Memoirs of the Geological Survey.

EXPLANATION

TO ACCOMPANY

SHEET 192 AND PART OF SHEET 199 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PARTS OF THE

COUNTIES OF CORK AND KERRY.

By J. BEETE JUKES, M.A., F.R.S.

With Palæontological Notes by W. H. BAILY, F.G.S. & L.S.

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THIS district was surveyed in the years 1853, 1854, and 1855, the part round Bantry Bay by Mr. Willson and myself, assisted in the part between Bantry and Kenmare Bays by Messrs. Kinahan, Foot, O'Kelly, and Wynne. A series of fossils was collected by the late James Flanagan, in the country round Bantry Bay, and from many parts of the adjacent sheets. Mr. Salter went through the district with me to look at these fossil localities in the year 1855, and something was done in the way of naming and arranging the specimens. It was, however, impossible for any man to complete this necessary work by desultory visits, and we were not allowed then to have a permanent palæontological officer in Ireland. In 1857, however, on the departure of Mr. Willson for the Indian Geological Survey, the Director-General filled up his place by transferring Mr. Baily from London to Dublin, to act as palæontologist to the Irish Survey. That gentleman having now been able to reduce our palæontological collections to something like order, and having prepared notes on the fossils found in this district, I have drawn up the following Explanation, after a brief visit to it, to refresh my recollections of it.

J. BEETE JUKES.

August, 1864.

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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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EXPLANATION

TO ACCOMPANY

SHEET 192 AND PART OF SHEET 199

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

It is proposed in these pages to describe the geological structure of the district included in Sheet 192, and the northern part of Sheet 199 of the one-inch Maps. This will comprise the country round the head of Bantry Bay, and a large part of the mountain ground between that Bay and Kenmare Bay on the north, and the rocky promontory between Bantry Bay and Dunmanus Bay on the south.

Bantry is the only town in the district; Carrigboy at the head of Dunmanus Bay, and Glengarriff and Adrigole on the north side of Bantry Bay, being the only villages. On the Kenmare side, the head of Kilmakilloge Harbour and the Cloonee Lakes come within the district. The ground round Bantry Bay belongs wholly to the county Cork, while that on the Kenmare side lies in county Kerry, the boundary between the two counties running along the line of watershed on the crest of the high ground north of Bantry Bay, as far west as Hungry Hill, when the county boundary turns down N. to Ardgroom Harbour.

1. *Form of the Ground.*

The south-west corner of Ireland exhibits several high, rugged promontories, running out to the W.S.W., terminating in precipitous headlands, with rocky islands and islets, each promontory separated from the other by a picturesque bay, running far into the land.

Dunmanus, Bantry, and Kenmare Bays are the three which are most regular in general form, while they are at the same time the most beautiful, on account of the loftiness and the varied outline of the ground intervening between them. Dunmanus Bay opens between Three Castle Head and Sheepshead, and runs in about thirteen or fourteen miles, with a width never exceeding two miles. The opening of Bantry Bay lies between Sheepshead and Bear Island, from which it runs about twenty miles into the land, with an average width of three miles.

The promontory between Dunmanus and Bantry Bays varies from two to two and a-half miles in width, and rises in rocky ridges to a height of about a thousand feet above the sea; Seefin, the highest point, being 1,136 feet.

The promontory between Bantry Bay and Kenmare Bay is about ten miles wide, and is much loftier and more rugged than

that to the south of Bantry Bay. The crest of the ridge is about half way between the two bays, and within the area of Sheet 192 it is of a rather regular height, rarely sinking below 1,500, or rising above 2,000 feet. The most conspicuous, but not quite the loftiest, point of the crest is that called Hungry Hill, where it approaches nearest to Bantry Bay. This is 2,251 feet high, and four miles N.E. of it is Knockowen, 2,169 feet; and three and a-half miles still farther to the N.E. is the Eagle's Nest, 2,003 feet, from which a spur runs out to N. by W., rising in Coomnadiha to 2,116 feet. These eminences belong to the Caha Mountains. From the Eagle's Nest no point quite reaches 1,800 feet for nine miles to the eastward, till we come to the Priest's leap Mountain (1,898 feet). A mile to the eastward of this is Knockboy, the highest point within Sheet 192, having an altitude of 2,321 feet; and nearly two miles N. of it is another Knockboy, of 2,280 feet, overhanging a deep hollow, in which Lough Akinkeen lies. Beyond this the crest of the ridge falls again, though it still forms the lofty ground in which lie the precipitous hollows of Lough Nambrackderg and Gouganebarra, and the many other glens and cleughs of that neighbourhood.

The lowest points of the crest or those which approach most nearly to "passes," are first that of Ballaghscart, between Adrigole and Glanmore, where the crest of the ridge sinks to about 1,060 feet; next that of the new road from Glengarriff to Kenmare, where the ground is again about 1,060 feet, the level of the road in the tunnel being about 1,000. About a mile east of that is the old road which crosses ground of about 1,100 feet. Three or four miles further to the east is the old Priest's leap road, which apparently crosses ground 1,500 or 1,600 feet high, but has no height marked on it in the Ordnance Map; while in the N.E. corner of Sheet 192, a new road has lately been taken from the glen of the Coomhola River, over the crest of the hills into the valley of the Slaheny River across ground which must be apparently about 1,200* feet above the sea.

Numerous spurs strike out in each direction from this central ridge, which is almost everywhere deeply eaten into by lateral glens and valleys. Peaks rise here and there from these spurs, so as to be more or less conspicuous objects between the summit crest and the sea. Of these I need only mention the Sugarloaf, 1,887 feet high, as a well known object to the westward of Glengarriff, and Coomhola Mountain, 1,561 feet, in the country to the eastward, which is, however, almost surrounded by hills of equal altitude.

The whole of this mountain mass is dotted over with lakes, from mere tarns of fifty or 100 yards in diameter, to sheets of water a mile or so in length. These are sometimes mere boggy pools among

* The Ordnance six-inch Maps, which are so admirable in their exactness in every other particular, have one slight defect, which is that of not marking the heights of the lowest points of a mountain crest, or line of watershed. For many purposes it is more important to know where the lowest points of a watershed occur, and what is their altitude, than it is to know the situation and height of the loftiest. I have elsewhere proposed to call these the "lowest connecting gaps," as being the points most tending to connect two river basins which the watershed separates.

the mosses of the mountain sides or ledges, but in many instances they are rock basins, environed on all sides but one by lofty precipices, rising directly from the margin of the lake. The central ridge is, indeed, in some places but little else than a thick wall, so deeply has each of its flanks been eaten into by the erosive agencies which have formed the valleys.

About Knockowen, for instance, N. of Adrigole Harbour, the valley of the Clashduff River is only 137 feet above the sea, at a point less than two miles from the summit of the ridge, which thereabouts maintains a regular altitude of about 2,000 feet, while on the north side the precipices plunge down into the glen of the Glanrastel River, which falls to within 400 feet of the sea level, in about a mile from the summit of Knockowen.

Just N. of the upper part of the hollow of Glengarriff, where the water of the Kerry River is only 200 feet above the sea, the crest of the ridge, called the Baureagh Mountain, rises in little more than a mile to a height of 1,600 feet, and from that the ground plunges down again precipitously into the valley of the Shean River, which within half a mile of the summit of the mountain runs at a level of only 440 feet above the sea.

In like manner in the Knockboy Hills, where the summit of the crest maintains a height of at least 2,000 feet for two or three miles, the valleys that penetrate them on either hand, do not rise to heights greater than 300 or 400 feet above the sea, till they come within a mile or two of each other. Lough Nambrackderg, 868 feet above the sea, is an oval basin of 500 yards by 250, environed by precipices rising 800 feet above the water on all sides but one, where is the exit for the small stream that runs out of it.

Lough Akinkeen, just on the other side of the watershed, lies at a height of 950 feet, and is environed on all sides but one by precipices, which in one part reach 1,300 feet in height, or 2,250 above the sea, the stream from it running northwards through an opening of some width, and falling by a succession of rapids and waterfalls, into a flat-floored valley or strath, the level of which is only 388 feet above the sea.—(*See fig.* 15, *p.* 33).

The principal streams on the northern side of the crest are those which run out to Kilmakilloge Harbour, and the Shean (called, also, in a part of its course, the Baureagh) River which runs down to Kenmare. On the south side several brooks run into Adrigole Harbour, and others into that of Glengarriff. The Coomhola River, one of the sources of which is Lough Nambrackderg, drains the southern slope of the Knockboy Mountains, carrying their waters, first in a wide transverse valley, then in an open longitudinal one, and then through a transverse glen to Snave Bridge, at the extreme head of Bantry Bay. The Owvane River and the Mealagh River fall into two little inlets, farther south, bringing the waters of the main valley of Bantry Bay, which is terminated towards the east by Shehy Mountain and Owen Mountain, and the ridges which connect them with the other surrounding ranges.

One quite subordinate but very singular feature in the form of the ground must not be omitted, and that is the occurrence, here and there, especially in the neighbourhood of the town of Bantry itself, of a

number of smaller isolated rounded hills with perfectly smooth outlines, looking often like artificial mounds, but varying from 50 to 150 or 200 feet in height. These are sometimes connected into longer ridges, and may almost always be distinguished from the rest of the ground by their comparatively high condition of cultivation. They have often the shape of an inverted basin or pudding-pan, and often have an old "rath" or circular rampart on their summits. They are composed of drift-clay, gravel, and boulders, all the other hills and mountains having thin-skinned soils, through which the bare rock frequently shows itself in crags, and knobs, and ridges.

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

Name.	Colour on Map.
Alluvium, Peat bog, &c.,	*Pale sepia.*
Drift, Gravel, Clay, and Boulders,	*Engraved Dots.*
d^1. Carboniferous Slate,	*Prussian Blue and Indian Ink.*
The Coomhola Grits, which occur in this Slate,	*Yellow Dots.*
c. Old Red Sandstone, c^3 Upper,	*Indian red (dark).*
c^2. Lower,	*Indian red (light).*

c. *Old Red Sandstone.*—At the time when this district was being surveyed, and when the one-inch Maps were being engraved, it was believed that the Old Red sandstone was divisible into three subgroups, and the characters c^3 and c^2 were accordingly adopted to signify the two uppermost of these. We have, however, been unable since to discover any characteristics which would enable us to separate any group of rocks at or near the base of those marked c^2 from that group, and yet allow of their being considered as part of the Old Red sandstone.

The whole of the rocks of the district, indeed, from the highest bed of the Carboniferous Slate as deep down as observation has allowed us to penetrate, is one great and apparently continuous series of sandstones or gritstones and clay-slates. There is no definite top to this series, and we have never been able to see the bottom of it, or to discover, in this district, what rocks it rests upon, and how it is related to them.

The only natural division in it is into a grey series above and a red series below, but it is often by no means easy to decide exactly on the boundary between the two. Beginning in the upper grey-slates, and examining the beds in descending order, we conclude that when the first red or purple slate shows itself we have passed into the red series. Beginning from below, and working upwards, we take the first appearance of a dark grey or black slate as a proof that we have passed into the upper group. It is to the slates only that we can trust with any confidence, since the gritstones or sandstones in which these slates lie are often very much the same in both series for many hundred feet on each side of their boundary. There often occurs a regular succession of beds, forming an aggregate thickness of two or three thousand feet, consisting of hard, fine-grained, massive, greenish-grey, or brownish-grey gritstones; many of these are affected by slaty cleavage, more or less decided in its character, and there is

every gradation therefore from a compact solid grit into a fissile clay-slate. Interstratified with these slaty grits there are real clay-slates of various colours—greenish, greenish-grey, brownish-grey, blackish-grey, lilac, or bluish-grey, passing into purplish-blue, and that into purplish-red and liver colour, and finally into brick-red. The grits themselves become red as we descend into the red series, and grey as we ascend into the grey. Where the rocks are not well exposed, it is obvious that it must be often difficult to decide where the red slates cease and the grey slates begin, even if we assume that the change of colour always takes place on the same geological horizon. I believe there is no decided instance of a dark grey or black slate occurring below one of a red colour, though some of the red rocks seem occasionally to fade into a palish-grey. I also believe that the lowest black slate and the highest red slate do occur always very nearly on the same geological horizon. It also appears that the lilac-coloured slates or slaty grits are near the upper part of the Old Red sandstone series, and that the topmost part of that series is often marked by the occurrence of a series of lilac, or purple, or red slates, with fewer grits than usual, though this is not invariably the case. Pale, yellowish, green colours often occur both in the slates and grits of the Old Red sandstone; and the upper part of that series, through a thickness of about a thousand feet, is often remarkably variegated. Calcareous bands or cornstones occur in it occasionally throughout.

As to the total thickness of the Old Red sandstone series, all we can say is that several thousand feet of it are often exposed, in regularly continuous succession, not only reckoning downwards from the highest beds, but in the heart of the formation, without including these beds, and that in no instance in this district have we seen, or apparently approached, the base of the series.

No fossils have ever rewarded the search of the collectors in any part of this series in this district, except just near the top of it, where a few fragments of plants, chiefly broken linear stems, have been found.

d^1. *Carboniferous Slate and Coomhola Grits.*—The upper or grey series consists of dark-grey, sometimes bluish-grey, sometimes nearly black, clay-slate, of a smooth earthy texture and glossy lustre. In the lower part these grey clay-slates are interstratified with thick, fine-grained grits, so that the slates are often merely partings between the grits, or sometimes occur as sets of slate beds of twenty or thirty feet in thickness between similar or greater thicknesses of grit beds. In many places the slates are covered by soil or vegetation, so that the grits alone appear, and the whole series seems as if it were one mass of gritstones. These, however, are always interstratified with slates of a dark grey colour till we come down to the red and variegated beds of the Old Red sandstone below.

A calcareous bed or cornstone occasionally shows itself among these gritstones, and may be recognised by its rusty brown colour, and its assuming the character of a rotten-stone. The gritstones which thus occur in the lower part of the Carboniferous Slate were called by me, whilst I was examining them in the summer of 1854, the Coomhola grits, from the name of the river valley at the mouth of which they are so well exhibited, that which lies next to the east of the Glengarriff valley. They are not, however, entitled

to be considered as a distinct group or formation, but merely as a local, or accidental, deposition of sandstones in the lower part of the Carboniferous Slate, just as groups of sandstone occur locally in the Coal Measures, or alternations of sandstones and limestones in the Carboniferous Limestone of the north of England.

Above them a considerable thickness of clay-slate usually occurs, with or without the occasional appearance of a thin gritstone. Calcareous bands of a few inches in thickness show themselves here and there in these slates, especially in the upper part of the series, and may be recognised by the rusty appearance imparted to the rock, in consequence of the decomposition of the carbonate of lime and the oxidation of the ferruginous matter mixed in the rock. In one or two places at the head of Bantry Bay these calcareous bands become actual limestones of a foot or so in thickness, of a grey colour and crystalline structure.

The slates are in some places quarried for roofing-slate, but rarely afford roofing-slates of first-class quality, being deteriorated not only by bands of unequal texture but by layers of nodular lumps of the size of a walnut. The total thickness of this Carboniferous Slate series cannot be less than 5,000 feet, without reaching any definite top to it. The part of it which is characterized by the occurrence of the Coomhola grits is certainly from 3,000 to 3,500 feet thick, as measured on each side of the mouth of the Coomhola glen above Snave Bridge, or on the eastern shore of the entrance to Glengarriff Harbour in the Ardaturrish district.

Fossils occur occasionally from top to bottom of the Carboniferous Slate, sometimes abundantly, especially about the calcareous bands of the upper part of it, while many large parts of it seem devoid of them for many miles. The same plants which are found in the upper part of the Old Red sandstone are also found in the Carboniferous Slate occasionally, especially in its lower part among the Coomhola Grits. Marine shells, or echinodermata, however, have never yet been found in this district in or beneath a red bed, while they occur in places in the very lowest of the grey beds. This setting in of marine fossils, coincident with the change of colour in the rocks, is an additional reason for separating them into two groups, to the uppermost of which Sir R. Griffith's term of Carboniferous Slate is singularly appropriate; while the lower is certainly the Old Red sandstone, inasmuch as one may walk along its beds uninterruptedly all the way from Glengarriff and Kenmare into the county Waterford, and follow them thence into Wexford, where the formation assumes precisely the same type as it does in S. Wales.

The "cleavage" of the rocks of the country may be mentioned here. It is perceptible everywhere, often in the hardest and most massive grits which commonly split more readily parallel to it than in any other direction. Its strike is universally E.N.E. and W.S.W., and its most usual dip is to S.S.E. at high angles. In some cases, however, the dip of the cleavage flattens to 30°, 40°, or 50°. This, when it takes place, is always in argillaceous beds, and if grits occur interstratified with these beds the cleavage always crosses them more or less nearly at right angles to the stratification.

Along one narrow line of country striking from Glengarriff Harbour to the eastward the cleavage seems to dip to the N.N.W. at 60° or 80°.

J. B. J.

3.—*Palæontological Notes.*

The following is a List of the Localities at which Fossils were collected, within the area included in Sheets 191, 192, 193, 198, 199, 200, and 205.

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of Cork.	Sheet 191.
1	101/1 & 2	Kilcatherine, . .	On shore a little W. of Loughaunagallig, Kenmare River; Carboniferous slate.
2	101/1 & 2	,, . .	On shore three quarters of a mile N.E. of Kilcatherine Point, Kenmare River; Carboniferous slate.
3	101/3	Inishfarnard, . .	S.E. end of Inishfarnard Island, at Ballycrovane Little, Conlagh Bay; Carboniferous slate.
4	101/4	Kilcatherine, . .	On shore between Reen Point and Kilcatherine Point, Kenmare River; Coomhola grit.
5	101/4	,, . .	About three-quarters of a mile N.E. of Reen Point, inland, near the boundary of Gortgarriff townland; Upper Old Red sandstone.
6	102/1	,, . .	Shore opposite the Island of Illaundonagha; Carboniferous slate.
7	102/1	Ardgroom, inward, .	Shore S.W. of the island of Illaunacuiree; Carboniferous slate.
8	102/1	,, ,, .	Shore N.E. of the island of Illaunacuiree; Carboniferous slate.
9	102/1	,, ,, .	S.E. of Foilatluggig, about a quarter of a mile inland; Carboniferous slate.
10	102/1	,, ,, .	Shore, W. side of Ardgroom Harbour, about a quarter of a mile N. of the island of Illauncreagh; Carboniferous slate.
11	102/2	,, ,, .	Shore, about a quarter of a mile E. of Foilatluggig; Carboniferous slate.
12	102/2	,, ,, .	Shore, near Knocknamona; Carboniferous slate.
13	114/1	Caherkeen, . .	Shore, half a mile N.W. of Caherkeen, S. side of Coulagh Bay; Old Red sandstone.
		County of Kerry.	
14	108/1	Collorus, . .	Shore, a little N. of Collorus Island, Ardgroom Harbour; Carboniferous slate.
15	108/1	,, . .	Shore, N.E. of preceding locality, about three quarters of a mile N.W. of Collorus; Coomhola grit.
16	108/1	,, . . .	Shore, entrance to Kilmakilloge Harbour; Coomhola grit.
17	108/1	,, . .	Inland, about half a mile S.W. of Collorus Point, and a quarter of a mile N.W. of the village of Collorus; Coomhola grit.
18	108/2	Loughaunacreen, .	Shore, near Loughaunacreen, E. side of Kilmakilloge Harbour; Coomhola grit.
19	108/2	Kilmakilloge, . .	Shore, S. of Bunaw, Kilmakilloge Harbour; Carboniferous slate.
20	108/2	,, . .	About a quarter of a mile E. of Bunaw; Carboniferous slate.
21	108/2	Tragalee, . .	Shore, a little S.W. of Carrignawohill Island; Coomhola grit.
22	108/3	Collorus, . .	Shore, a little N. of Bird Island, E. side of Ardgroom Harbour; Carboniferous slate.
23	108/3	,, . .	Shore, opposite Black Island, E. side of Ardgroom Harbour; Coomhola grit.

List of Localities at which Fossils were collected—*continued.*

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of Kerry—*continued.*	
24	108/3	Collorus, . .	Shore, N. side of Collorus Island, E. side of Ardgroom Harbour; Carboniferous slate.
25	108/3	Coolownig, . .	Cutting on new road from Castletown Bearhaven, half a mile S. of Collorus; Upper Old Red sandstone.
26	108/3	,, . .	Cutting on same road a little S. of preceding locality; Upper Old Red sandstone.
27	108/3	Cuhig, . . .	Cutting on same road, three quarters of a mile further S., near Glashananinnaun Bridge; Old Red sandstone.
			Sheet 192.
28	100/4	Ardea, . . .	Shore a little S. of Ardea Castle, Kenmare River; Carboniferous slate.
29	100/4	,, . . .	Shore under Ardea Castle; Carboniferous slate.
30	100/4	Ardea and Cloonee,	River Cloonee, about 20 yards from its mouth; Coomhola grit.
31	100/4	Cloonee, . . .	Shore between Cloonee River and Leaghillaun; Old Red sandstone.
32	100/4	Lehid, . . .	W. side of Lehid Harbour; Carboniferous slate.
33	100/4	,, . . .	E. side of Lehid Harbour; Carboniferous slate.
34	108/2	Canfee, . . .	On road a little W. of Schoolhouse, S. of Lehid Harbour; Coomhola grit.
35	101/1	Coomagill, . .	Shore about half a mile N.E. of Ormond's Island, Kenmare River; Upper Old Red sandstone.
36	101/3	Derrylough, . .	Road-cutting three quarters of a mile S. of Ardea Bridge; Carboniferous slate.
37	101/3	Drombohilly, Lower,	On same road, half a mile S. of preceding locality, one mile and a-half E. of Lehid Harbour; Old Red sandstone.
38	108/2	Derreenatlooig, .	Shore, N. side of Kilmakilloge Harbour; Upper Old Red sandstone.
		County of Cork.	
39	105/1	Ardaturrishbeg, .	Shore, one mile and a quarter S. of Glengarriff Castle; Coomhola grit.
40	105/1	,, . .	On road, four miles from Glengarriff to Bantry; Coomhola grit.
41	105/1	Coorycommane, .	Summit of Coorycommane Mountain, about three quarters of a mile S.W. of Coomhola Bridge; Coomhola grit.
42	105/2	Cooryleary, . .	North side of Coomhola Bridge, Coomhola Valley; Coomhola grit.
43	105/2	,, . .	Near Coomhola Bridge, Coomhola Valley, W. side; Coomhola grit.
44	105/3	Ardaturrishmore, .	North of Ardaturrish Point, entrance to Glengarriff Harbour; Coomhola grit.
45	105/3	,, . .	South face of Ardaturrish Point; Coomhola grit.
46	105/3	,, . .	Shore, N. side of Ardaturrish Point; slate in Coomhola grit.
47	105/3	,, . .	Ardaturrish Point; Lower Coomhola grit.
48	105/3	,, . .	Shore at Reennagough Point; Coomhola grit.
49	105/3	Ardnamanagh, .	Shore, N. side of Ardnamanagh Point; slate in Coomhola grit.
50	105 3	Reenavanny, . .	N.E. point of Whiddy Island, opposite E. Redoubt; Carboniferous slate.

List of Localities at which Fossils were collected—*continued.*

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of Cork—*continued.*	
51	105/4	Reenadisert, . .	N.W. side of Ballylicky Bridge, three miles W. of Bantry; Carboniferous slate.
52	105/4	Reenydonagan, .	Reenydonagan point, two miles and a-half N. of Bantry; Carboniferous slate.
			Sheet 193.
53	92/3	Cappaboybeg, .	One mile on the road from Cappaboy Bridge to Inchigealagh; Coomhola grit.
54	92/3	Lackareagh, . .	Summit of hill, one and a quarter miles N.E. of Carigana ss Castle; Coomhola grit.
55	92/4	Gortloughra, . .	Half-way between Shehybeg and Shehymore Mountains; Coomhola grit.
56	92/4	Cousane, . .	Half a mile N. of Shehybeg Mountain; Carboniferous slate.
57	93/1	Shehybeg, . .	Shehy Mountain, a little S.E. of the summit; Carboniferous slate.
58	93/1	Shehymore, . .	Half a mile N.W. of the summit of Shehy Mountain; Carboniferous slate.
59	93/1	,, . .	Three quarters of a mile N.E. of the summit of Shehy Mountain; Carboniferous slate.
60	93/1	,, . .	Half a mile N.E. of the summit of Shehy Mountain; Carboniferous slate.
61	108/2	Dromdiclogh, West,	S. of Carrigmore House, three miles W. of Ballyneen; Carboniferous slate.
62	108/3	Ballyhalwick, . .	On road, one mile and a half E. of Dunmanway; Coomhola grit.
63	108/4	Manch, West, .	On old road, half a mile N. of Manch Bridge, three miles and a half E. of Dunmanway; Carboniferous slate.
64	119/2	Seehanes, . .	Ahaneagh, E. side of River Ilen, about three quarters of a mile S. of Castle Donovan; Carboniferous slate.
			Sheet 198.
65	115/3	Brom, South, . .	Glebe House, near Castletown Bearhaven; Upper Old Red sandstone.
66	115/3	Cametringane, .	Shore near Castletown Bearhaven; Carboniferous slate.
67	115/3	Derrymihin, West, .	Shore, S. of Union Workhouse, opposite Dinish Island, Castletown Bearhaven; Carboniferous slate.
68	115/3	,, ,, .	Shore, E. of preceding locality, between it and Minane Keal; Upper Old Red sandstone.
69	115/4	Ardagh, . . .	Shore, a little N.W. of Ballynakilla; N. side of Bear Island; Upper Old Red sandstone.
70	127/3	Kilkinnikin, West,	Shore, S.W. of Kilkinnikin, about one mile N.E. of White Ball Head, Bantry Bay; Coomhola grit.
71	127/3	Kilkinnikin, East, .	A little E. of preceding locality, N. side of Tramore; Coomhola grit.
72	127/3	,, ,, .	Shore at Lahillaun, about three quarters of a mile N.E. of White Ball Head; Carboniferous slate.
73	127/3	Loughanebeg, .	Point, N. of White Ball Head; Coomhola grit.
74	127/3	Canalough, . .	Black Ball Head; Carboniferous slate.

LIST of LOCALITIES at which FOSSILS were collected—*continued.*

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of CORK—*continued.*	
75	127/3	Canalough, . .	On road near the Signal Tower, half a mile N.E. of Black Ball Head; Carboniferous slate.
76	127/3	,, . .	Shore, a little N. of Fortglass, half a mile N.E. of Black Ball Head; Carboniferous slate.
77	127/4	Lickbarrahane, .	Mathews' Rock, two miles N.E. of Black Ball Head; Carboniferous slate.
78	127/4	,, . .	Shore, a little N. of preceding locality; Carboniferous slate.
79	127/4	,, . .	Shore, a little farther N. of preceding locality; Carboniferous slate.
80	127/4	Brackloon, . .	Shore, S.W. of Carrigfadda, half a mile N.E. of Mathews' Rock; Carboniferous slate.
81	128/1 & 3	Disert, . . .	Fair Head, W. entrance to Bearhaven; Carboniferous slate.
82	128/1 & 3	,, . .	Shore, a little S. of Piper's Point, N. of preceding locality; Coomhola grit.
83	128/1 & 3	Dunboy, . .	Shore at Dunboy demesne, about one mile and three quarters S. of Castletown Bearhaven; Carboniferous slate.
84	128/1 & 3	,, . .	Shore at Dunboy demesne, a little S. of Dunboy Castle, and N. of preceding locality; Carboniferous slate.
85	128/1 & 3	Derrycreeveen, .	Shore near Redoubt No. 5, W. end of Bear Island; Coomhola grit.
86	128/1 & 3	,, . .	S. side of new road to Lighthouse, W. end of Bear Island; Carboniferous slate.
87	128/1 & 3	,, . .	N. of new Lighthouse, W. end of Bear Island; Carboniferous slate.
88	128/1 & 3	,, . .	Telegraph Tower, W. end of Bear Island; Carboniferous slate.
89	128/1 & 3	Derrycreeveen and Ballynakilla,	In stream W.N.W. of Knockanallig mountain, W. end of Bear Island; Carboniferous slate.
90	128/2 & 4	Cloonaghlin, . .	On road half a mile W. of Rerrin, W. end of Lawrence's Cove, Bear Island; Coomhola grit.
91	128/2 & 4	Ardaragh, West, .	Shore, W. of Leahern's Point, S. side of Bear Island; Coomhola grit.
		SHEET 199.	
92	116/3	Ardaragh, East, .	N. side of Lonehort Point, E. end of Bear Island; Coomhola grit.
93	116/3	,, . .	S. side of Lonehort Point; Carboniferous slate.
94	117/1	Roosk, . . .	Shore at Mehal Head, between Adrigole and Glengarriff, Bantry Bay; Coomhola grit in Carboniferous slate.
95	118/1	Dromclogh, . .	Relane Point, two miles and a quarter S.W. of Bantry; Carboniferous slate and Coomhola grit.
96	118/1	Dromleigh, North, .	On road about half a mile S.W. of Bantry; Coomhola grit.
97	118/2	Carrignagat, . .	Bantry; W. side of road from Bantry to Dunmanway; Carboniferous slate.
98	130/3	Gorteanish, . .	E. side of Evanson's Cove, N. shore of Dunmanus Bay; Coomhola grit.
		SHEET 200.	
99	119/1	Maunvough, . .	Half a mile S.E. of Trawlebane Bridge, four miles E. of Bantry; Carboniferous slate.

LIST of LOCALITIES at which FOSSILS were collected—*continued.*

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of CORK—*continued.*	
100	120/3	Baurnahulla, . .	Three quarters of a mile E. of Aheen Bridge, one mile S.E. of Dromdaleague; Carboniferous slate.
101	120/3	Lahanaght, . .	Three quarters of a mile N.W. of Lahanaght House, two miles E. of Dromdaleague; Carboniferous slate.
102	120/3	Killaveenoge, West,	Three miles E. on the road from Dromdaleague to Reavouler Bridge; Carboniferous slate and Coomhola grit.
103	120/3	,, ,, .	On branch road about half a mile E. of preceding locality: Carboniferous slate.
104	121/1	Lettergorman, .	On road one mile N. of Lough Atarriff; Carboniferous slate.
105	134/2	Bealad, . . .	Quarter of a mile N. of Bealad House, four miles N.W. of Clonakilty; Coomhola grit.
106	134/3	Dungannon, . .	Connonagh, boundary of parishes of Rosscarbery and Kilmacabea; Coomhola grit.
107	134/3	Benduff, . . .	A little E. of Benduff Cottages, two miles N. of Rosscarbery; Coomhola grit.
108	141/1	Mohanagh, . .	A little S.W. of Glasheennagnauv, two miles N.W. of Skibbereen; Coomhola grit.
109	141/2	Abbeystrowry, .	W. of Abbey Schoolhouse, one mile and a half N.W. of Skibbereen; Coomhola grit.
110	141/2	,, . .	E. of Abbey Schoolhouse, a little N.E. of preceding locality; Carboniferous slate.
111	141/4	Rossnagoose, . .	N. side of road, one mile and a half W. of Skibbereen; Carboniferous slate.
112	142/1	Aghills, . . .	Half a mile S. of Shepperton, two miles W. of Union-hall; Coomhola grit.
113	142/1	,, . .	Shepperton, one mile and a half N.W. of Union-hall; Carboniferous slate.
114	142/2	Drom, . . .	A little S. of Leap, on road to Glendore, N. end of the Harbour; Carboniferous slate.
115	150/1	Inishbeg, . .	On the river Ilen, half a mile S.W. of Inishbeg Bridge, Skibbereen; Old Red sandstone.
		SHEET 205.	
116	150/4	Gokane, . . .	Gokane Point, W. of Toe Head Bay; Upper Old Red sandstone.
117	151/1	Castlehaven, . .	Shore, S.E. of Tracarta, one mile and a half S. of Castle Townsend; Upper Old Red sandstone.
118	151/3	Toe Head, .	Toe Head; Carboniferous slate and Coomhola grit.

List of the Species of Fossils collected from the Localities included in the preceding Table.

The numbers opposite each name refer to corresponding ones in the list of localities, and are intended to indicate the places at which the fossils were collected.

Note.—The capital letters before the numbers are intended to mark the kind of rock which occurs there, S. standing for shale or slate, G. for grit, both being presumed to be of Carboniferous age, and O. R. S. for Old Red sandstone.

PLANTÆ.

	Localities.
Filicites lineatus[a] ('linear plants'),	S., × × × 6, 28, 41, × ×46, 56, 63, 67, × × 94, 99, 104, × × 109, 110, 111.
,, ,,	O. R. S., 115, 117.
Sphenopteris? leaflets,	S., 14, 24.
Adiantites Hibernicus,	O. R. S., 116, 117.
Sagenaria Veltheimiana,	S. and G., ? 4, 20, 56.
,, ,, ? Knorria acutifolia, *Dunker and Meyer*,[b]	G., 96.
,, ,, ? roots like Stigmaria,	S., 1, 14, 24, 67.
,, ,, stems and roots?	O. R. S., 26.
Sagenaria (*Dunker and Meyer*),[c] Cyclostigma Kiltorkense (*Haughton*), showing central axis,	O. R. S., 117.
Sagenaria, ? fruit like Lepidostrobus,	S., 8.
Plant stems, &c., undetermined,	S. and G., × × 1, 8, 10, 12, × × 14, 20, 22, 24, 29, 30, 39, 43, 51, 67, 75, 83, 84, 88.
,, ,,	O. R. S., 5, × × × 13, 25, 26, 27, × × 31, × × × 35, 38, 65, 68, 69, 115, 116, 117.

CÆLENTERATA.

Actinozoa.

Alveolites depressa,	S., 52.
Chætetes dubius,	S., 77.
,, tumidus,	S. and G., 33, 52, 62, 95, 106.
Cyathophyllum (Petraia) celticum[d] or pleuriradiale,	S., 52, 74, 75, 77, 79.
Pleurodictyum problematicum,[e]	S. and G., 33, 95.

MOLLUSCA.

Polyzoa.

Ceriopora rhombifera,[f]	S. and G., 2, 4, 25, 49, 99, 102.
Fenestella antiqua (Goldf.),	S. and G., 2, 40, 51, 52, 60, 74, 75, 76, 77, 78, 79, × × × 81, 86, 87, 88, 93, 95, × × 99.
,, (undetermined),	S., 2, 61.
Glauconome pluma,	S , 40, 52, 86.
Polypora laxa,	S., 52, 77.

Brachiopoda.

Athyris ambigua?	G., × 47, × × 92, 95, 108.
,, lamellosa?	S., 64.
,, Royssii or concentrica?	S., 40, 52.
,, ?seminalis, n.s., fig. 4,	G., × 47, × × 92.
Chonetes Hardrensis	S., 52, 74.
Cyrtina heteroclita?[g]	52.
Lingula mytiloides,	S. and G., 45, 51, ? 55, 56, 92, 95.
,, squamiformis,	S., and G., 44, × × 56, × 90.

[a] Explanation to Sheets 187, &c., fig. 2, p. 20.
[b] Palæontographica, Naturgeschichte der Vorwelt, vol. 3, pl. xiv., fig. 3.
[c] Ibid, vol. 3, pl. xiv., fig. 4.
[d] Explanation of Sheets 187, &c., p. 24, fig. 4.
[e] Ibid, ,, p. 25, fig. 5.
[f] Including C. (millepora) gracilis, Phil., and (*Favosites*) serialis, Portl.
[g] This species is included on the authority of Mr. Davidson, to whom we are indebted for an examination of the Brachiopoda in this collection.

	Localities.
Orthis Michelini,	S., 40, 64, 77, 86, ? 87, 89, 93, × × × 99.
Producta, new species ?[a] fig. 3, p. 21,	S., 52.
,, scabricula,	S., 52, 74, 75.
,, semireticulata,	S., ? 52.
,, species undeterminable,	S., 60, 64.
Rhynchonella pleurodon,	S. and G. 2, 4, 33, 34, 52, 53, 58, 70, 74, 82, 87, 92, 95, 99, 101, × × 102, 106, 108, 112.
,, pugnus?	G. 118.
Streptorhynchus crenistria,	S. and G., 4, × × 32, 33, 52, 59, 74, 77, 78, 79, 87, × 95, 100, 101, 102.
Strophomena analoga,	S., 2, 78.
Spirifera cuspidata,	S. and G., 2, ? 33, 74, 79, 95, ? 100, 107, ? 118.
,, disjuncta,[b] including var. Barumensis,	S. ? 40, 51, 52, 59.
,, lineata,	S. 2, ? 52, 74, 86, 87, 88, 93.
,, striata,	S. and G., 2, ? 52, 58, 74, 77, 78, 79, 82, 86, × × 89, 93, 107, 108, × × × 118.
,, Urii,	S., 59.
,, species undeterminable,	S. and G., 52, 100.
Spiriferina cristata, var. octoplicata,	S., 51, × 52, 74.
,, laminosa,	S., 52, 87.
Terebratula hastata,	G., 95.

Conchifera.

Anodonta Jukesii,	O. R. S., 116.
Arca (species undetermined),	G., 82.
Avicula Damnoniensis,	S. and G., 4, 17, 18, × 19, 30, ××40, ×× 41, 42, 45, × × 47, × × 48, × × × 56, 70, 73, 82, 90, 92, × × × 96, × × 97, 98, × 99, 100, × × 102, 103, 105, ××× 106, 107, × 108, × × 112.
,, (species undetermined),	S., 14, 57.
Aviculopecten arenosus,	G., 95.
,, plicatus?	G., 105.
Axinus? n.s., fig. 9, p. 23,	G., 108.
,, species undetermined,	G., 42.
Cucullæa depressa,[c] *Phillips*,	G., 108.
,, Griffithii,[d] *Salter*, MSS. (fig. 5, p. 23),	G., 108, 112.
,, Hardingii,	S. and G., 23, 33, 44.
,, (species undetermined),	G., 30, 71.
Curtonotus elegans,[e] *Salter*,	G., 42, ? 48, 92.
,, ,, var. rotundatus,	S. and G., 11, 42, 70, 75, 95.
,, (species undetermined),	S. and G., 42, ? 76, ? 82.
Cypricardia (,,),	S. and G., 42, 71.
? Dolabra securiformis,	G., 92.
Leda attenuata,	G., × 95.
Modiola Macadami,	S. and G., × × 3, × × 7, × × 11 14, × × × 15, 16, × × 18, 21, × 30, × × × 34, × × × 39, ××41, × × × 42, 43, × × 47, × × 48, 70, × 71, 73, 82, × 85, 90, × × × 91, 92, 107, 112.
Myacites? or new genus,	G., 108.
Nucula tenuiarata, *Sandberger*,[e]	G., 82.
,, new species, fig. 8, p. 23,	G., 112.

[a] Mr. Davidson is doubtful whether to consider this a known or new species, and remarks that it most nearly approaches to P. semireticulata, or to some allied forms.
[b] This species is included on the authority of Mr. Davidson, who examined the specimens from the localities appended.
[c] Palæozoic Fossils of Cornwall, Devon, &c. In the explanation of plate 19 of that work, fig. 71 is referred to as Cucullæa (?) complanata, the same shell being described at p. 42, under the name of C. depressa.
[d] See Explanation to Sheets 187, &c., p. 28.
[e] Ibid, ,, p. 28, fig. 6.

	Localities.
Nucula (species undetermined),	S. and G., 14, 45, 47, 48, 56, 82, 92, 95, 97, 99, 101, 108, 118.
Posidonomya Becheri,[a] (Coal Measures?)	50.
Pterinea spinosa?	G., 108.
? Pullastra bistriata,	S., 52.
Sanguinolites oblongus,	G., ? 48.
„ plicatus,	G., 4, ? 18, 71, 90, 92, 108.
„ (species undetermined),	S. and G., 14, 17, 23, 30, 42, 56, 85, 108.
Small bivalves undetermined,	S. and G., 11, 14, 16, 42, 47, 56, 70, 90, 91, 97, 99, 105, 108, 118.

GASTEROPODA.

Acroculia vetusta,	S., 52.
Euomphalus pugilis,	S., 95.
„ (species undetermined),	S., ? 76.
Loxonema („ „),	S. and G., 15, 73, 82, 108, 112.
Macrocheilus („ „),	S. and G., 70, 75, 92.
Natica plicistria,	S., ? 100.
„ (species undetermined),	S. and G., 11, 19, 92, 107.
Patella retrorsa?	S., 60.
Pleurotomaria (species undetermined),	S. and G., 92, 95, 100.

HETEROPODA.

Bellerophon bisulcatus,	G., 112.
„ decussatus?	G., 95.
„ striatus,	S. and G., 11, 82, 100, 103.
„ subglobatus,	S. and G., 52, 62, 82, 95, 96, 97, 100, 101, 107, 108, 112.

CEPHALOPODA.

Orthoceras undulatum,	S. and G., 90, 92, 100, 103.
„ (species undetermined),	S. and G., 4, 62, 70, 73, 95, 99.

ANNULOSA.

ECHINODERMATA.

Actinocrinus triacontadactylus,[b]	S. and G., 4, 40, 51, 54, × × 59, 60, 64, 77, 78, × × 79, 82, 86, × × 87, 89, 93, 99.
„ ? (small head and stem),	S., 75.
? Adelocrinus hystrix,	S., 51.
Archæocidaris Urii,	S., 77.
Cyathocrinus planus?	S., 51, 77.
Platycrinus lævis? fig. 13,	S., 77.
Crinoidal remains principally consisting of disconnected joints and fragments, undeterminable,	S. and G., 2, 30, 49, 51, 52, × × 54, 58, 61, 74, 75, 76, 78, 79, 81, 82, × × 86, 88, 89.

CRUSTACEA.

Leperditia subrecta,[c]	S., 41, ? 95.
Phillipsia pustulata,	S., 50, 52, 74, 77.

PISCES.

Scale of Holoptychius?	G., 23.
Tooth of Bothriolepis?[d]	O. R. S., 117.

[a] This species at the above locality exhibit varieties similar to those figured under the names of *membranacea* and *costata*, by M'Coy.

[b] *A. polydactylus* and ? *lævis*, Miller; *tesselatus*, Phil. Geol. Yorksh., vol. 2, tab. 4, fig. 1. ?*Cyathocrinus variabilis*, Phil., Pal. Foss., tab. 16, fig. 48; *icosidactylus*, Portl. Geol. Rep., tab. 15, fig. 7, and *A. costus*, M'Coy; Carb. Foss., Ireland, tab. 26, fig. 2, are probably synonyms of this species.

[c] Explanation to Sheets 187, &c., pp. 18 and 30.

[d] This tooth resembles very closely one from Kiltorcan, county Kilkenny, which, upon comparison with Agassiz's figure, I had doubtfully referred to the above genus. Explanation to Sheets 147 and 157, page 17, fig. 4 *e*.

Remarks on the Fossils.

The large series of fossils examined from this district, consisting of several thousand specimens, was obtained from 118 different localities in the counties of Cork and Kerry; the majority of them having formed part of the collection made by the Geological Survey many years ago. In the general aspect presented by these fossils they are very similar to those noticed in the Explanation of the sheets of the Cork Harbour district, 187, &c., having been for the most part procured from rocks of similar lithological character, being, in fact, an extension of the same beds towards the western extremity of Ireland. Some of the fossil localities on Sheets 197 and 198 had already been alluded to in the Explanations to those sheets, published in 1860;* a few additional species, with other particulars, having, however, occurred on a further examination, it was considered advisable to include them in the foregoing lists with the present series, to which they belong.

In consequence of the general similarity between the fossils of this collection (as already alluded to) and those mentioned in the Explanations to Sheets 187, &c., but few additional remarks will be necessary, and those may be considered supplementary to what is already published in that explanation.

Continuing these remarks in the same order of arrangement, and commencing with an account of the REMAINS OF PLANTS, we find the branching stems called *Filicites lineatus*, or "linear plants,"† as before stated, to be the most characteristic and abundant fossil plant occurring in beds of a shaly or slaty character belonging to the Carboniferous series at many localties throughout this district.

At two localities only, with the exception of those referred to the Old Red sandstone, were anything like leaflets observable, they resemble in form some of those belonging to species of the genus Sphenopteris. Large stems and branches of *Sagenaria Veltheimiana*‡ occur indiscriminately in both shales and grits of the Carboniferous series, as well as in deposits of the Old Red sandstone formation, accompanied in some instances by fragments, probably its roots, punctated, and very similar to Stigmaria.

The majority of the plants in this assemblage of fossils, like those in the corresponding part of the collection, are in too imperfect a condition for anything like accurate determination; all that can be said of them at present being as to the class to which they belong, some of them (particularly those from Dunboy Demesne, near Castletown, Bearhaven, locality 83), are large stems, as much as two inches and a-half in diameter; the vegetable matter of which is carbonized and exhibits traces of cellular structure at locality No. 8, from rocks on the south shore of Kenmare River, a little N.E. of the island of Illaunacuiree, plant stems occur in a very quartziferous grit, accompanied by a cone-like body, resembling what is usually known as Lepidostrobus, and which, although obscure, appears to be of a somewhat similar character to that figured by Dr. Geinitz§ as the fruit of Sagenaria Veltheimiana. The specimen collected by the Geological Survey is represented at *a*, fig. 1, that at *b* is copied from Dr. Geinitz' work, for comparison on the same woodcut. Some of these plant remains are associated with marine shells, principally Modiola Macadami.

The most interesting plant localities in this district are in rocks of the Upper Old Red sandstone at Gokane and Tracarta, near Toe Head, and Castle Townsend (localities 116 and 117), from both of which were obtained the fossil fern, *Adiantites Hibernicus*, with stems of *Sagenaria*, similar to those found

* Explanation to Sheets 197 and 198 of the maps of the Geological Survey of Ireland. "Note on the Fossils," pp. 9–13.

† Explanation to Sheet 187, &c., pp. 19 and 20; fig. 2.

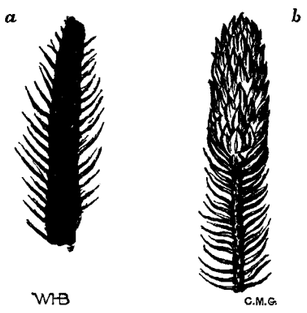
‡ Ibidem, pp. 21, 22; fig. 3.

§ "Darstellung der Flora des Hainichen-Ebersdorfer," &c., pl. 4; fig. 4.

at Kiltorcan, county Kilkenny, described in the Explanations to Sheets 147 and 157, pp. 12 to 18.

Corals, or Zoophyta.—The absence of the Carboniferous limestone throughout this portion of the district will account for the comparative paucity of species belonging to this class of animals; this will be particularly apparent on reference to the list of species, where that of the corals will be found to contain only a few small examples of *Rugosa*, a group so abundant in the limestone, with some others of the division *Zoantharia tabulata*, the larger forms being entirely absent in these deposits.

Fig. 1.



a. Plant resembling *b*.
b. Sagenaria Veltheimiana, after Geinitz; termination of branch.

Polyzoa.—From the same cause as that remarked upon with regard to the corals, the species of this division of the Mollusca are also few in number; this small amount in the variety of forms being, however, compensated for by the abundance of individual specimens, principally belonging to Fenestella, and referable to one species, *F. antiqua*, Goldfuss, which was collected at eighteen different localities, from both shales and grit; as before remarked however,* it occurs in the greatest profusion in the shales, being at some localities so abundant that every layer of the rock on separation discloses the beautiful lace-like skeletons of these compound animals; it is not unfrequently accompanied by the pretty branching form which I have referred to, *Ceriopora rhombifera*.

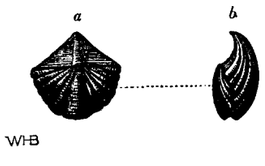
Brachiopoda.—In the determination of the species of this, the most important class of the Mollusca from these rocks, we have again to acknowledge the kind assistance received from Mr. Thomas Davidson, F.R.S., to whom they were sent for examination; he has, with few exceptions, confirmed the determination I had arrived at; although in some few instances differing from it, in others he considered the state of the fossils, which were often in the condition of imperfect distorted, internal casts and impressions, so obscure as to render their specific determination impossible, or at least very uncertain.

In Mr. Davidson's observations upon the fossils submitted to him, he informs us of the occurrence of several almost perfect impressions of what he believes to be referable to *Cyrtina heteroclita*, a sub-genus of Spirifera, on a slab from Reenydonagan Point, near Bantry; this shell being accompanied by a Producta, hereafter alluded to, which he thinks may be a new species. The occurrence of Cyrtina in these rocks he considers a most interesting discovery, "from this shell, which is found in many well-known foreign Devonian localities, never having hitherto been recognised in any true Carboniferous bed or locality." (A representation of this specimen is given at fig. 2, *a*, *b*.)

At the locality from which this fossil was obtained, the beds of brown slate or shale are full of the impressions and casts of fossils, nearly if not all of them appearing to be identical with those usually met with in Carboniferous limestone, perhaps more so even than at any other fossil locality

* Explanation to 187, &c., p. 26.

Fig. 2.



Cyrtina heteroclita?

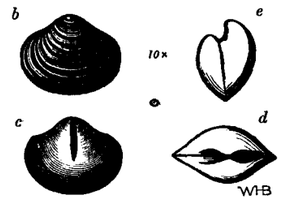
Fig. 3.

Producta (new species?)

within the district; amongst other characteristic fossils of the limestone and lower shales, the Trilobite, *Phillipsia pustulata*, is very plentifully distributed through the beds at this place. From the associated fossils presenting this unmistakable Carboniferous aspect, I had looked upon this shell, referred to *Cyrtina* by Mr. Davidson, as merely a peculiar form of *Spiriferina cristata* var. *octoplicata*; and I may perhaps be excused the caution exercised in that determination, from that gentleman's having since expressed some amount of hesitation respecting it in a subsequent communication, in which he says that "as the interior cannot be examined he may be mistaken, as some examples of *Sp. cristata* approach somewhat in shape to these casts, although he had not seen any with so large and sharply defined an area, and complete *pseudo-deltideum*." He agrees also in thinking that we have from this locality examples of that species, together with *Sp. laminosa*—a larger shell, very characteristic of the Lower Limestone shale, such as those at Hook Head. Under these circumstances, therefore, it has been included in the list as a doubtful species.

The Producta above referred to, is sketched at fig. 3. Several impressions or casts of this shell occur on the same slabs with the preceding from Reenydonagan Point. Mr. Davidson, who appears inclined to consider it to be a new species, observes that "it approaches most nearly to *P. semireticulata*, or to some other allied forms, and appears to have been of an elongated oval shape, with regularly convex ventral valve, the dorsal one following the curves of the opposite valve; the hinge line is straight, beak moderately produced and incurved; surface of the valves covered with fine radiating striæ or small ribs, crossed upon the ventral portion with concentric lines. The shell does not appear to have exceeded some 8 lines in length by 7 in width, and is not known in North Devon."

Fig. 4.



Athyris? n. s.
a. Natural size.
b. External shell enlarged 10 diameters.
c. d. e. Casts of interior do., do.

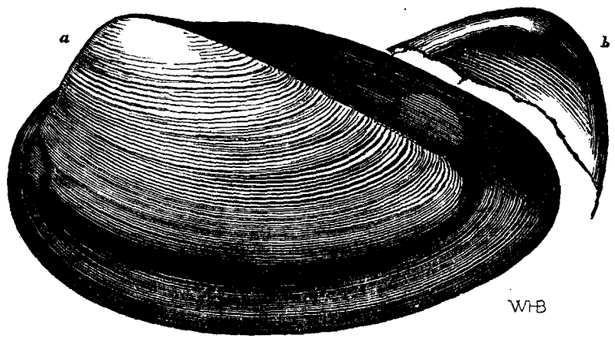
A very minute shell, probably belonging to the genus Athyris, but as Mr. Davidson remarks, unknown to him, is drawn at fig. 4. Its natural size is shown at fig. 4 *a*, the other figures, *b*, *c*, *d*, *e*, being considerably enlarged. This little shell was found at two localities—No. 47, Ardaturrish Point, and 92, east end of Bear Island, occurring at both in grit beds in considerable abundance, the exterior of the shell (fig. *b*) taken from a sealing-wax cast of the impression, is covered by about twelve strong and regularly concentric rugæ; the cast (*c*) has a strong indentation or depression resembling somewhat that in *Athyris ambigua*, but only proceeding about half way down the ventral valve from the beak or umbo. These little shells, which at first sight look like small seeds scattered through the bed, may possibly be the fry of a larger species.

The most universally distributed amongst the fossil Brachiopoda in these rocks, occurring in beds of both shale and grit, are *Rhynchonella pleurodon*, collected at nineteen localities; *Streptorhynchus crenistria* and *Spirifera striata* at fourteen localities; *Orthis Michelini*, a characteristic Lower Carboniferous fossil, was found to be abundant at one particular locality (No. 99), 4 miles E. of Bantry; *Spirifera disjuncta* (and its variety *Barumensis*,) on the authority of Mr. Davidson, occurs with *Spirifera striata* at every locality throughout this district in beds of both shale and grit, although, as he remarks, it is sometimes difficult, from the distorted and fragmentary casts and impressions in this collection, to distinguish them with certainty. I have not myself, however, been able to detect those differences which would lead me to conclude any specific distinction could be drawn with safety between them, all appearing to me resolvable into the characteristic Carboniferous species, *Spirifera striata* and *cuspidata;* although in deference to the opinion of Mr. Davidson, they have been included in the list of fossils under the names of *Sp. disjuncta* and its variety *Barumensis*.

It certainly appears to me strange, supposing these Devonian species of Brachiopods to be correctly determined, that so few should be identified from these Irish rocks—only two or three, and that amongst them should be found one shell, I allude to the *Cyrtina*, the occurrence of which is not even well authenticated in British strata.

Conchifera.—With respect to the ordinary bivalves or *Conchifera*, occurring in these rocks, the most characteristic and abundant, as remarked in a former explanation,* are the *Avicula Damnoniensis* and *Modiola Macadami*, the former of these shells having been collected at twenty-nine, and the latter at twenty-six localities, both species occurring indiscriminately in shale or grit, and often in the greatest profusion. Some large shells, bearing a considerable resemblance to the casts of *Pterinea spinosa*, Phillips,* occur at locality 108. The genera *Cucullæa*, *Sanguinolites*, *Curtonotus*,† and *Nucula*, are also largely represented in these rocks, particularly in the grit beds. The large bivalve shells, believed to be a species of *Cucullæa*, and formerly named by Mr. Salter in MSS. *C. Griffithii*, were collected principally from grit beds at locality 108, near Skibbereen. One of these shells, showing marks of the hinge teeth and muscular impressions, is drawn, fig. 5. I have doubtfully

Fig. 5.



Cucullæa Griffithii. *Salter*, MSS.

* Explanation to Sheet 187, p. 28.
† See Explanations to Sheets 187, &c., p. 27, 28, and fig. 6.

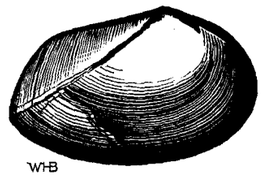
referred to *Myacites* a smaller bivalve from the same locality, with a deep sulcus extending across the valves, as in *Grammysia;* it may possibly prove to be a new genus. Of the genus *Nucula*, three species are figured, figs. 6, 7, 8.* One of these, an elongated form, fig. 6, I believe to be identical

Fig. 6. Fig. 7. Fig. 8.

Nucula tenuiarata. *Sandberger.* Nucula n. sp.? Nucula n. sp.?

with *Nucula tenuiarata*, Sandberger. It shows a number of teeth—about thirty-five on the hinge line; the others, figs. 7 and 8, are too imperfect for showing anything more than the general outline, and that they belong to the genus, is evidenced by the remains of the fine and regular teeth-like markings on the hinge line characteristic of it. Another cast of a bivalve, resembling some examples of the genus *Axinus*, is drawn at fig. 9. It may prove to be an undescribed species, but is not in a sufficiently perfect condition for description.

Fig. 9.



Axinus sp.?

Fig. 10.

Orthoceras undulatum, showing siphuncle and septa.

Some specimens of a large bivalve, believed to be *Anodonta Jukesii* was collected in Upper Old Red sandstone, at locality 116, Gokane Point, Toehead Bay, accompanied, as it usually is, by the fossil fern, *Adiantites Hibernicus*. The rock at this place is of a slaty character, like that of Tracarta (loc. 117) on the boundary of Sheet 205 to the north, which is evidently a continuation of the same beds, and where the same plant, *Ad. Hibernicus*, occurs.

Gasteropoda.—Very few univalve shells, or *Gasteropoda*, are found in these rocks, with the exception of the *Heteropoda*, which are represented by four small species of *Bellerophon;* two of these *B. striatus* and *subglobatus* being the most numerous.

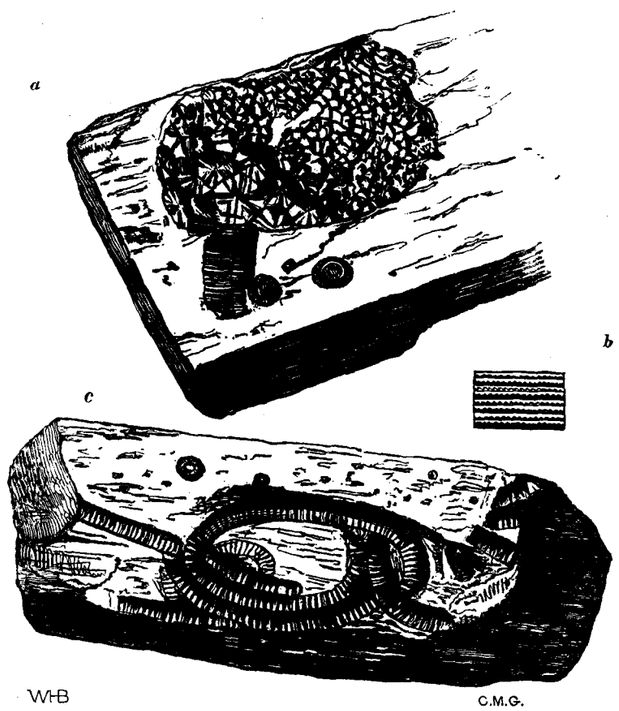
Cephalopoda.—The *Cephalopoda* in this part of the collection are confined to the genus *Orthoceras*, examples of which are tolerably abundant; only one species, *O. undulatum*, could, however, with any degree of certainty, be determined. A sketch is given, fig. 10, p. 25, of a specimen referred to this species from grit, loc. 108, which shows the beaded siphuncle and septæ remarkably well.

Echinodermata.—Remains of Crinoids are plentifully distributed throughout various beds of slate and grit. They are generally in a disjointed condition, which makes their determination difficult and uncertain; occasionally, however, we get more perfect specim-

* Palæozoic fossils, pl. 22, fig. 81, *d*.

such as that shown at fig. 11, p. 25, (from the lowest beds of grey slate just above the red rocks of Shehy Mountain, loc. 59), where the head,

Fig. 11.

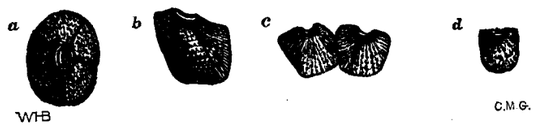


Actinocrinus triacontadactylus. *Miller.*

although the plates are somewhat disarranged, presents sufficient characters for determination, and having a portion of the *stem* or *column* attached becomes a very important aid in the identification of more fragmentary specimens. An enlargement of some of the joints of this column is given at *b*, to show the toothed character of the articulatory surfaces of each joint. I believe this species to be *Actinocrinus triacontadactylus*, Miller, and that several others, such as *polydactylus*, and probably *lævis* of the same author, *tesselatus* and *Cyathocrinus variabilis* of Phillips, *icosidactylus* of Portlock, and *costus* of M'Coy, will be found to be nothing more than synonymes of this species. The impressions of the curved stems, fig. 11 *c*, from the same place are evidently to be referred to the same species, and are interesting as showing the flexibility of this portion of the animal; curved stems of the same character occur at several other localities.

Some detached plates of a Crinoid Head represented at fig. 12, *a d*, resembling very much in the ornamentation of the surface the figures of *Adelocrinus hystrix*, Phillips. They were collected at loc. 51, near Bandon, with the exception of *d*, and are included in the list of species to the Explana-

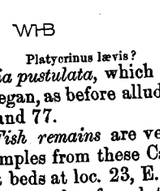
Fig. 12.



? Platycrinus (Adelocrinus) hystrix. *Phillips.*

tion of 187, &c., p. 18, the figures having been omitted; as they may serve to throw some light upon the probability of the relation of these obscure fossils to *Platycrinus*, and as one of the fossils occur within the limits of these sheets, fig. 12 *d*, they are introduced here;—*a* is the basal or pelvic portion, consisting of five plates, very similar to that figured 42 *a b* on pl. 16, Phillips, Palæozoic Fossils; *b*, *c*, and *d* are *scapular* plates from which the arms or rays proceeded, and from their proportionate size correspond with plates of the same character. It is doubtful, however, whether the specimen figured at *d* belongs to the same species.

Fig. 13.



Platycrinus lævis?

A small crinoid head showing the graceful character of its finely tentacled arms, with some of the scapular plates of the body, is represented at fig. 13. It was collected from the slate rocks at loc. 77, W. of Bearhaven, and is probably a species of *Platycrinus*, perhaps *lævis*, but from the deficiency in the plates of the body and the absence of other specimens it cannot be determined with certainty.

Crustacea.—The only examples of this class observed in the rocks of this district are those of the numerous bivalve carapaces of small Entomostraca, *Leperditia* or *Cypridea*,* the species *subrecta*, which doubtless occurs at several other localities, only being determined with certainty from one locality—a determination for which we are indebted to Professor Rupert Jones; and the characteristic Carboniferous Trilobite, *Phillipsia pustulata*, which was found to be tolerably abundant at loc. 52, Reenydonegan, as before alluded to *ante* p. 21, occurring also at two other localities, 74 and 77.

Fish remains are very poorly represented in this collection, the only examples from these Carboniferous rocks being a scale of Holoptychius from grit beds at loc. 23, E. side of Ardgroom Harbour.

The tooth referred to Bothriolepsis was found associated with the fossil fern, *Adiantites Hibernicus*, and other plants like those of Kiltorcan, county Kilkenny†, in beds of a slaty character referred to the Upper Old Red sandstone at locality 117, Tracarta, and is therefore important as indicating a similar horizon.

WILLIAM HELLIER BAILY.

August 6, 1864.

* See Explanation 187, &c., p. 30.
† See Explanation 147 and 157, p. 17, fig. 4 *e*.

Mr. Davidson was kind enough not only to examine the whole series of our Brachiopoda from the Carboniferous slate, but to send them back to us, accompanied by a detailed set of notes and observations upon them, some extracts of which I have solicited his leave to add as an appendix to Mr. Baily's Palæontological Notes in this Explanation.

I would here premise that there has apparently been some slight misapprehension as to the lithological character of the rocks, both in Mr. Davidson's mind and elsewhere. When particular beds of the true clay slate are highly calcareous, they fall, on decomposition, into a brown, rusty, sandy-looking rock, which in hand specimens is readily mistaken for a brown fine-grained sandstone.

As these calcareous bands are those most abounding in fossils, and those which are most decomposed exhibit the specimens best, an examination of a series of specimens of fossils leads to an erroneous idea of the nature of the rocks in which they lie, which are often taken for brown grits, when they are in reality black clay slates. In his recently published volume in the Palæontological Society's publications, on "Devonian Brachiopoda," Mr. Davidson speaks of the Reenydonagan beds as "grits;" whereas they will be found in this Explanation to be described as dark clay slates, with calcareous bands.

Still this error is not so material as it might appear at first, because throughout the great series of the Carboniferous slates, essentially a clay slate series, fine-grained gray grits may and do occur sometimes, either in little bands of an inch or two in thickness, or in thicker beds of a few inches or a foot or two, and then either quite isolated or grouped together in a set of aggregated beds. These grits occasionally occur high up in the series among the slates, but are most frequent in its lower part. To these lower grits only was the term "Coomhola grit" originally applied; but I am by no means certain that some of those which have been called "Coomhola grits," because they were exactly similar lithologically, and contained exactly the same fossils, are, in reality, in the same geological horizon as the great series of grits which cross the Coomhola valley, and come out on the Ardaturrish shore. Perhaps it would be better not to insist too strongly on the necessity for this strict synchronism, but to consider any set of grit beds, if only of a few feet in thickness, occurring any where in the Carboniferous slate, as entitled to the appellation of Coomhola grits; and to take the fossils of the Coomhola grits, as not indicative of any particular part of Carboniferous time, but merely of a peculiar set of conditions, occurring here and there at different portions of that period.

With these few observations, I append the extracts from Mr. Davidson's notes, which appear to me to be too valuable not to be published.

EXTRACTS from Mr. DAVIDSON'S NOTES, dated December, 1863 :—

"In the County of Cork we have the *Carboniferous limestone* largely developed, and very rich indeed in *Carboniferous* Brachiopoda.

"This limestone has been most zealously and attentively searched by Mr. J. Wright, of Cork, to whom I am indebted for having been able to examine a complete series of its Brachiopoda, and we have conjointly drawn up the following list :—

"1. *Terebratula hastata*, Sow: and its var. *T. sacculus*, Martin.
2. *Athyris Royssii*, L'Eveillé.
3. *A*—— *lamellosa*, Qd.
4. *A*—— *plano-sulcata*, Phil.
5. *A*—— *ambigua*, Sow.
6. *Retzia radialis*, Phil.
7. *R*—— *ulotrix*, DeKon.
8. *Spirifera striata*, Martin.
?9. *S*—— *Mosquensis*, Fischer. I am not certain whether this species does in reality occur in Ireland. It is possible that the shells so named may be varieties or modifications in shape only of *Sp. striata*.
10. *S*—— *duplicicosta*, Phil.
11. *S*—— *trigonalis*, Martin. *Sp. bisulcatus*, is a synonym.
12. *S*—— *rhomboidea*, Phil.
13. *S*—— *cuspidata*, Martin.
14. *S*—— *distans*, Sow.
15. *S*—— *pinguis*, Sow.—rotundata.
16. *S*—— *integricosta*, Phil.
17. *S*—— *triradialis*, Phil.
18. *S*—— *glabra*, Martin.
19. *S*—— *Urii*, Fleming.
20. *S*—— *lineata*, Martin.
21. *S*—— *elliptica*, Phillips.
22. *Spiriferina laminosa*, M'Coy.
23. *S*—— *cristata* var. *octopticata*, Sow. and var. *biplicata*.
24. *S*—— *insculpta*, Phil.
?25. *Cyrtina dorsata*, M'Coy. Fragments only of this so termed species have been hitherto found; it may perhaps be the same as *C. septosa*, Phil.
26. *Rhynchonella reniformis*, Sow.
27. *Rh*—— *cordiformis*, Sow.
28. *Rh*—— *acuminata*, Martin.
29. *Rh*—— *pugnus*, Martin.
30. *Rh*—— *pleurodon*, Phil.
31. *Rh*—— *flexistria*, Phil.
32. *Rh*—— *reflexa*, DeKon. Discovered by Mr. Wright subsequent to the publication of my Monograph.
33. *Rhynchonella angulata*, Linn.
34. *Rh*—— *trilatera*, DeKon.
35. *Camarophoria crumena*, Martin.
36. *C*—— *globulina*, Phil.
37. *Strophomena analoga*, Phil.
38. *Streptorhynchus crenistria*, Phil.
39. *S*—— *Kellii*, M'Coy. This may perhaps be nothing more than a variety of *S. crenistria?*
40. *Orthis resupinata*, Martin.
41. *O*—— *Michelini*, L'Eveillé.
42. *Productus giganteus*, Martin.
43. *P*—— *Cora*, D'Orb.
44. *P*—— *semireticulatus*, Martin.
45. *P*—— *longispinus*, Sow.
46. *P*—— *margaritaceus*, Phil.
47. *P*—— *undatus*, Def.
48. *P*—— *Wrightii*, Dav.
49. *P*—— *tessellatus*, DeKon.
50. *P*—— *aculeatus*, Martin.
51. *P*—— *Youngianus*, Dav.
52. *P*—— *pustulosus*, Phil.
53. *P*—— *scabriculus*, Martin.
54. *P*—— *fimbriatus*, Sow.
55. *P*—— *punctatus*, Martin.
56. *P*—— *spinulosus*, Sow.

"57. *Products plicatilis*, Sow.
58. *P.——— mesoloba*, Phil.
?59. *Chonetes comoides*, Sow. I am uncertain as to the existence of this species in the County of Cork.
60. *C.——— papilionacea*, Phil.
61. *C.——— Buchiana*, DeKon.
62. *C.——— Hardrensis*, Phil.
63. *Crania quadrata*, M'Coy.
64. *Discina nitida*, Phil.
?65. *D.—— Davreuxiana*, DeKon.

"In the County of Cork (according to the maps and sections made by the Geological Survey of Ireland) we have underlying the Carboniferous limestone an enormous development of Carboniferous slate which is stated to contain Carboniferous fossils only, such as *Sp. cuspidatus, Orthis Michelini, Strept. crenistria, Athyris squamosa, Rh. pleurodon*, &c. (Salter). Under these there occurs another series of brown grits and slates (Coomhola series of Jukes?) which stratigraphically would belong to the Carboniferous period or system, but which contain a mixture of *Carboniferous* species and shells hitherto known only as *Devonian*.

"The fossils occur abundantly in these lower grits and slates in the condition of imperfect distorted internal casts and impressions, and are often so obscure as to render their specific determination impossible, or at least very uncertain. We are, however, sometimes able to reproduce portions of the shell with its natural shape, by pressing a piece of softened gutta-percha into the impression the shell has left in the rock; and I may here observe that the aspect of the rock, with its accompanying fossils, is quite similar to what we find in North Devon, viz., the Marwood and Pilton group.

"These Irish *brown grits* and *slates* contain, as far as my examination has gone, but few determinable species of *Brachiopoda*.

"*Spirifera.*—*Sp. disjuncta, Sp. cristata*, var. *octoplicata*, and *Cyrtina heteroclita*? alone could be determined. *Sp. striata*, var. *attenuata*, may perhaps be present, but it is very difficult to say whether imperfect specimens, similar to those found in these Irish grits belong to it, or to *Sp. disjuncta*. One specimen of another? *Spirifer*, with a smooth sinus and fold? does occur in the collection sent by Mr. Jukes for my examination; but it would be unsafe to speculate upon its specific determination; all these of the above-named Spirifers occur in North Devon.

"*Spirifera disjuncta.*—This very important middle and upper Devonian species of the Continent has received many denominations, but I quite concur with those Palæontologists who have considered *Sp. calcarata, Sp. gigantea, Sp. inornata, S. Verneuilii, S. Lonsdalii, S. extensa, S. Archiaci, S. Murchisoniana, S. protensa, S. Barumensis*, and several other so termed species, as all belonging to a *single species*. There can be no doubt but that *Sp. striata* is a closely allied species, but differing in shape sufficiently to be distinguishable from *Sp. disjuncta*, the lateral ribs of *Sp. disjuncta* being almost always simple, while those of *Sp. striata* usually increase in number by the occasional intercalation of additional ribs. Almost every Palæontologist has considered *Sp. striata* and *Sp. disjuncta* to be distinct species, among whom we may name Messrs. De Verneuil, D'Archiac, De Keyserling, Sir R. I. Murchison, Bronn, Bouchard, Salter, Morris, Woodward, Sowerby, Phillips, DeKoninck, Quenstedt, Suess, Dupont, &c. *Sp. disjuncta* and *Sp. Mosquensis* are certainly distinct species, the dental plates in the last-named species being considerably larger, and I am very uncertain whether *Sp. Mosquensis* does in reality occur in Ireland. The Irish so termed species being in all probability modifications in shape only of *Sp. striata*.

"The Irish distorted and fragmentary casts and impressions exactly resemble those from Braunton, Barnstaple, &c., in North Devon.

"*Sp. disjuncta* occurs abundantly in upper and middle Devonian limestone and shale, in various foreign localities, such as at Ferques in France; in Belgium, the Eifel, China, &c., &c.

"In a paper 'Sur le Calcaire Carbonifere de la Belgique et du Hainaut Francais," by E. Dupont (Bull de l'Academie Royale de Belgique, 2nd ser., vol. xv., No. 1), Mr. Dupont states to have found in his "Assise d'Etrœung," *Sp. Vernenulii* or *disjunctus*, associated with *Sp. Mosquensis*, both in the same bed and neighbourhood of Dinant. The author further remarks that the palæontological character of this bed is therefore of an intermediate description, since it contains a mixture of Devonian and Carboniferous species,

that at the lower portion the bed contains hardly any Devonian forms, higher up we find a mixture of a most remarkable description; we have *Phacops latifrons* and *Spirifer disjunctus*, side by side with *Sp. Mosquensis* and a *Productus*, which is at the same time close to *P. scabriculus* and to *P. semireticulatus*; higher up the fossils are all Carboniferous. Now, it appears to me possible that these Belgium beds of "Etrœung" may be the equivalent to the Irish grits and North Devon, Marwood, and Pilton beds. In your Irish grits, although you have not, as far as I can perceive, *Sp. Mosquensis*, you certainly have *Sp. disjunctus* and *Cyrtina heteroclita*? associated with *Prod. scabriculus*, and another species nearly allied to *Prod. semireticulatus*.

"In the Irish grits we find, therefore, all the modifications in shape due to cleavage and contortions that we perceive in the North Devon grits and slates.

"*Athyris.*—All the specimens I have been able to examine are in such imperfect condition as to be at present specifically undeterminable. They represent one or two species. Some of the specimens may perhaps belong to *A. concentrica*, but they might also be referable to *A. Royssii*, their shape being so much altered by pressure and other causes, as to have lost their characteristic features. It is uncertain whether any of them do represent *A. plano-sulcata*, or *A. ambigua*. Better specimens may perhaps turn up upon further search; but with the material now in hand, nothing *positive* can be said, and it would be unsafe to bring these casts forward in evidence of the age of one rock. In North Devon we find *A. concentrica* and some impressions very similar to those we meet with in these Irish grits.

"*Rhynchonella.*—*R. pleurodon* occurs plentifully, and there is evidence of another species resembling *R. pugnus*? These two species are well-known Carboniferous forms; but as they have also been found on the Continent, in beds of a Devonian age, their evidence can go for but little in the determination of the exact age of the rock we have under consideration. No specimen can be attributed to *Rh. laticosta*, a species so abundant in the North Devon Marwood beds, and where *Rh. pleurodon* is also exceedingly abundant.

"*Streptorhynchus.*—*S. crenistria* impressions referable to small examples of this species, occur here and there in these Irish grits. The shell is also found in North Devon, where it appears to have attained larger proportions; but as this species is common to both Carboniferous and Devonian rocks, its presence cannot assist in the determination of the age of the rock in which it may occur.

"*Orthis.*—We find in these Irish grits internal casts and impressions which may represent perhaps three species of the genus, but none of them are sufficiently complete to admit of a certain determination. Some impressions may be referable either to *O. interlineata*, or to *O. Michelini*; another bears some resemblance to *O. arcuata*, Phil.; and another to Sowerby's *Orthis? plicata*. Similar impressions to some of these occur in the North Devon beds (Marwood and Pilton).

"*Chonetes.*—Impressions which may perhaps be referable to *C. Hardrensis*, occur here and there in a very distorted and imperfect condition. Similar casts may also be found in the Marwood and Pilton North Devon series.

"*Productus.*—Specimens referable to two species occur plentifully in these Irish grits; one of them may be identified with *P. scabriculus*, a shell found likewise in North Devon. The second species is perhaps new, but it approaches somewhat to small individuals of *P. semireticulatus*, or to *P. longispinus*. It has not been recognised in North Devon. Its being associated in Ireland with *Cyrtina heteroclita* is remarkable.

"In these Irish beds we do not, however, find any certain evidence of the existence of either *Prod. prælongus*, or of *Strophalosia caperata*, as far as I can see—two shells so very abundant in the Marwood and Pilton North Devon series.

"*Rensselœria*??—No shell referable with certainty to the genus *Terebratula* could be found among the Irish specimens sent for my examination; but some elongated oval casts, approaching in shape to *R. stringiceps*, occur at Belgooly (County Cork). These casts are, however, too imperfect to admit of specific determination. In shape they approach to some nearly similarly formed casts from the neighbourhood of Ilfracombe, in North Devon.

TABULAR VIEW.

Marwood and Pilton, North Devon.	South of Ireland—County of Cork. Brown Grits and Slates above Old Red sandstone.
1. Terebratula sacculus, . . .	No specimens hitherto found.
2. T.——— elongata, . . .	Do. do.
3. Athyris concentrica, . . .	Imperfect impressions which may *perhaps* belong to this species.
4. Athyris ——— another species,	Impressions and casts which may perhaps be referable to another species.
5. Spirifera disjuncta, . . .	Occurs in these grits.
6. Sp.—— Urii, . . .	No specimen of this appears to occur.

Marwood and Pilton, North Devon.	South of Ireland—County of Cork. Brown Grits and Slates above Old Red sandstone.
7. Spirifera cristata, var. octoplicata, .	Is found in these grits.
8. Sp—— laminosa (according to Mr. Salter), . . .	I have seen no specimen of this shell.
9. Cyrtina heteroclita. Mr. Valpy has found this shell in North Devon.	A shell much resembling C. heteroclita occurs in these Irish grits.
10. Rhynchonella pleurodon, . .	Abundant.
11. Rh———— laticosta, . . .	None of the Irish specimens sent for my examination do belong to this species.
12.	*Rh. pugnus?* (one specimen).
13. Strophomena analoga, . . .	Does not appear to occur in these Irish grits.
14. Orthis interlineata, . . .	It is uncertain whether the Irish specimens belong to this or to *O. Michelini.*
15. Orthis plicata, Sow., . . .	Identical examples or casts occur in these Irish grits
16. Streptorhynchus crenistria, . .	Occurs in these Irish beds.
17. Chonetes Hardrensis, . . .	Occurs in these Irish grits.
18. Strophalosia caperata, . . .	No specimen.
19. Productus prœlongus, . . .	No specimen.
20. Prod—— scabriculus, . . .	Occurs.
21.	*Productus*, N. Sp.? occurs in these beds along with Cyrtina heteroclita.
22. Discina nitida, ...	No specimen.
23. Lingula Mola, ...	No specimen.
24. Rensselaria? stringiceps, . .	A species allied to this appears to occur.

"From the above comparison it would appear that about twenty-one species of *Brachiopoda* have been found to occur in the North Devon grits and slates, while about sixteen have been recognised in the Irish corresponding beds.

"Of the twenty-one North Devon species, nine or ten only have been recognised in the Irish brown grits, not quite half of the species being common to the two.

"They contain in common *Athyris* (perhaps *concentrica.*) *Spirifera disjuncta* and *Cyrtina heteroclita?* hitherto considered to belong to the Devonian age, but there is no reason why they should not have existed also in that of the Carboniferous period.

"The absence, however, in these Irish beds of any example of *Rh. laticosta, Strophalosia caperata, Productus prœlongus,* and *Lingula mola,* species so common and characteristic of the North Devon beds, is very remarkable; but our not having met them among the specimens sent from Ireland for examination, is no proof that they do really not occur in these Irish grits.

"T. Davidson."

Mr. Davidson's examination of our Brachiopoda. collected from the Carboniferous slate of Cork, thus yields considerable support to the belief of their being identical with the so-called Piltown and Marwood beds of N. Devon. It must, however, be recollected that the palæontological evidence for this identity by no means depends entirely on the identity of their Brachiopoda. The peculiar species of other fossils, especially of Conchifera, which are found in the two districts, and in those districts only, are a still stronger proof of their identity. Added to which are other species of fossils, which are found in one of the two districts, and also in the Carboniferous limestone, so that the argument that "things which are equal to the same things are equal to one another," comes into play. To these palæontological arguments is to be added the evidence of lithological identity in the beds, and stratigraphical relation to similar beds above and below in the two districts. J. B. J.

November, 1864

4. *Relations between the Form of the Ground, and the lie and position of the Rocks, and general account of the latter.*

Within the limits of this district all the mountain ground is formed of the Old Red sandstone, while the lower and more level parts of the district lie on the upper part of the Carboniferous slate. The Coomhola grits usually occur on the flanks of the mountain ranges, making the lesser hills between them and the low grounds. This description applies especially to the country round the head of Bantry Bay, and also to that round Dunmanus Bay.

The Carboniferous slate which forms the ground round the head of Bantry Bay lies in a synclinal hollow or trough of the Old Red sandstone, which rises out into the ridge of Knocknaveagh on the south, and the Glengarriff and other hills on the north. (*See section,* fig. 14, p. 32.)

The sides of this trough are regular and simple, the beds rising up very steeply, sometimes even vertically, and striking steadily in the same direction for many miles. Where the rocks are bare, as on some of the hill sides, or on the shore at low water, this peculiar steadiness in the strike of the highly inclined beds gives the ground a very remarkable aspect, for it seems scored by parallel lines, looking at a distance as if they had been machine-ruled. Although this perfect parallelism is very remarkable on the sides of the troughs, and in the narrow anticlinal ridge of Knocknaveagh, and throughout its extension to Sheep's Head; yet it is by no means maintained in the broad synclinal hollow round the head of Bantry Bay, or in the broad anticlinal ridge between Bantry and Kenmare Bays. In both these cases the beds undulate in very numerous curves, which are close and rapid in the softer beds of the Carboniferous slate, with a radius of only a few yards, or even a few feet, while they are more open and larger in the Old Red sandstone, with a radius of a mile or two, and traceable along the strike of the beds, through several successive groups of hills, and across the intermediate valleys.

Detailed Descriptions.

5. *Position and Lie of the Beds.*

For purposes of description in detail we can divide the district into the following parts:—

a. The great central ridge between Bantry and Kenmare Bays.
b. The Glengarriff district.
c. The Bantry district and Whiddy Island.
d. The Durrus and Kilcrohane promontory, from Carrigboy to Sheep's Head.
e. The Clonee district, on the south side of Kenmare Bay.

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a. The Great Central Ridge between Bantry and Kenmare Bays.—We may take the road from Glengarriff to Kenmare as affording a good insight into the structure of this ridge. In the immediate neighbourhood of Glengarriff the dull red and brown grits and slates dip generally to the

Fig. 14.

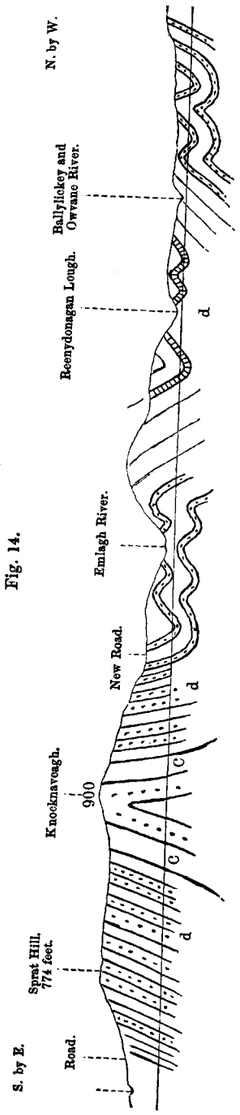
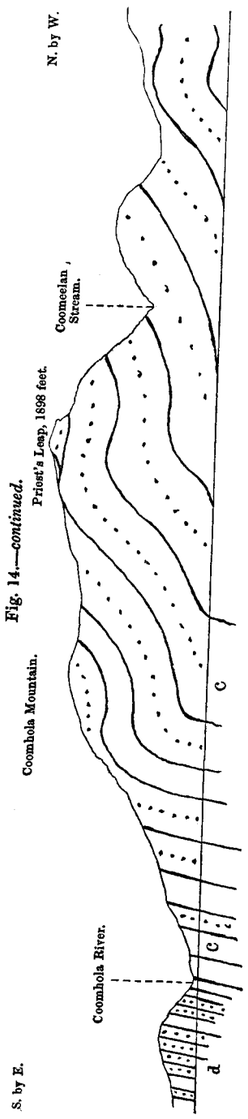


Fig. 14.—*continued.*



Scales:—1 inch to a mile horizontal; 3 inches to a mile vertical.
The dotted bands in the latter may be taken to represent the Coomhola grits; and the bands with vertical strokes (as about Reenydonagan) to represent limestones, the plain bands being clay slates.

c. Old Red sandstone. *d.* Carboniferous Slate.

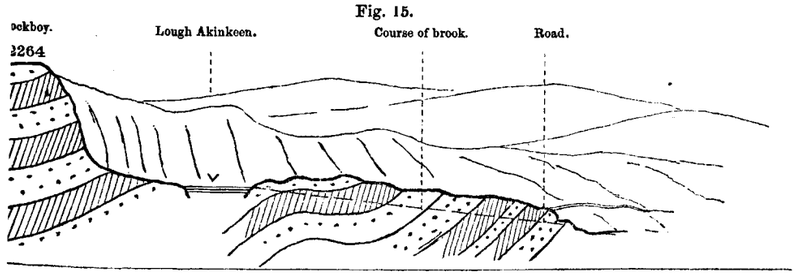
S.S.E. at high angles, about 60° on an average. Small local undulations may, however, be discerned, as, for instance, on the southern brow of the hill of Cobduff, where the beds form a little trough-like fold that may be traced across the turn of the Glengarriff and Bantry road and along the southern side of the boundary of the Glengarriff Castle domain, and thence into the harbour. On the west side of the harbour the beds dip steadily to the southward at high angles, but to the N. of the harbour, about the Glengarriff domain, they sweep round so as to dip nearly W. at 30° or 40°, then recovering their strike again, they undulate over the summit of the ridge in one or two bold curves on either side of the tunnel. They are often nearly horizontal about the axes of the synclinal and anticlinal curves, and afford excellent examples of slaty cleavage cutting across the stratification. This cleavage is often vertical, with an invariable strike of E. 30° N. and W. 80° S., but sometimes dips to the S.S.E. at 70° or 80°. On the north side of the tunnel the beds at first dip about S.W. at 20°, and then continue to undulate in gentle curves as far as Releagh Bridge, and in all the hills on both sides of this part of the valley of the Sheen River, till, as we come within a mile or two of Kenmare Bay and the Roughty River, they begin to plunge at high and steady angles towards the north.

The same general facts may be observed by anyone traversing the ridge by the old Priest's leap road, or following the new line of road up the Coomhola River and crossing the ridge near Loughs Nambrackderg and Akinkeen into the valley of the Slaheny River, and following that down to Kilgarvan. In the Coomhola Mountain and in the central and longitudinal part of the Coomhola Glen, where it runs along the strike of the beds, the rocks all dip steadily to S.S.E. at about 60° to 70°. As, however, the lower beds rise up towards the higher parts of the ridge, undulations begin to set in, which cause the same beds to be continually repeated in the ground, and extended in numerous folds across the axis of the main anticlinal. In the several precipices which surround the S.W. half of Lough Nambrackderg the beds show their edges only, dipping regularly inwards, or to S.W. at 40° or thereabouts, while on the north side great areas of the surfaces of these beds form smooth sheets of rock which coincide with the surface of the ground there.

Observations on the cleavage about Knockboy, by Mr. Willson, state it to be perpendicular with an E.N.E. and W.S.W. strike in beds dipping S.W. at 30°, and in others which are nearly horizontal but waving in gentle undulations.

In the still loftier precipices which rise on the south side of Lough Akinkeen the beds dip S. at 30°. Knockboy, the highest point of the district, rises over the centre of a little basin in these beds which seem to dip inwards towards it on all sides. We have here one of the innumerable examples which might be adduced among the Cork and Kerry mountains of

Fig. 15.



Scale:—3 miles to an inch vertical and horizontal.

the entire want of any relation between the forms of the ground and the "lie" of the beds beneath the surface. Here, in the very heart of the ruggedest and loftiest mountains of the district, the beds approach most nearly to the position of undisturbed horizontality—the highest eminences, the steepest precipices, and the most deeply eroded lake-basins, half environed by the most rugged cliffs, all occurring side by side in the same mass of unbroken and gently inclined beds.

Two or three miles to the northward, as we descend into the open valley of the Roughty River, all the beds pitch at very high angles to the northward, often rising up vertically to the surface for a mile or two together.

If we explore the mountain ground that stretches to the west of Glengarriff past the Sugarloaf to Hungry Hill and the neighbourhood, we meet with similar features—broad and sweeping undulations in the beds about the loftiest central hills and round the heads of the wild glens and valleys, gradually passing into steady and high inclinations towards Kenmare Bay on the N.W., or Bantry Bay on the S.E.

The six-inch maps of this district, which are preserved as data in our office, are covered with notes of the same "purple and green grits and slates," in long continuous sections of successive beds, or repeated in numerous rolls and undulations; but it would serve little purpose to extract them, inasmuch as the facts are patent to everyone who may traverse the ground.

b. The Glengarriff District.—Massive purplish gray grits and slates strike across the head of Glengarriff Harbour, and may be seen in the little cliffs and numerous crags around Eccles's Hotel, and on both sides of the water as far as Garinish Island. They all dip S. at angles varying from 50° to 80°. In Garinish Island a small flattening of the beds to 35° may be observed,* and if they are followed thence westward to Shrone Hill, they may be seen to curve round so as to dip S.W. at 48°. To the southward of this, however, and all along shore as far as Coolieragh Harbour, the red rocks dip S. at 60° or 70° with great steadiness. On the eastern side of the harbour the southern dip curves slightly into one to S.S.E. at 70°. The flattening of the beds in Garinish Island is probably in the line of the little trough which runs up through Cobduff,† but with that exception the dip remains steady at 70° or 80°, past Gun Point and by Ardaturrish and Reennagough Points to Ardnamanagh Point. Purple, green, and greenish gray slates and grits may be seen in the little island called Illauncreeveen and the adjacent shores. Continuing along shore to the south and east, a little rocky cove is met with near the "Yellow rocks." A slated cottage and garden may be seen in this cove, from which a paved road proceeds northwards across some boggy ground to join the main road near Glengarriff Castle grounds. This cottage is in the townland of Ardaturrish Beg, and the boundary between the Old Red sandstone and the Carboniferous slate runs under it. The point which runs out from the cottage on the north side of the cove shows purple slate with some liver-coloured bands, while in the rocks on the south side by the garden we get greenish and light gray slaty grits, with bluish gray slates above them. Linear plants were found in the liver-coloured bands interstratified with the red slates on the north side of the little cove, and also in the blue slates on the south side, whence we also got a part of the stem of a *Knorria*. From this cove southwards to Reennagough Point there is a continuous section exposed in the low cliffs, showing a great series of pale, greenish gray grits, interstratified with gray and black slates, the dip being very steady to the S.S.E. at 75° or 80°. As the distance from the cove to Reennagough Point is 4,000 feet in a straight line, and a dip of 75° gives a thickness of 97 feet for every 100 feet of horizontal distance, we must apparently have a thickness of 3,880 feet here. Fossils are sparingly distributed throughout this thickness, though they require much hammering and breaking of the rock to discover them. Mr. Wyley was the first to prove their existence, but they were afterwards found more plentifully by Mr. Salter and myself, by the late J. Flanagan, the fossil collector, and since by Mr. Baily and our present collectors, C. Galvan and A. M'Henry.

* The cleavage here is stated by Mr. Foot to dip N.N.W. at 65°.

† A little to the eastward of the Glengarriff Castle grounds Mr. Foot notes the occurrence of cleavage, striking E. 30° N., with a vertical dip in beds dipping S.S.E. at 60°.

From the part of the coast which lies in Ardaturrish Beg, just S. of the cottage, we have got *Fenestella antiqua*, *Athyris Royssii* or *concentrica*, *Avicula Damnoniensis*, *Modiola Macadami* and *Actinocrinus triacontadactylus*, in addition to the plant remains.

From Ardaturrish Point Mr. Salter and myself one day procured, besides the stem of a *Knorria* and other plant fragments, fossils which he determined as *Avicula Damnoniensis*, *Cucullœa trapezium*, many *Lingulæ* and *Cythere* (*Leperditia*), and some *Annelids*, to which Mr. Baily now adds *Curtonotus elegans*, *Sanguinolites oblongus*, *Modiola Macadami*, and several undetermined species of *Nucula*. These occur at about a height of 2,000 feet above the topmost bed of the Old Red sandstone.

At Reennagough Point, about 1,000 or 1,200 feet still higher in the series, Mr. Salter and I procured *Rhynchonella pleurodon*, *Avicula Damnoniensis*, and a shell belonging to the genus *Pileopsis*, to which Mr. Baily adds *Modiola Macadami*.

Thick grits, almost absolutely vertical, strike very steadily through the ground of Reennagough Point about E.N.E., but on going round into the cove between it and Ardnamanagh Point, dark gray slates are found in the line of strike, the two rocks having the same dip, and striking directly at each other. There must, therefore, be a fault running N. and S. along the western side of this little cove, with probably a downthrow to the east. On the east side of this cove, and round Ardnamanagh Point, the rocks are all dark gray slate with one or two calcareous bands, becoming in some places actual limestone. The dip gradually flattens from 90° to 60°, and then to 40°, and thence along the shore of Ardnagashel the slates are bent into numerous folds and undulations. Among the fossils collected from Ardnamanagh Point Mr. Baily has detected *Ceriopora rhombifera* and *Cyathocrinus variabilis*.

From the Ardnagashel shore these slates, with calcareous bands, notwithstanding their crumpled and contorted condition, nevertheless strike into the ground between Snave Bridge and Reenadisert—the calcareous bands being well seen on the shore of Eagle Point, and traceable through several small undulations on each side of it.

The Coomhola grits also strike steadily from the Ardaturrish shore through the ground above Ardnagashel into the Coomhola Valley, N. of Snave Bridge. They are, however, in some places traversed by faults which cross the strike of the beds, and bring in different beds abutting against each other. One of these faults was very clearly shown in the bed of a stream south of the road, and about N.W. of Ardnagashel House, in which, for a space of about thirty yards thick, light gray grits might be seen abutting against dark gray slates, both rocks dipping S.S.E. at 80°. This fault crossed the beds obliquely, running about N.W. and S.E., and has apparently a downthrow to the S.W.

In going up the Coomhola Valley from Snave Bridge the black or dark gray slates are first met with about Poulgorm, dipping S.S.E. at 80°, but after passing the bend of the river, where a little stream comes in from the east, the slope of the hill on that side of the brook exposes a great section in the Coomhola grits, all dipping S.S.E. at 80°, with cleavage dipping N.N.W. at 70° or 80°. The beds strike steadily through the townland of

Cooryleary, past the Roman Catholic chapel there, and are clearly exposed as far as Coomhola Bridge, and even still further to the north. Dark gray and black slate appears again from underneath these grits to the northward of Coomhola Bridge, both in following up the River Coomhola to the east-north-east, and along the Glengarriff road to the west-south-west; but a few yards to the northward of this line the massive purple grits and slates of the Old Red sandstone make their appearance.

On the Coorycommane Hill fossils were found which Mr Baily identified as *Filicites lineatus*, *Avicula Damnoniensis*, *Modiola Macadami*, and *Leperditia* (*Cythere*) *subrecta*, and in the townland of Cooryleary, to the eastward, the same beds yielded *Plant stems*, *Avicula Damnoniensis*, *Curtonotus elegans*, and the variety called *rotundatus*, together with species referred to *Axinus* and *Cypricardia*, and other small bivalves.

These beds strike steadily with the same high southern dip through the hills to the "Bull's Pocket," and by Lough Atooreen, and thence through the hill called Knockbreteen (in Sheet 193), and so on to the turn of the road at Cappaboy, south of the Pass of Keimeneagh.

On the top of the ridge at the boundary between the townlands of Cappaboymore and Cappaboybeg there is a curious little dry ravine or pass, a miniature representation of that of Keimeneagh, it cuts in a straight line N.N.W. and S.S.E. directly across the purple slates and grits which there dip S.S.E. at 70°, and may be seen both in the precipitous sides and on the unbroken floor of the glen. It is narrow for its depth, and while it has certainly not been cracked open by any disturbing force, since the unbroken beds may be seen crossing its floor, it is obvious that no stream of water running over the present ground could come near it.

Fossils were found in the beds at Lackareagh and Cappaboybeg, among which Mr. Baily identifies *Rhynchonella pleurodon*, and *Actinocrinus triacontadactylus*, and *Cyathocrinus variabilis*. The cleavage thereabouts is vertical, with the usual strike, but a little N. of Carriganass Castle the cleavage, according to Mr. Willson, dips N.N.W. at 80° in beds dipping S.E. at 70°.

From near Cappaboy the beds are suddenly bent up again to the south, and then undulate round the eastern termination of the Bantry Bay trough, in consequence of the gentle rise of the axis of the main synclinal and those of the minor folds, which allows the Old Red sandstone to crop out round them to the eastward. The southern arm of the main synclinal forms Shehy Mountain,* from which it strikes back to the W.S.W. with several sharp folds, past Cousane Gap, through the Maughnacleagh Hills down to Ardsmore and Drumclogh in the valley of the Mealagh river, a little to the eastward of Sheet 192. They here recede again towards the eastward in consequence of being folded over into another small synclinal trough on the northern slope of the Mullaghmesha Hills, from near the top of which they again strike back to the W.S.W. towards Knocknaveagh and the ridge south of the town of Bantry.

In the hollow of the corrugated trough, whose eastern limits are thus sketched out, lie the upper slates, which undulate along the shore from Reenadisert, by Ballylickey, Reenydonagan, Gurteenroe, and Dunamark, into the town of Bantry.

Along the line of the old road, north of Ballylickey, some thin grit bands in the slates allow of these small and rapid undulations of the beds being

* In the beds in the neighbourhood of Sheehy Mountain fossils have been found, which Mr. Baily has identified as *Filicites lineatus*, *Sagenaria Veltheimiana*, *Fenestella antiqua*, *Lingula mytiloides* and *squamiformis*, *Rhynchonella pleurodon*, *Streptorhynchus crenistria*, *Spirifera disjuncta*, *striata*, and *Urii*, *Avicula Damnoniensis*, *Patella retrorsa*, and *Actinocrinus triacontadactylus*.

readily traced backwards and forwards through the crags and quarries about. So regularly bent are these hard grits that I one day carried away the top of one of the anticlinal curves as a specimen, and keep it in the Museum in Dublin.

The calcareous bands of the higher beds afford in some places a similar facility for tracing the curves through the slate rocks, of which the original bedding is often utterly obscured by joints and cleavage. One band of this kind may be followed from near Ballylickey, round Eagle Point, and then round Reenydonagan Point, and back again to the road at the eastern end of Reenydonagan Lough, where it makes a good crystalline limestone, two feet thick, that was formerly quarried in the flat near the head of the lake. The band dips S.S.E at 50° on the north side of Reenydonagan Point, rises out at 70° on the south side of it, but immediately curves over again, and takes the ground at an angle of 20°. Near Reenydonagan I formerly noted the cleavage as dipping S. 30° E., at 55° and 60°, in beds dipping S.S.E. at only 5°. These calcareous bands may be traced here and there for a mile or more up the little valley east of Reenydonagan; but still farther east thin grits make their appearance among the slates, the same lower beds apparently as those north of Ballylickey. These thin grits undulate through the townlands of Gortagarry, Shandrumbeg, and Skahanamore, and back again through Inchiclogh, where they are exposed in the rapids and waterfalls of the river Mealagh.

Fossils are often numerous in the calcareous bands. From a locality at Reenadisert the following species have been identified by Mr. Baily—*Plant stems*, *Fenestella antiqua*, *Lingula mytiloides*, *Spiriferina cristata* (var. *octoplicata*) *Actinocrinus triacontadactylus*, *Cyathocrinus variabilis*, *Adelocrinus* (? *Platycrinus*) *histrix*. The best fossil locality in the district, however, is the extreme point of Reenydonagan, where the calcareous bands are well decomposed and allow of the ready extraction of the fossils. While examining the district, in the year 1854, I used sometimes to amuse myself by knocking out *Phillipsia pustulata* and other fossils by the dozen from this locality. The following species are mentioned by Mr. Baily in the preceding lists as having been procured from Reenydonagan:—*Alveolites depressa*, *Chætetes tumidus*, *Cyathophyllum* (*Petraia*) *celticum*, *Fenestella antiqua*, *Glauconome pluma*, *Polypora laxa*, *Athyris Royssii* or *concentrica*, *Chonetes Hardrensis*, *Cyrtina heteroclita* ? *Producta scabricula*, and *semireticulata*, and a *new species*, *Rhynchonella pleurodon*, *Streptorhynchus crenistria*, *Spirifera disjuncta*, *lineata* ? and *striata*, *Spiriferina cristata*, var. *octoplicata*, and *laminosa*; *Pullastra bistriata*, *Acroculia vetusta*, *Bellerophon subglobatus*, *Cyathocrinus variabilis*, *Phillipsia pustulata*.

We have now followed the beds from the eastern side of Glengarriff harbour, deep in the Old Red sandstone, up to these calcareous bands, which are probably about the highest beds of the Carboniferous slate which are left in the neighbourhood. It was previously stated that on the west side of Glengarriff harbour nothing but purple and green grits and slates can be seen as far west as Coolieragh harbour. In the rocks to the S.W. of that harbour several calcareous bands or cornstones were observed by Mr. Foot interstratified with the green and purple grits and slates. I observed myself formerly similar good cornstones in the hills east of Roche's Hotel, on the east side of Glengarriff harbour in beds which are probably nearly in the same geological horizon. It appears from this and other facts that the beds on the opposite side of the mouth of Glengarriff harbour do not exactly correspond. The curve that brings in the S.W. dip in Shrone Hill probably throws the higher beds farther to the south-west on the western side of the harbour. The purple grits and slates may be seen in the northern half of the little island of Garinish West, but the southern part is composed of the bluish gray grits and slates. Bluish gray grits and slates then strike along

shore past Mehal Head, with a dip of 85° to the S.S.E. As the shore projects to the southward across the line of strike about Mehal Head and Shot Head, the thickness of the Carboniferous slate, with its Coomhola grits, cannot be less than 2,500 feet there. When the shore recedes to the north about Adrigole harbour it cuts back into the purple and green grits and slates of the Old Red sandstones which strike across that harbour with a high southern dip, varying from 45° up to 90°. The Carboniferous slate continues beneath the water, with the same W.S.W. strike and high dip showing itself in the two Roancarrig Islands and in the shore of Lonehort Point and the eastern extremity of Bear Island. (*See Explanation of* 197, 198, *and part of* 191.)

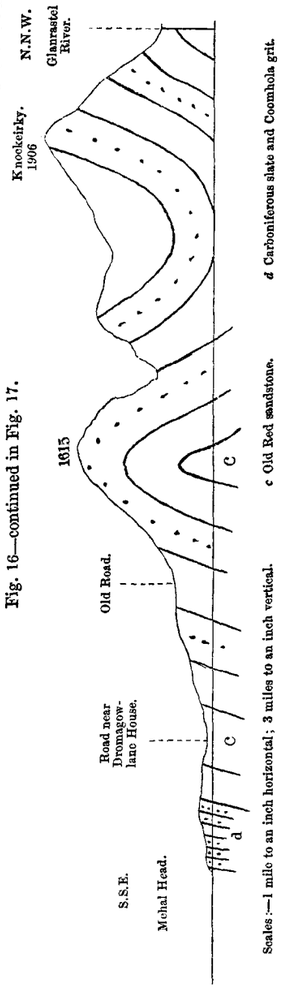


Fig. 16—continued in Fig. 17.

Mr. Kinahan notes the occurrence of plant fragments in the rocks on the shore, due east of the small pool called Lough Naravy, and observed a small fault near there, running nearly N. and S., with a downthrow to the east. Fossils were also collected at Mehal Head, among which Mr. Baily has identified *Fenestella antiqua, Orthis Michelini, Spirifera lineata* and *striata, Actinocrinus triacontadactylus*. Near Lonehort Point on Bear Island, and in the little cliffs running along the north side of it, fossils are very abundant, including among others, according to Mr. Baily's identifications, *Lingula mytiloides, Rhynchonella pleurodon, Avicula Damnoniensis, Dolabra securiformis, Modiola Macadami, Sanguinolites plicatus, Curtonotus elegans, Orthoceras undulatum*, and undetermined species of *Athyris, Nucula, Macrocheilus, Natica* and *Pleurotomaria*.

From Mehal Head and the neighbourhood, the massive red and gray grits rise to the northward, and undulate through the mountain ground, as shown in the section, fig. 16, till they dip beneath the Carboniferous slate and Coomhola grit of the Cloonee Loughs. (See section, figs. 16 and 17, in which, however, as in the other section, fig. 14, the heights of the hills and the inclinations of the slopes of the beds, as well as of the hill sides, are greatly distorted, inasmuch as the scale of the heights is three times that of the lengths.)

Mr. Kinahan notes the occurrence of cleavage, with a dip of 80° to the N.N.W., in beds dipping S.E., at 45° N.W. of Glankeel Lough.

c. The Bantry District and Whiddy Island.—The ridge of Knocknaveagh rises immediately to the southward of the town of Bantry, to a height of 933 feet. About the summit of the ridge, beds of grit and slate show themselves, having pale purple, lilac, and green colours. These beds strike about

E.N.E. and W.S.W., and are often absolutely perpendicular, or so nearly so that it is difficult to say in which direction the dip may be. As we descend, however, either on the north or south side of the ridge, we soon find ourselves among greenish grits, interstratified with bluish gray slates, and shortly come to bluish gray or black slates alone. It is, therefore, obvious that the Knocknaveagh ridge is an anticlinal, showing the uppermost beds of Old Red sandstone in the centre, and the Carboniferous slate with the Coomhola grits upon either flank. In the town of Bantry itself, the dark gray slates may be seen in many places, forming a series of terraced ledges underneath the Union Workhouse, and in the quarries to the east of it, dipping S.S.E. at 75°, the cleavage coinciding with them. In the new cuttings for the road going down to the Square the beds are contorted, though the cleavage is steady, with a dip to S.S.E. at 70° or 80°. Near the Church a calcareous band shows itself, the slates having a general dip there of about 60° to the S. This southern inclination is probably not far continuous, the beds rising out again to the south, on the flanks of the Knocknaveagh ridge, while in all the country to the east and N.E., about Caherdaniel and Dumbrow, as also towards Dunamark and Gurteenroe, the undulations in the beds are numerous and rapid, and often well exhibited by means of the hard grit bands in the slate.

In some small quarries south of the Dunamark Mills, the gray slates with nodules about the size of potatoes, which the quarrymen sometimes denominate "bulls' eyes," dip S.W. at 30°, as shown by the lines of nodules, while the cleavage dips S.S.E. at 25° only, and this very low cleavage is perceptible in one or two other places in this locality, forming a marked exception to its usual high inclination.

There is by no means so fine an exhibition of the Coomhola grits on this southern side of the basin as there is to the northwards in the sides of the mouth of the Coomhola Valley, but this is probably in consequence of the great piles of drift which cover so much of the rocks about the town of Bantry. In the hills N. of Lough Bofinna, where the ground is bare of drift, a great mass of grits, interstratified with gray slate, shows itself; but these, according to Mr. Willson's observations, dip chiefly to the S.S.E., at angles of 70° or 75°, without any sufficient space between them and the purple slates and grits south of Lough Bofinna for their reappearance. It is probable then that these are the Coomhola grits, in a partially inverted position.

Fossils occur in the beds both east and west of the town of Bantry, among which Mr. Baily has identified *? Knorria acutifolia, Avicula Damnoniensis, Bellerophon subglobatus*, and species of *Nucula* and other small bivalves.

From the town of Bantry the beds strike steadily to the E.S.E., alongshore to Relane Point, notwithstanding the numerous contortions, which show that these folds are chiefly corrugations on the line of dip, very slightly affecting the strike of the beds. In the grits and slates of Relane Point, the following fossils have been noted by Mr. Baily :—*Chætetes tumidus, Pleurodictyum problematicum, Fenestella antiqua, Athyris ambigua, Lingula mytiloides, Rhynchonella pleurodon, Streptorhynchus crenistria, Spirifera cuspidata?, Terebratula hastata, Aviculopecten arenosus, Leda attenuata, Curtonotus elegans* (var. *rotundatus*), *Euomphalus pugilis, Bellerophon decussatus ?* and *subglobatus*, species of *Pleurotomaria* and *Orthoceras*, and *Leperditia* (*Cythere*) *subrecta*.

Whiddy Island is composed wholly of dark gray and black slate, including many bands of gray grit. The grits are especially numerous in the south-western part of the island. All the rocks are folded into numerous and rapid contortions and corrugations, as may be seen in the cliffs, near the western redoubt. Along the northern side of the island, the strike and dip

are steadier, the strike coinciding with the greatest length of the island, which runs nearly N.E. and S.W., the dip being in some places to N.W., at others to S.E., but almost always at angles of 60° or more.

Near the northern end of the island, at the old castle of Reenavanny, some thin grit bands strike nearly east and west across the island, dipping S. at 10°, and north of these, and apparently rising from under them, are black Carbonaceous slates, which are sometimes so soft as to stain the fingers, and form a substance which can be used by carpenters as black chalk. This is especially the case in the cliffs of a little cove, which lies to the W.S.W. of the east redoubt. North of this cove the slates dip S.E. at 50°, being traversed by a perpendicular cleavage which strikes E. 30° N., till along the eastern shore these beds are thrown into rapid undulations.

A few yards on the eastern side of the northern point of the island are some small calcareous bands, with nodules of dark gray calcareous grit. Fossils were found in these beds, containing, among other things, the tail of a *Phillipsia pustulata*.

If we walk from Bantry along the old road past the Workhouse, and so over the ridge of Knocknaveagh, we shall find, just as we come above the highest fences on to the heathery ground, that the rocks have the purple or lilac tinge, marking the appearance of the Old Red sandstone. A little beyond the bend of the road on the south side of the ridge, we lose this red colour again, and find ourselves in the gray beds.

If again we follow the new road to Dunmanway, which runs east from Bantry, and crosses the ridge by the gap of the Owenashingaun stream (a tributary to the Ilen), we meet with the purple beds immediately after winding round the curious drift mound of Ardnaginah West, and we lose them before arriving at the ruins of the old castle of Baurgorm. The rocks in both these traverses seem to be all perpendicular, and to strike steadily to the E.N.E. The Coomhola grit part of the Carboniferous slate, strikes through Sprat Hill, which lies on the watershed between the basin of the Durrus River and that of the Ilen, and may be seen at intervals all the way to Kealmine Lough and Castle Donovan (in Sheet 193). Fossils were collected from thence at two spots S.E. of Trawlebane Bridge (in the N.W. corner of Sheet 200), among which Mr. Baily identifies *Filicites lineatus, Fenestella antiqua, Orthis Michelini, Rhynchonella pleurodon, Avicula Damnoniensis,* and some species of *Nucula* and other small bivalves, a species of *Orthoceras,* and portions of *Actinocrinus triacontadactylus.*

Coming back now westwards along the south side of the Knocknaveagh ridge to the pass of Cappanaloha, through which runs what used to be the mail-coach road into Bantry, we meet with a difficulty. The gray grits and slates of the Carboniferous slate continue to strike steadily to the E.S.E., as far as the turn of the road; but in the ground immediately to the westward of this Mr. Willson met with purple slates and grits directly in the strike of these beds, and these purple slates and grits have also an E.N.E. and W.S.W. strike, and dip southwards at high angles. There must, therefore, either be a large fault here, or the rocks must be suddenly bent into sharp folds, the axes of which rise to the westward, and allow of the appearance of the lower rocks at the surface in consequence of that rise. The ground unfortunately is much covered by rough wood, heather, and furze, and no sufficient section is exposed to enable us to determine the point; but Mr. Willson preferred the hypothesis of a complex flexure in the rocks instead of that of a great fracture, and I am inclined to agree with him. If there be a fault it will course about N.N.W. and S.S.E., a bearing which would carry it through the centre of Whiddy Island and up the middle of Glengarriff Harbour on the north, and into the head of Roaringwater Bay on the south.

There are features along that line which would harmonise well with the supposition that it is continued to these places, whether it be a line of fracture or only one along which a cross flexure takes place in the beds.

d. The Durrus and Kilcrohane Promontory.—On the western side of the Cappanaloha Gap, through which run the roads from Bantry to Fourmilewater or Carrigboy, and to Ballydehob and Dunmanway, a ridge rises in continuation of that of Knocknaveagh. Like the Knocknaveagh ridge it consists of red and green grits in the central and highest parts, where the lower rocks crop to the surface, with the gray slates and grits on each side. The beds strike E.N.E. and W.S.W., or exactly along the length of the promontory, with the utmost regularity, and dip almost invariably at very high angles, either towards Bantry Bay on the one side or towards Dunmanus Bay on the other. The cleavage seems always to dip at a high angle from 60° to 80° to S. 30° E.

At the head of Dunmanus Bay, about Carrigboy, we get the blue and dark gray slates above the part in which the grits lie; but Mr. Willson did not note the occurrence of any calcareous bands, except in the neighbourhood of Blair's Cove.

Some of the slate beds are capable of being worked into roofing slate of tolerable quality, and Lord Bandon has now (1864) opened a quarry at Rossmore, near the shore, about a mile to the W.S.W. of Fourmilewater-court. The beds here dip S. by E. at 50°, while the cleavage crosses them very obliquely, dipping S.S.E. at 62°. The part now opened is deteriorated by the occurrence of many nodular lumps ("bulls' eyes") in the slate, but it was hoped that the band which they were going to cut into when I visited the quarry would be free from these.

The characters which distinguish an ordinary clay slate, such as a geologist would call a "good slate," from that which makes a "first-rate roofing slate," although of high importance economically, are nevertheless so minute and imperceptible to the eye, as scarcely to be appreciated until a quarry is actually opened, and the matter brought to a practical test. A fine-grained argillaceous rock may be traversed by a true slaty cleavage, and yet may be deficient in that tenacity which enables it to be split into large plates of the requisite thinness, so as to combine strength and size with lightness. The slate-quarry men, like vein-miners, are always very urgent in inducing proprietors to go deep in search of good slate. The phrase, "it is sure to improve in depth," is constantly on the lips of both sets of practical men. It is doubtless founded in truth, so far as that it is necessary to sink deep enough to get beyond the reach of the ordinary atmospheric influences before one can reach the "unweathered" material. Beyond that, however, there does not appear to be any reason why the materials of a bed, or the contents of a vein, should "improve in depth" rather than "in length;" and where they dip at a high angle of inclination, it must be much less expensive in most cases to follow them along the strike, and examine them near the surface, rather than incur the costly preparations necessary to explore them in depth. Any change, either for the better or the worse, is just as likely to occur in one direction as the other—always taking care, of course, to allow for the influence of the weather in the parts near the surface.

If now we drove along shore by the new road, past O'Donovan's Cove, to Kilcrohane, we should find the same rocks continuing in the same straight line all the way right out to Sheep's Head. A straight line drawn a little inside the heads of the various coves and recesses of the coast forms the boundary of the red series, all the projecting points and pieces of land outside of that are composed of the gray. Where the road leaves the immediate shore, and runs a little inland, as about Kilcrohane, the rocks passed over have the peculiar lilac tinge of some of the upper parts of the Old Red sandstone series of the western part of Cork. These lilac and green grits and

slates may be followed past the signal tower of Sheep's Head, and seen in the vertical cliffs just S.W. of Lough Akeen, where they appeared to me to be dipping northwards at rather low angles. On the north side of Sheep's Head, however, the gray grits and slates dip north at 50° or 60°, but have at least one sharp fold or contortion which runs from the extreme point of Sheep's Head back for several miles. This is part of a larger synclinal fold, by which the Carboniferous slate with the Coomhola grits are brought rather suddenly into the middle of the promontory along the line of the anticlinal axis, which must, somewhere about Seefin, separate into two anticlinals.

Several folds and contortions indeed are noted by Mr. Willson, in the green and purple grits and slates of Seefin and the hills N.W. of Kilcrohane.

He also notes the occurrence of an anticlinal of purple slates striking out on the coast near the Gortavallig Mine, where the word Cashmahignafane occurs on the one-inch map, one arm of which dips N., and brings in the gray slates and grits, which strike continuously from that point along the south shore of Bantry Bay, while the other arm dips S. at 70° or 80°, and brings in the gray grits and slates of the small synclinal trough just now mentioned.

The Carboniferous slates and Coomhola grits which strike along the south shore of Bantry Bay are an exact repetition of those striking along the N. shore of Dunmanus Bay, dipping to the N.N.W. instead of to S.S.E. at a similar high angle in general, and with similar small flattenings or contortions occasionally.

A slate quarry has lately been opened in a little indentation of the coast in the townland of Gortakilly, about N. by E. from the summit of Seefin. This belongs to a small company, called formerly, I believe, the Bantry Bay, but now the Kilcrohane and Gortakilly, Slate and Slab Company.

Another quarry on the same band has been commenced by Lord Henry Loftus, a little further to the eastward, in the townland of Gouladoo, and another by Mr. Gumbleton, in the townland of Foilakilly, on the coast N.W. of the summit called Gouladane.

In the Gortakilly Quarry the beds were vertical, striking E.N.E. and W.S.W., with the cleavage dipping to S.S.E. at about 75°.

In the Gouladoo Quarry the beds seemed to dip to the south; but this might be due to mere overhanging or superficial inversion, arising from what is known as the "weight of the hill," since the quarry was being opened at the top of a cliff more than a hundred feet above the sea.

"Purple slates" and "purple slates and grits" and "green and purple grits and slates" are noted by Mr. Willson on the six-inch maps among all the hills in the central part of the promontory, between these two narrow skirtings of Carboniferous slate; the beds dipping generally at high angles outwards, but occasionally subject to rapid undulations or sharp twists, often requiring a good deal of care and attention to make them out.

(c.) *The Clonee District, on the S. side of Kenmare Bay.*—In the Explanation to Sheets 197, 198, and part of 191, an account is given of the beds of gray slate and grit which strike along the southern shore of Kenmare Bay from Inishfarnard and Kilcatherine Point to Kilmakilloge Harbour.

The head of Kilmakilloge Harbour comes within the limits of Sheet 192, and the gray slates strike into this district as far as the Cloonee Loughs.

At Battle Point, on the north side of Kilmakilloge Harbour, the blue and gray slates and grits of the Coomhola part of the Carboniferous slate series strike, according to Mr. O'Kelly's observations, steadily to the E.N.E., dipping S.S.E. at 60° or 80°. These beds, however, are probably inverted, and dip northwards in reality, as about Bunaw the blue slates, with fewer grits, set in, as being at first vertical, but afterwards dipping N.N.W. at 70° or 80°.

These gray slates may then be followed all the way round the coast to Lehid Harbour, showing a few contortions and variations of dip occasionally, but on the whole preserving the E.N.E. strike over all the lower ground

which intervenes between Lehid Harbour and Bunaw. Fossils were found in these beds in several localities, among which were plant stems and fragments some of which were identified as *Sagenaria Veltheimiana* by Mr. Baily, together with *Avicula Damnoniensis*, *Modiola Macadami*, *Sanguinolites plicatus?* and a species of *Natica*.

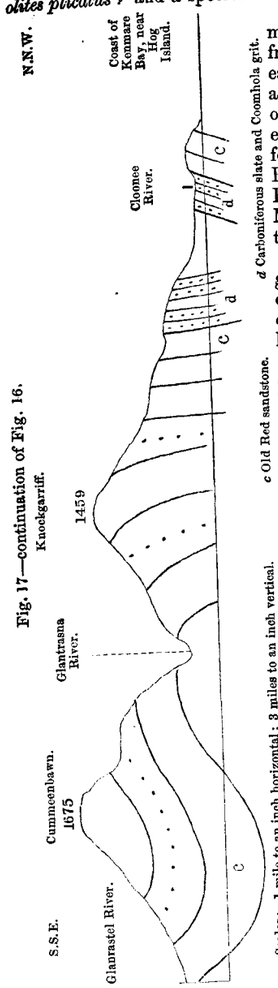


Fig. 17—continuation of Fig. 16.
Knockgarriff.

This lower ground, however, suddenly terminates along a line running about S.S.W. from Lehid Harbour to Kilmakilloge, to the eastward of which line the ground rises rapidly and forms the Hill of Knockatee, the summit of which is 1,008 feet above the sea. On the eastern side of this line the bare rocks are formed of the red and green grits of the Old Red sandstone, which also strike steadily E.N.E. and W.S.W., and seem, according to Mr. O'Kelly's observations, to dip altogether to the N. at angles varying from 35° to 80°.

The two kinds of rock, the red and the gray, may be seen in some places striking at each other within a very few feet of each other, proving, therefore, the existence of a large fault, with a downthrow to the west.

A precisely similar occurrence was observed on the N. side of Kenmare Bay, above Dereenrickard Lough, where the fault can be distinctly seen on the roadside, as observed by Mr. Wynne. (*See Explanation of Sheet* 182, *&c.*)

The gray grits, interstratified with black slates, strike across the entrance of Lehid Harbour, as observed by Mr. Kinahan, with a good deal of rapid undulation, but with a general dip to the S.S.E., in consequence of which the purple and green grits and slates rise out about Leaghillaun, and strike thence along the coast of Kenmare Bay, up to the head of it.

Between Lehid Harbour, however, and the Lower Cloonee Lough there lies a small trough of Carboniferous slate and Coomhola grit, the beds of which preserve, according to Mr. A. B. Wynne's observations, the same steady E.N.E. strike, dipping inwards generally at high angles. Plant stems were found at several places in these beds, as also in the red rocks below them; besides which fossils have been procured from the gray beds, including *Chætetes tumidus*, *Streptorynchus cerenistria*, *Rhynchonella pleurodon*, *Spirifera cuspidata*, *Avicula Damnoniensis*, *Cucullæa Hardingii*, and perhaps another species, *Modiola Macadami*, and species of *Sanguinolites* and *Actinocrinus*. On following the gray beds along the little lane on the south side of the Lower Cloonee Lough, they will be found to terminate abruptly against the red rocks, along a line running between the two lakes, as observed by Mr. Wynne, both rocks dipping at high angles, and striking directly at each other.

It is plain, therefore, that we have here another example of those curious transverse faults which seem to be numerous on each side of Kenmare Bay, in this neighbourhood.

Through all the hills to the southward of the district now described as Knockatee, Knockanouganish, Knockgarriff, and Knockagarrane, to Cummeenanimma and Knocknagarivela, and those lying to the eastward of the Upper Cloonee Lakes and Inchiquin Lough, the ordinary green and purple grits and slates of the Old Red sandstone series strike to the E.N.E., with high inclinations to the N.N.W. The rocks preserve the same general "lie" in the Barraduff and Killaha Mountain, and thence all along the southern side of the Kenmare Valley, to the head of it, some miles beyond Kilgarvan.

There is, however, what appears to be a singular anomaly in the nature of the beds which lie above the red rocks at Kenmare compared with these just described near Cloonee.

On both sides of Kenmare Bay—namely, round Coungar Harbour on the north, and about Lehid and Kilmackilloge on the south, we find the Carboniferous slate and Coomhola grits above the red beds, with a thickness of several hundred feet at least. In tracing these Carboniferous slates indeed along the south side of the bay to Kilcatherine Point, their thickness seems to be quite as great as in Bantry Bay, and cannot be less than 2,000 or 3,000 feet, without any appearance of reaching the top of the formation. In the same way, at Coungar and Cloonee, the beds that occur in the ground seem merely to be the lower part of the formation, and consist almost entirely of grits, with merely a few interstratified slates. Not the slightest appearance of the Carboniferous limestone shows itself.

But about six miles farther up the bay, the Carboniferous limestone forms several islands, and then the mainland under Kenmare, and runs thence to Kilgarvan, forming a band ten miles long, with a thickness of at least some hundred feet. It lies in a trough of the Old Red sandstone, the red slates and grits dipping regularly towards on either side, and beds of dark gray slate and gray gritstone of precisely the same character, and with many of the same fossils as those of the Carboniferous slate, come in between the Old Red and the limestone. But instead of being several hundred or several thousand feet in thickness, as these gray slates and grits are six miles to the westward or twelve miles to the southward, they have at Kenmare a thickness certainly not greater than 100, and perhaps not greater than fifty feet. The beds may be seen S. of Cleedy and near Kilgarvan, as described in the Explanation of Sheet 184.

I must confess to have been for a long time puzzled to give any rational account of the cause of this change, but I now believe that the true explanation is that suggested in the Explanation of 187, &c., which looks on the Carboniferous limestone as contemporaneous with the Carboniferous slate; limestone being formed in these parts of the sea in which forests of crinoids and other animals lived and flourished, while in other parts great deposits of sand and mud were thrown down which hindered or prevented the growth of the animals.

Some mud and sand loving species are found in the slates and grits, which do not make their appearance in the limestone, while those which flourished only in clear water are absent from the mechanical deposits. Many, however, if not all, of these species, which have been called Upper Devonian species, must, I think, be considered as true Carboniferous forms, and the Marwood and Piltown beds of N. Devon, as truly Carboniferous rocks as the Mountain Limestone of Derbyshire itself.

6. *Drift.*

The country in general is singularly free from those superficial accumulations of loose gravel, or sand, or clay, which, for want of a better designation, we group under the head of "Drift." In some places, however, in the valleys and lower grounds, very large local accumulations of these matters may be seen. They occur in patches, sometimes on the flanks of the hills, up to a height of 600 feet above the sea, with a depth of thirty or forty feet at least, and also along the sea-shore at intervals, and sometimes in the bottoms of the valleys, especially near the heads of those valleys, on approaching the line of water-shed where it crosses a "pass," or one of the "lowest connecting gaps" of two neighbouring "river basins."

On the N. side of Bantry Bay, the ridge of Ardnagashel shows three of these drift mounds, the most conspicuous being the one marked by engraved dots in the one-inch map.

The rounded hills of Whiddy Island, are also composed of them, and these about Reenydonagan and Gurteenroe, and the hills immediately N. of the town of Bantry, one of which makes a great cliff of rubbish overhanging the sea. It all seems to be composed of a mass of dirty sandy clay or clayey sand enclosed semiangular and rounded blocks of all shapes and sizes, many of them polished and scratched.

Some of the blocks now lying on the beach just N. of Bantry and fallen from the cliff above, are composed of crinoidal limestone, exactly like ordinary Carboniferous limestone. As some of these blocks are three or four feet across, and as they not uncommonly occur in this drift, it is clear they have not been derived from any rocks now existing in Bantry Bay, or anywhere on the south side of the Glengarriff ranges of hills. Besides these there are many blocks of gray grit which might be Coomhola grit; but it is singular that masses of purple grits, such as the hills about are chiefly composed of, are rare in this drift.

Ridges and round hills of drift may be followed from Bantry for six miles up the valley of the Mealagh River, clearly distinguishable from the hills of rock by their smooth regular forms and their green cultivated sides, while the rocky hills are rough and dark with heather or gorse. The drift hills are mostly round isolated mounds of 100 or 150 feet in height, and standing on a base about half a mile in diameter, with bare rock showing in the low ground between them. They are very often crowned by one of the circular* forts or "raths" which are very common in the country, but are rarely, if ever, to be seen except on the drift, the easily excavated materials of which have been used in the construction of the rampart.

The river Mealagh is now forming a great cliff in one of these mounds in the townland of Dromsullivan North, about three and a-half miles N.E. of Bantry; but it is not very easy to get a clear section of them, as the fallen rubbish makes a steep talus rather than a vertical cliff.

They are conspicuous, not only in the main valley of the Mealagh River, and ranged on the hills on each side of the valley, but also up the valley of the tributary stream which comes down from Coomanore Lough (*Sheet* 193), and on each side of the Doneelagh stream, which comes from Lough Bofinna. That lough, indeed, is itself caused by a semicircular sweep of drift mound from one rocky ridge to another, the lough having no hook running into it, and being near the watershed; neither has it any but an artifical cut for a stream running out, as it would appear that naturally the winter floods after extending over the boggy flats round the lough, escaped partly by evaporation and partly by soaking through the drift mound.

* There is one exception to this circular form in the wood at the back of Newtown House, a mile N. of Bantry, where there is a quadrangular ditch with a kind of bastion at each corner.

From Lough Bofinna a line of mounds and patches of drift runs westward along the northern slope of Knocknavea up to a height of more than 500 feet and into the Pass of Cappanoloha, where the drift mounds are especially prominent objects, and whence they run for some miles down the south side of Bantry Bay; being here, as elsewhere, conspicuous by their rounded or flattened summits, their steep smooth sides, and their highly-cultivated appearance, as contrasted with the rocky ground, whether the latter be high or low, steep or flat. A semicircular mound of drift forms the little lough in the Deer Park of Bantry in the same manner as at Lough Bofinna.

Similar drift mounds composed of similar materials set in in the valley of the Durrus River, on the south side of the Cappanoloha Gap, running down to Carrigboy or Fourmilewater; and they show themselves in the recess of the hills at Kilcrohane and in many other parts of the country.*

I have often searched in the small openings into them for sea shells, but never could find the least fragment or appearance of one. Whether the formation belongs to the boulder clay, and whether, like that is now supposed to have been, it has been produced on dry land underneath a former universal ice covering, I do not pretend to decide.

There is, however, no district in the British Islands, perhaps, in which the proof of what is called glacialisation is so universal and well marked. The rocks, especially the hard grits, are everywhere rounded and polished, and grooved in the fashion which everyone now admits ice alone is capable of producing. Glacial scratches, too, are exceedingly frequent, especially on the hard grit surfaces. These scratches, whatever may be the direction of the slope of the surface, often run N.W. and S.E. Other directions, however, are common, but they are much more frequently approximating to a N. and S. than to an E. and W. bearing. They are often seen on the summits of the crests of the ridges, as well as on their slopes.

The smoothing and polishing of the rocks, on the other hand, is often to be traced at low water down into the sea. This is especially noticeable along the shore to the S.E. of the mouth of Glengarriff Harbour.

However the drift was produced, I believe that what is now left of it is only a part of what once was there. It is impossible to suppose that the present steep-sided, round, isolated mounds, with often but narrow valleys between them, were thus formed originally. It is evident that they were all one connected mass, the valleys between them being formed by denudation.

It seems probable, then, that the whole country was once covered with a mass of drift, 50, 100, or 150 feet thick, and spreading with a lesser thickness up the sides of the mountains up to heights of 500 feet above the existing sea level, and that this drift has since been swept off the country with the exception of the round mounds and patches of it now described.

7. *Lodes or Mineral Veins.*

Ores of copper, baryta, and lead have been observed at several places in or near to the Coomhola grits, that strike along the southern side of Bantry Bay.

In the townland of Derryginagh Middle, about two-and-a-half miles to the east of Bantry, is a large irregular deposit of white and mottled sulphate of baryta, occurring apparently in a lode-like mass, running nearly E. and W. Mr. Willson's note on it is "barytes lode, 15 feet in width at parts, being pure in centre, but at the sides impregnated with specular iron." It had

* The drift is not well marked on the one-inch maps. Some of the most conspicuous mounds near Bantry have been dotted; but it is not the mere presence of drift that is most remarkable, but the form of the mounds and ridges; and it was felt that to attempt to shade these, while the much loftier rocky hills about them were left unshaded, would only mislead.

been partly opened a little before my visit in July, 1864, but the workings were then apparently discontinued.

About four miles W.S.W. of Bantry is a lead lode, striking through parts of the townlands of Rooska and Killoveenoge, for a distance of about a mile, according to Mr. Willson's observations; this contains silver-lead ore, and underlies to the S. at an angle of 25° (from the perpendicular). He describes a cross-course as cutting this along the boundary of Rooska West and Rooska East, and running about N.E. and S.W., with some indications of the main lode on the eastern side of it, in the townland of Rooska East, on the same line of bearing that it has in Rooska West, or nearly E. and W. (true.)

This mine is now being worked in Killoveenoge, under the superintendence of Captain Charles Thomas and Captain Mitchell. According to information received from Captain Thomas the lode at a depth of fourteen fathoms, "is three-and-a-half feet wide, between two walls, consisting of light *elvan*, killas quartz and lead; the richest part of the ore is on the foot wall, which underlies S. three feet to a fathom." They had a shaft farther west, which in August last was sunk seventeen fathoms, and which they expected to cut the lode at twenty-three fathoms.

Eight miles farther to the W.S.S. in the same beds, as they strike along the southern shore of Bantry Bay, a lode was formerly opened on the eastern side of a little semicircular cove, in the townland of Carravilleen, nearly due N. of Kilcrohane. This was called a copper mine, but contained, according to Mr. Willson, "a large deposit of a crystalline white substance called by the miners carbonate of manganese."

A specimen of this substance was sent to Mr. Warington W. Smyth for examination, and he has communicated the following information respecting it:—

"As this substance, occurring in considerable quantity, had an appearance very like some of these compound carbonates (ankerite, &c.), which are sometimes capable of employment for smelting, a specimen of the compact crystalline kind was analyzed in the Metallurgical Laboratory, in Jermyn-street.

"The specific gravity was 2·818, and the constituents as follow:—

"Carbonate of lime,	49·85
,, magnesia,	31·39
,, protoxide of iron,	9·53
,, protoxide of manganese,	7·30
Silica,	1·54
Alumina, water, and loss,	39
	100·00

"The above proportion of carbonate of iron would give only 4·60 per cent. of metallic iron, but the proportion of that metal is evidently very variable in the mass."

A mineral vein was obscurely traceable also in the cliffs on the other side of the cove.

About half-a-mile farther west, in the cliffs of the townland of Killeen North, is another lode, containing copper and iron pyrites, and green carbonate of copper, according to Mr. Willson. This had also been penetrated to some distance, and some green carbonate of copper extracted. It coursed, like the other lodes, nearly E. and W., and underlay to the S. at an angle of 20° (from the perpendicular).

Other mineral veins occur at Gortavallig, three miles beyond Killeen. The one noted by Mr. Willson strikes nearly E. and W., with an underlie to S. of 20° (from perpendicular), and contains gray and yellow copper, and had been worked extensively some years previous to 1854. It is now again in work as the Carberry Mining Co., (Limited), with Mr. John Penrose as captain, who, in reply to my inquiries, was kind enough to inform me that "three lodes have been discovered in the sett, of which No. 1, or the N.

lode, runs nearly due E. and W., and underlies S. about one foot to the fathom. This lode, at the deep adit level, which is seven fathoms over high-water mark, is two feet wide, composed of peach, friable spar, mundic and peacock copper ore. No. 2, or middle lode, is very large, composed of a mass of quartz and mundic, with a little bright yellow copper ore embedded in clay-slate or killas, bearing 18° S. of E., and underlie about 2 feet 9 inches in the fathom South. This lode has not been seen below the adit level, where it is sixteen feet wide. No. 3, or south lode, is composed of gossan, spar, and gray copper ore, which yields, by an assay made, forty per cent. of pure copper. This, like No. 2, has not been seen below the adit level, and has only been opened upon a cut six feet long there."

In August, 1864, cross cuts were being driven to intersect these two latter lodes, 20 fathoms below the adit level.

"Elvan" is mentioned by both Captain Thomas and Captain Penrose, as occurring in their mines, but I rather suspect that none of the substances so named would be called "elvan" by a geologist. If by "elvan" we are to understand a quartziferous felstone, or crystalline-granular mixture of felspar and quartz occurring as an intrusive vein, I can only say that none of the officers of the Survey have ever seen any portion of such a rock on the south side of Bantry Bay.

My attention was called, during the last summer, to some specimens of lead ore and its containing rock, in the Exhibition of the Royal Dublin Society. These specimens came from the Cappagh mines, between Skull and Skibbereen, and the rock was labelled "elvan." On examining them, however, I found the so-called "elvan" to be nothing else than a fine-grained green gritstone, exactly like the gritstone which so frequently occurs in the Croomhola grits of West Cork.

Mr. Warrington W. Smyth informs me that—"The original meaning of the Cornish word 'elvan' is uncertain, and it is frequently misapplied even in Cornwall to various rocks, whether dark or light coloured, of granular character, and generally hard. Such misapplication is, however, only made by persons unfamiliar with the true elvan."

In the sense in which it has been used by Sir H. T. Dela Beche, and other geologists since his time, no rock deserving the name has yet been shown me from any locality S. of Bantry Bay.

J. Beete Jukes.

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