Memoir. | Survey.

EXPLANATIONS

TO ACCOMPANY

SHEETS 200, 203, 204, AND 205, AND PART OF 199

OF

THE MAP

OF THE

GEOLOGICAL SURVEY OF IRELAND,

ILLUSTRATING PART OF

THE COUNTY OF CORK.

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DIRECTOR-GENERAL OF THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM:

SIR RODERICK IMPEY MURCHISON,

D.C.L., F.R.S., G.C.ST.S., &C., &C.

Geological Survey Office and Museum of Practical Geology, Jermyn-street, London.

IRISH BRANCH.

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

LOCAL DIRECTOR:

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

SENIOR GEOLOGISTS:

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

ASSISTANT GEOLOGISTS:

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

COLLECTORS OF FOSSILS, &C.:

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

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

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

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

Condensed memoirs on particular districts will also eventually appear.

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

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EXPLANATIONS

TO ACCOMPANY SHEETS 200, 203, 204, AND 205, AND PART OF SHEET 199,

OF THE MAP OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The district included in these sheets of the map belongs wholly to the county of Cork. Cape Clear and Mizen Head,* the two southern promontories of Ireland, are comprised in it.

In Sheet 199, the places of most note are the villages of Skull and Ballydehob; in Sheet 200, the towns of Skibbereen and Rosscarberry,† with the villages of Dromdaleague, Castletownsend, Union Hall, Leap, and Glandore; while in Sheet 204 are the town and harbour of Crookhaven, and the village and harbour of Baltimore.

1. *Form of the Ground.*

Several long regular but rather broken ridges, with their intervening longitudinal valleys, strike across this district with a general bearing of E. 25° N., and W. 25° S.

The central ridge is that which terminates in the rocky cliffs between the Mizen Head and Three Castle Head, the valley on the north of it forming Dunmanus Bay, and that on the south Roaring Water Bay. This ridge rises to a height of 765 feet immediately over Mizen Head. At Knocknamaddree, three miles N. of Crookhaven, it rises to 1,034 feet; attains its highest elevation of 1,339 due N. of Skull, in Mount Gabriel, the highest hill in the district, declining then to a mean height of about 300 feet for some distance, but rises again at Carrigfadda, which is four and a half miles N.W. of Rosscarberry, to 1,027 feet. This ridge is, in two places, cut completely across by broad transverse valleys, which almost obliterate it for the time. One of these is immediately to the northward of Ballydehob, giving passage for several strong brooks into Roaring Water Bay; the other, north of Skibbereen, is the valley of the river Ilen, which springs from the hills that lie W. of Dunmanway, in Sheet 193.

In the district included in Sheet 199, is another of these parallel ridges, separating Dunmanus and Bantry Bays; the highest point of this is called Seefin, and is 1,136 feet high, several other points being over 1,000 feet. It is cut down to a height of about 300 feet at the

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* "Mizen Head is the ancient *Notium Promontorium* of Ptolemy."—*Smith's History of Cork.*

† Smith, in his "History of Cork," vol. i., p. 265, says that Rosscarberry was "formerly "called *Ross Alithri, i.e.*, the field of pilgrimage. This anciently was the seat of a "famous university, and at it was educated the Irish professor who first opened the "public schools at Oxford, before which time the Saxons flocked to Ireland as to a "great mart of learning."

gap, which gives passage to the main Bantry road. It is mentioned here, but its geological description will be included in that of Sheet 192.

In the south-eastern part of the district the ridges are smaller and more numerous, their summits not being generally more than 300 or 400 feet above the sea, although their sides are often broken by rocky cliffs. There is one point of 719 feet near Fox Hall, N. of Rosscarberry, and one of 476 feet, near Castletownsend.

As a subordinate feature of the main central ridge may be mentioned the small ridge which runs on each side of Skull Harbour, and from thence to Toormore Bay. To the S.W. of Toormore Bay it is again met with, and continues out S.W. to Mizen Head, where it forms a bold cliff, nearly perpendicular, over 300 feet in height.

The islands that fringe the coast on the south lie in lines parallel to the hills just mentioned, showing that they also are the summits of ridges which are partly submerged, the islands answering to the peaks, and the straits to the longitudinal and transverse valleys. The most northern of these partially submerged ridges is that forming Horse Island, Castle Island, Long Island, Goat Island, and that part of the mainland that lies to the S. of the beautiful land-locked harbour of Crookhaven, and is only prevented from being an island by a sand flat between the head of Crookhaven and Barley Cove.* Another forms Inisodriscol and the Calves; and on the line of the most southern is Sherkin and Clear Island, and the Fastness Rock. The Fastness Rock is remarkable, not only for being the most southerly portion of Ireland, but also for its aspect, as it rises, with nearly perpendicular sides, to a height of 97 feet from the water, with not much more than room for the base of the lighthouse that stands on it.†

Nearly all the rivers and streams in this area discharge their waters into the Atlantic Ocean along the south coast, the drainage of only the small N.W. portion entering Dunmanus Bay. From the direction the mountain ridges take, it might naturally be expected that the principal river in each basin would flow either eastward or westward, as they would were it not for the transverse valleys previously mentioned, through which they find their way to the south coast. The only considerable river is the River Ilen, which, with its tributaries, drains about 100 square miles. It runs nearly due S. to Skibbereen, where it becomes tidal, and changes its direction to the S.W.

The indentations into the land along the south coast, especially those that form harbours, often lie in the lines of the previously mentioned transverse valleys. Four miles on the east of Mizen Head, however, is the long narrow bay called Crookhaven, which coincides with a longitudinal valley. Toormore Bay, on the N.E. of Crookhaven, nearly cuts across the Mizen Head promontory, and forms a peninsula of the parish of Kilmoe; the isthmus between Dunmanus Harbour and Toormore Bay being only a mile and a half across. The bay called Skull Harbour, which lies a few miles further E., is partly

* The strand of Barley Cove would form one of the most beautiful and excellent bathing places in the kingdom, the sand being very fine and soft, and the water of exquisite clearness and purity.—J. B. J.

† No height is given for this on the Ordnance Map; the height here given is on the authority of the assistant light-keeper.

sheltered from the swell of the Atlantic by the islands off the coast. Roaring Water Bay, still further eastward, runs for more than two miles to the north, up into the land. To the N. and N.E. of Sherkin Island there are numerous creeks and bays, many of which are dry at low water, and some of them could be easily reclaimed. Between Sherkin and the mainland is Baltimore Bay, in which there is good anchorage. It has entrances into it at the N.W. and S., the former being very intricate, as it is full of small islands and shoals, while the latter has a rock called the "Perch Rock" in the centre of it.*

About three miles on the east of Baltimore is Lough Hyne, a picturesque salt-water lake, out of and into which the tide ebbs and flows with tremendous force, as the entrance is very narrow compared with the capacity of the lough. Further N.E. are the long, narrow harbours called Castlehaven, Glandore, and the Bay of Rosscarberry. The last-named is gradually filling up with sand and slob.†

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

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

Aqueous Rocks.

		Name.	Colour on Map.
		Alluvium and Bog,	*Pale sepia.*
		Drift,	*Engraved dots.*
Carboniferous	d¹	Carboniferous Slate,	*Prussian blue & Indian Ink.*
Old Red	c³	Upper Old Red Sandstone,	*Indian red (dark.)*
Old Red	c²	Old Red Sandstone,	*Indian red (light.)*

The Old Red sandstone is the lowest or oldest rock formation exposed in this district. It has been divided into two groups called c² *Old Red sandstone*, and c³ *Upper Old Red or Yellow sandstone*, the latter being the upper six or eight hundred feet of the formation, without any definite boundary between it and the lower part. Though not very definite, this is, however, a most useful division, for near its lower boundary occurs the *copper zone* that prevails through the whole of the S.W. of Ireland.

The lowest beds of the Old Red sandstone that are seen, consist of alternations of thick beds of purple grits and slates, among which are a few that are of a gray or green colour; higher up, immediately below the Upper Old Red sandstone, purple, green, blue, and gray argillaceous and arenaceous slates predominate, associated with some grits and a few coarse-grained green sandstones. In this part of the Old Red sandstone, many of the beds are cupriferous. Above them,

* This harbour was of considerable importance before the year 1631, at which time the town of Baltimore was sacked and burnt, and the inhabitants carried into slavery by Algerian rovers, who are said to have been piloted into the harbour by a Dungarvan fisherman named Hackett (*see Smith's History of Cork, vol. i., p.* 278). Now there is only a wretched village on its shores, though it is still a port, the vessels belonging to Skibbereen being registered from the port of Baltimore.

† When Smith wrote his history it was a tradition that "the harbour of Rosscarberry was formerly navigable for ships."

forming the lower part of the Upper Old Red sandstone are green and purple slates with a few grits, and over them are yellow and gray grits with shale partings, and a few beds of slate.

Through the whole of this group calcareous beds or *cornstones* occasionally occur, which are of various appearance, often having a brecciated look as if angular fragments of slate were embedded in a calcareous paste.* Another form they take is that of a cellular grit when weathered, the cells being full of binoxide of manganese or peroxide of iron; but the common form is a rotten, dark, brown, rusty stone. When the cornstones contain copper they are locally called *gossen lodes*. They occur in beds, patches, and lenticular masses. Sometimes a bed can be traced for a long distance.

The base of the Old Red sandstone is nowhere exposed in this district, but we have a thickness of at least two or three thousand feet, the upper 800 feet, or thereabouts, being called the Upper Old Red sandstone.

Fossils are locally abundant in the upper division, being principally plants. None have hitherto been found in the lower part.

d^1 *Carboniferous Slate.*—Between the Carboniferous slate and the Old Red sandstone there is no definite boundary, as the upper beds of the latter are yellow and gray grits with a few green and purple slates or shales, while the lowest beds of the former are gray and yellow grits, with a few blue and black slates or shales, the lowest bed of black or blue slate or shale being considered the base of this division. As the gray and yellow grits are followed upwards, the yellow are found to give place to gray, and the beds of slate to be more frequent and to increase in magnitude until at last they replace nearly all the grits, a few of which only are found here and there interstratified with the upper part of the slate. Calcareous bands, sometimes nearly a pure limestone, and nodules frequently occur in the slate, and fossils are locally abundant. The grits of the lower part of this group have been called *Coomhoola grits* from Coomhoola, near Glengarriff, where they are well developed. The top of this division is nowhere found within the limits of this district, but what is here represented is probably at least 2,000 feet thick.

G. H. K.

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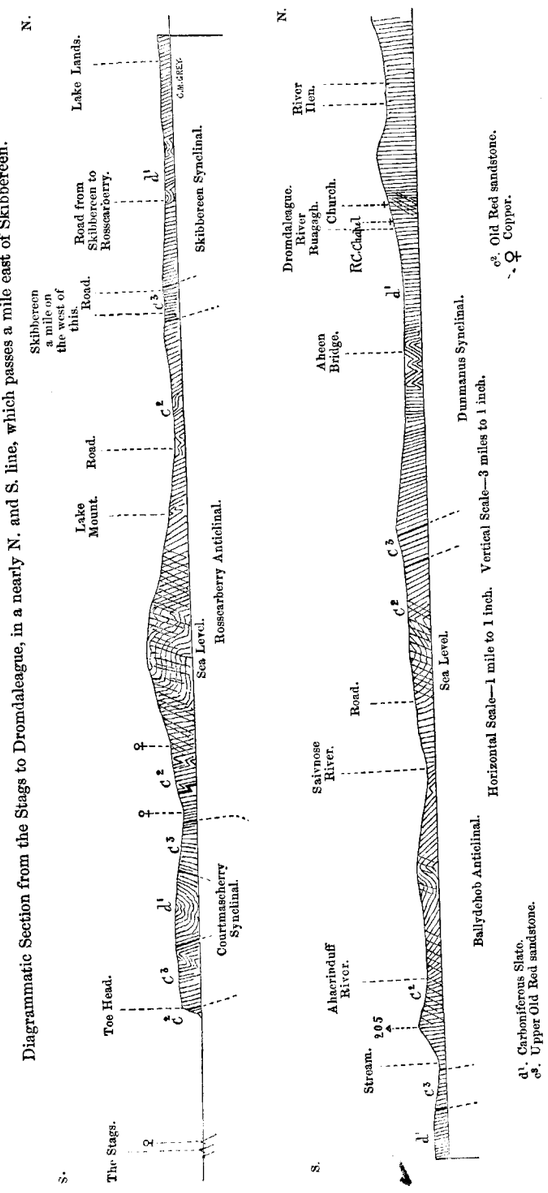
3. *Relations between the Form of the Ground and its Internal Structure.*

Anticlinal and synclinal curves, whose axes have a general bearing of E. 25° N. as before remarked, traverse this district, the lines of the hills and valleys running parallel to those axes. The main anticlinal axis, which has been called in the published sections (*see Longitudinal Sections, Sheet* 4, *new series*) *the Ballydehob Anticlinal*, forms the principal feature, as along that line are the highest peaks which have been previously enumerated. These hills are composed of grits and slates of the *Old Red sandstone* formation. To the north of this is the *Dunmanus and Ballycotton Synclinal*, (*see Fig. No.* 1), on which

* This appears to be due to small fragments of clay that were mixed up with the sand before it was indurated into a stone. The sand has been saturated with calcareous matter, while the slate was not affected.—(See note by Mr. Jukes to Explanation 197, &c.)

Fig. No. 1.

Diagrammatic Section from the Stags to Dromdaleague, in a nearly N. and S. line, which passes a mile east of Skibbereen.



there are ranges of valleys and hills, running about E. 25° N. and W. 25° S., the former generally occurring in the space in which the Upper Old Red sandstone and the slates of the Carboniferous slate are the subjacent rock, while the hills are formed by the *Coomhoola grits*. Immediately south of the *Ballydehob Anticlinal* is the *Skibbereen Synclinal*, in which the Carboniferous slate occurs; and farther south is the *Rosscarberry Anticlinal* where the Old Red sandstone rises up again, while at Toe Head is the most western part of the northern branch of the *Courtmacsherry Synclinal*, which again brings in the Carboniferous slate. From this it will be seen that the Lower Old Red sandstone, although the lowest in geological position, generally forms the highest ground, while the valleys are generally in the Carboniferous slate or the Upper Old Red sandstones.

Although the principal hills are in lines that have a general bearing, coinciding with the axes of the curves, yet some of the highest peaks do not occur exactly on the line of those axes, and are therefore not composed of actually the lowest beds. The peak of Carrigfadda is about a quarter of a mile on the south of the axis of the Ballydehob anticlinal. Mount Gabriel is very peculiar, as although it lies about the middle of that anticlinal curve, its summit shows a small synclinal depression, the rocks in it being either the uppermost beds of the Lower Old Red sandstone, or the base of the Upper Old Red sandstone; this synclinal curve being traceable for a mile or two east and west on each side of the summit. Here indeed, as elsewhere, the large anticlinal arches are corrugated by many minor undulations, either on their flanks or summits.*

On the W.S.W. of Mount Gabriel Knocknamaddree seems to be on the axis of the curve, and therefore in this place the lowest or oldest rocks are the most elevated.

The transverse valleys that run nearly N. and S., and sometimes cut entirely through the mountain ridges, but more often only form deep chasms in the hill sides, appear often to occupy the lines of faults; as in the western part of the area, where mining operations have been carried on, faults have been proved in the underground works, coinciding in direction with the transverse valleys. Besides these, numerous open joints and small shifts were observed, being well exposed in the coast sections.

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

* Mr. Willson thought that the summit of this hill was formed of rocks of the Upper Old Red sandstone; and I am inclined to agree with his opinion, as the copper zone, which usually occurs about the uppermost beds of the Lower Old Red sandstone seems to come in some distance below the beds that form the summit of Mount Gabriel.—G. H. K.

Detailed Description.

[The district was surveyed by Mr. W. S. Willson now of the Geological Survey of India; by Mr. A. Wyley, late Geological Surveyor of the Cape Colony; and by Mr. Du Noyer. Mr. G. Henry Kinahan has since gone over the ground, and compiled the following details from their notes on the six-inch maps, with the addition of his own observations.—J. B. J.]

4. *Position and lie of the Rocks.*

The Mizen Head Promontory.—In the S.W. portion of this district, rocks come to the surface nearly everywhere, and good sections are exposed along the sea coast and in the valleys and deep fissures across the hills. The section seen on the west coast line, between Three Castle and Mizen Head, shows purple and green grits and slates, over which, at the two heads, are greenish gray grits and gray and green slates. The beds from Carrigcoosheenboy to Three Castle Head dip N.W., at angles varying from 60° to 75°, and from Carrigcoosheenboy to Mizen Head S.E., at angles varying from 45° to 60°. The rocks at the two Heads being part of the Upper Old Red sandstone, some of the beds in this section are cupriferous, and will be mentioned in detail at the end of this explanation. From this to Toormore Bay all the sections seen expose similar rocks to those just mentioned, rolling in sharp or gentle curves and flexures across the axis of a large anticlinal curve (*the Ballydehob Anticlinal*), with general dips N.W. of about 50°, and S.E. of about 45°. At Crookhaven there is a small synclinal depression (the northern branch of the *Skibbereen Synclinal*), which brings in a small basin of Upper Old Red sandstone. To the north of the harbour the strata are very much contorted and twisted, while in the peninsula on which Crookhaven is built the beds dip steadily towards the N.W., at angles varying from 55° to 80°.

Between Toormore Bay and Skull Harbour the rocks will be found to be the same as those about Crookhaven. They are occasionally traversed by a few N. and S. fissures which may be on lines of faults, but none of them as yet have been proved; one well marked fissure forms the long narrow gut called Croagh River. In this neighbourhood the synclinal curve is flatter than on the E. of Skull Harbour, as the beds that form its N. side dip southward at angles varying from 40° to 70°, while those forming its south side dip northward at from 30° to 65°.

Along the south coast of Dunmanus Bay the rocks belonging to the Carboniferous slate are found above the Old Red sandstone. Their first appearance on the west is immediately north of Knocknamadden, where they form two small headlands. They are next met with going N.E. in the islands on the N. of Dunmanus Harbour, where they consist of gray and greenish grits with blue and gray slate. They stand at a high angle, being generally nearly vertical (80° to 90°). In the slates the cleavage strike runs parallel to the axis of the main curves (E. 20° N.), and dips southward at 80°. A good section is exposed along the coast on the E. of these islands, where the gradation from the Old Red sandstone up into the Carboniferous slate is well seen. In this section some small flexures were observed, which show that the apparent thickness of the beds here exposed is more than the real thickness. The grits (Coomhoola grits) predominate here, but proceeding along the coast eastwards higher beds will be met with. These beds can be well examined in the coast section N.E. of the rock called Carrigphilip, where the beds are dark gray and bluish slates, some of which are nodular. Among these grit bands are of frequent occurrence, and in places there are a few good solid hard gray grits. Inland, on the S. of this, sections of the lower beds previously mentioned are also exposed in numerous places.

About two miles to the N.E., on the N. of Drishane Bridge, there is another coast section, the rocks in which are principally gray, blue, and blackish slates, with thin grit bands and flagstone. The dip is usually nearly vertical, but generally has a slight inclination northwards. Some of these slates would make good roofing slates. The cleavage is generally vertical, and strikes nearly E. and W. From this the Carboniferous slate runs to the N.E. corner of the district, similar rocks to those previously described being exposed in numerous sections. At Blair's Cove, which is near the east end of Dunmanus Bay, a bed of impure limestone was observed.

Country lying E. of Dunmanus Bay.—Five miles E. of Dunmanus Bay, where marked on the map, there is a lenticular tract of Old Red sandstone country, surrounded by Carboniferous slate. This Old Red sandstone is brought up through the upper rocks by an anticlinal curve. On the south of this a small branch runs from the main or *Ballydehob Anticlinal*, which forms a spur of Old Red sandstone country, at the N. and S. of which the Carboniferous slate is found. To the eastward of this the Carboniferous rocks generally dip northward, at angles varying from 40° to 80°, the Coomhoola grits forming high ground to the E.N.E. of Dromdaleague. Fossils are locally abundant, the principal places where they were observed being marked with an asterisk on the maps.

Dromdaleague and Curraghalicky Slate Quarries.—Half-a-mile N.W. of the village of Dromdaleague are the Dromdaleague slate quarries. The rocks here dip northward at an angle of 75°, and the bed of slate has been traced for more than half a mile toward the east. Mr. Du Noyer has made the following note:—"Dark gray roofing slate, thin bedded, with thin layers of small nodules; the cleavage planes strike E. 20° N., and dip southward at 80°."

About six miles due E. of Dromdaleague is the Curraghalicky quarry, a little on the W. of a lake of that name. Mr. Du Noyer gives the following description:—"Smooth very dark gray roofing slates, full of small compact nodules, often containing iron pyrites. There are two sets of joints that bear respectively N. 30° W. and N. 60° E.; the dip of the rock is not apparent; the cleavage strikes E. 29° N." In neither of these localities is the thickness of the *vein* of slate exactly determinable.

The Old Red Sandstone of the Ballydehob Anticlinal.—At the N.E. corner of the area contained in Sheet 200, in the neighbourhood of Kilmeen, the Old Red sandstone appears. It occupies a long triangular-shaped tract of country, which here is only a mile and a quarter wide, but it gradually increases as it is followed to the S.W.; and on the N. of Roaringwater Bay it is nearly six miles across. In the vicinity of Kilmeen there are green gray and purplish grits and slates belonging to the Upper Old Red sandstone; but as only the ends of the beds are exposed, no dips could be recorded. At and to the N. of Rossmore are purple and green grits and slates belonging to the Lower Old Red; they have a vertical E. and W. cleavage. Proceeding towards the S.W., along the Old Red country, various sections of rocks similar to those mentioned will be found, as far S.W. as Brookville, which lies three and a half miles to the north of Glandore. About a mile on the W. of Brookville, Mr. Du Noyer observed a fault crossing the beds nearly at right angles; and from this fault, for about ten miles towards the S.W., there is an inversion along the junction of the Old Red sandstone and the Carboniferous slates, the latter and the Upper Old Red dipping to the N.N.W. as if passing under the Lower Old Red sandstone; but this inversion only affects a narrow strip of the Lower Old Red, as at a short distance north of the boundary between the Upper and Lower Old Red the dip will be found in the right direction, that is, towards the S.S.E., away from the axis of the anticlinal curve. The river Ilen flows through a deep valley that cuts across these hills; another of these deep valleys

runs nearly north from Ballydehob, and between these two valleys green and purple grits and slates may be observed here and there over the country, dipping generally at high angles either N.N.W. or S.S.E., with occasional small and local curves in other directions.

Due south of Ballydehob, near the coast, there is a small synclinal curve (the northern branch of the *Skibbereen Synclinal*), which extends towards the W.S.W., and brings in a small patch of Carboniferous slate on the W. of Skull Harbour. The rocks on the S. side of this synclinal dip northward at from 70° to 85°., and on the N. side southward at from 45° to 65°.

Between the western arm of Roaringwater Bay and Skull Harbour there are various deep fissures that usually bear nearly N. and S.; all of these have been proved by the mining operations in this locality to be along lines of faults, and are marked as such on the map. One of them can be traced for miles, as it forms a deep gash in the mountains half a mile E. of Mount Gabriel; from thence it runs S. through the Coosheen mine; and right in the direction of it is the sound between the West and Middle Calf Islands and the deep valley that joins the North and South harbours in Clear Island. It has been proved to be a fault on the side of Mount Gabriel and in the Coosheen mining "sett."

Cappagh Slate Quarry.—This quarry is situated on the W. shore of Roaringwater Bay, two and a-quarter miles south of Ballydehob. The *vein* of slate is of a purplish blue colour, and about eight yards wide; at present it is but little worked, and the slates seem to be heavy and coarse. The cleavage plane strikes E. 15° N. and dips N. at 60°. Some of the associated slates are cupriferous.

Long Island, with Castle and Horse Islands.—These, with some minor islands, lie on the small anticlinal that splits the *Skibbereen Synclinal* towards the west into two branches. They are all formed of purple and greenish grits and slates belonging to the Lower Old Red, and dipping N.N.W., at angles varying from 50° to 65°, except on the S. side of Long Island, where the beds dip southward at 80°. The shape of these is usually a long irregular parallelogram, whose longest axis has a bearing of E. 25° N. Long Island well deserves its name. It is nearly two and a half miles long, and scarcely half a mile across in its broadest part, and on an average only a quarter of a mile wide. The beds of all these islands are in the cupriferous zone.

Carthy's and Skeam Islands.—These lie in the southern branch of the *Skibbereen Synclinal*, and consist of gray blue and ribboned slates and gray and blue grits of the Carboniferous slate group; they are near the axis of the curve, the rocks in them being crushed up in sharp folds, which form natural arches, one very fine example occurring near the S.W. extremity of Skeam East.

Old Red Sandstone E. of Roaring Water Bay.—Immediately east of Roaringwater Bay the anticlinal curve that divides the *Skibbereen Synclinal* into two branches, is itself subdivided into two minor curves, which bring up two small ridges of Lower Old Red sandstone, in which there is a trace of copper. The rocks of the Old Red occupy a triangular tract, which extends E. as far as the river Ilen. The rocks in the southern part of this curve are inverted, the Carboniferous slate dipping apparently under the Old Red.

Carboniferous Slate of the Skibbereen Synclinal.—The Carboniferous rocks that lie in the trough of *Skibbereen Synclinal* occupy a belt of country across that part of the district that is included in Sheet 200. It is about two miles wide, as far E. as the village of Leap, after which it gradually increases, and at the eastern margin of the district it is about four and a-half miles wide. Toward the west, as before remarked, it is divided into two. The rocks consist of gray, greenish, and blue grits and slates, with a few bands of black slate. The beds both in the northern and southern branch are inverted, as they all dip northwards at angles varying from 50° to 89°

Mr. Wyley has proved a fault where marked on the map, two and a-half miles W. of Skibbereen, having a downthrow to the E., that nearly entirely conceals the Upper Old Red, a small portion of it only being found on the E. of the fault.

About two miles W.N.W. of Skibbereen, in the neighbourhood of Glasheennagnauv and the townland of Abbeystrowry, the rocks are very fossiliferous.*

To the N. of Skibbereen there are two alluvial flats along the River Ilen, which obscure the geology in those particular localities. From Skibbereen to the village of Leap, if we do not take into account a few local curves, the rocks dip northward as if under the Old Red sandstone, as shown in the section (fig. 1), taken in a nearly N. and S. line from the Stags to Dromdaleague. As all the sections across this basin are nearly similar, if one be examined it will suffice for all. Beginning in the Upper Old Red sandstone, due south of Sheppertown, which is about two miles S.W. of Leap, there are yellowish and gray slates and grits, which dip northward at about 75°. In some of these beds Mr. Wyley found fossil plants. Over these, in the Carboniferous slate, are blue ribboned and gray gritty slates, and a few grit bands, that have a similar dip to those in the Upper Old Red. On the north of Sheppertown Lake there are gray slate and slaty grits, in which there are two dark gray crystalline limestone bands, two or three feet thick. Mr. Wyley considers them the N. and S. outcrop of the same bed, as in this place there is a small synclinal curve, the beds immediately N. of Sheppertown Lake, dipping N.W. at about 60°, while a little farther north they dip S.E. at about 70°. From Aghill's Lake, for more than half a-mile toward the north, the rocks are well exposed, and consist of alternations of gray and blue slates and grits, all of which dip N.W. at angles varying from 55° to 85°. N. and S. of Milleen Bridge, which lies a little to the N.W., the rocks are also well seen, and are similar to those just mentioned, being the rocks on the northern side of the curve. All the recorded dips are toward the N.W., though in some places the beds stand nearly vertical; but the general inclination is about an angle of 70° or 75°. On many of the rocks in this section are good ripple marks.

A very good section of these rocks is also seen on the N. of Leap, but it is similar to that just described, unless that in it Mr. Du Noyer did not observe the limestone bands mentioned by Mr. Wyley.

From the fault due north of Leap to the east of the district, the nature of the *Skibbereen Synclinal* changes, as it is no longer inverted, the Old Red sandstone, both north and south of it, being found to dip under the Carboniferous slate. The rocks are similar to those in the section described.

Benduff Slate Quarry.—This quarry is situated two miles N.W. of Rosscarberry, on the northern road from that place to Leap. The beds worked are a very dark gray slate. The vein is about 200 feet wide, the cleavage strikes E. 15° N. and dips at 85° to S.; the bedding is obscure, but seems to go in wavy lines oblique to the cleavage strike, and with a general dip towards the N. In a few places there are some small local joints, that run N. and S., and are called *heads;* there are others which are oblique to the horizon, and are called *floors;* but unfortunately none of these can be depended on to continue any distance, as there is no regular system of joints in the slates in this particular locality. Small specks and veins of iron pyrites occur in some of the slate: when they are in nodules, they are called *bulls-*

* A great number of fossils of the assemblage peculiar to the Coomhoola grits were found there by Mr. Salter and the late James Flanagan, and myself, consisting of shells belonging to the genera Cucullœa, Curtonotus, Lingula, with trilobed Bellerophons, and Mytilus Damnoniensis, &c., &c., &c.—J. B. J.

eyes, and when in lines along the lamination, *rucks*. There is also a peculiar curled structure, which sometimes appears in lines through the slate, spoiling the part in which it occurs; these are locally called *cullheads.**

The Rosscarberry Anticlinal extends along the S.S.E. coast, and brings up a strip of Old Red sandstone rocks, which extend from the eastern margin of the district to the Bill of Cape Clear. At the S.E. corner of the district we find the *Courtmacsherry Synclinal* divided from the *Rosscarberry Anticlinal* by a fault. *The Courtmacsherry Synclinal* is divided into two by a minor anticlinal.

The Kilkeran Anticlinal is inverted along its southern side as the Carboniferous slate and the Upper Old Red dip apparently under the Lower Old Red sandstone, at an angle of 55° (*see Longitudinal Sections, Sheet* 4, *New Series*). The Lower Old Red here consists of purple slate and pale purple grits, with a few bands of greenish slate, the Upper Old Red of greenish gray flags and shales, and the Carboniferous slate of dark gray and blue slates and flags. The Old Red from this to Rosscarberry is similar to the rocks of that group previously described.

Country between Rosscarbery and Castlehaven.—Between Rosscarberry Bay and Glandore Harbour there are numerous minor curves and flexures in the Old Red rocks, the axes of which generally bear about E. 20° N. In this place there is a mineral vein containing manganese and iron, which will be more fully described hereafter. Between Glandore Harbour and Castlehaven the rocks are like those on the E. of Glandore Harbour, and lie in similar positions.

Low and High Islands.—To the south of this, about a mile out to sea, there are two islands, called the Low and High Island. They are formed of gray and blue slates, grits, and flags of the Carboniferous slate group that dip northward at 70°. On the north side of High Island there is a remarkable landslip, a large mass, over half an acre in extent, having separated from the island and slid down. This will be seen in the accompanying sketch by

Fig. 2.

* The proprietor informed me, when I visited the quarry (October, 18°0), that near the road it was worked for a depth of 70 feet, but at that time was full of rubbish. He also kindly furnished me with a list of the slates that they make, and their present prices:—

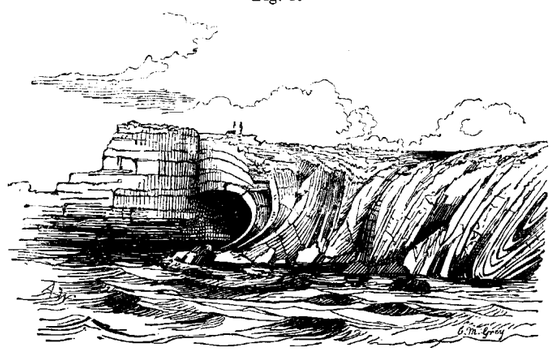
Queens,	28 to 36 inches high by different widths,			£1 10	per ton.
				5 0	per thousand.
1st Duchesses,	24 inches by	12,		3 15	do.
2nd do.	22	do.	11,	2 15	do.
1st Countesses,	20	do.	10,	2 0	do.
2nd do.	18	do.	9,	1 5	do.
1st Ladies,	16	do.	8,	1 0	do.
2nd do.	14	do.	7,		

Mr. Du Noyer (see fig. 2); the rounded mass on which the light falls in front of the island having separated from the cliff behind it. Across the south of Low Island there is a nearly east and west fault, a downthrow to the N. These islands seem to lie in the *Courtmacsherry Synclinal.*

Country between Castlehaven and Baltimore.—From Castlehaven to Baltimore Bay the rocks are very similar to those of the Old Red before described, the cupriferous zone being easily traced along its northern boundary, especially in the numerous creeks and bays near the mouth of the River Ilen, Mr. Wyley having recorded it in various places. He also found fossil plants and ferns; a very good locality being the extreme point of the peninsula that bounds Rincolisky Harbour on the W. and a little on the east of the Skeam Islands.

Toe Head Promonotory.—South-west of Castlehaven, in the Toe Head promontory, we find the extension of the *Courtmacsherry Synclinal,* bringing in a small belt of Carboniferous slate. The rocks here are very much twisted and contorted, forming all sorts of fantastic curves, which are well seen in the cliff, both east and west of the Head. Mr. Wyley has sketched some of them, and Fig. 3 represents a remarkable horizontal roll, forming a natural arch, at

Fig. 3.



Contortions at Foilcoo, near Toe Head.

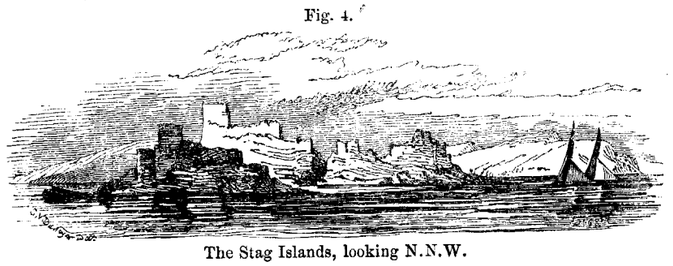
a place called Foilcoo, half a mile N.W. of Toe Head, in grits of the Carboniferous slate. Numerous remains of plants, with some leaves of the Adiantites Hibernicus, were found here by Mr. Wyley.

On the Toe Head Promontory, the Upper Old Red sandstone, that runs from Sandycove to Toe Head Bay, has an inverted dip along its northern boundary, as it inclines under the Lower Old Red. This inversion can be traced for thirteen miles to the S.W., being seen in the Kedge Island on the south part of Sherkin, and along the S.E. coast of Clear Island; in all which places the cupriferous zone or highest beds of the Lower Old Red sandstone is found to dip apparently under the lower beds. There are numerou ssection exposures of the Old Red sandstone between Castlehaven and Baltimore Bay, but none of them require special notice.

The Stags.—On the south of Toe Head, about a mile to sea, are some remarkable rocky islands, called the Stags. The copper zone of the Lower Old Red sandstone runs through them; and on one of these islands, called the Anvil Rock, Mr. Wyley found a small lode of "good purple copper ore." In the Anvil Rock the beds are greenish slaty grits, and in the rest of them they are dull purplish gray slates and grits. They all dip N.W. at about 75°. Mr. Du Noyer has made the accompanying sketches of these islands, showing

their peculiar appearances, and the different look they present, if taken at different points of view. (See figs. 4 and 5.)

Fig. 4.



The Stag Islands, looking N.N.W.

Fig. 5.

The Stag Islands, looking S.W.

Sherkin Island.—This island lies on the W. of Baltimore Bay. Its extreme length is about three miles, and its width one and a-half; but its coast is indented by numerous deep bays and harbours; the principal of which are Kinish and Horseshoe Harbours. The entrance into Kinish Harbour is from the north through a narrow sound, after which it widens out considerably, being only divided from Horseshoe Harbour on the S.E. and Gascanane Sound on the west by narrow isthmuses. Good sections of the rocks, which are similar to those on the mainland, are seen all round the coast line. At the south-west end of the island are cupriferous beds, "seemingly the same as those at the Kedges." At the S.E. corner between Horseshoe Harbour and Barrack Point the slates were quarried to a small extent for roofing slates. The beds have similar dips to those on the mainland immediately eastwards, the inverted curves being also found here, the uppermost beds of the Old Red Sandstone appearing as if they dipped under the lower beds. Mr. Wyley mentions that the rocks are all scratched and rounded as if with ice. "The scratches often showing distinctly below high-water mark, but in these cases the drift has only been recently removed." Mr. Wyley also remarks "the numerous chalk flint pebbles on the Abbey Strand in Sherkin Island, on the east side of Inishodriscol and the N.E. part of Roaringwater Bay," and suggests that they may possibly have been brought in ship ballast.

Inishodriscol.—This island lies on the N. of Sherkin. The south point of it consists of Lower Old Red sandstone, and a strip along its north coast of the Upper Old Red—the cupriferous zone running E. 20° N. through the centre of the island. The beds all dip northward at angles, varying from 60° to 85°. Mr. Wyley got good fossil plants and ferns in two localities in the small island, a little to the north, called Illaungawna. It seems to be the eastern continuation of the previously mentioned plant bed at the eastern point of the head that bounds Ringroliskey Harbour on the W.

The Calves.—A mile and a-half W.S.W. of Inishodriscol lie the Calves, which are three islands, called the West, Middle, and East Calf. They are formed of rocks of the Lower Old Red sandstone, which dip N.N.W. at angles varying from 55° to 75°. Most of the rocks are cleaved by cleavage planes striking E. and W., and vertical. They are in the cupriferous zone, and Mr. Willson records gray copper ore and the green carbonate as occurring on the north shore of the western island.

Clear Island.—This island lies in the strike of the rocks of Sherkin, being divided from it by a strait about a mile wide, called Gascanane Sound. It is a long irregular island, which is nearly divided by two bays called the North and South Harbours, which are joined by a deep glen, and has the appearance from the main land of two islands. These bays and the intervening glen seem to be on the continuation of the before-mentioned fault that runs nearly N. and S. immediately E. of Mount Gabriel.

The rocks composing this island can be well examined in the cliffs that bound it on all sides. At the east end are seen green, gray, and purple grits, with purple and gray slates, that are nearly vertical, but generally have a slight dip towards the N.N.W. Along the south-east of the island is the continuation of the inverted curve that was before remarked on the mainland and Sherkin Island. Here we find the cupriferous zone, the uppermost beds of the Lower Old Red sandstone dipping under the rest of the Old Red. The coast line most part of the way runs along the strike of the beds, and copper stained rocks were remarked in seven places between Cooslahan Point and the Lighthouse. At the west side of Ineer, or the South Harbour, there are excellent building stones, especially for tool work, which have been extensively quarried to build some of the public buildings in Skibbereen and elsewhere. These grits are very massive and granular, of a greenish gray colour. Near this place, in green slates, there are numerous large cubes of iron pyrites, some of them over an inch in diameter. All the rocks here dip steadily northwards at angles, varying from 70° to 85°. The Bill of Cape Clear is formed of green and purple grits and slates that dip N.N.W. at 80°.

From the Bill of Cape Clear to Trawkieran on the North Harbour, the rocks have a steady northerly dip, varying from 70° to 90°. About four furlongs N.E. of the North Harbour are two remarkable rocks called Stuckaunaminnaun and Stuckaunfoilnaman, which stand up in lofty pointed pinnacles, and are supposed to resemble stags' horns. Near this, in a cliff, there is a "gray gritty slate, with gritty nodules that develop cross lines of ribboning, which are themselves quite oblique to the bedding of the rock." The cleavage in this bed strikes E. and W., and dips S. at 80°. A little on the W. of the North Harbour there is the ruin of a castle called Doonanore, which shows the encroachment of the sea during the historical ages. Smith, in his "History of Cork," written in the year 1750,* mentions that "there is a very narrow passage about a yard broad, and ten yards in length, leading to the castle." Now this passage is nearly all gone, and only half of the castle remains, as the other half was carried away with the rock on which it was built. Near the west of the island there is a small lake that is peculiar, as its waters have the property of absorbing oily matter from woollens or wood.†

Fastness Rock.—In the strike of the Bill of Cape Clear, and exactly four miles S.W. of it is the *Fastness Rock*, composed of dull greenish grits, and gritty slates, which are nearly vertical. It consists of two rocks, the most

* Vol. I., page 286.

† When on the island in the year 1854, I was surprised to see this lake full of frieze, woollen yarn, and train oil barrels; and on making inquiries I learned that the waters absorbed all the fatty matter out of them if they lay in it for a few days. The inhabitants, or as they are locally called "The Capers," said it was a peculiar leech which lives in the lake sucked it out. Since then I find that Smith, in his "History of Cork," gives a full account of this lake. (Vol. I., p. 288).—G. H. K.

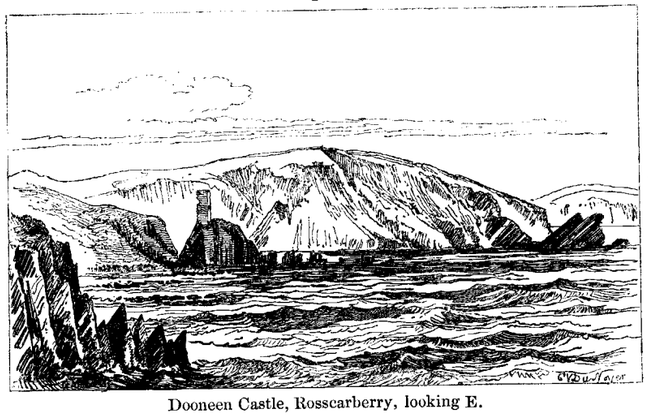
southern of which is only a few feet above high-water mark, while the north rock is about ninety-seven feet high, and on it a lighthouse has been built. Through the larger rock runs a large fissure or joint, which is filled up with angular fragments of grits cemented together, with a siliceous ferruginous substance.* The sea is gradually eating into this fissure, and eventually, unless an artificial breakwater is built it must split the rock.

5. *Drift and other Superficial Coverings.*

Patches of local drift (*i.e.* made up of pieces of the subjacent rocks), will be found in various places, sometimes forming considerable cliffs along the sea coast. The fragments and blocks of rocks it contains are often well worn, as if from being a long time rolled about by water; at other times they will be found to be polished and grooved on one or two sides, while the rest of the rock is angular and rough. This is easily explained when we look at the rocks of the country and see them all furrowed and polished by ice, showing that at no very remote geological period, glaciers flowed down the hills, and numerous icebergs floated from the shores. The stones that were caught up in the glaciers were rounded and polished by rubbing against one another, or the rocks they passed over. Ice scratches and grooves are very well marked in the pass through which the new road from Skull to Bantry has been made on the east shoulder of Mount Gabriel, and in numerous other places, in fact, nearly everywhere that the rocks have not been too long exposed to weathering agencies. All the exposed crags and knobs of rock, especially in the low ground near Ballydehob, have been wonderfully smoothed and polished by glacial action. In some places the debris of the moraines of the glaciers still remain, leaving large angular blocks of stone piled up in confused masses.

There are small *alluvial flats* along some of the rivers, and *bogs* are scattered over the country generally on the hills, but good peat bogs occur rarely towards the east of the district. Under the slob on the east of the town of Rosscarberry, Mr. Du Noyer has noted that they dig peat-bog for fuel, and also at the head of Tralong Bay, which lies on the coast two

Fig. 6.



Dooneen Castle, Rosscarberry, looking E.

* When the foundation for the Lighthouse was being sunk, they came on this peculiar substance, and imagined that it was the foundation of an unrecorded ancient habitation.

miles S.W. of Rosscarberry. This shows that the land here must have sunk, besides which we have a well-marked record of the encroachment of the sea by erosion during the historical period at the old Castle of Dooneen, which was built on a small island in Castlebay, a mile and a quarter south of Rosscarberry; half of the castle and the rock on which it was built having been gradually carried away.—*From Notes by* Messrs. Willson, Wiley, and Du Noyer.

6. *Minerals.*

Notes on the Mines and Minerals by G. Henry Kinahan.

Ores of the following metals have been worked in this district, viz. *copper, lead, manganese, baryta,* and *iron;* besides which *iron pyrites* is also found. Associated with these are *quartz, calc spar,* and *chlorite;* the two last-named being the *fat* and *blue peach* of the miners.

The *copper* often occurs in beds, being found impregnating shales in the form of *gray copper ore,** which near the surface of the ground has changed into the green carbonate (*malachite*), or in wet places into the blue (*azurite*). When it is found in regular lodes it is usually either the yellow (*copper pyrites*), or purple ore (*variegated copper pyrites*).

Lead is found as the sulphide (*galena*).

Manganese also occurs in beds and lodes. The beds in which it is usually found are green shales, that are full of small round pockets that contain the binoxides (*pyrolusite* and *psilomelane*). The same ores are found when it occurs in lodes.

The *baryta* is found in lodes and veins as the sulphate (*heavy spar*).

Iron occurs in nearly all the quartz veins and strings, generally as *micaceous ore,* or *red hæmatite.* It is also found as iron pyrites (*mundic* or *sulphur ore*), in some of the lodes, and in cubes in green chloritic slates.

Associated with the copper and iron ores in the quartz lodes are the miners' *fat* (calc spar), and *blue peach* (chlorite).

The veins† of quartz and the other minerals that are found as the gangue of the ores of copper generally run with the strike of the strata, and often have the same dip, being found in strings and veins in one set of beds, or as a vein between two beds. When this is the case, the lodes are poor, containing very little ore; but when they run obliquely to the strike of the beds there is a chance of their *making copper.* An oblique vein is called by the miners a *contra* or *conter lode,* while the others are said *to lie with the country,* as in their parlance the strike of the strata is *the lie of the country.* Many of the beds immediately below what is taken as the supposed boundary between the Upper and Lower Old Red sandstone are cupriferous, often to such an extent as to weather quite green, being covered with a thin film of the green carbonate, in which places a *contra* lode is sure to contain some good copper.

The lodes may cut the coppery beds in two different ways, viz., run oblique to the strike, as before mentioned, or they may run with the strike, but hade with a greater angle than the dip of the beds, and in both cases taking up the ore from the intersected beds. *Flying veins* of quartz are also found in some of the cupriferous beds which form bunches of ore.

In the copper zone the beds are generally gray or greenish slate or shale, the *killas* of the miner, with a few purple beds, associated with gray and purple grits and a massive light green coarse grit or sandstone. This latter

* This ore generally contains some silver, but whether it ever contains enough (30 per cent.) to entitle it to be ranked as *silver fahlerz,* I was unable to ascertain.

† In this locality all beds that contain copper ore as well as regular veins are called *lodes.* In these notes they will also be called lodes; but when the ore is known or supposed to occur in a bed, the fact will be mentioned.

rock is considered by the miners "to be highly productive of copper;* the gray and greenish slates are also considered "congenial" to copper ore, while the purple and dark coloured kinds are unfavourable. Among these are the quartz lodes, which, though generally very small, rarely exceeding a few feet in width, and often being only a few inches, are extremely numerous, which is considered unfavourable by the miner, as he says, "too many lodes make all poor."

Beginning at the north of the district, and going first S.W. and then easterly, the mines and principal localities in which copper has been proved will be found in the following order:—

		Sheet
Derreennalomane lodes,	Baryta and Copper,	199
Canty's Cove lodes,	Copper and Lead,	—
Dhurode Mine and lodes,	Copper,	—
Three Castle Head lodes,	—	203
Mizen Head lodes,	—	—
Barley Cove lodes,	—	204
Brow Head Mine,	—	—
Galley Cove lodes,	—	—
Crookhaven Mine,	—	—
Kilbarry lodes,	—	—
Spanish Cove lodes,	Copper and Baryta,	—
Boulysallagh lodes,	Copper,	—
Goleen lodes,	—	—
Beakeen, Ballybrack, Coney Island, and Long Island lodes,	—	—
Ballyrisode lodes,	—	199
Lowertown lodes,	—	—
Mount Gabriel lodes,	Copper and Baryta,	—
Coosheen Mine,	Copper,	—
Gortnamona, Derreennatra, Kilbronoge, and Rossbrien lodes,	—	—
Ballycummisk Mine,	Copper and Baryta,	—
Cappagh Mine,	Copper,	—
Ballydehob lodes,	—	—
Kilcoe lodes.	—	—
Horse and Castle Islands lodes,	—	—
Bawnies Hall Mines,	Copper,	205
Aghatubrid Mine,	Manganese,	200
Rosscarberry lode,	—	—

Derreennalomane Lodes.—Towards the north of the district, in the townland of Derreennalomane, on the south slope of Mount Corin, four and a quarter miles N. 10° E. of Skull, there is a thick lode of sulphate of baryta, which bears nearly E. and W. This, a few years ago, was extensively worked. In the vicinity of the baryta lode, Mr. Willson records a bed containing copper ore, on which trials were made.

Canty's Cove Lodes.—Nine and a half miles S.W. of Mount Corin, on the shore of Dunmanus Bay, in a "coos" called Canty's Cove, Mr. Willson mentions that lead and copper ore were proved. The lead ore is in a lode under an ancient house called Canty's House, and the copper ore was proved ten yards farther towards the west.

Dhurode Mine and Lodes.—About two miles farther S.W., on the same coast line, is situated the Dhurode mine, where there is a lode that bears E. and W., and contains yellow copper ore (*copper pyrites*). On it some small shafts were sunk, but at present they are abandoned. Beside the lode on which the mine is situated, there are two other quartz lodes that run with the strike of the associated rocks (E. 20° N.) that contain yellow copper ore. One of these lies a little on the N.E., and the other a little to the S.W. of the mine.

* This green sandstone is called by the miners *Elvan* or *Helvan,* and some of them consider it to be the same as the Elvans of Cornwall; but I need scarcely say that they are quite different kinds of rocks, as these are of aqueous origin, while the Cornish Elvans are igneous.—G. H. K.

Three Castle Head Lode.—To the S.W. of Dhurode mine, near Three Castle Head, there is also a lode that contains copper. It bears E. 20° N., and is situated in Coosheenatowick, which lies immediately N.E. of Dun Lough.

Mizen Head Lodes.—On the south of the last-mentioned lode, and half a mile due N. of Mizen Head, Mr. Willson records "very rich copper ore" as having been found in a cliff called Foilnagower, which lies a little to the S.E. of the point called Illaunnacaheragh on the one-inch map. There is also a lode that contains copper ore immediately S.E. of Mizen Head.

On the west shore of Barley Cove copper is found in two or three beds nearly due W. of the Rock of the Devils.

Brow Head Mine.—This mine lies immediately N. of Brow Head, which is the cape at the S.E. of Barley Cove. The lode there worked is about ten feet thick, and contains *gray*, *purple*, *yellow*, and *peacock* copper ore. A little on the N. of the lode there is a bed impregnated with gray ore. This mine was formerly worked; and Capt. Roberts, who was working it by tribute when visited, informed me that at thirty fathoms' perpendicular depth it seemed to be changing into a "good yellow stone." It hades N.E. at 43°, and a shaft has been driven down the lode for sixty fathoms, proving it for a perpendicular depth of thirty fathoms or twenty fathoms below the adit level.

Galley Cove Lodes.—A mile to the N.E. of Brow Head, at Galley Cove, copper ore has also been found, and the cliffs are stained with the *green carbonate*. About half a mile to the N.E. of this copper ore was also proved.

Crookhaven Mine.—This is situated a little on the E. of the village of Crookhaven, and in it four lodes have been worked, and are called by the following names:—

4. *Champion lode.*—Yellow copper in quartz vein.
3. *Quarry lode.*—Yellow and purple copper.
2. *Gossen lode.*—Yellow copper at the depth of forty fathoms.
1. *Purple lode.*—Purple copper.

No. 1, or the *Purple lode*, lies on the sea-shore, half a mile due east of the village of Crookhaven; it hades or underlies N.W. at about 50°. This seems to be a bed of *killas* full of small veins and strings of quartz that contain the ore.

No. 2, or the *Gossen lode*, is a bed of ferruginous calcareous shale. A bed that seems to be the same brought up by an undulation in the strata, is well exposed farther south-west on the coast line, immediately south of Rock View, where it is highly calcareous; in places it has the appearance of a breccia, and in others it is stained with the green carbonate of copper.

No. 3, or the *Quarry lode*, is a bed of *killas*, with small veins and strings of quartz. Nos. 2 and 3 hade similarly to No. 1.

No. 4, or the *Champion lode*, is a regular quartz lode which "makes" very large at the surface of the ground, but towards the S.W., as seen in the cliffs due south of Rock View, it divides in depth into strings. Captain Henry Thomas, the resident agent, has proved the lode at the engine shaft for forty fathoms in depth, and for twenty fathoms it hades a little to the N.; after that it is vertical, and at forty fathoms it hades a little to the S. The lode seems to continue towards the E. to the sea. The works here are carried on by means of an engine shaft which has been sunk on the Champion lode; from this they drive towards the south to cut the other lodes. Captain Thomas discovered five other lodes on the N. of the engine shaft, but as they all hade northward at a similar dip to those already mentioned they are more likely to be beds than regular lodes.

Kilbarry Lode.—To the south of the hamlet called Kilbarry, and about a mile N. 15° W. of the village of Crookhaven, a lode that bears E. 25° N. was sank on for the depth of twenty fathoms, but no ore worth recording was obtained.

Spanish Cove Lodes.—These lie about a mile due north of the Crookhaven mine. There are two lodes, one at Spanish Cove, that hades S. and bears about E. 25° N., and contains some yellow copper ore; the other is situated a little more north, and in it are *Copper pyrites* and *Heavy spar*.

Boulysallagh Lodes.—In the townland of Boulysallagh, and about a mile N.W. of Spanish Cove, there are two lodes that were anciently worked to a slight extent; they bear E. 25° N., and hade to the S.E. The most southern of them is called the *Dane's lode.**

In the same townland, and a little on the N. of the village of Goleen, there is also a lode that bears nearly E. and W., and hades north. It is called the *New lode*. It shows transparent white quartz, which was supposed to contain gold, and a company was formed to crush it, but abandoned it, as they never obtained any gold.

Goleen Lode.—Due east of Goleen Mr. Willson records gray copper ore, which seems to be in beds of *killas*.

Beakeen, Ballybrack, Coney Island, and Long Island Lodes.—In these places, which lie from four to eight miles on the east of Goleen, copper has been found in various strings and beds. Trials have been made in Ballybrack and Long Island on the lodes.

Ballyrisode Lodes.—To the W. of Toormore Bay, and immediately S.W. of Ballyrisode House, there are beds with strings of quartz that contain copper ore. Immediately N. of the same bay, with a bearing of E. 15° N., there is a large quartz vein; this vein, on the N. of Ballyrisode House, is shifted towards the north by a nearly N. and S. fault, or *cross course*,† that runs where the road is situated immediately east of Ballyrisode House.

Lowertown Lodes.—On the E. of Toormore bay, between it and Croagh river, there are numerous beds that, when weathered, deposit flakes of the green carbonate; these beds are likely to contain gray copper ore disseminated through the mass. Associated with them are small veins and strings of quartz.

Between Croagh river and Skull harbour Mr. Willson records cupriferous beds.

Mount Gabriel Lodes.—Two miles N. of Skull Harbour, and on the E. of Mount Gabriel, there are a few small lodes that "show" copper, and a vein of sulphate of baryta. The latter was worked a little, and is shifted to the N. by a N. and S. fault that lies where the new road from Skull crosses the ridge on the E. of Mount Gabriel.

Skull Bay Mining Company's, or Coosheen Mine.—This is situated immediately east of Skull Harbour, and eleven *lodes* were worked or proved in it, which are recorded below under the names given them by Captain W. Thomas, the resident agent of the company.

Table of Lodes.

1. *North lode*,‡	Bearing	E. 10° N.,	Yellow copper in quartz vein.
2. *New lode*,	,,	about W. 45° N.,	Dark gossen in quartz vein.
3. *No. 7 lode, west*,	,,	E. 10° N.,	Green carbonate in whitish *killas*.
4. *Maitland's lode*,	,,	,,	Gray ore in *killas*.
5. *New lode*,	,,	,,	Yellow ore.
6. *Old lode*,	,,	,,	Gray ore.
7. *Thomas's lode*,	,,	,,	Purple ore and green carbonate.
8. *Campbell's lode*,	,,	,,	Purple ore.
9. *Carmichael's lode*,	,,	,,	Yellow ore.
10.) 11.) *South lodes*,	,,	E. 25° N.,	*Mundic* in quartz veins.

* Ancient mining operations, or any works of which the inhabitants of the country have no record, are called in the S. of Ireland *Dane's* or *Old Men's works*.

† Faults that run across or oblique to lodes are called by the miners either *Cross courses* or *Flookan courses*.

‡ About half-way between Nos. 1 and 3 there is a vein of quartz called the *Sparry lode*, which was observed in one place, but no trials have been made on it.

All these, except Nos. 10 and 11, underlie or *hade* south. Most of them have only been proved near the surface, and seem to be beds, not regular lodes. No. 6 has been proved to a depth of forty-two fathoms below grass, or sixteen fathoms below the adit level, which is a little above high-water mark. At this depth this lode hades S. at about six to one (80°), and is seven feet thick; seven inches in thickness, on an average, of this contains nothing but good gray copper ore, while the rest is filled up with quartz, gray copper, green carbonate, and *blue peach*. In one part of the old workings, *on the back of this lode*, there was a thick mass of gossen full of the green carbonate that extended downwards for sixteen fathoms; this is now all worked out. Where marked on the map, at about three furlongs on the E. of Skull Harbour, there is a nearly N. and S. *cross course* or fault. This has been proved to be a compound fault, as it splits into three as it goes both north and south from the *old lode* (No. 6 in table). It is supposed to be part of the previously mentioned fault on the east of Mount Gabriel, and at the harbours in Clear Island.

Gortnamona, Derreennatra, Kilbronoge, and Rossbrien Lodes.—In these townlands copper has been found and trial-pits sunk, but at present no works are being carried on. The lodes and beds are seemingly some of those just mentioned, and apparently form the connexion between the lodes at Coosheen and the lodes in Ballycummisk.

Ballycummisk Mine.—This is the only place in the whole district under examination in which the copper lodes have been developed; the mine at the present time being most satisfactorily worked, under the superintendence of Captain Richard Pope, who furnished me with the following information. This mine is cut off from those just mentioned by a fault or *flookan course*, that runs with a bearing of about N. 40° E., along which they drive their levels. In the adit level, which was brought up the fault from Rossbrien Cove, they have cut the following nine lodes:—

1st. Quartz vein, with specks of yellow and purple copper.
2nd. Ditto.
3rd. Quartz vein; a good bunch of purple ore, with *gossen*, was found at the *flookan course*.
4th. Same as first and second.
5th. *Lady vein*, containing gray, purple, and yellow ore.
6th. *Purple lode*, containing purple copper, peach, and carbonate of lime. In the seventy-two fathom level there is a good deal of yellow ore mixed with the purple.
7th. *Yellow vein*—yellow copper ore.
8th. *Baryta lode*, which contains quartz, baryta, micaceous iron and yellow copper. This lode is the principal one in the "sett," as it is of greater magnitude, and contains very rich ore, but the latter is deteriorated by the baryta, as it is impossible, by washing, to separate them. Captain Pope thinks the lode is improving as they go down, and at the sixty-one fathom level there was less baryta than at the fifty-one fathoms.
9th. *Yellow copper lode*, in which there is a vein of "stone ore" (*copper pyrites*), that runs from six to thirty inches in thickness.

All these hade S. at about one in twelve (85°). The shaft is sunk on the *Lady's vein*, and has been driven along the flookan course northward, as follows:—

Fifty-one fathom level, cutting all the lodes on the N. of the *Lady's vein*.
Sixty-one fathom level to the *baryta lode*.
Seventy-two fathom level to the *yellow vein*.
Eighty-two fathom level was being driven in, but when visited had cut none of the lodes.

Cappagh Mine is situated on the eastern continuation of the lodes in the last. It was formerly worked, but is now abandoned.

Ballydehob Lodes.—A little on the N.W. of Ballydehob are two lodes in which copper was proved. *They lie with the country.*

Three miles N.E. of Ballydehob, and about a mile W. of Ballybane, there are *Danish or Old Men's workings*. Mr. Willson mentions that "they are in beds highly impregnated with copper ore." In the vicinity of this locality there are other beds that also contain copper ore.

Kilcoe Mine lies two and a-half miles S.E. of Ballydehob. The vein was proved for about fifty-five fathoms in depth by the Mining Company of Ireland, who lately abandoned it. In the neighbourhood of this place there are many beds in which copper ore was observed; also in two or three places on the east shore of Roaringwater Bay.

Horse and Castle Islands Mines.—These islands lie in the mouth of Roaringwater Bay. At the east end of Horse Island the principal lode, at about the eight-fathom level, split up into strings, although it was a large lode, and had a good appearance at the surface. Near the west end of the same island, in *Triphook's shaft*, thirteen fathoms below the adit level, the vein produced good yellow ore; and Captain Pope, who gave me the above information, says it seemed to improve as it went down. There are two lodes and various beds that contain copper ore at this end of the island, which seem to be part of those in Castle Island, which lies a little to the S.W.

In the islands that lie to the southward beds containing copper ore were also observed—on the S.E. coast line of Clear Island, in six or seven places; in Sherkin Island and in Hare Island; on the mainland in the Skibbereen river (near the S.E. corner of Sheet 199), and in various places along the coast line from the south entrance to Baltimore Harbour to the eastern margin of the district, near Galley Head,* all of which have been previously mentioned in the *Detailed Description*.

Bawnies Hall Mines.—These old mines lie to the S.W. of Castletownsend, and about two miles N. of Toe Head. The south mine is situated, according to Mr. Wyley, "in shales strongly impregnated with copper ore," and the northern mine on "a vein in pale gray slates that are impregnated with copper ore." Shafts were opened in each of these places, but no quantity of ore was raised. They have been abandoned for some time.†

Aghatubrid Mine lies about six miles and a-half E.N.E of Skibbereen, and a little on the N. of Glandore. The *channel* of manganese, on which it is situated, runs nearly east and west, extending from Leap to within a mile of Rosscarberry, a distance of about three miles. When visited by me the works were discontinued, as the ore is said to deteriorate in depth. The following is a note made by Mr. Wyley in 1854, on the vein: "Very solid and massive beds of binoxide of manganese, seldom less than six feet in thickness, occurring solid and in stalactitic and botryoidal masses like hæmatite. Associated with it are *heavy spar*, *hæmatite*, and *quartz*, but no *copper ore*." In depth the hæmatite is said to increase in quantity, replacing the manganese ore.

Farther east, partly under and a little to the W. of Rosscarberry, Mr. Du Noyer has marked another channel of manganese ore, which may be part of that just mentioned, but shifted more towards the south by a north and south fault. This appears likely, as where one channel ends the other immediately begins a little on the S., as marked on the map.

Although for some time past none of the iron ore has been worked, yet, about a century ago, there were iron mines in operation, as will be seen from the following extract from *Smith's History of Cork*, vol. ii., p. 390.

"This ore (iron) is to be had in great plenty in most parts of this country. There are two considerable iron works carried on as it were in both extre-

* Galley Head lies immediately outside the E. margin of Sheet 200.

† This is one of the few places in the county Cork in which copper ore was known to exist when Smith wrote his history in 1750.

mities of the county, viz., at Comoly (*Coomhoola*), near Bantry Bay, for both sow and bar iron; and in the parish of Affadown (*Aghadown*), near Roaringwater Bay, for sow iron only; and also at Aragline, near the eastern extremity of the county; in all which places iron ore is found in plenty. * * * * * * In all these works they use a sixth part of the English red mine to the native ore, in order to render it more ductile. Our ores are generally very rich, and make exceeding good iron." And in a note to the above he mentions:—"About the year 1632 the Earl of Cork had in his several forges or bloomeries in this county 1,000 tons of bar iron, besides 200 tons drawn out and faggotted into rods, at a fitting mill erected by his lordship; and about 20,000 tons of sow iron. Bar iron was then sold for £18 per ton."

These works must have been on the decline when he wrote, as the scarcity of wood for charcoal is mentioned, and "charred peat" is proposed as a substitute.

Since the above was in press, Sir R. Griffith, Bart., has re-published in the *Dublin Quarterly Journal of Science, Vol. I., p.* 244, his List of *Localities in Ireland where Mines and Metalliferous Indications have been discovered*, and as it mentions a few localities and minerals that will not be found in the preceding pages, the following extract is taken from it:—

Post Town.	Localities and Counties.	No. of Ordnance Sheet.
	CORK.	
BALLYDEHOB, . . .	**Ballycummisk*, Copper,	140
	Cappaghglass (*Cappagh*), Copper,	140
Audley Mines, . . .	*Foilnamuck*, Copper,	140
	Horse Island. Copper. Traces of Lead occur in the Gossans of all these mines,	149
	Rossbrien, Copper,	140
Ballydehob Mines, . .	*Ballydehob*, Copper,	140
	Boleagh, Copper,	140
	Cooragurteen, Copper,	140
	Kilvoe, Copper,	140
	Skeaghanore, Copper,	140
	Derreennalomane, Copper,	131
Roaring Water Mines, .	Kilkilleen, Copper and Lead,	140
	Laheratanvally, Copper and Lead,	140
	Leighcloon, Copper,	140
BANTRY, ...	Gortavallig, Copper,	138
CASTLETOWNSEND, .	Cooscroneen, Copper,	142
	Rabbit Island (Squince), Antimony, Copper & Lead,	142
CROOKHAVEN, . . .	Altar, Copper,	148
	Ballydivlin, Copper,	147
	Ballyrisode, Copper,	147
	Balleen, Copper,	147
	Carvigacat (*Dhurode*), Copper and Auriferous Gossan,	147
Crookhaven Mines, . .	*Boulysallagh* (*West Carberry*), Copper, Silver, and Lead,	147
	Callaros, Copper,	147
	Cloghane (*Mizen Head*), Copper,	146
	Crookhaven, Copper,	147
	Kilbarry, Copper,	147
	Mallavoge (*Brow Head*), Copper,	152
	Spanish Cove (*Kilmoe*), Copper and Argentiferous Lead,	147
ROSSCARBERRY, . . .	*Aghatubrid*, Manganese and Copper,	142
	Derry, Copper,	143
	Drom, Copper,	142
Glandore Mines, . . .	*Keamore*, Copper,	142
	Kilfinnan, Copper,	143
	Rouryglen, Manganese and Iron,	143
	Gortagrafnane, Copper,	143
	Littleisland, Copper and Sulphate of Barytes,	143
SKIBBEREEN, ...	*Bawnishall*, Copper,	151
SKULL, ...	*Castlepoint*, Copper,	148

* Mines *now* or *formerly* worked, are printed in italics.

Post Town.	Localities and Counties.	No. of Ordnance Sheet
	CORK.	
Coosheen Mines, . .	*Castleisland*, Copper,	149
	Coosheen, Copper and Iron,	139 & 144
	Gortnamona, Copper,	140
	Long Island, Copper,	148
	Skull, Copper,	148
	Leamcon, Copper,	148
	Mount Gabriel, Copper,	139

From this it will be seen that Antimony, Auriferous Gossan, and Argentiferous Lead should be included in the minerals of this district. Lead also seems to occur more frequently than is stated in my notes.—G. H. K.

Note on the Mines of the South-west of Cork, by Mr. Jukes.

Being unwilling that the imagination of the reader should be led astray by the array of mines and lodes detailed in the preceding pages by Mr. Kinahan, I think it right to add a few remarks upon them.

The result of our examination of the country during the years 1853 to 1856 showed us that at about the period of the deposition of the beds of grit and slate which lie near the boundary of the two subdivisions of the Old Red sandstone, that is about the base of the part called the Upper Old Red or Yellow sandstone, or a little below it, some rocks containing a quantity of copper ore were somewhere being acted on by water and their debris carried to the place where those grits and slates were being deposited. It was probably the same mass of rocks that yielded from time to time the materials of those grits and slates, and the particles of copper ore which were deposited in them. However that may be, there was a great *mechanical deposition* of copper ore in the beds formed at the bottom of the water, so that all the grits and slates were here and there impregnated with copper ore over all the district stretching from Waterford through Cork into Kerry. This copper deposit was, like most materials deposited from water, not a continuous sheet, but occurred in patches in different beds of grit or slate, through a thickness of three or four hundred feet, over all that area. None of the beds of grit and slate are themselves continuous throughout the formation, which is made up of local cakes of sand and mud, deposited side by side over the area. The copper ore was distributed here and there among these beds as a copper sand, or copper mud, mixed with the siliceous and argillaceous sands and clays. Eventually these beds were greatly indurated, greatly disturbed, and tilted up into highly inclined, often vertical, or even inverted positions, and bent into numerous (we may almost say innumerable) folds, and large parts of them were from time to time cut off and removed by denudation, so as to produce many successive surfaces upon them, till at last the present surface was arrived at.

The disturbances must have been accompanied by many fractures causing fissures, some of which would remain more or less open below in different parts of their course.

Some action subsequently determined the segregation of some of the copper ore out of the beds into some of these hollow fissures by some process, of the exact nature of which we are ignorant, and thus new "mineral veins," or true "lodes," were formed here and there about the country.

Some of these fissures and cracks contain strings and bunches of exceedingly "rich ore;" but with the exception of the Allihies (or Bearhaven) mines, none of the lodes (whether true or false) of the S.W. part of the county Cork have yet been proved to have a sufficient quantity of ore in any one locality to make a "rich" mine.

It will be obvious that a large quantity of poor ore, easily accessible, may be more productive of profit than the richest ore, or even actual metal itself

which is disseminated in small quantities, or in situations requiring great trouble and expense for its extraction.

The very fact of the wide diffusion of copper ore in small quantities over so large an area is against, rather than in favour of, the probability of rich mines being found. It shows that the copper ore occurs chiefly as a mechanical deposit derived from the waste and destruction of some original "mineral vein" district, and does not form here an original "mineral vein" district itself.

The fact of small veins and strings of rich ore occurring here and there agrees well with the above hypothesis; but is a fact of great danger to the uninstructed speculator, as being likely to lead him into operations which will not be profitable.

The south-western part of the county of Cork is a district which, perhaps more than any other, requires great caution as well as skill and prudence to mine with profit, and is a most delusive district to the speculator, from its containing so many of these specimens of "rich ore," many of which have not indicated the existence of much more ore than was actually seen in the specimen.—J. B. J.

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