

# Memoirs of the Geological Survey.

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## EXPLANATORY MEMOIR

TO ACCOMPANY

SHEET 18 OF THE MAPS

OF THE

## GEOLOGICAL SURVEY OF IRELAND,

COMPRISING

PORTIONS OF THE COUNTIES LONDONDERRY  
AND TYRONE.

BY

J. NOLAN, M.R.I.A., AND F. W. EGAN, B.A.,

WITH

PALÆONTOLOGICAL NOTES BY W. H. BAILY, F.G.S.

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

PROFESSOR A. GEIKIE, LL.D., F.R.S.

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

---

IRISH BRANCH.

*Office, 14, Hume-street, Dublin.*

DIRECTOR:

EDWARD HULL, LL.D., F.R.S., F.G.S.

DISTRICT SURVEYOR:

G. H. KINAHAN, M.R.I.A., &C.

SENIOR GEOLOGISTS :

W. H. BAILY, F.G.S., L.S. (Acting Palæontologist);

R. G. SYMES, M.A., F.G.S.; S. B. N. WILKINSON; J. NOLAN, M.R.I.A.

ASSISTANT GEOLOGISTS:

R. J. CRUISE, M.R.I.A.; F. W. EGAN, B.A.; E. T. HARDMAN, F.C.S.; J. R. KILROE;

W. F. MITCHELL; ALEX. M'HENRY, M.R.I.A.;

A. B. WYNNE, F.G.S. (Resident Geologist, Acting Secretary).

FOSSIL COLLECTOR : R. CLARK.

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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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## PREFACE.

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THE district included in this Memoir has been ably surveyed by Mr. J. Nolan and Mr. F. W. Egan, who have drawn up the account of physical and geological features to accompany the Map, Sheet 18.

Other writers have preceded these authors. The district about Dungiven has been described by Dr. Berger and the Rev. W. Conybeare in their well-known memoir "On the Geological Features of the North-Eastern Counties of Ireland" (Trans. Geol. Soc. Lond., Vol. I., 1816), in which the relations and characters of the formations were first pointed out. This was followed by the appearance of the Geological Map of Ireland, by Sir Richard Griffith (1835), in which still further advance in the classification of the rocks of this part of Ireland is shown; and a few years afterwards (1843), by the elaborate "Report on the Geology of Londonderry, Tyrone, and Fermanagh," by General Portlock, in which the district round Dungiven occupies an important place; two coloured geological sections, prepared by Professor Oldham, which pass through this town or its vicinity, having been drawn to illustrate its geological structure.

As regards the geological age of the Metamorphic rocks which occupy a great tract of the western half of the Map, there is every probability that they represent the Lower Silurian series of other countries. Owing, however, to their altered state, all traces of fossils, which we may suppose were originally present in them, have disappeared.

EDWARD HULL,

*Director.*

*September, 1884.*

# EXPLANATORY MEMOIR

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### INTRODUCTION.

THIS district comprises much of the central part of county Londonderry in the vicinity of Dungiven, with a small portion of Tyrone to the south and south-west. Besides Dungiven, which, from its size, position, and facilities of railway communication, is the most important place in the district, there are the small towns of Feeny and Claudy, on the coach road from Dungiven to Londonderry, and the villages of Park and Moneyneany—the former prettily situated on the river Faughan, in the valley lying between the Sperrin Mountains and the lesser elevations of Straid and Slieveboy, the latter situated to the south-east, within a few miles distance of Draperstown, in the map to the south. (Sheet 26).

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### CHAPTER I.

#### PHYSICAL GEOGRAPHY AND GEOLOGY.

Most of the ground in this area is hilly and mountainous. To the south lies the Sperrin range, dividing this county from Tyrone and having an average elevation of about 2,000 feet. The chief summits are Sawel and Dart, which reach heights of 2,240 feet and 2,040 feet respectively. On the west of these are Mullaghdoon and Carnakilly, 1,616 feet, and on the east Meenard, 2,061 feet, Mullaghaneany, 2,070 feet, Oughtmore, 1,878 feet, and Craigagh, 1,489 feet; while of the outlying summits, Knockanbane, or Barnes Top, 1,506 feet, and the almost isolated dome-shaped hill of Mullaghash, 1,581 feet, are the principal. These mountains have gently flowing outlines with long smooth peat-covered sides, over a mantle of drift of considerable depth, extending almost to their tops, and are traversed by long and rather wide valleys, the chief of which occur on their southern flanks, and have been already described in the memoir for the sheet to the south, (26). On this side, Finglen, S.E. from Feeny, and the upper portion of Glenrandal, are the most remarkable.

The eastern side of this district is also mountainous, but presents features differing considerably from those just described. The hills, with few exceptions, are portions of the great basaltic

plateau of north-eastern Ireland, and have flat tops. On the west the sides are scarped, and frequently broken with landslips. A very striking view of the physical features of this district is obtained from the mountain road between Draperstown and Dungiven, on reaching the summit level of which a most extensive panorama is disclosed, embracing in the foreground the wooded and cultivated lands about Dungiven, the smooth peaty slopes of Sperrin on the left, and the steep irregular escarpments of the basaltic plateau on the right, terminated northwards by the precipices of Magilligan or Benevenagh, where the blue line of the distant ocean meets the horizon.

Besides these, numerous hills of considerable altitude rise through the central, western, and north-western parts of this area, the chief of which are Teeavan Hill, 1,085 feet, south of Dungiven, south of which, on the opposite side of the Altnaheglish valley, is Streeve Mountain, 1,282 feet, and to the S.E. Crockalough, 1,347 feet, Straid Hill and Slieveboy, near Park, 1,002 feet and 855 feet respectively, S.W. of which latter are Crockdooish, 1,062 feet, and Tornoge, 925 feet. North-westwards, near Claudy, is a small chain of hills called Boultybracken, attaining 970 feet at the highest point, to the right of which is a dreary mountain tract, including Muldonagh, 963 feet, and Althullion, 914 feet, while to the north-west is Slievebuck, 822 feet.

All these latter hills, as well as those of the Sperrin range before mentioned, lie in the country formed of metamorphic rocks, while in the vicinity of Dungiven, where there is an extensive tract of Carboniferous sandstone, the ground is comparatively flat, nowhere becoming hilly. To the east of this are sandstones of Triassic age, which, north and west of Benbradagh, spread over a tolerably large area, but southwards of that mountain occupy only a slight margin at the base of the basaltic cliffs, and are usually overlaid with a thinner band of Chalk and Greensand.

The glens and valleys form also very remarkable features, and are particularly deserving of notice. The best known is that called Lughnapeastia,\* situated about four miles S.S.W. from Dungiven. This beautifully wooded and watered vale lies at the embouchure of several deep glens—one to the east, through which the Altnaheglish river finds its way, extending for a distance of four miles to the base of the basaltic hill called White Mountain; another called the Glen of the Owencam or Crooked Burn, extending for nearly an equal distance south-eastwards; and a little farther on, where the valley opens on a small alluvial plain, is another glen from the south, and a smaller one from the west, the vale continuing for about a mile further northwards, where it opens on the wide sandstone plain about Dungiven. All these glens are deep, narrow gorges, and being for the most part picturesque clothed with natural wood, through which the waters

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\* *Lughnapeastia*, i.e., the hollow of a monster or serpent. Loughnapiast is a name applied to more than one lake in Ireland, and signifies the serpent lough. This is the name of the smaller lake at Glendalough, Co. Wicklow, which, according to tradition, was anciently inhabited by a large serpent that destroyed men and cattle, but was killed by S. Kevin.

of small cascades occasionally sparkle, afford a pleasing contrast to the bleak moors and wastes around.

South-eastwards of Dungiven is the Benady Glen, traversing a tract occupied by standstones, schists, and metamorphic limestones, and at its termination, near Dungiven, by massive crystalline rocks. This latter is the most interesting spot in the vale, the river foaming over its rocky bed underneath overhanging crags covered with ivy and wild foliage, the right bank being crowned with the venerable ruins of Dungiven old church and an ancient pillar stone, from which a most comprehensive view of the surrounding scenery is obtained.\*

Among other remarkable glens in this district may be mentioned Altmover, west of Dungiven, cut through plant-bearing sandstones of Carboniferous age; Finglen, S.E. of Feeny, Dooalt and Glenrandal, near Park; Bond's Glen, west of Claudy; and the pretty sylvan glen of the Ness, or Burnthollet, to the north-west, near the "Oaks," in which is a very fine waterfall, of which a sketch is given in Portlock's Report, p. 168.

In some of these glens are remains of ancient river courses. In that of the Ness, just mentioned, an irregular terrace may be traced for a considerable distance below the waterfall, and in some parts remains of the old river cuttings exist, and form an avenue some twelve feet above the present level of the water. Sketches of these are also given in Portlock's Book, pp. 176, 177. Another example occurs in Altmover Glen, where an isolated mass in the centre of the gap, near the south end, called "The Schall," is evidently due to this cause, and a similar rock forms a noticeable feature near the east end of Bond's Glen, opposite the large limestone quarry.

The lofty range of the Sperrin mountains to the south, and the basaltic hills to the east, form the watershed of all that part of the district that drains into the river Roe, which discharges its waters into Lough Foyle north of Limavady. The drainage of the western part of the area is determined by a line of watershed extending northwards and southwards from Altahullion Hill, four and a-half miles north of Feeny, to Sawel mountain, whence it turns south-westwards along the ridge. All the waters here, except a small portion to the south-west, which drains into the Foyle a little above Strabane, drain into the river Faughan, which, deriving its head waters from the northern declivities of Sawel, Dart, and the neighbouring mountains, follows a north-westerly course for about 20 miles to the upper part of Lough Foyle, near the mouth of the Foyle river.

J. N.

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\* A sketch taken on this spot by the late G. V. Du Noyer, M.R.I.A., is given in Gen. Portlock's Report on Londonderry, &c.

*Dungiven Old Church.*—The foundation of this ancient ecclesiastical establishment is attributed to St. Nechtain, who flourished in the seventh century, and is believed to have been a native of Scotland, being identified by some with St. Nathalan or Nachlan, of Deeside, Aberdeen. The present building, said to have been an abbey church for Augustinian friars, dates from 1100. In the chancel is the richly sculptured tomb of Con-cy-na-gall, a chieftain of the O'Cahans or O'Kanes, a sept anciently powerful in the district. See O'Hanlon's *Lives of Irish Saints*, Vol. I., p. 127.

In the eastern part, the high ground occupied by the Miocene volcanic rocks is bounded on the east, throughout the greater part of its length from north to south, by a depression which marks the course of a great fault separating these rocks and those that lie immediately below them from the Carboniferous and Lower Silurian strata on the east.

The most elevated points in this area are situated on the following hills, the upper parts of which are generally devoid of drift:—Benbradagh, 1,336 feet above the sea; Carn Hill, 1,479 feet, and an intervening hill marked 1,490 feet; Craigmore, 1,306 feet; Ashlamaduff Hill, 1,036 feet; Carrick Mountain, a little more than 1,400 feet; Glenshane Mountain, somewhat over 1,525 feet; White Mountain, 1,774 feet; Bohilbreaga, nearly 1,600 feet; Mullaghmore, 1,825 feet. In the area containing Altered Lower Silurian rocks are:—Coolnasillagh, slightly above 1,400 feet; and Ballynure Hill, about 1,350 feet.

Boulder clay overspreads a considerable portion of the Miocene district, giving a smooth outline to the ground in the less elevated parts, and diminishing in thickness as the surface ascends to the higher areas, in which latter the rock becomes exposed to view in many places, projecting from the peaty and heath-covered ground in masses which now and then present low scarped faces, running in various directions.

This volcanic tract, as before mentioned, forms the western portion of the great basaltic plateau, the boundary of which can here be generally traced by the eye along a well-marked line indicated by a rapid change of level in the surface, occasionally accompanied by a rugged escarpment of the basalt, as at Benbradagh, Corick Mountain, Mullaghmore, Bohilbreaga, &c. The margin of this plateau is occasionally broken into by deep indentations, the largest and most striking of which in this sheet is Legananam Pot, a deep hollow running in for a length of about 200 yards, and formed probably by the action of water falling from a greater height than that at which the present summits stand.\*

The drainage of the eastern part of the sheet is partly effected by the river Roe, which, rising north-west of Bohilbreaga, and deriving its waters chiefly from the high ground including Corick, Glenshane, and White Mountains, and partly from Mullaghmore, Bohilbreaga, Coolnasillagh, Craigmore, and Carn Hill, flows through the depression already alluded to, and bends westward along another line of fault between Carn Hill and Carrick, falling eventually into Lough Foyle, north of Limavady, in sheet 12. A small area in the north-east is drained by the Agivey river, which carries the water to the Lower Bann; and the drainage in the south-east is conveyed to the Moyola river, by means of the Douglas river, &c.; and by it to the northern part of Lough Neagh, whence it also finds its way by the Lower Bann to the Atlantic, a little below Coleraine.

F. W. E.

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\* See Portlock's Report, p. 149.



## CHAPTER II.

*Formations or Groups of Rocks entering into the Structure of the District.*

## AQUEOUS ROCKS.

Name.		Colour on Map.
	Bog and Alluvium,	<i>Chalons brown and gamboge.</i>
Post-Pliocene (Drift),	Sand and Gravel, . . . } Lower Boulder Clay, . . . }	<i>Engraved dots.</i>
Cretaceous,	{ <i>h</i> <sup>5</sup> Upper Chalk with Flints, . . . { <i>h</i> <sup>4</sup> Upper Greensand, . . .	<i>Pale Emerald green.</i> <i>Do. (deeper tint).</i>
Triassic,	. <i>f</i> <sup>5</sup> Lower Keuper Sandstone and Marl.	{ <i>Venetian red with wash</i> <i>of Indian ink.</i>
Carboniferous,	{ <i>d</i> <sup>1</sup> Upper Calciferous Series, { <i>d</i> <sup>1</sup> Lower do.,	{ <i>Prussian blue with wash</i> <i>of Indian ink and</i> <i>yellow dots (dark tint).</i> <i>Do. (light tint).</i>

## IGNEOUS AND METAMORPHIC ROCKS.

Miocene,	{ B Basalt sheets (Lower Series), { B† Basalt and Dolerite dykes, . . .	<i>Burnt carmine.</i> <i>Do. (deep tint).</i>
Altered Lower Silurian Rocks.	{ β 1 to 2 Mica Schist with beds of hornblendic and talcose Schists, &c., . . . } { <i>q</i> Quartz Schist, . . . } { λ Limestone beds and Schists, . } { B† Dykes and sheets of Dia- base, &c., . . . }	<i>Light crimson lake.</i> <i>Do. with wash of</i> <i>gamboge.</i> <i>Cobalt blue.</i> <i>Burnt carmine</i> <i>(deep tint).</i>

## ALTERED LOWER SILURIAN ROCKS.

These consist chiefly of schists and grits with limestones, quartzites, or quartz-schists, and igneous rocks, occupying by far the largest portion of this area. The schists have been generally described as chloritic or talcose, though it is more probable they are micaceous, the mica being one of the hydrous varieties. They do not seem to have been very highly metamorphosed, as the associated arenaceous rocks have not been changed into gneiss, but only into micacised grits. These latter are often very quartzose, and a peculiar variety was found in some places in which are semi-rounded grains of glassy quartz and white or flesh coloured felspar, giving the rock so great a resemblance to porphyry that in some places it has actually been described under that name.

In many places the schists are compact in texture, felspathic and silicious, with little mica, ultimately becoming quartz-schist

or quartzite. This, however, is seldom the typical rock of that name. It is generally of a light, yellowish colour, and seems to graduate into felsitic schist. In the district to the south (sheet 26) crystalline blebs of quartz are developed in rock of this kind, resulting in a variety petrologically identical with quartz porphyry. Limestones and calcareous schists are also found among these rocks, occurring most plentifully among the beds that strike W.S.W. from Dungiven and continued in the adjacent sheet, none whatever occurring among the Sperrin mountains, and only a few isolated beds in the district to the north. These limestones are in most places schistose, in some cases dolomitic, often differing little from the associated beds except in their peculiar brownish weathering; while in other localities they are massive, of considerable thickness, and large quarries have been opened upon them, chiefly for agricultural purposes. In the neighbourhood of Dungiven they occur in great mass, occupying a rather considerable tract, as may be seen on the map. This district will be afterwards more fully described.

Associated with the schists and limestones in many places, chiefly with the latter, and usually following the bedding, are very peculiar rocks of a pyroxenic character, which may be classed as diabase. Although, as just remarked, they usually follow the bedding, yet clear evidence of intrusion may be observed in some places. Nevertheless, their remarkable fissile structure, coinciding with the foliation of the schists so as to render discrimination between them often a matter of considerable difficulty, is highly suggestive of their having been affected by the same metamorphic action. If this be so, we must consider them to be of Lower Silurian age.

We shall now proceed to describe in detail some of the principal sections and other localities where these rocks may be observed.

In the north-western part of the district the chief section is that of the Ness or Burnthollet river. Here, at the bridge, on the Dungiven road, are grey shining schists that feel unctuous to the touch, and coarse grits with semi-crystalline looking fragments of felspar; higher up are similar beds associated with a massive coarse schistose rock. On the right bank of the stream, about three-quarters of a mile from the bridge, limestone-schist, with seams of pure bluish limestone, appears in a low cliff, and further up forms great part of the rocky sides of the ancient river-course before described. Farther north-west are coarse mica-schists, through which the stream cuts a deep ravine, terminated to the north-west by the pretty waterfall which forms the chief point of attraction in the locality.

North of the valley of the Ness a very remarkable rock is seen in a quarry near the roadside, S.S.W. of Slievebuck. It is a dark green jointy mass in which no bedding is perceptible, and has a pretty strong resemblance to an igneous rock. Upon closer examination no hornblende or allied mineral was detected, but a dark green unctuous mica with chlorite and specks of black mica. Fragmentary pieces, chiefly of quartz, also occur, and traces of micaceous foliation were distinctly observed.

South of the Ness, the hill called Boultbybracken, and district around, is formed of schists of the prevailing type, among which, on the road from Londonderry to Claudy, a mile west of that village, one of the largest of the peculiar igneous rocks before mentioned may be observed. It is best seen on the north side of the road, where extensive quarries have been opened for road metal. It has planes of division exactly parallel to the bedding of the adjacent schists, and on examination it is found to be a finely crystalline aggregate of felspar and pyroxene. To the north-east this mass is abruptly cut off, perhaps by a concealed fault, but to the south-west it crops out in several bosses through the fields, yet strangely enough could not be found in the adjacent river valley. Over, and separated from it by some thin schists, is a small bed of limestone.

Bond's Glen, lying westward of this, presents some remarkable sections. At Toneduff Bridge are limestone schists interstratified with the peculiar pseudo-porphyrific grit before mentioned, the rock being here extremely quartzose. This bed does not occur on the opposite side of the river, though limestone does, associated with dark talcose schists. At a quarter of a mile to the west is a large quarry in flaggy dark blue limestone, showing a thickness of at least 100 feet, and limestone schists are again met with farther west, close to the margin of the sheet. The rocks associated with them are mica schists, in some parts talcose, in others felspathic and quartzitic. East of Claudy there is a good deal of the peculiar quartzites or quartz-schists before mentioned. These are well seen on the hill, north of Killycar school, particularly at its western end, which they form marked crags. Portions of the beds, however, are felspathic and chloritic or talcose.

Quartzites graduating from felspathic schists also occur in the burn near Claggan-bridge, where they are associated with limestone-schist. Limestone was formerly obtained at the back of the cottage west of the bridge, but it has been long since abandoned. A little east of Killycar-bridge, on south side of the river, is a dyke of finely crystalline dolerite, that seems to be different from those generally associated with the Lower Silurian metamorphic rock, and is probably one of those dykes of Tertiary age so prevalent over the north of Ireland.

A very large quarry in blue flaggy limestone may be observed at the cross roads, one mile and-a-half E.N.E. of Killycar school, and farther east numerous quartzites crop out on the hill north of Glentaugh. At Mullaghmeash thick beds also occur, with glittering micaceous quartz-schists.

North of this is a wild barren tract called Ovil Hill, over most of which quartzites appear close to the surface, though there are few actual outcrops. Farther north, at Ballymoney, numerous exposures occur in streams and bosses among the fields, and are chiefly mica-schists, with thick, coarse grits. In some places are dark grey schists, that split into extremely thin layers, not unlike beds in which graptolites have been found in other districts. Similar beds also occur at Claudy, in the stream at east end of the village, but no trace of fossils was found at either locality.

At Magherabane, north of Ballymoney, a small dyke of dolerite was noticed, northwards of which there is little worth mentioning, except the limestones in the valley N.E. of Glenconway Hill. These are associated with talcose-schists, and in the southern and larger quarry the limestone-schists are traversed by veins of calcite containing quartz and barytes.

A very important section may be seen on the river Roe, about a mile southwards from Dungiven. The rocky bed over which the river foams and dashes is a dark green mass, apparently an aggregate of felspar and pyroxene or hornblende, with, in parts, long crystals of actinolite. Apparently interstratified with it are limestones, thin beds of schist, talcose in some parts, and in others changed into quartzite. The rock is very peculiar, for, though in great part it has the appearance of a largely crystalline igneous mass, it is schistoid in others, and looks either as if the whole was the result of metamorphism or as if that action affected the rocks subsequent to its intrusion.

The associated limestones are also remarkable. That which is found immediately west of the old church is highly crystalline, with black shining facets, and a similar limestone—probably the same bed—is met with close to the water on the S.E. of the church, where it is abruptly cut off by a small N.W. and S.E. fault. At the eastern termination of the section is an indurated limestone, varying in colour from dark blue to light yellow and green, directly overlaid by the bright reddish conglomerates of Carboniferous age.

The greatest tract of limestone in the district is met with further on in that part of the valley called the Benady Glen. In the river banks an almost continuous section of it is exposed for about a mile; and, as may be seen by the map, it has a considerable range over the country to the right, its presence being abundantly proved in many localities, particularly at Coolnasallagh, Boviel, and Carn, where extensive quarries have been opened; while on the left side it is, at a short distance from the river, abruptly cut off by a large N.W. and S.E. fault. This is, for the most part, a thick bedded flaggy dark-blue limestone, more or less schistose and micacised, with in many places interposed beds of schists. A good section through these rocks is seen in the little tributary stream called the Black Burn, which falls into the Roe from the south side, a little east of the hamlet called Crabarkey. In the upper part of this stream the schists are associated with igneous rocks of a basaltic character that appear to be interbedded, though they are more probably intrusive, the beds in their immediate vicinity being apparently affected by them, and exhibiting a peculiar cuboidal jointing, assimilating them in appearance to the basalt. South of this, at Hillhead, these schists are interstratified with limestone schists, over which similar beds again appear, in parts thin and fissile, but in others massive, of a light green colour, and much indurated, changed in some cases into quartzite. These again are overlaid by flaggy crystalline limestones, that seem to occupy the remaining course of the stream to the point where it meets a tributary from the S.S.W., called the

Currawable Burn. In this latter are coarse micaceous and thin limestone schists, associated with a fissile pyroxenic rock somewhat like that observed in the Roe near the old church. To the south this mass is terminated by a fault, which also appears to cut out the limestones, none appearing in the upper part of the stream, which chiefly exposes beds of dark micaceous schists. Among these, a rock, like the igneous one just described, appears, and another of similar character crops out to the N.N.W., close to the hamlet of Far Crabarkey. Portions of these latter look so like hornblende-schist as to suggest the idea that they are more likely to be of metamorphic than of eruptive origin.

In the remainder of the metamorphic rock area, in the Benady Glen, numerous small beds of limestones are interstratified with the schists. A dyke of compact dark green basaltic rock is found at the bend of the stream, half-a-mile east of Tamniarin Bridge, and a small dyke of dolerite is seen in a tributary from the south. A similar one also occurs north of the river, near Boviell, among the schists that traverse the limestone area.

On the Owenrigh, which joins the Roe in the alluvial flat south of Dungiven, there is a very important section at about two miles S.S.E. of the junction of these rivers, in the parish of Banagher. The rocks here are almost devoid of schist structure, though distinctly bedded, and in one place on the right bank of the river are hardly distinguishable from those of igneous origin. In the vicinity are bosses of a dark compact pyroxenic variety, with nests of carbonates, the relations of which to the surrounding rocks do not appear. Limestone alternating with schists mostly talcose next occupy the section, being apparently representative of the thick beds in the Benady Glen, and in some of the streams beautiful deposits of calcareous sinter on mosses, &c., were observed. This district is also much affected by faults that cut off the series to the west and south-east.

In Lugnapiastia, the name given to that part of the glen immediately east of the large N.N.E. fault, are coarse schists forming crags, and rocks of the same character occur in the glens to the east and south-east. At Lugnapiastia two courses of hornblende rock were observed on the high cliffs to the right of the glen.

South of Banagher parish church, a little N.W. of this valley, limestones are also found associated with igneous rocks. The ground here is much covered by drift, yet enough of the rocks appear from which some idea of their relations may be judged. Limestone was observed on the left bank of the burn, nearly half a mile south of the church, while above it at a short distance is crystalline pyroxenic rock, apparently overlying a large bed of limestone which is seen in an extensive quarry a few yards to the west. Over this the presence of another mass of pyroxenic rock is evidenced in numerous blocks, some of which seem to be in situ, while undoubted outcrops appear farther south. On the high ground to the S.W. portions of the series reappear, and in the adjacent river north of Drumslieve. Here what seems to be

the most westerly of the igneous rocks is seen in the southern bank half a mile S.E. of Fincarn, reappearing to the S.W. at the road side, and in the little stream that descends the northern slope of Mullaghash, where it disintegrates into beds of rich yellow ochre. The other or more easterly igneous rock is seen in the river at the east end of the little alluvial plain, which probably conceals the intervening limestone. Here it has the bedded structure so common in these rocks, and between it and the overlying limestone, which appears a little higher up, beds of coarse schist and schistose grit are interposed, although on the hill to the N.E. no such beds were found, the limestone apparently lying immediately on the igneous rock.

Towards the south-western part of the district numerous beds of the peculiar quartzites before described occur. Near Park they were observed at the hills of Straid and Slieveboy, at which latter place the rock is freely exposed, and the gradual change in metamorphism from a felspathic-schist at the foot of the hill to hard white quartzite at the top is well exemplified. West of this numerous quartzitic beds crop out at Crockdooish and the country north-west of it, the largest being that margining the bog south of Ballynaneanar, close to the western limits of the sheet. Of the limestones in this part of the district the most important are those that occur in and south of the Alla burn, thick limestone schists on which quarries have been opened, and that popularly called the Altahoney limestone south of Crockdooish. This latter is well exposed for over half a mile's distance along the valley watered by a little stream called the Inver river. It has a thickness of about 250 feet. To the east these beds are probably cut off by a concealed fault, mica-schist occurring directly in their line of strike at the junction of the Inver with the larger stream of Glenrandal, while towards the west they are covered by the thick drift that overspreads the hills in that direction, but they reappear at Main Mountain, where, however, their thickness is much diminished.

Southward of Main Mountain there is a large dyke of felstone porphyry, which may be seen cutting across the schists about a quarter of a mile north of Bullock Br., its direction being there about W.N.W., heading northwards at 60°, from which it turns up the course of the stream for over half a mile to the junction with another stream from the N.N.E., beyond which it is not visible. This is a hard rock of a flesh colour, containing apparently two feldspars, with chlorite and hexagonal plates of biotite. No quartz is visible. It is exceedingly tough, and occurs in massive cuboidal blocks; and as it is probably susceptible of a high polish, would make a useful and ornamental building stone.

About a mile south-east of Bullock Br., and on the same stream at Stroanbrack, is a highly crystalline rock, apparently pyroxenic, though differing in some respects from others of this class. It is distinctly schistose, and merges almost imperceptibly into typical schist at the bridge. It is difficult to say whether this be an

igneous or a highly metamorphosed rock. Another peculiar green rock, but more compact, forms a boss on the roadside at Craig, associated with limestone.

Two miles north-east of Craig, at Stranagawilly, a very interesting section occurs. At 300 yards N.W. of the bridge soft green pyroxenic trap of the usual character is met with, succeeded by micacised or talcose schists and limestone schists. These latter overlie hard green massive schists, changed in some parts into a kind of quartzite, while along the east bank of the river a small fault extends, bringing in another but smaller limestone, with beds of dark talcose schists. At and south of the bridge is a crystalline rock, apparently igneous, and containing much black mica, succeeded by similar hard massive green schists. Some of these are highly calcareous, and might almost be classed as limestone, while others are so compact as to look like trap. At the bend in the stream, half a mile S.E. of the bridge, one of the soft decomposing pyroxenic rocks appears, succeeded by thin schists and a dyke-like mass of the green compact rock before mentioned, and a little higher up another dyke of the pyroxenic variety is seen. Farther on are dark grey schists with grits, and at a mile distance, at the junction of the main stream with the Pollanore, another but much larger pyroxenic rock occurs, with marked spheroidal weathering disintegrating extensively into deep yellow ochre. Here it is undoubtedly intrusive, crossing the beds of schist several times. It is probably a portion of the great dyke that reappears to the east in the side of Learmount Mountain, and on the road adjoining.

In the stream south of Gortnashamer Br., one mile and a half N.E. of Stranagawilly, a section is exposed cutting through three of these pyroxenic rocks, two of which were traced for some distance over the country to the right, and in one place are associated with limestone. This latter again occurs with them in the stream at Altinure Mullen, close to the village of Park, and what is probably the continuation of the same igneous rock is more largely developed in the river Faughan at Learmount demesne, and in a little brook close to its western boundary, where, however, limestone was not observed, and the rock is so fissile as to look at first extremely like the schists.

In Dooalt Glen, which lies to the south-west of Park, another very interesting succession of rocks may be observed. South of the hamlet of Tireighter there is a bed of limestone, and over it a massive pyroxenic rock showing spheroidal weathering. This latter is of a dark green colour, and so friable that it is difficult to get any portion unweathered. At some 200 yards distance it decomposes into an ochre, and in the adjacent drift—largely derived from it—brighter and finer looking seams were noticed. The schists succeeding the trap are massive, with cuboidal structure, being probably a result of alteration due to it, as before remarked. Close to where the mountain road crosses the stream by a wooden bridge a similar trap appears, under and conformable to the schists, which here strike to the N.E., but regain their usual north-westerly dip immediately beyond the bridge, where the

first-mentioned trap reappears, and occupies the bed of the stream for a short distance. At a quarter of a mile higher up it is again seen, and can be traced for about half a mile, where it finally disappears. In the Oughtevaddy Burn, south of the main stream, a trap was observed, which is in all probability a continuation of the lower one noticed at the bridge, and is again seen to the W.S.W., where it obliquely crosses the head of Dooalt Glen. On Meany Hill, to the right, many of the rocks are compact, of a green colour, and have the cuboidal jointing before mentioned. Some of them are quartzose grits of the peculiar porphyritic appearance elsewhere noted.

To the east of this, in the river valley S.S.W. of Dreen, similar, if not the same, beds appear. At Crockahilly, in the stream that joins the main one from the south-east, the trap is clearly proved to be intrusive, having a N. and S. direction cutting across the schists, but changing abruptly to E. and W. At the junction of this small stream with the main one it disappears, but what is probably its continuation is seen a little lower down, where it is conformable to the adjacent schists. In the vicinity of the intrusive portion of the dyke the schists have the trap-like appearance so often mentioned. Half a mile farther south, close to the alluvial flat, another trap of the same kind was observed, as also about three-quarters of a mile to the north-east, in the pretty little wooded glen called Glenamoyle.

J. N.

The streams east and north-east of Currudda Bridge contain sections showing beds of argillaceous and talcose schist, with a little gneiss. Near Altrasna Bridge similar rocks occur, together with soft greenish-coloured earthy schist, and varieties of micaceous and hornblendic schist. The beds on Coolnasillagh Mountain are generally more or less gneissose, with bands of dark mica-schist. Some are very ferruginous, and send forth streams of water charged with iron. In the steep banks of the stream flowing southwards, at the south-west of Ballynure Hill, the mica-schist is extensively exposed to view, and where the fault crosses the beds are observed to stand in broken masses at the eastern side at higher levels than that of the adjacent Carboniferous sandstone.

F. W. E.

#### CARBONIFEROUS ROCKS.

*Lower Calciferous Series.\**—The beds classed under this denomination may be seen at Ash Park, to the south-west of the tract of Carboniferous strata about Dungiven. They are reddish brown pebbly sandstones and conglomerates, the pebbles being of white and pink quartz, schist, and other metamorphic rocks. To the south these beds are evidently cut off by a fault, the dip in this

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\* The author has elsewhere expressed an opinion that these beds are identical with those that overlie the Lower Old Red Sandstone (Dingle Beds) at Pomeroy, and are the representatives of the Upper Old Red Sandstone of Scotland. See *Quarterly Journal, Geol. Society*, Nov. 1880, p. 529.



section being steadily S.S.E., while on the opposite side of the Owenrigh river they are seen capping the schists at a considerable elevation above the beds of the upper series on the north.

J. N.

The beds of this series are very well seen along the streams south of Ballynure Hill, and consist of red and reddish brown conglomerate and breccia, with red flaggy sandstones and sandy shales. The sandstones are sometimes pebbly, and the more earthy varieties are often marked with yellowish green striping. The pebbles in the conglomerate, &c., consist chiefly of mica-schist, with pieces of quartz, jasper, and the harder sandstones. These beds are less frequently exposed in the thickly drift-covered ground south and west of Moneyneany. At their junction with the mica-schist in the Douglas and Altalack rivers the conglomerate is very coarse, and contains many blocks of mica-schist loosely crowded together, in some instances reaching a length of six feet.

F. W. E.

*Upper Calciferous Series.*—These beds occupy much of the country to the east and south-east, and form the greater portion of the tract of Carboniferous rocks about Dungiven. They consist of sandstones, in some parts pebbly, shales and quartzose conglomerates, in general more or less calcareous, and in a few places, beds of impure limestone and dolomite. They vary in colour from yellow or white to red and grey, and are usually affected by numerous small faults, which appears to be a characteristic. One of the best known and most remarkable sections is that at Altmover, west of Dungiven. At the southern end of this glen a white quartzose conglomerate is seen resting nearly horizontally on the schists, and interstratified with it are soft shaly sandstones, with a thin bed of magnesian limestone. To the north these rocks are abruptly cut off by a fault, the next visible beds being sandstones, of greyish white to yellow colour, with deep red sandstones at base. Green earthy partings occur, and the sandstones are highly calcareous. On the opposite or northern side of the glen ripple marks are noted on similar rocks.

Farther on, where the glen turns to the north, extensive quarries have been opened, the sandstones being obtainable in blocks of almost any required size, and highly prized for building purposes, as they are considered by some persons to be equal in quality to Portland stone. They are of a light yellow to white colour, and abound with plant remains. Interstratified with them are shales and arenaceous limestones, the beds separated by green earthy partings. Large quarries in similar fossiliferous strata, with seams of red earthy beds and bands of dolomite, have been opened higher up.

Another good section occurs on the Bovevagh river to the north. Here, at about a mile's distance east of Glenconway Hill, the basal white conglomerates rest at low angles unconformably on the schists, east of which for half-a-mile no rocks are visible; but at that distance, similar conglomerates, overlaid

by yellow pebbly sandstones, appear. Further east, and extending to end of section at Rosebrook, are successions of yellow changing to reddish sandstones, shales with soft green and red marls, and three or four beds of a curious nodular dolomite.

A little north of Dungiven, in the stream that flows through Pellipar demesne east and south-east of the house, are friable yellow and grey sandstones, like those elsewhere described, interstratified with red sandstones and shales; and at Derryware Bridge, a little east of the demesne boundary, fossils are said to have been procured. The course of the stream higher up shows similar beds, and at the locality called the Hass, fossils, chiefly plant remains and scales of *Holoptychius*, were found, according to Portlock.\* At a quarry adjoining the mountain road here excellent building stone was raised, and a newer one has been opened some distance to the south-east, from which the stone used in building the new R. C. church was obtained.

J. N.

*Upper Calcareous Sandstone.*—East of the fault, at Weddell Bridge there are thinly bedded gray calcareous sandstones, others soft and shaly and of a reddish colour, and others again comparatively hard and more silicious. The rocks are almost entirely concealed below drift between that and Moneyneany, being slightly exposed to view at 750 yards south-west of Boherdale Bridge, and again in broken beds close to the fault in the stream north-east of Doyle's Bridge.

The greatly disturbed beds along the north and south fault line,  $1\frac{1}{2}$  mile east of Crockawilla, are composed of hard light bluish gray sandstone, fine-grained and calcareous, interstratified with blue and gray shale and occasional thin beds of hard impure limestone. They are well seen along the upper part of the stream, close to the fault. Below them, throughout the rising ground south of Bohilbreaga, in continuous section along the Sruhanroe River, and more at intervals in other streams, a great variety of beds comes to view, which may be generally described as consisting of variegated rather soft sandstones, whitish with purple and greenish tints, and irregularly interstratified with beds of harder ferruginous sandstone, and red and green sandy shales. Near the basalt escarpment of Bohilbreaga these, with somewhat coarse white sandstones, and others delicately striped in reddish and salmon-coloured tints, are overlaid by red and green shales, which might be readily supposed to belong to the Keuper Marl, but which appear rather to belong to the Carboniferous formation. In lithological character all these beds bear a general resemblance to, and they are probably identical with, those at Cove Bridge and Unagh, near Cookstown.†

F. W. E.

Similar beds are met with on the western slopes of Mullaghmore and White Mountain, and south-west of the latter, near Barony Br., fossils were obtained.

J. N.

\* Report, p. 488.

† Geological Survey Memoirs, Sheet 27, pp. 22-28.

At Eden Bridge and along the flanks of Craigmore and Barn Hill small sections occur in the Upper Calciferous Sandstone, and north of Carn they contain a small quantity of whitish variegated nodular limestone.

### TRIASSIC BEDS.

*Lower Keuper Sandstone.*—The wide area of Triassic rocks skirting the basalt north-east of Benbradagh is obscure, owing to the abundance of drift that overspreads it.

It is possible that some disintegrated marly beds which occur in the indentation  $\frac{3}{4}$  mile W.S.W. of Legananim Pot, and others due east of Craigmore, may belong to the Keuper Marl; but from observations made elsewhere in the district it seems more probably correct to include all here in the Lower Keuper Sandstone.

F. W. E.

On the west of Benbradagh these beds are freely exposed, particularly on the hilly road leading to the large chalk quarry. They consist of soft bright red sandstone, with in some places beds of darker-coloured shale, and are often difficult to distinguish from the underlying red beds of the Carboniferous formation, particularly as peculiar seams of green colour traverse the sandstones of both series. The latter, however, have usually more of a reddish brown tint. The thickness of the Triassic rocks here is estimated at 670 feet.

J. N.

Bright red marly sandstones are found at Carn Hill and Craigmore, over the Carboniferous sandstone, and in several places along the western slope of Corick Mountain. West of Craigmore, where comparatively recent slips have taken place, the Triassic beds consist of deep red obliquely laminated sandstone. Other sections, in the streams north-east of Eden Bridge, disclose to view brick-red marly flags, sometimes ripple-marked and striped with green laminae.

### CRETACEOUS BEDS.

*Upper Chalk.*—The chalk, which consists of a hard compact perfectly white fossiliferous limestone, occurs here in a narrow belt cropping out from below the basalt, and is exposed to view in several places where it has been quarried for burning. An example occurs near the north margin of the sheet, where it is seen to contain flints, and is overlaid by about three feet deep of flint drift lying between it and the basalt. The flints in this drift are for the most part reddened in the interior.

F. W. E.

Along the steep sides of Benbradagh beds of Greensand and Chalk, not exceeding from 12 to 20 feet in thickness, are found under the basaltic cover. Owing to the landslips that prevail, a good deal of the rock occurs in blocks over the flanks of the

mountain, and a considerable displaced mass of the kind forms a conspicuous feature towards its southern end where the road crosses. Here, and a little farther north, between the two small faults, the bed of greensand crops out, and, like the chalk, is highly fossiliferous. The flints in the debris over the quarry are reddened in the same way as those before described. Numerous springs of excellent quality occur abundantly along this escarpment.

J. N.

West of Craigmore the chalk is slightly exposed between the basalt and the Triassic rocks. Here also, and at Bohilbreaga, there occurs below the basalt a very hard flinty breccia, composed of shattered flints and variously coloured fragments cemented closely together in a bedded mass about three feet thick. Large blocks are found in the drift, presenting all varieties from a fine breccia made up of sharply angular fragments, to a coarse mass in which there is a certain amount of rounding in some of the pieces, and the fragmentary nature of which may not be recognized in a hand specimen. This is no doubt a volcanic product, due to fragments of the chalk and flints having been brought up with the basalt during its eruption.

#### MIocene BASALT.

*Lower Basalt.*—The basalt in this district is for the most part fine-grained, and has a platy structure. This structure is most apparent on the weathered surfaces, being imperceptible on a fresh fracture in the interior. In a few places the rock masses exhibit a rudely columnar form, as in the Ashlamaduff River, and at Craignashoke, where the large slips occur, to the west of Bohilbreaga. Numerous patches and ice-worn bosses, the latter often presenting irregularly-scarped faces, exist throughout the area north and west of Brockagh Bridge, and in the upper portions of the range including Benbradagh, Carn Hill, and Craigmore.

Beds of amygdaloid occur among the sheets of basalt, as at Bohilbreaga and Craignashoke, and in the deep ravine of Glendoo Burn, north of the former place; also at Mullaghmore, &c. It is generally of a purplish colour, and contains large zeolites filling irregular cavities, with numerous small round zeolites, and occasionally vesicles filled with calcite. Traces of red and yellow ochre or bole also occur, but not so frequently as in some other parts of the miocene area.

A bed of limonite, not more than ten inches thick where seen, comes between the chalk and basalt at Craignashoke, and a bed of lignite occurs at Bohilbreaga. These are noticed further on.

The thickness of the basalt in this district is probably about 300 feet.

F. W. E

## POST PLIOCENE (DRIFT)

*Lower Boulder Clay.*—This deposit is pretty generally spread over this district, being mostly exposed in the numerous streams and river sections, and covering the flanks of the hills to an average height of from 900 to 1,000 feet, attaining to over 1,300 feet on some of the slopes of the Sperrin mountains. The character of its contents varies as usual with the subjacent strata, and in some places there are intercalated beds of sand and gravel. Shells have been found in a few localities, usually occurring in a compact plastic chocolate-coloured clay. At Bovevagh, near the old Church, there is a well-known deposit of this kind, chiefly distinguished by the occurrence of a turretted shell, which Portlock calls *Turritella Terebra*. Other localities were noted in the Owenbeg river, a little south of the bridge, one mile westwards from Dungiven, and in the stream north of the hamlet called Drumslieve, nearly two miles S.E. from Feeny. In these and other places farther north in the area included in sheet 12, Portlock found *Cyprina Islandica* and *Nucula oblonga*, which latter he calls "the characteristic shell of the deposit."—Geol. Report on Londonderry, &c., p. 157.

*Sand and Gravel.*—These superficial beds occur pretty thickly over the boulder clay, and also extend to a considerable height on the hills, though not so much as the boulder clay which rises from beneath them, not being found higher than from 1,100 to 1,200 feet. They usually form flat-topped hills or terraces, a very remarkable one of which may be seen on the left bank of the Faughan river, south-east of Claudy, between the Upper and Lower Binn. Here there is a thickness of about 50 feet, and the terrace is in some parts worn into curious ravines, of which Portlock gives a woodcut.—Geol. Report, &c., p. 637.

In the vicinity of Dungiven flat-topped gravel hills are found at a height of 400 feet, in the country east of Altmover Glen; and south of the town, on the slopes of Teeavan Hill, still more remarkable and extensive traces occur at heights of 500, 750, and 850 feet, the highest terrace in the district being that close to Glenedra Br., six miles to the south, having an altitude of 1,200 feet.

J. N.

The lower boulder clay is exposed in sections, sometimes twenty feet deep, along the mountain streams in the basaltic area, as, for example, in the Formil, Ashlamaduff, and Kelvin Rivers, where it is seen to consist of brown clay, containing somewhat worn blocks of basalt, with pieces of mica-schist, quartz, and occasionally round pebbles of chalk.

Deep sections in stratified sand and gravel, often obliquely laminated, occur in the banks of the Dunlogan River, near Moneyneany, the gravel being sometimes cemented with calcareous and black ferruginous materials, so as to form a hard conglomerate. It contains pebbles of mica-schist, &c., up to nine inches diameter, and is no doubt chiefly derived from the disintegration of the Carboniferous beds of the district.

## GLACIATION.

The effects of ice-action may be traced in the rounded masses and smooth surfaces of the basalt, and in a few instances striae are preserved. These markings indicate variations in the direction of the flow, depending no doubt on the absence or otherwise of local obstruction arising from the already existing form of the ground. In the adjacent district to the east the striae have tolerably uniform north-westerly and south-easterly bearings, with what appears to be a preponderance of evidence in favour of a course from the south-east.

F. W. E.

South of Banagher parish church, striae bearing E. 40 S. occur on blocks of hard green igneous rock, close to the large limestone quarry, and two miles to the east, striae bearing E 15 W. were observed.

## RECENT.

*Peat bogs and alluvial flats.*—The peat bogs are not numerous, and are of little importance. A thick cover of peat is spread over most part of the mountains to the south, which often is of good quality and considerable depth, supplying an inexhaustible source of fuel to the district. Little alluvium occurs, except on the margin of the river Roe, about Dungiven, and farther north at Gelvin, where it spreads over a pretty large extent.

## CHAPTER III.

## PRINCIPAL FAULTS, &amp;c.

Some miles north of Dungiven the country is traversed by an east and west fault affecting Carboniferous and Triassic rocks, and probably the basalt. Distinct evidence of it is seen on the Gelvin river, a little N.W. of the chapel, where, on the left bank, Triassic sandstones strike directly against those of the Carboniferous system, which occupy the bed and opposite side. Again, at nearly six miles to the west, Carboniferous strata occur in the Bovevagh river, considerably westwards of where schists appear in an adjoining stream from the south-west, the beds having a persistent southerly dip.

South-west of Dungiven the fault that bounds the Carboniferous rocks on the south, with downthrow to the north, is proved by the southerly dip of the beds, both of the lower series at Ash Park and the upper about Banagher Old Church, the fault being visible in the river bank a little S.E. of the latter, as before observed. The N. and S. fault, which runs parallel to the course of the stream on the west, cuts off all the limestones, and a great alteration in dip is produced, the limestones being also cut off to the east by a nearly N.E. and S.W. fault, which is further proved at the stream section near Lisnahilloge and the River Roe, where

Carboniferous strata dip directly against the schists. West of this fault, and probably cut off by it near Dungiven, is another extending south-eastwards. Where it divides the Carboniferous rocks from the schists in the River Roe, slickensides were noted, and farther on it cuts off the great limestones of the Benady Glen. Evidence of it again occurs in the turn S.W. of Calhame Br., and at the boundary of the Carboniferous rocks to the south-east, where some displacement is visible. West of Tamniarin Br. a fault at right angles to it cuts off the Benady limestones, with their associated schists, to the S.E., and forms a marked feature on the hill to the N.E., where it displaces Triassic and Cretaceous beds with the overlying basalt. The throw of the fault here is eastward at about 300 feet.

J. N.

The great fault running nearly north and south in the east of the sheet brings down the basalt and the Triassic and Carboniferous beds against the mica-schist on the east. Its effects are, as already stated, to be observed in the stream between Bohilbreaga and Ballynure Hill, where the relative levels of the rocks indicate a break of this nature, having a downthrow on the west. It can be traced northward and southward into the adjoining sheets.—(Nos. 19 and 26.)

The position of the basalt of Eden, occupying a low level in the space between Craigmere and Corick Mountain, and referred to by Portlock as being involved in a certain amount of obscurity,\* is explained by the occurrence of a N. westerly fault, by which it and the sandstones have been thrown down on the north side, and the effects of which are limited by another fault passing west of Currudda Bridge, with a western downthrow. Where the latter fracture crosses the stream flowing south-east from Craigmere, the basalt and chalk are seen in displaced masses, the chalk being traversed by a fissure filled with broken materials of flints, &c.

By means of the small break south of Crockawilla the red sandstones, &c., of the Lower Calciferous series come against the mica-schist, as is seen in the Altalack River. This is probably a shifted portion of the fault which runs across the south of Ballynure Hill, the course of which is here traceable only by the broken beds and changes of dip in the mica-schist, but is more amply verified in the adjoining sheet to the east.—(No. 19.)

Inconsiderable faults occur at Bohilbreaga and Craignashoke, bringing down the basalt in each case on the west side. The disturbed condition of the surface in the latter place is in great measure due to more recent slips, large confused masses of the basalt forming uneven mounds over the sloping Carboniferous ground for a distance of about seven hundred yards from the escarpment.

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\* Report, pp. 124, 183.

## MINERALS.

A band of limonite occurs at Craignashoke below the basalt, resting on a layer composed of chalk and flints. This band is, where visible, eight to ten inches thick, but is said to amount to between two and three feet. It consists, in the upper part, of a finely laminated dark and light brown mass of iron oxide, merging downwards into a brown ore containing pisolitic grains of a harder nature.

At the south of Bohilbreaga, a short distance east of the fault, and at about the same horizon as the iron ore, is a bed of bituminous lignite, said to reach eighteen inches in thickness, and containing small pieces of amber. An adit was driven to work this bed some years ago, and among the debris carried out are found flints and fragments of chalk, together with many pieces of the lignite.

F. W. E.

*Ochre.*—Many of the pyroxenic dykes and sheets among the schists disintegrate into extensive deposits of ochre of a rich brownish yellow colour, as has been before observed. Much of this, however, is so impure as to be of little value, but in some parts seams occur which may be of commercial importance. One of the chief deposits is that on the upper part of the Glenrandal river, two miles S.E. from Stranagalwilly, where it is found both in the main stream and in the tributary to the west. Deposits of it were also seen on the river south of Tireighter, near Park, and in the vicinity of Feeny, one mile and a quarter S.E. from the village in the stream on the south side of the road, called the Crooked burn road, leading to Draperstown.

*Lead.*—Some tumblers of galena were picked up in excavating for the railway at Scriggan, one mile and a half north of Dungen, but no vein or lode was discovered.

J. N.



PALEONTOLOGICAL NOTES—SHEET 18.  
LOCALITIES from which FOSSILS were collected.

No. of Locality.	Quarter Sheet of 6-inch Map.	County and Townland.	Situation, Geological Formation, and Sheet of 1-inch Map.
SHEET 18.			
		COUNTY OF LONDON-DERRY.	CARBONIFEROUS FORMATION; CALCIFEROUS SANDSTONE.
1	24/4	Derrynaflaw, . . .	A little south of Hollow Bridge, Altmover Glen, about two and a half miles north-west of Dungiven. (CalcifEROUS Sandstone, Upper, on Map.)
2	24/4	Do., . . .	About half a mile south of Hollow Bridge, two miles north-west of Dungiven. (CalcifEROUS Sandstone, Upper.)
3	25/1	Moneyneany, . . .	Rocks in stream at Barony bridge, three and a half miles south-east of Dungiven, on road to Draperstown. (CalcifEROUS Sandstone, Upper.)
4	25/3	Lackagh, . . .	Half a mile north of Dungiven, on stream which passes through the demesne of Pellipar, and between the Newtown Limavady and Garvagh roads. (CalcifEROUS Grit, Upper.)
5	25/3	Hass, . . .	In stream a little east of Hass, Lower, and half a mile east of Dungiven.
6	25/3	Do., . . .	One mile east of Dungiven. (Micaceous shales).
			CRETACEOUS—UPPER CHALK—WHITE LIMESTONE.
7	25/3	Boviel, . . .	Small quarry one mile north of Carn, and three miles south-east of Dungiven.
8	25/3	Carraghlane, . . .	Quarry at Benbradagh Mountain, three miles north-east of Dungiven.
9	25/3	Do., . . .	Benbradagh Mountain, about a quarter of a mile north-west of preceding locality.
10	25/3	Tirgolan, . . .	Large quarry at Benbradagh Mountain, about two miles north-east of Dungiven.

LIST of the FOSSILS collected from the LOCALITIES mentioned in the preceding TABLE.

The numbers opposite each species refer to the places at which they were collected, and the mark × placed before them denotes their comparative abundance.

CARBONIFEROUS.

	<i>Plants.</i>	Localities.
Calamites Suckowii, . . .	. . . . .	4.
Lepidodendron, . . .	. . . . .	4.
Lepidostrobus, fruit of do., . . .	. . . . .	4.
Sagenaria Veltheimiana, . . .	. . . . .	2.
Filicites lineatus? . . .	. . . . .	2.
Plant fragments indeterminable, . . .	. . . . .	1, 2.

CRUSTACEA.—Ostracoda.

Leperditia Okeni, . . .	. . . . .	3.
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VERTEBRATA.—Pisces.

Palæoniscus (scales), . . .	. . . . .	5.
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CRETACEOUS—UPPER CHALK—"White Limestone."

PROTOZOA.—Spongia.

Cliona cretacea, . . .	. . . . .	7.
Coscinopora infundibuliformis, . . .	. . . . .	7, 8.
Ventriculites radiatus, . . .	. . . . .	6, 7.

## LIST OF FOSSILS—continued.

ZOANTHARIA.— <i>Aporosa</i> .		Localities.
<i>Parasmilia</i> ( <i>Caryophyllia</i> ) <i>centralis</i> ,	.	7.
ECHINODERMATA.		
<i>Ananchytes ovatus</i> ( <i>Echinocorys vulgaris</i> ),	.	$\times \times 7$ .
<i>Cardiaster ananchytis</i> ( <i>Holaster æqualis</i> ),	.	7.
<i>Galerites abbreviatus</i> ( <i>Echinoconus</i> ),	.	7.
BRACHIOPODA.		
<i>Rhynchonella limbata</i> ,	.	6, 7, 8.
„ <i>plicatilis</i> ,	.	$\times \times 6, \times \times 7, \times 8, \times \times 9$ .
<i>Terebratulula biplicata</i> , including <i>T. abrupta</i> (Tate),	.	7.
„ <i>carnea</i> ,	.	$\times \times 6, \times \times 7, \times 8, 9$ .
„ <i>semi-globosa</i> ,	.	6, 7, 8.
MOLLUSCA.— <i>Lamellibranchiata</i> .		
<i>Astarte lenticularis</i> ,	.	7, 8.
<i>Inoceramus</i> sp.,	.	7.
<i>Lithodomus</i> sp.,	.	7.
<i>Nucula</i> sp.,	.	7.
<i>Ostrea vesicularis</i> ,	.	6, 7, $\times 8, 9$ .
<i>Pecten æquicostatus</i> ,	.	7.
„ <i>quinquecostatus</i> ,	.	7, 8, $\times 9$ .
<i>Spondylus spinosus</i> ,	.	7.
<i>Thetis</i> sp.,	.	7.
Gasteropoda.		
<i>Pleurotomaria Mailleana</i> ,	.	7.
„ <i>perspectiva</i> ,	.	7.
„ <i>Requienianus</i> ,	.	7.
„ <i>sarthinus</i> ,	.	6, $\times \times 7, \times 8$ .
<i>Turritella</i> sp.	.	8.
Cephalopoda.		
<i>Ammonites Jukesii</i> ,	.	7.
<i>Belemnites mucronata</i> ,	.	6, 7, 8, $\times 9$ .

With respect to the Palæozoic fossils, Portlock, in his Report on the Geology of Londonderry, &c., page 482, writes as follows—"In the Hass Townland, one mile east of Dungiven, the sandstone is associated with soft, shaly, thin micaceous beds, in which were found a few scales of *Rhizodus* (*Holoptychius*) *Portlocki*, Agassiz, whilst immediately above them the grits contain numerous fragments of plants."

"There is here, therefore, a distinct indication of Carboniferous strata, which is strengthened by the occurrence of numerous fragments of crushed calamites, probably *C. nodosus*, in a soft red shale, one mile and a quarter west-north-west from the Hass locality, and half-a-mile north of Dungiven, on the stream which passes through the demesne of Pellipar, and between the Newtown Limavady and Garvagh roads, and again, two miles and a half west in Altmover Glen, the shales associated with the grits contain fragments of plants extremely similar to those found in the shales of Ballynascreen and Maghera, as well as some similar to the smaller specimens of the Pellipar locality. A low sandy or gravelly flat, through which the Roe winds its way, occupies the central portion of Dungiven, and divides the grits and shales, immediately below the red shale, with Calamites from the Altmover grits. If the latter, therefore, are considered the base of the Carboniferous strata, it is very probable that the former belong to a higher point in the system, the sandstones, with their shales and marly clays, representing, not merely one member, but probably a very large portion of the Carboniferous system, no mountain limestone being here present."

LIST of additional species of CRETACEOUS (*Upper chalk fossils*) from Localities on Sheet 18; described by Portlock in his Report, already cited, as from Dungeness, and included in the collection made by the Ordnance Survey.

PROTOZOA.—*Spongiæ*.

*Amorphospongi* (*Achilleum*) *per-reticulatum*, . . . Portl. Rep., p. 342.

ECHINODERMATA.—*Echinoidea*.

*Ananchytes sulcatus* (*Echinocorys*-Tate's list), . . . Portl. Rep. and Ordn. Coll.

*Catopygus columbarius* (*Nucleolites carinatus*), . . . Ordn. Coll.

*Micraster cor-anguinum*, . . . Do.

*Brachiopoda*.

*Rhynchonella octoplicata*, . . . Do.

*Lamellibranchiata*.

*Chama* (*Diceras*) *inæquirostrata*, . . . Do.

*Gasteropoda*.

*Pleurotomaria Thomsoni*, Tate (? *Turbo bicarinatus*), . . . Portl. Rep. and Ordn. Coll.

*Turritella* (*Cerithium*) *unicarinata*, . . . Ordn. Coll.

*Cephalopoda*.

*Ammonites Oldhami*, . . . Do.

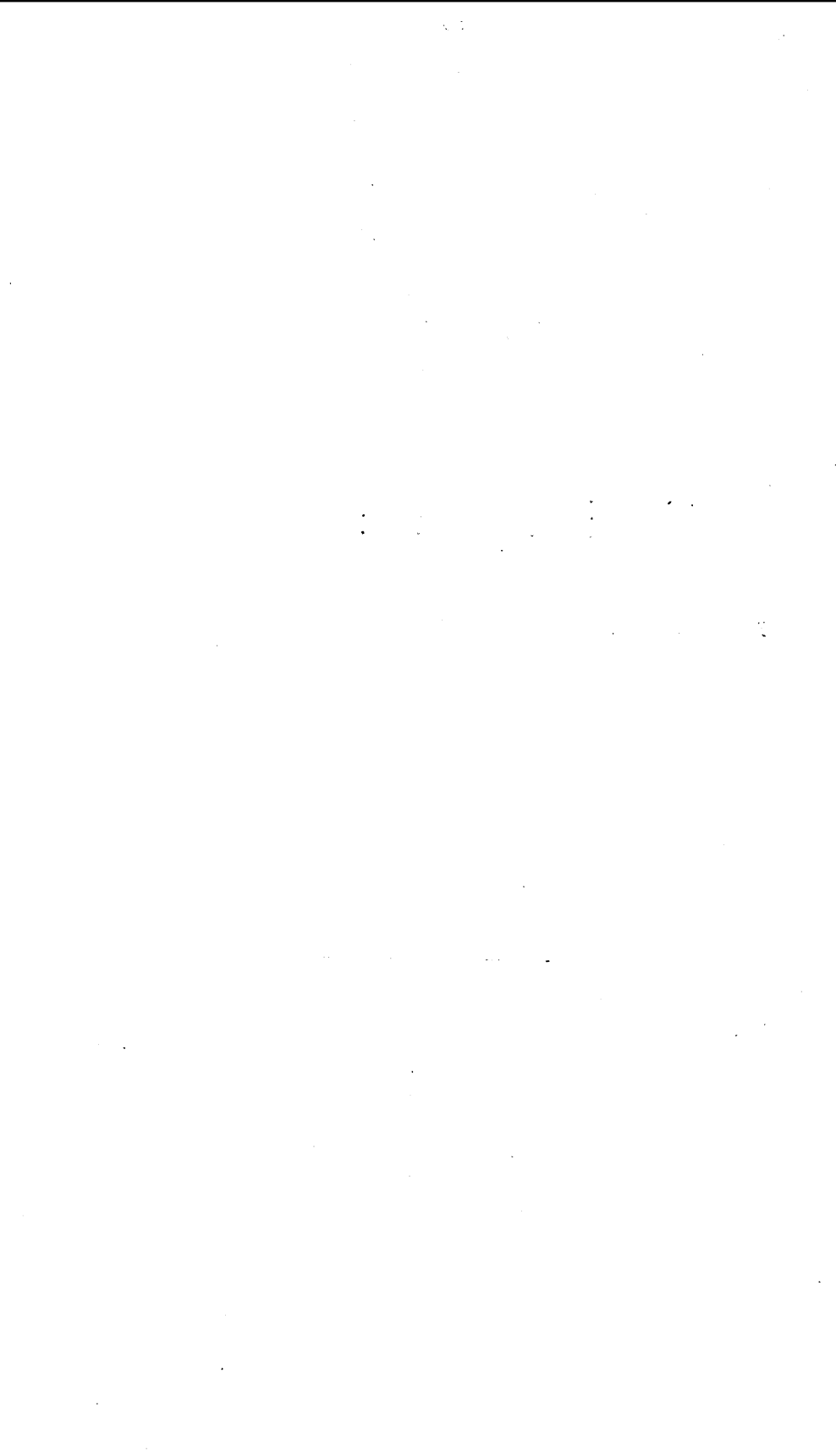
„ *Portlocki*, . . . Do.

*Nautilus lævigatus*, . . . Do.

„ *radiatus*, . . . Do.

WILLIAM HELLIER BAILY.

August 11, 1884.



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