Coal,	0	6
5.	*Seat*—fire-clay,	1	3
4.	*Connemara*—impure pindy,	0	6
3.	*Hard Seat*—clunch,	0	6
2.	*Rock*—olive grit,	3	0
1.	*Slate*—blackish shale,	—	

The Fourpenny and Sweet veins have been worked for about three-quarters of a mile to the east of the winding pit, to the depth of their present level (fifty-four yards deep at the pit). At the eastern extremity of the workings the veins were curiously twisted, being suddenly curved to the west, so sharply that the beds were inverted, the seats lying on the coals. The Sweet vein was never followed further than the inversion, but the Fourpenny was, and is found to turn immediately, and again strike towards the east, forming a bunch quite round; after which the coal disappears, but the seat and roof ran on towards the east. In the level which lies about one furlong further east the roofs and seats of the five lowest coals in the General Section were met with, but in none of them was there any coal; although to the S.E. of this, and a little on the N.E. and E. of the Roman Catholic chapel, two coals were proved. The lowest is a thin coal, and was worked a little along its basset; the other is only strings of culm. Both of them dip southward. A little to the west of the winding pit, where marked on the map, there is a nearly north and south fault or *check*, with a horizontal *jump* of fifty-four yards, being an upthrow to the west. This will be called the "Killinane fault," as it will be again referred to. From the Killinane fault to the eastern extremity of the colliery the Bulk vein has not been proved, although it is supposed to exist.

To the west of the Killinane fault the Mining Company are carrying on their works, but have only as yet proved the Fourpenny and Sweet veins. At 100 yards from the Killinane fault there is a fault in the Fourpenny, and two in the Sweet, but so small, being only a few yards, that they are not marked.

Cloonbannin, Drominagh, and Dromskehy North Collieries.—The coals in these collieries are the continuation of those in the last, but seem to be divided from them by a large fault, an upthrow to the W., which has not yet been proved, but appears to run nearly N. and S. through the centre of Dromskehy. In them Nos. I., II., III., and IV. coal, or the *Morgan's, Sweet, Rock*, and *Bulk veins*, have been proved and worked more or less. To the north of these coals another coal was worked, called here the *Killinane vein*, from the townland in which it was found,* which has a dip to the southward. It may be brought in here by an E. and W. fault, but if not, it is most likely only a local bed, as it has never been found anywhere else. The coal it contains is only a pindy. A short distance above, or to the southward of the Rock vein in Drominagh, a *rider* has been proved in two places, which corresponds with a *rider* found in the *Dromagh Colliery*, hereafter to be described. *Morgan's vein* has only been found in one place, which is situated in Cloonbannin, where it is exposed in a cutting for the road that runs W.S.W. from Drominagh Bridge. The *Bulk vein* was proved in one place also, in Cloonbannin, at the road that divides Cloonbannin East and West, where the parish boundary forms an angle. The Fourpenny and Sweet veins, immediately west of the road just mentioned, swell to an amazing thickness, in what are locally called pockets, the Fourpenny being thirty and the Sweet forty feet thick. From this it would seem that a fault to the S.W. occurs, as, when the beds form *bunches* or *bulk* in the S.E. part of this district (except in the *Bulk veins*), they are nearly sure to be cut off, immediately afterwards by a *check*, or fault; but as none of these collieries are now being worked, no information more than has been mentioned could be obtained.

A mile, and a mile and six furlongs farther to the S.W., at the junction of the townlands of Meenskeha East and West and Meenskeha West with Milleenylegane, culm is said to have been proved and worked a little.

* This coal has not been put in the General Section, as this is the only place it is recorded in.

To the N.N.W. of Drominagh Bridge, Sir R. Griffith records two beds of culm—one at the distance of about three furlongs, and the other at about a mile—that are two and six inches thick.

These include all the coal and collieries that are known in the "Lisnacon Range." In the south or "Dromagh Range" are found the coals and collieries now to be described. We shall begin at the most eastern, and follow them towards the south-west.

Dysert Colliery.—This old colliery is situated about three miles to the S.S.W. of Kanturk, and half a mile south of Mineville Cottage. Through the centre of it runs an anticlinal curve, on both sides of which coals were proved and worked. On the south of the curve the *Sweet*, *Rock*, and *Bulk veins* (Nos. III., IV., and V., coals) were worked, the Rock vein being very thick—from four to seven feet—having a dog of nine inches, and a rock seat and roof. The Sweet vein lay on fire-clay, and was from fourteen to eighteen inches thick. Towards the west, at the apex of the curve, it *bunched*. It was also worked on the north of the curve, under the name of the *Piper's vein*. On the north of the curve, besides the Piper's vein, the Bulk was worked a little, and another coal, which may either be the Rock vein or a *rider* to the Sweet. A coal smut is seen to the N. and S.E. of Dysert Bridge, which may be either the Finnane or the Castle vein. The sides of the curve incline south and northward, at angles of 60°. This colliery is cut off towards the east by a *check* or fault that is supposed to be the continuation of the fault that cuts off the Coolclough colliery on the east. Towards the west it is also cut off by a fault, which, along with the anticlinal curve, caused the large *bunch* of the Sweet vein previously mentioned.

Dromagh and Dromskehy (South) Colliery.—This lies in the continuation of the last. All the coals in the General Section have been proved or worked here. This colliery is at present (August, 1860) being worked by N. P. Leader, Esq., to whose underground agent, Mr. Monaghan, I am indebted for most of the following information. Immediately west of the fault that cuts off the Dysert colliery at the W., the *Sweet*, *Rock*, and *Bulk veins* (Nos. III., IV., and V. coals) were worked along to the W. to where the C in Church is engraved on the one-inch map, in which place there is a check that, in crossing these beds, shifts them out of their course forty yards horizontally towards the S., but does not break their continuity. It runs S.S.E., and farther south, as will be afterwards mentioned; it is a downthrow to the east, or an upthrow to the west. Nearly north of this fault, at Dromagh Castle, No. I. coal, or the Castle vein, was worked.

Five furlongs west of this, where marked on the map, there is another *check*, a fault, being an horizontal shift of seventy yards to the south. This fault bears N. and S. About 333 yards on the east of this there is another *check*, or fault; also a downthrow to the E., which shifts the Sweet vein four yards horizontally, though it does not shift the veins above the Sweet as much.*

Mr. Monaghan gave me the following as the horizontal distances between the several coals, taken in a nearly N. and S. line through the present engine-pit, which was sunk about 200 yards on the north of Dromahoe Bridge, as shown in Fig. 6.

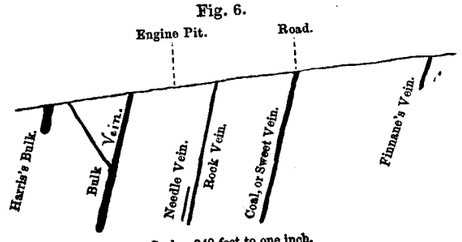
Section No. 20.

		Ft.
13.	*South, or Harris's Bulk.* No. VI. coal,	—
12.	Intermediate distance,	21
11.	*Bulk vein* (south arm). No. V. Coal,	—
10.	Intermediate distance,	105

* This last mentioned fault is supposed to be the continuation of the "Killinane fault," mentioned while speaking of the Lisnacon and Killinane colliery; while the fault that lies to the W. of it is supposed to run N. through the centre of the Dromskehy (north) colliery.

		Ft.
9.	*Bulk vein* (north arm). No. V. Coal,	—
8.	Intermediate distance,	117
7.	*Needle vein*,	—
6.	Intermediate distance,	15
5.	*Rock vein.* No. IV. Coal,	—
4.	Intermediate distance,	120
3.	*Coal vein.* No. III. Coal,	—
2.	Intermediate distance,	210
1.	*Finnane vein.* No. II. Coal,	—
	Total,	588

Fig. 6.



Scale—240 feet to one inch.

N. and S. Section through the present Engine Pit at Dromagh, from measurements communicated by Mr. Monaghan.

As these beds dip to the southward at an angle of 70°, it will give about the following vertical thickness of the measures between the coals:—

*Section No. 21.**

		Ft.	In.		Ft.	In.
19.	*South, or Harris's Bulk.* No. VI. Coal,	1	6	to	5	0
18.	*Seat.* Fire-clay and clunch,				1	6
17.	Intermediate beds,				19	0
16.	*Bulk vein* (south arm). No. V. Coal,				1	3
15.	Intermediate beds,†				99	0
14.	*Bulk vein* (north arm). No. V. Coal,				6	0
13.	*Seat.* Fire-clay and clunch,				2	0
12.	Intermediate beds,				106	0
11.	*Needle vein*,				0	4
10.	*Seat.* Fire-clay,				2	0
9.	Intermediate beds,				14	0
8.	Rock vein. No. IV. Coal,	1	8	to	2	0
7.	*Seat.* Fire-clay and clunch,				2	0
6.	Intermediate beds,				111	0
5.	*Sweet, or Coal vein.* No III. Coal,	1	6	to	1	11
4.	*Seat.* Fire-clay and clunch,				3	0
3.	Intermediate beds,				194	0
2.	*Finnane vein.* No. II. Coal,				1	3
1.	*Seat.* Fire-clay and clunch,				not known.	
	Total,				571	3

No. II. Coal, called here the *Finnane vein*, is a culm. It has been proved from the old incline to the fault that lies on the west of the present engine-shaft, a distance of half a mile. It was also proved to the west of the fault just mentioned. Very little of the culm has been taken out of it, and the thickness of the seat has not been proved.

* In this section the average thickness of the several beds of coals are added, which makes the total greater than it would be if only the intermediate beds, as in Section No. 20, were given.

† This is the thickness between the outcrops of these *arms*.

No. III. Coal, called here the *Coal vein*, is from fifteen to nineteen inches thick, with a *clearing* of from three to four inches. It is all coal, and lies on a seat, the upper part of which is a fire-clay that imperceptibly changes towards the bottom into a clunch. It has been worked from the fault on the west of Dysert to that on the west of the present engine-shaft; but as yet has not been proved to the W. of the last-mentioned fault.

No. IV., or the *Rock vein*, when regular, has the following section :—

Section No. 22.

		Ft.	In.
5. *Rock roof.* Gray grit,		0	10
4. Culm,	1 0	1	11
3. *Dog.* Pyritous black grit,	0 2		
2. Culm, with a little coal,	0 9		
1. *Seat.* Fire-clay and clunch,		2	0
Total,		4	9

but it varies very much; and when the vein thickens, the *dog* always thickens, too, so that there is seldom more than twenty-one inches of culm "got" in it, oftentimes less. The *dog* also does not run regularly through the centre of the vein, but rises and falls continually. This coal has been worked from the fault, at Dysert, as far west as No. III., or the *Coal vein*, and has been proved much farther, as will be hereafter mentioned.

The *Needle vein* was only proved in the present engine-pit. A coal that seems to be in the same position was before mentioned while speaking of the Drominagh colliery.

No. V., or the *Bulk vein*, is most irregular, ranging from a few inches to as much as twenty feet in thickness. It consists of several coals that, when separate, are locally called *arms*. Due south of the present engine-pit it consists of two coals (see Fig. 6) that are thirty-five yards apart at their outcrop, and join, or *bulk*, at forty yards in depth, the south coal being nearly perpendicular. The distance at the surface between the outcrops of the coals is most variable, as they close in and separate most irregularly, following no sort of rule whatsoever. At forty yards on the west of the engine-pit they are only ten yards apart, the southern arm overlapping the regular or northern arm. The *bulk* has been worked from the Dysert fault to the fault on the west of the engine-pit. In the eastern part of this colliery this vein *bulked* at the surface, being on the N.W. of the church twenty feet in thickness; from that toward the west the *bulk* was below the surface; and Mr. Monaghan informs me that it is gradually getting deeper as they go in a westerly direction. To the west of the fault that lies on the west of the engine-pit this coal was worked in the townland of Dromahoe, and found to have five or six arms. The coals that form the *bulk*, though all culm, are of different qualities, and the different arms can be recognised in the deep working. None of them, except the *south*, or *regular arm*, has a *seat* (fire-clay) under them, all the others having a slate under and over them.

No. VI. Coal, or the *South, or Harris's Bulk vein*, has only been proved for about three furlongs towards the east, from the fault that lies on the west of the engine-pit. It is also an irregular vein; but very little is known about it, as it has only been slightly worked.

This colliery is worked on the long level method, as in the Mining Company's colliery at Lisnacon and Dromskeely, only that there they have an adit level, while here they are too deep, and have to pump all the water from the workings.

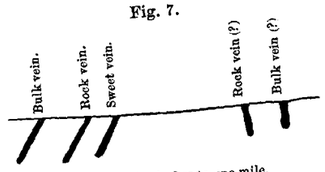
Ducleagh Coal.—To the south of Dromagh, in the townland of Ducleagh, there are a few coals that have been proved or worked a little, which may be higher coals than any of those that have been worked in Dromagh colliery. The most northern of these, which is not in the townland named, but

immediately north of the southern boundary of Dromagh, was proved in the fair green of that place. It has been called by Mr. Foot the Fair-field vein; and all the information that could be gleaned about it is, that it is very thin, not worth working, and that it is nearly vertical, and has a seat on the north side. Three hundred yards to the south of it, at the southern extremity of the plantation, another coal was proved and slightly worked; it goes by the name of the Lady's vein, and is said to be the same coal as the Fair-field; but for what reasons I could not discover. It dips S., at the end of the wood, at 25°, and near Castleview at 80°. About 320 yards to the S., and therefore seemingly above it, there is another coal called the *Garrane Bulk*. This coal makes like the Bulk vein, having *arms*; it has been worked a little. Besides these, there are some small strings and veins of culm and pindy, two veins being above or to the southward of the Garrane Bulk, and two to the northward, between it and the Lady's vein, the highest, or that most to the south, being about 580 feet above the Garrane Bulk. All these coals dip south at angles varying from 70° to 80, and have *seats* (fire-clay and clunch) under them.

A little on the E. of Castleview there is a fault, a downthrow to the E. that runs with a bearing of S.S.E., which is the continuation of the *check* that was previously mentioned as lying on the west of the church in Dromagh. As before remarked, it begins at the coals in that place, and when it reaches the *Garrane Bulk* it has been proved to shift that coal horizontally about 100 yards. To the E. of this fault the *Lady's* and *Fair-field veins* were never proved; but the *Garrane Bulk*, I am informed by an old collier, was worked a little at the road, the outcrops of the *arms* being thirty-three yards apart, the N. arm dipping S. at 60°, and the south N. at 87°. They joined or *bulked* at a depth of twenty yards. Three hundred and forty feet above the Garrane Bulk, on the east of the fault, another coal was worked a little; it is worthy of note, as in the townland of Garrane, that will be immediately mentioned, a coal was worked at the same height above the *Garrane Bulk* there situated.

Dernagree, Keale, and Island Collieries.—These lie farther south-west on the strike of the Dromagh coals. Through the centre of these collieries runs the axis of an anticlinal curve, the inclination of its sides being northward at 80° and southward at 60°. The principal operations were in the vicinity of Dernagree, where the *Sweet, Rock*, and *Bulk veins*, No. III., IV., and V. Coals were worked on the south side of the curve, and the *Rock* and *Bulk* on the north* (see Fig. 8.)

Fig. 7.



Scale—Twelve inches to one mile.

Section through Dernagree, bearing N. 27° W. and S. 27° E.

On the north of the curve the coals mentioned were worked in Keale and Dernagree, at the villages, and also five furlongs on the N.E. of Dernagree.

About a mile to the N.E. of Dernagree one of these coals was proved. To the south of the village the *Bulk vein* was worked in Keale, and from that, in

* The coals on the N. of the curve are said to end not more than forty yards deep from the surface, which would seem as if a fault cut them off.

a N.E. direction for about six furlongs, through Dernagree into Island-Dahill. The *Rock vein* was worked in Dernagree and Island-Dahill, and proved nearly all the way over to Dromagh colliery. The *Sweet vein* was only worked a little in Dernagree.

Garrane Colliery.—In the townland of Garrane, which joins Dernagree on the south, three beds of coal were worked, viz., a coal that is supposed by Mr. Foot to be the continuation of the *Fair-field vein*, the *Garrane Bulk*, and a coal that lies about three hundred and forty feet above the latter. Very little information can be obtained about the coal that is supposed to be the continuation of the Fair-field vein; its outcrop was proved from the road that runs nearly N. and S. through Keale to the eastern boundary of Killetragh. It is said to be nearly vertical, with a slight dip to the northward; but with a fire-clay or *seat* on the north side. Extensive pits were opened on it in Killetragh, but they did not repay the outlay, and were abandoned. The *Garrane Bulk* was only worked immediately north of Minehill House, where it was fourteen feet thick, and consisted of two arms. The *bulk* dipped S. at 80°, while the *arm* N. at about 40°. The former lay on a *seat* (fire-clay and clunch), and over it was a gritty slate, which was again succeeded by a *quarry rock* (a hard, massive, greenish gray grit);* while slate was under and over the *arm*. The outcrop of the arm was proved as far west as the bounds of Garrane, where the parish boundary is marked on the map. The coal above or to the southward of the Garrane Bulk was only worked a little along its basset in Garrane and Killetragh.

About six furlongs on the N.E. of Minehill House, in the townland of Killetragh, a coal was proved that is said to be the Garrane Bulk; but if it is, the strike must suddenly turn, or the coal must be thrown down by a fault, an upthrow to the W. Three furlongs farther N.E. a coal was also proved, that is supposed by Mr. Foot to be the Lady's vein.

Cleanrath Colliery.—This colliery is situated about three and a-half miles due north of Millstreet and a little more than a mile W.S.W. of Dernagree. Three coals were worked in it, the *Finnane's*, *Sweet*, and *Rock veins*, No. II., III., and IV. coals;† they seem to be on the strike of the Dromagh coals. The Finnane's and Sweet veins have been proved and worked from the eastern boundary of Cleanrath to a *check* or fault, a downthrow to the E. that runs about N.20°E. under the farmstead that is situated in the N.W. of the townland. About fifty feet over the Finnane's vein there is a *rider* about eight inches thick that was worked slightly by basset pits. The Rock vein was only worked a little on each side of the road.

Coal-pits, Duarrigle and Lisnashearshane Collieries.—These collieries are situated about three and a half miles N.N.W. of Millstreet, and a mile S.W. of Cleanrath. In Coal-pits, a little to the S.E. of Church Hill, three beds of coal were formerly worked. Two of these are supposed to be the *Sweet and Rock veins*, and the highest may be the *Needle vein*. To the N.E. of these, on the S. of Mount Justice, in the townland of Knockagarrane, a coal was also worked, which seems to be the *Castle*, or *Morgan's vein*.

In Lisnashearshane and Duarrigle three beds of coal were also worked that lie to the south and appear to be higher than those in Coal-pits. The lowest of these is a very small pindy vein, and was only worked along its outcrop. The second was proved, or worked, from the road that runs north and south through the townland of Coal-pits, in a N.E. direction, to the eastern boundary of Duarrigle, where it turned and ran nearly E. and W. till it was cut off by a nearly N. and S. fault a downthrow to the E.,‡ that is situated about 340

* I never remarked a grit like this associated with any of the other coals.
† Mr. Foot considers these to be the Sweet, Rock, and Bulk veins.
‡ It is worthy of note, as a remarkable fact, that all the N. and S. faults that are proved are downthrows to the E. or upthrows to the W.

yards to the east of the bounds of Duarrigle. The vein was from sixteen to twenty inches thick, with a *dog* two inches thick in the centre of it. Half of it was often coal, the rest culm. Under it was a *seat* (fire-clay and clunch), and over it a slate in which fossil ferns are found.*

The highest coal was worked a little in Duarrigle and proved in Lisnashearshane. It was from two to three feet thick, on a fire-clay, with a rock roof. Further south-west, in the strike of these beds, and half a mile due east of Duarrigle Castle, there were a few pits sank on a coal; and a mile to the S.W. of these pits Mr. Foot records a coal that is exposed in the river Blackwater. They seem likely to be the continuation of one of the beds in Duarrigle colliery. A coal smut is also exposed in the bank of the same river, two miles S.E. of Duarrigle Castle, and immediately west of Flintfield House.

6. *Drift and other Superficial Deposits.*

Drift.—At the north-east corner of the district there is drift formed principally of limestone gravel and clay, which spreads generally over the limestone, and in a few places runs up the valleys into the Coal Measure hills. It is of considerable depth, covering nearly all the limestone in that part. The deep drift which spreads over all the rocks in the valley at the foot of the Caherbarnagh range, and entirely conceals them to the west of Millstreet, is gravel and clay formed from the debris of the Old Red sandstone and Coal Measure rocks, with here and there an odd limestone fragment. Accumulations of local drift (*i.e.*, formed of the wear of the underlying rocks), are found in various places, sometimes of considerable depth.

Bogs.—A great portion of the mountainous ground has a peat covering, which sometimes is often of a considerable depth; but when this is merely a growth of peat over undulating ground, it has not been inserted in the map. There are, however, large flat peat bogs in the S.W. corner of the district, one of which is called Annagh Bog.†

Alluvial flats, none of them being of great size or importance, are found along the rivers Blackwater, Feale, and their tributaries.

7. *Minerals.*

The three varieties of coal found in the district are *Anthracite*, *Culm*, and *Pindy*.

The *Anthracite* is of a dark brown colour, and is generally, except what is got from the *Sweet vein*, impregnated with iron pyrites, which often occurs in nodules and thin layers.

Culm is a laminated coal which crumbles when exposed to atmospheric influence.

Pindy is a carbonaceous shale, or a highly argillaceous culm; sometimes it has so much carbon in it that it can be used for fuel. This kind of coal in the county of Limerick is called *slaty culm*, and in the Queen's and Kilkenny counties *kelve*.

* This is the only coal roof in which ferns were remarked, and here they seem to be numerous; but on account of the decomposed state of the shale it was impossible to get any good specimens.
† The insertion or omission of peat bogs has been a difficulty with us. In some parts of Ireland the bogs are so widely spread that it would sometimes be impossible for us to determine what rock lay underneath them. We have, then, been obliged to insert them for this reason, as well as for their own sake. If, however, we inserted all the peat that spreads over mountain ground our maps would, over large districts, show little else, the rock only appearing in the ravines or in scattered crags. We have, therefore, only inserted those peat bogs which form great flats, and usually those only which lie in the low ground.—J. B. J.

A copper mine from which the yellow ore (*copper pyrites*), was taken was formerly worked in the vicinity of Millstreet, and is recorded in Sir R. Griffith's published "List of Mines and Mineral Localities," but the exact place where it was situated could not be ascertained when the district was examined by us.

G. H. K.

GLOSSARY OF LOCAL AND COLLIERS' TERMS.

Terms used in the county of Cork Collieries are marked thus *.
Terms used in the county of Limerick are marked thus †. When there is neither an asterisk nor dagger the terms are used generally.

* *Arms.* When a bed of coal divides into two or more beds before it comes to the surface, the outcrops are called arms.
† *Binder*, a thin grit in a bed of shale.
Brass, iron pyrites.
† *Brass Binder*, a thin pyritous grit.
Brownstone, grit of the Old Red sandstone or Coal Measures.
* *Bulked*, when a bed of coal swells out to a great thickness.
* *Bunch*, when a bed of coal suddenly swells out to a great thickness.
* *Check*, generally a fault, sometimes a deterioration of a bed of coal.
† *Clay*, fire-clay.
Clearing, a thin layer of smut between a coal and the seat or roof.
* *Connemara*, an impure earthy pindy, mixed with fire-clay.
† *Cover rock*, the bed immediately over a coal.
* *Dog*, a thin layer of clunch or grit that is found in some of the coal beds.
† *Gravel*, shales that can be worked with the pick and shovel.
* *Gug*, a pit carried down the inclination or dip of a bed of coal.
* *Hard seat*, clunch or hard sandy clay.
* *Jump*, the amount of a horizontal shift of the beds.
† *Melt*, applied to a rock that disintegrates.
Mountain stone. In Limerick applied to the Coal Measure grit, and in Cork to the Old Red grits.
† *Pencil or Pincil*, soft shale.
* *Pindy*, carbonaceous shale, in Limerick called *slaty culm.*
* *Pockets*, same as *Bunches.*
* *Rider*, a thin bed of coal that locally comes in over some of the regular coals.
Rock, grit or sandstone.
Roof, the bed immediately over a coal.
† *Rotten pencil* is applied to either black shaly fire-clay or fire-clay mixed with shale.
Running Limestone, limestone fragments in the drift.
Sandy Limestone, magnesian limestone or dolomite.
* *Seat*, fire-clay and clunch.
† *Seat Clay*, fire-clay under a coal.
† *Seat rock*, the nearest grit under a bed of coal.
* *Slate or Slāăt*, shales.
† *Slaty Culm*, pindy that can be used for fuel.
* *Soft seat*, fire-clay.
Spa, gossen, oxide of iron.
Spar, quartz, *soft spar*, calc spar. Spar is also used in the Cork collieries by the colliers, in speaking of the rootlets of the stigmaria in the fire-clay and clunch.
Standing vein, a bed of coal that is vertical or nearly so.
Stone, grit or sandstone.
* *Strings of culm*, beds not more than a few inches thick, or partings of culm.
* *Sweet coal*, coal nearly free from iron pyrites.
* *Top of coal*, the outcrop of a coal.
† *Verge of coal*, the same as the *top of coal.*

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