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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.

THE District here described has been geologically surveyed throughout its entire extent, with the exception of the northern margin, by Mr. Wilkinson—the latter portion by Mr. Symes. Regarded as a whole the tract may be described as an elevated plateau of Carboniferous strata lying in a position but slightly inclined to the horizon. Its most striking features are, undoubtedly, the rugged scarp of the Upper Carboniferous Limestone, with its capping of massive grit, forming the base of the Yoredale series, which attains to an unusual thickness in this district, and which is altogether absent over the central and southern parts of Ireland. The gradual expansion in thickness of the sedimentary beds of the Carboniferous series in a northerly direction is here exemplified in the presence of this Sandstone, and that of the Middle Limestone series.

EDWARD HULL, Director.

Geological Survey Office,
Dublin, 26th May, 1885.

EXPLANATORY MEMOIR

TO ACCOMPANY

SHEET 44 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The area about to be described includes portions of the Counties Fermanagh and Leitrim and a very small portion of the County Cavan. The northern limit of the Map crosses in an east and west direction through the centre of Lough Erne, and the limestone cliffs of Church Hill. The eastern passes by Doraville, Castle Hume, Graan, and Skea Houses. On the south, the map terminates along a line drawn E. and W., a quarter of a mile south of Skea House, Belcoo, Glenfarne Hall; and Munakill Lough is intersected by the southern margin. On the west, Foxfield Lodge, Ross Point, and Bilbery Island, the two latter on the shores of Lough Melvin, come just within the margin of the sheet. The villages of Derrygonnelly and Belcoo, both in Fermanagh, are not of very much importance, nor is the small hamlet of Garrison, on the shores of Lough Melvin. In Leitrim county is the village of Kiltyclogher.

S. B. W.

Physical Geography.

The district under description is highly varied in its physical features. For the most part it consists of an elevated table land, bounded by the depression of the Erne on the east and north, that of Lough Macnean on the south, and of Lough Melvin on the west. The margins of the table land are formed by escarpments of limestone, while the central portions consist of beds of massive grit, with a few intercalations of shale and of trap-rock, towards the northern borders.

The principal escarpment rises from the middle of the northern margin of the map, west of Church Hill, Carrick Lough, Knockmore Cliff, where it is extremely well defined, continuing in a southerly direction by Carn House and Belmore Mountain, leaving the sheet south of Garden Hill, where it becomes less marked. The greatest height reached on this escarpment is on the north, where it is 1,133 feet above sea level; at Knockmore Cliff it reaches 919 feet above sea level. This escarpment is formed of the Upper Limestone, and is a most striking feature.

South of Kiltyclogher the hills of Bollieboy (1,509) and Glenfarne (1,200) rise in a more gradual way, and are formed of strata

higher up in the Carboniferous series. The eastern portion of the Sheet along the valley of the Sillees River consists of a network of alluvial flats and bogs, generally surrounding hogbacked hills of Boulder clay drift.

Drainage.—The greater portion of this district is drained by rivers which run into Upper Lough Erne. Lough Melvin receives the drainage of the western slope of the "Fermanagh Highlands," as also of the northern slopes of the hills to the west of the Kiltyclogher and Manorhamilton road. A very small area in the extreme S.W. corner is drained by a little stream running into the Bonet river, passing through Lough Gill, and eventually reaching the sea at Sligo.

The Sillees river is supplied from the natural reservoirs formed by the Loughs Carrick and Bunnahone, and it winds through the low-lying lands south of Derrygonnelly, forming near Hall Craig two considerable lakes, viz., Carran and Ross. Leaving the latter it attains much larger dimensions, being a deep, sluggish stream, winding and doubling through the alluvial flats. It leaves the sheet at Drumrainy bridge, about a mile N. of Skea House, and eventually reaches Upper Lough Erne. Owing to its winding course, the low lands are easily flooded, and indeed every winter it overflows its banks for miles causing great harm to the lands. It is supposed that the drainage scheme which is at present in progress will relieve this district of much of the surplus water. Bunnahone and Carrick lakes, before mentioned as being the head reservoirs, are considerably less than three miles from Lower Lough Erne, with a fall of 82 feet; but there is no natural connexion between them and Lough Erne. The southern portion of the district, including Glenfarne hill (1,200) is drained by innumerable little streamlets which form two large sheets of water, Loughs Macnean Upper and Lower, the former about five miles in length, the latter about three miles, with a breadth varying from one to two miles in each instance. These loughs are connected by a sluggish river about three-quarters of a mile in length. The water is eventually carried off by the Arney river, which enters Upper Lough Erne some four or five miles higher up than the mouth of the Sillees river. The height of the water of Upper Lough Macnean is 172 feet above sea-level.

The district drained by the stream running into Lough Melvin lies on the western face of the hills known as the "Fermanagh Highlands," and the northern slopes of Bollieboy, a ridge of ground a mile S.E. of Lattone Lough forming the watershed between the Erne waters and those of Lough Melvin, the latter eventually entering the sea near Bundoran. All the larger lakes mentioned appear to descend to a greater depth on the southern shore than on the northern, which shelves out gradually. S. B. W.

The drainage north of the Maghoo escarpment passes into Lough Erne, or westwards by the Bradogue river.

The surface on the top of the escarpment has a gentle slope to the south, so that the drainage following the slope is received into numerous small loughs formed on the terraces of the sandstone and limestone, having their greatest length corresponding to the

strike of the rocks; such are Meenameen Lough and Glencreawan Lough; after leaving these loughs, the waters gradually pass southward and flow either into Lough Erne on the east, or Lough Melvin on the west.

In long continued wet weather the elongated tarns already mentioned become overcharged, having but small outlets, and then their waters pass out in a northward direction through caverns formed in the limestone overlying the shale, and make their appearance in the face of the escarpment in waterfalls.

Landslips in this district are frequent, especially at the base of the escarpment at Maghoo which lies to the north of Shean North; there the *talus* has accumulated to an enormous extent; and, being for the most part composed of black shales, readily becomes highly charged with moisture, forming mud; then by gravitation it is propelled forward, and also carries with it the boulder clay of the low ground into Lough Erne.

R. G. S.

Rock Formations and Divisions.

Aqueous Rocks.

Name.			Colour and Sign on Map.
Recent accumulations.	Peat (bog), Alluvium, and other superficial covering.		*Burnt Sienna.*
Post-Pliocene or Drift.	Boulder Clay, . . .		*Engraved dots.*
Lower Carboniferous Series.	Millstone Grit, . . .	d^4	*Pale lamp-black.*
	Yoredale Shale, . . .	d^3	*Light indigo.*
	Yoredale Sandstone, . .	d^3	*Yellow, red dots.*
	Upper Limestone, . .	$d^{2'''}$	*Deep Prussian blue*
	Middle (or "Calp") Limestone, . . .	$d^{2''}$	*Dark Indigo.*
	Middle (or "Calp") Sandstone, . . .	$d^{2''}$	*Dark Indigo with white dots.*
	Lower Limestone, . .	$d^{2'}$	*Light Prussian blue,*
	Lower Carboniferous Shale	d^1	*Prussian blue and Idian ink.*
	and Sandstone,* .		*Prussian blue and Indian ink, dotted yellow.*
Lower Old Red Sandstone.	"Dingle Beds," purple and green slates, grits, and conglomerates, .	b^6	*Indian red and purple.*

Igneous Rocks.

Dolerite and Basalt, . .	B.	*Burnt carmine.*

Lower Old Red Sandstone.

"Dingle Beds."

The area presumably occupied by this member of the Geological series lies in the extreme N.E. corner of the sheet on the shores of Lough Erne. In the Sheets immediately adjoining, openings through the Drift deposits allow the rock to be seen, but in this Sheet the beds are hidden by deep Drift hills and

* This Division is supposed to underlie the northern part of Lough Erne and the small islands of Boulder Clay, but is not anywhere visible.

tracts of bog land. They consist of purple and greenish shales, grits, and micaceous sandstone, with a base of conglomerate laid open near the village of Lack. (Sheet 33.)

Carboniferous Beds.

Lower Limestone.

The area occupied by the Lower Limestone lies along the south shore of Lough Erne, stretching from Tully Point, past Graan House, to Skea House, where it leaves the sheet. There are many openings where the rock can be well seen.

South of Graan House on the Derrygonnelly and Enniskillen road, the formation is seen in a quarry, and consists of massively-bedded crystalline grey limestone. A little N.E. of this on the road to Ely Lodge, a large quarry has been opened just south of Magherdunbar Cottage. It is a bluish grey well-bedded crystalline and slightly cherty limestone, highly fossiliferous; and when burnt makes excellent lime; it is also a good road material, but for building purposes it is here not of much use, owing to its splintery nature. The dip is here 10° N.W. East of Magherdunbar House there are several very fine quarries. The beds are massive, of blue and grey colours, crystalline and highly fossiliferous. They are from 3 to 4 feet thick, with occasional bands of shale; and have a slight dip N. This rock would make an excellent building stone. Proceeding along the road towards Ely Lodge, the greater part of the planted ground, known as the "new plantations," has the limestone close to the surface, and cropping up repeatedly.

The ground between the old and new coach roads between Enniskillen and Ballyshannon, from Levally Glebe House to the Quarries of Carrickreagh, is formed of limestone, which shows itself in every little stream; and at the higher parts of Fardrum and Carrickreagh, there are innumerable limestone ridges, running parallel in a N.W. and S.E. direction. The rock is broken up on the surface, much weathered and waterworn. The dip here cannot be determined; but there is no reason to suppose that the bedding has been at all disturbed, as the lower beds of Carrickreagh Quarry are beautifully shown in a clean face of rock, some 300 yards long, and about 80 feet high, in a horizontal position, the beds being very massive, averaging 3 feet thick, slightly fossiliferous, and taking a very fine polish. For building purposes, grave-stones, chimney-pieces, &c., a finer stone it would be impossible to find; and, owing to its being on the very shores of Lough Erne, the cost of carriage is necessarily small.

The dip where there is any shown is about 3° S.W. Following the rising ground to the left of the coach road to Ballyshannon, exposures of rock are frequent. At Clarragh the beds are disturbed by faulting, but the general dip is S.W. from 3° to 5°. At the cross roads to Ballyshannon and Derrygonnelly, and at the Cosbystown Methodist Chapel, crystalline gray limestone is seen to be nearly horizontal.

About half a mile N.W. of this the undulating ground, covered with natural hazel and blackthorn scrub, lies on a sheet of limestone,

almost horizontal, though much weathered and waterworn. A little S. of Binmore Glebe House, the beds are cut off by a fault and are not seen again, except on the shore N. of Tully Castle and the Heron Island, where massively bedded gray crystalline and fossiliferous limestone is seen to dip immediately under the beds of the "Calp" or Middle Division at 10° in a N.W. direction. On receding some twenty yards, from the junction, and probably approaching the line of fault previously referred to, the beds rapidly tilt up from 20° or 25° to 70°, in a N.W. direction; they are massive, highly crystalline, and contain a considerable quantity of fossils.

S. B. W.

Middle (or Calp) Limestone, Shale, and Sandstone.

These beds consist of two divisions, the upper consisting of dark earthy and carbonaceous limestones and shales. The lower of yellowish sandstones and gray shales; the whole are overlain by the solid and cherty beds of the Upper Limestone.

In the northern portion of the Sheet the Calp shales form the flanks of the escarpment which can be seen overhanging the road from Belleek to Church Hill, and capping the shales are the Upper Limestones.

The sandstones of the Calp series are not seen in the face of the escarpment at all, but are found in the low ground, especially in the district between Lough Melvin and Belleek, where at Farrancassidy cross-roads as far as the brook at Drumlisaleen we have a continuous section of the fossiliferous ferruginous sandstones resting on the shales of the same group, dipping at a very low angle to the south.

East of the cross-roads, the shales are met with in Gortnalee Brook, but they are much disturbed, and roll in a N. and S. direction.

Farther east, a fault running up the valley by Ninny's Hill from Lough Erne throws down the thick-bedded, soft, white sandstones to the north, dipping at angles as high as 10°, but the normal dip is at a very low angle to the south. North of the fault the shales are found in the brook slightly displaced owing to contiguity to the fault.

The succession of the beds upwards is not very distinct, on account of the enormous accumulations of boulder clay and *talus* lying between the base of the escarpment and Lough Erne; but the section north of Glennalong shows the impure limestones and shales of the Calp series separating the sandstone of that age from the Upper Limestone.

The thickness of the beds comprising this series cannot be calculated for want of a continuous section; but the thickness of the uppermost beds of shale, &c., may be estimated to be at least from 400 to 500 feet.

R. G. S.

The lower beds appear to have been denuded considerably E. of Derrygonnelly, but south of Monea Castle they are seen dipping immediately under the Calp sandstone, about W. at 5°; also at Tullymargy Castle (W. at 5°). East of Springfield they are nearly horizontal, but at a point half way between Killycat

Bridge and Lenaghan Park the beds are seen disturbed, giving evidence of faulting. N. of the line of fault they dip 10° N.W., but a little further away from the fault they again regain their nearly horizontal position. South of the fault they dip S. at 10° to 15° and also soon become nearly horizontal. South of this fault the Calp sandstone does not appear, owing to the masses of drift and large tracts of alluvial matter which make it impossible to trace the beds satisfactorily. But at the base of Belmore Mountain shales are seen underlying the Upper Limestone, where they are nearly horizontal.

At Mullaghdun Church, however, in the little stream, the beds dip S. at 5°, that is, away from the Upper Limestone, and a slight fault clearly cuts out these beds and brings the Upper Limestone to a lower level on the hill side. No further evidence is seen of the Calp beds in this area. In every case where the beds are seen, they possess the characteristics of the "Calp" series, being impure argillaceous limestones, of dark blue colours to nearly black, with shale partings, and containing large quantities of fossil plants and shells.

Three other areas are occupied by this division. The largest of these is in the neighbourhood of Lough Melvin, in the N. W. corner of the Sheet; at Rossinver in a stream by the road-side, a deep bank of shales and impure blackish limestones lying horizontally occurs. Following up the Glenanif river a short distance, impure limestones are seen to dip at 5° and 10° due W. In the Ballagh river, about one mile S. of the last named, the beds are slightly disturbed by faulting, and a little N. of the Roman Catholic Chapel, they dip nearly due north at 25°: the beds then sweep round; and in the river which divides the counties Fermanagh and Leitrim, they dip at 5° in E. and S.E. directions under the Upper Limestone. About half a mile E. of this on the road between the villages of Belcoo and Garrison, an open quarry shows impure argillaceous limestone, with shale partings, slightly disturbed by a small fault. Owing to the Drift deposits, nothing further is seen of these beds till Garrison river is reached, where deep shale beds are exposed, which, without any apparent reason, are excessively contorted.

In other places however the Calp beds retain their nearly horizontal position; and sweeping round northward, they gradually become thinner and are found disturbed in the stream east of Brollagh, which is probably in connexion with a fault.

Throughout, they consist of similar earthy, impure limestones, with shales; the latter weathering into a stiff blue clay.

Of the other two small areas mentioned, on the extreme western margin of the Sheet about three miles N. of Foxfield lodge, a very small area comes within this sheet; and at Foxfield lodge, a triangular system of faulting brings up the Calp beds for a very small space.

The sandstones belonging to this division generally lie between two sets of limestones and shales, and are well represented in the neighbourhoods of Derrygonnelly and Garrison. Taking those beds near the former place; in the first place, we find them about Monea very well shown, dipping S. at a low angle.

They are massively bedded, with flags included occasionally. In 1878 very fine blocks were raised and cut for curb-stones for the village of Lisbellaw, and at the present time, 1880, the town of Enniskillen is being repaved from these quarries. In the village of Derrygonnelly the beds crop up at the flax-mill, and at the other end of the village on the road and at the corn-mill, brown sandstones are seen dipping 3° S. and S.W. Following the road, evenly bedded white quartzose sandstones are well shown, dipping in a southerly direction at 5°, and a little further on they are almost horizontal, or, with a very slight westerly dip, immediately under the Upper Limestone. South of Sandhill Lough, brown sandstones crop up at the margin of the peat bog, being almost horizontal. Flaggy yellow sandstones occur at Monea Church, dipping S.W. at 3°, which is built on beds lying horizontally. A little E. of this, the beds of sandstone are seen lying horizontally on the Calp limestone.

The beds are here probably crossed by a fault, and nothing more is seen of them. Owing to the masses of boulder clay deposits and numerous alluvial flats, no certain evidence of the presence of the sandstone can be obtained.

The beds in the neighbourhood of Garrison are of the same character as those just mentioned. They may be seen at the S.E. end of Lough Melvin, where they are found dipping at a low angle, never exceeding 5°; thence they stretch N. of Garrison, in the direction of Brollagh Lough, and along the northern shores of Lough Melvin. Good sections are also shown in the stream, which, passing through the village, enters the lough from the east.

S. B. W.

Upper Limestone.

The Upper Limestone is massive, crystalline, and coralline, or crinoidal. It is characterized by numerous irregular beds of chert, which sometimes replace the greater part of the limestone rock. In the adjoining counties of Cavan, Leitrim, and Sligo, this division of the Carboniferous Limestone forms a very striking feature, as it does in this district.

There are several isolated areas occupied by the Upper Limestone. The larger, that of Church Hill, stretches in a wavy line in a S.W. direction to Knockmore. In this district, between Carrick Lough and Knockmore, the rocks are subjected to much faulting, which causes a somewhat high angle of dip; for instance, between Carrick Lough and Doagh Lough the limestone dips under the Yoredale sandstone at from 20° to 40°. A little distance S.W. of Doagh Lough a fault following the line of the valley to Tullywania Lough causes the beds to dip away from the sandstones in a south-easterly direction at 40°. At the back of Knockmore they are again slightly disturbed. The eastern face of Knockmore stands out in bold relief. The cliff must be about 350 feet high, the rock of which it is composed being so massive that it is hard to detect the bedding. A similar example is to be seen in the "Hanging Rock," between Florencecourt and Black Lion. The beds are very nearly horizontal, with only a slight inclination to the south. Following a wavy line south to Boho, where the

boundary between the Yoredale Sandstone is very perfectly marked, the limestone runs far up into the hill, with the sandstones resting on it, the former dipping under the latter at 3°. From Boho the limestone is easily traced along the base of Belmore mountain, which forms a somewhat bold feature, the escarpment being clearly marked, and the dip still remaining at a low angle.

At Mullaghdun Church a fault occurs which brings the Upper Limestone down the hill, the boundary between the Upper and Calp Limestones being now along the line of the coach road, and after some little distance losing itself in Lough Macnean Lower. To the W. of this fault the beds dip at rather a higher angle. This is probably owing to the presence of a fault which runs from Lough Ora past Garden Hill, considerably disturbing the beds. This fault brings up the limestone on the W., and the boundary sweeping down to and across Upper Lough Macnean, leaves the Map opposite Glenfarne Hall. What is particularly noticeable in the beds of the Upper Limestone is the very large amount of chert, both in bands and in isolated masses, or nodules. The latter are well defined on the shores of L. Macnean, where the subaerial solution of the limestone has left the harder chert nodules projecting. N.E. of Garrison, at Glennalong hill a band of limestone (here very narrow) sweeps down in a S. direction, the dip being low, viz., about 3° to 5° E., under the Yoredale Sandstone; then it crosses the Roogagh River, where a good section may be seen, the junction of the Calp and Upper Limestone being well marked. A few hundred yards further south the boundary of Upper Limestone and Yoredale Sandstone is along the line of a fault; but a very little distance further it again becomes an ordinary boundary, the beds dipping E. at 5°. Continuing south-west of Lough Aleater the beds expand rather suddenly into a much larger area. To the east the Upper Limestone is cut out considerably by a fault running from the east of Lough Aleater, past Kilcoo cross-roads, sweeping round at the base of the Yoredale beds, in an easterly direction, as far as Lattone Hill, where it is abruptly cut off by a large fault, which runs N.E. to Carrick Lough. In the neighbourhood of Kiltyclogher the boundary between the Upper Limestone and Yoredale Sandstone is very irregular, being in some places faulted; but west of the village the limestone beds are undisturbed and nearly horizontal, with the sandstones also at a low angle resting on them. In the Kilcoo river, sections of very cherty, evenly bedded, grey crystalline limestone occur, dipping about 5° S.E. South of Eagil, where the stream cuts through the boulder clay, the beds of similar cherty grey, crystalline limestones, containing fossils, dip at 15° S.W., but are rather contorted; to the S.W., past Boliebaun, they dip at 5° E.S.E., and a little further S. they are seen perfectly horizontal. About half a mile further south, the boundary line between the Yoredale Sandstone and Upper Limestone is disturbed by several small faults and breaks. An important fault which runs from Boliebaun, in a N.E. direction, brings down a small area of the Yoredale Sandstone on the west.

This fault apparently loses its effect northwards, as no further evidence of its existence is found.

In the S.W. corner of the Sheet the same beds sweep round, and are seen dipping steadily at 3° to 5° N.E. under the sandstone; but at the cross-roads, where the Kiltyclogher road joins the Enniskillen and Manorhamilton coach road, they are cut off by a fault, the further effect of which is obscured by a large tract of peat bog. West of Munakill Lough, a small triangular area of Calp Limestone is brought up, in the immediate vicinity of which the Upper Limestone is disturbed, dipping as high as 20° N.W.; but immediately on getting from the line of fault the beds are seen in many openings and outcrops as having re-established themselves at a steady low dip of 3° to 5°. At this point these beds of the Upper Limestone leave this Sheet.

There are still five isolated areas occupied by the Upper Limestone; in every case brought to view by the presence of faults and the action of denuding agencies. South of Derrynacarbit Lough, a fault running from Lough Aleater in a curved N.E. direction past Meenagleragh Lough, appears to have an upthrow and downthrow on the same side. W. of Big Dog's Lough the limestone is brought up on the west; at the N.E. end of the fault, the sandstone is let down on the same side and dips at 30° towards a narrow strip of Upper Limestone. This is seen in a place known as "Green Glen";—probably from the greenness of the vegetation along the line of limestone contrasting with the heather and moorland surrounding it.

North of Lough Alaban another narrow strip of Upper Limestone is brought up by a fault running more or less parallel to the "Green Glen" fault, and at Lough Formal, a similar case of faulting occurs, bringing up a large mass of limestone.

A fault runs in a N.W. and S.E. direction from Lattone Lough to Lough Macnean Upper, where an outcrop of limestone occurs, in the townland of Meenagh. Where a clear fracture can be obtained, this rock is found to be of a grey colour and compact texture, but much broken up and with a slag-like appearance; in places it is of a deep red colour, owing to the infiltration of peroxide of iron, the earth in the immediate vicinity being bright brick red.

The limestones throughout all this district have given way on a large scale to the combined chemical and erosive action of water. At Knockmore and Belmore Mountain, there are many caverns, and the streamlets frequently sink into subterranean passages.

S. B. W.

In the north of the district, to the north of Lough Navar, the limestones are very compact and appear to be indurated, possibly owing to the influence of the adjacent sheets of dolerite. North of Glencreawan Lough the boundary between the Upper Limestone and the Calp beds is well defined; the strike of the rocks being very steady for a considerable distance, in a N. 70 E. direction, with a dip to the S.S.E. of 5°. In the direction of Church Hill

the limestone forms a cap to the escarpment, and contains a large proportion of chert. In this neighbourhood the rocks are tilted by numerous faults not of any particular significance. The thickness of the Upper Limestone along the northern portion of the sheet probably does not exceed 200 feet.

R. G. S.

Yoredale Sandstone.

In this district the Yoredale sandstone generally takes the form of massively-bedded, highly quartzose, coarse grits, sometimes slightly conglomeratic, with a few beds of flaggy sandstone, and occasionally shale partings. To determine their thickness would be a very difficult matter, owing to the frequent faults which repeat the beds. Roughly it may be somewhere between 300 and 400 feet.

A large area is occupied by the Yoredale Sandstone; faults causing the beds to be frequently repeated. South of Lough Navar over a large extent of ground the dip is steadily in a southerly direction at about 5°, and the strata consist of highly-quartzose, white, and yellow sandstones, sometimes passing into grits. In the district surrounded by the hills, called Big Dog and Little Dog, these beds are disturbed and repeated by a system of more or less parallel faults, which run N.E. and S.W. On the N.W. of the first fault the dip is S.E. at 10° to 15°. On the Dog hills it is 30° S.E. A fault running from Lattone Lough to Carrick Lough, causes the beds on the S.E. of the line of fault to dip N.W. at 20° to 25°.

About one mile to the S.E. at Lough Namanfin, the sandstones seem to recover their steadiness of dip and direction and extend on the E. and S.E. to Tullybrack (1,175 feet). About Lough Mulderg, and Belmore mountain (1,312 feet) they dip at a very low angle, and stretching down to the shores of Lough Macnean Upper, they cross the lough. From Glenfarne Hall they stretch northwards at the base of the Yoredale shales, dipping at from 3° to 5° S.W., until about one mile and a half S. of Kiltyclogher they rapidly narrow out, the limestone running far up into the valley. S.W. of Lough Gillaganleane, the shales are faulted and brought far down the hill slope, cutting out the sandstones considerably: and at the head of the Lattone streamlet, the beds are repeatedly subjected to breaks, which very nearly cut them out altogether. However, due E. of Bolieboy an E. and W. fault brings the sandstones up again, and they sweep round the S.W. base of the hill dipping at 5° under the shales, until reaching the Roman Catholic Chapel of Barr West, they are again faulted and leave the Sheet east of Munakill Lough.

To the N.W. of Bolieboy hill a fault throws in a small isolated area of Yoredale Sandstone, which may be seen on the side of the valley dipping immediately under the Limestone at 15° S.E. Two miles east of Garrison the sandstones stretch up to Drumbad and Lough Navar, dipping S.W. at from 3° to 5°, and often passing into coarse grits and fine quartzose conglomerates, which

44.

Memoirs of the Geological Survey.

EXPLANATORY MEMOIR

TO ACCOMPANY

SHEET 44 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

INCLUDING

PORTIONS OF COUNTIES FERMANAGH, LEITRIM, AND CAVAN.

BY

R. G. SYMES, M.A., F.G.S., AND S. B. WILKINSON.

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

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1886.

CONTENTS.

make a fair building stone for bridges or rough structures, though after exposure they weather rusty brown in patches. The land for agricultural purposes, lying on this formation, is invariably of the worst description, for as the rock weathers it crumbles into fine quartzose sand, which rapidly fills drain pipes and even open drains.

Yoredale Shale.

The Bolieboy and Glenfarne Hills are formed of beds belonging to this division, the latter, however, being capped with Millstone Grit. Over this tract the beds are very nearly horizontal, and have a thickness (where not displaced by faulting) of about 490 feet. They contain bands and nodules of ironstone, but not to the extent of those in the shale beds of the Cuilcagh and Slievenakilla ranges. South-west of Kiltyclogher they are much broken up and contorted, owing to the existence of several faults already referred to. Another area of comparatively small dimensions occurs between Loughs Tullywania and Fadd, along the line of fault, running from Lattone Lough to Carrick Lough, where the shales are brought down to the south-east, and dip at from 40° to 50° against the Yoredale Sandstone. They consist of ferruginous black shales, but without the thick bands of ironstone so common in the beds to the S.E. of this district.

Millstone Grit.

The hill W. of Lough Macnean Upper, known locally as Glenfarne Hill (1,096 feet high), is capped with massive white quartzose grit and fine conglomerate, considered to represent the Millstone Grit. These beds are almost horizontal, except where a slight displacement of the boundary between the shales and grits occurs, owing to two small breaks. The grit is an extremely hard rock, and there is the greatest possible difficulty in facing it, but it makes an excellent building stone for bridges, window sills, &c.

S. B. W.

POST-PLIOCENE.

Drift.

The Drift consists of stiff blue and reddish clay, with glaciated stones and boulders, and is generally known as Boulder Clay.

To the north of Lough Melvin and along the extreme northern portion of the sheet, the low ground is covered with large accumulations of Boulder clay moulded into low ridges lying in a direction corresponding to that of the ice-striation. Few sections of Boulder clay can be seen, with the exception of road cuttings, where striated blocks of sandstone and black shaly limestone are found imbedded in a stiff clay. Immediately over the Boulder clay there is a pasty impervious loam of various thicknesses separating the soil from the subsoil; this loam attains its greatest thickness at Rosscor, near the shores of Lough Erne, and leaves the soils wet and marshy. On the high grounds there are few traces of Drift.

R. G. S.

The Drift in the central and southern districts entirely consists of stiff blue Boulder clay, with pebbles and rounded or striated boulders; the limestone boulders retaining the scratches more perfectly than those of any other rock. The boulders are local, being composed of rocks from the surrounding hills. In the eastern and south-eastern part of the sheet large deposits of Drift are found, generally surrounded by alluvial flats and bogs.

A list of localities where glaciated rock surfaces or glacial striæ have been observed is given on another page. The general direction of the ice-movement indicated by these observations is towards the north-west—that is, from the interior towards the seaboard.

S. B. W.

Recent and Post Glacial Deposits.

In the S.E. corner of the sheet there are some alluvial deposits of clay or silt, which are worked and burnt into tolerable bricks.

Along the valley of the Sillees River a network of alluvial flats, with occasionally a peat bog, follows the course of the stream and its tributaries.

In the higher districts there are vast tracts of mountain bog, sometimes reaching as much as 12 or 14 feet in thickness in the cuttings or pits formed in working the turf banks for fuel. In the lower bogs, stems and branches of fir are plentiful.

S. B. W.

Igneous Rocks.

To the N. W. of Church Hill there is a large well-marked dyke of dolerite running in a N. W. direction. This dyke is remarkable for having a large number of angular pieces of quartzite imbedded in it; but no trace of the rocks of the immediate district were noted. It is traceable further north in Sheet 32 on the northern shores of Lough Erne, having similar pieces of quartzite imbedded in it, but it is there in proximity to the quartzite of the Metamorphic Series, whereas in this Sheet its visible outcrop must be separated by at least 600 to 700 feet of intervening strata.

Another dyke of dolerite, traceable about a mile and a half W. of the last mentioned one, is not so large, nor has it any imbedded foreign fragments in it. It is found there along one of the faults, as well as bursting through the Upper Limestone further south.

R. G. S.

Two small outcrops of dolerite occur—one at the angle of the road south of Farm Hill, and the other about one mile east of Blaney Bay, at the junction of the Lower Limestone with the Calp Sandstone. The rock in each case is dark greenish crystalline granular, and weathers spheroidally.

In the N.E. corner of the Sheet on the N. shores of Lough Erne, a dyke of dolerite traverses the country in a N.W. and S.E. direction to the north of the road; it is about 100 yards wide, of a dark greenish colour and with a globular structure; it makes an excellent road metal.

At Carricknagower Lake a large mass of hard bluish green basalt spreads itself over the slope. It appears to be about 7 feet or 8 feet thick, and extends down to the well called Tober Patrick. At Derrynaharbit Lough and Tullynanny Lough there is another bed of basalt which extends to south of Lough Navar. It is highly polished in several places, and retains the ice striæ very perfectly, particularly at Tober Patrick.

A decomposed dyke of dolerite occurs on the road side a little S.E. of Springfield, on Derrygonnelly and Enniskillen road.

These sheets of dolerite and basalt are clearly intrusive, and have been injected into the Carboniferous beds at some period more recent than the Lower Carboniferous; but, there is in the district no further evidence as to the date of their protrusion.

S. B. W.

Faults.

As the faults have already been sufficiently described in previous pages (pp. 9 to 15), in connexion with the range and position of the formations, further reference to them under a separate heading appears unnecessary.

Glacial Striæ observed in this District.

Townland.	Direction.	Remarks.
Bar of Slawin, . . .	N. 60 W. or S. 60 E.	Direction of flow doubtful.
Menacloyabane, . . .	N. 65 W. or S. 65 E.	,,
Glen West (Tober Patrick),	N. 45 W. or S. 45 E.	,,
Glennasheevar, . . .	N. 45 W. or S. 45 E.	,,
Rossinure, ...	N. 40 W. or S. 40 E.	,,
Meenagleragh, . . .	N. 45 W. or S. 45 E.	,,
Meenagh, ...	N. & S.	Very large glaciated surface. Striæ well shown. Direction of flow doubtful.
Corralea, ...	N. 45 W. or S. 45 E.	Direction of flow doubtful.
Carrickmacflaherty, . .	N. 60 W. or S. 60 E.	,,
Rahallan, ...	N. 60 W. or S. 68 E.	,,
Glenkeel, ...	N. 45 W. or S. 45 E.	,,
Shean North, . . .	E. & W.	One mile S. E. of trig. point.
Farrancassidy, . . .	N. 80 W.	West of Cross-roads.

Palæontological Notes—Sheet 44.
Localities from which Fossils were collected.

No. of Locality.	Quarter Sheet of 6-inch Map.	County and Townland.	Situation and Geological Formation.
		County of Fermanagh.	Carboniferous Limestone, Sandstone, and Shale.
1	8/3	Drumlisaleen, . .	Quarry on left side of old road from Belleek to Garrison, close to National school, one mile south of Belleek, and three miles north of Garrison; calcareous limestone and sandstone. (Middle or Calp Beds; on Map.)
2	8/3	Moneendogue, . .	Large quarry close to Farrancassidy cross-roads, about a quarter of a mile south of preceding locality; buff coloured sandstone (Middle or Calp Beds; on Map.)

Palæontological Notes.

Localities from which Fossils were collected—*continued.*

No. of Locality.	Quarter Sheet of 6-inch Map.	County and Townland.	Situation and Geological Formation.
3	8/3	Gortnalee, . .	Rocks in stream close to Gortnalee-bridge, three miles and a half north-east of Garrison; dark gray shales. (Middle or Calp Beds; on Map.)
4	8/4	Carrigslagh, . .	Rocks in field, quarter of a mile south of Slawin Church, three miles south-east of Belleek near road from thence to Churchill; buff-coloured sandstone. (Middle or Calp Beds; on Map.)
5	8/4	Calagheen, . .	Rocks at Nunny's hill, a little south-west of preceding locality; calcareous limestone. (Middle or Calp Beds; on Map.)
6	13/3	Garrison, . .	Rocks on shore of Lough Melvin, a little north of Garrison; gray flaggy sandstone. (Middle or Calp Beds; on Map.)
7	14/4	Rossinuremore, .	Cliffs over Sereenagh River, about two and a half to three miles west of Derrygonnelly; gray crinoidal limestone, and dark gray shales. (Upper Limestone; on Map.)
8	15/1	Derrygonnelly, .	Rocks in River Sillees, close to town; coarse gray arenaceous limestone, and micaceous shales. (Middle or Calp Beds; on Map.)
9	15/1	Derrygonnelly, .	Cliff close to old church on road leading from Derrygonnelly to Ballyshannon-road, quarter of a mile north of the town; coarse arenaceous limestone, and micaceous flags. (Middle or Calp Beds; on Map.)
10	15/1	Cosbystown, . .	On Ballyshannon and Enniskillen-road, two miles north-east of Derrygonnelly; dark gray limestone. (Lower Limestone; on Map.)
11	15/2	Blaney East, . .	Quarries at Blaney Bay, three miles north-east of Derrygonnelly; dark gray compact limestone. (Lower Limestone; on Map.)
12	15/3	Derryvary, . .	Rocks in stream, on left side of road from Enniskillen to Derrygonnelly, one mile north-east of Monea Church, micaceous shales. (Middle or Calp Beds; on Map.)
13	15/3	Derryvary, . .	Quarry in field, about a quarter of a mile from preceding locality, on same road; sandy and flaggy beds. (Middle or Calp Beds; on Map.)
14	21/2	Graan, . . .	Quarry on left side of road from Enniskillen to Derrygonnelly, two miles north-west of Enniskillen; dark gray compact limestone. (Lower Limestone; on Map.)
15	21/2	Moyglass, . .	Rocks on left side of old Derrygonnelly road, near Moyglass cross-roads, from a quarter to half a mile north-east of Springfield, four miles north-west of Enniskillen; bluish gray limestone baked to a blackish shale, from contact with an igneous rock. (Middle or Calp Beds; on Map.)
16	21/2	Magherandunbar, .	Quarries near Manor House, on Ballyshannon and Enniskillen road, three miles north-west of Enniskillen; dark gray compact limestone (Lower Limestone; on Map.)

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

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 LIMESTONE, SANDSTONE, AND SHALE.

	Localities.
Plantæ.	
Fucoids?	8, 11, 12.
Plant fragments,	2, 6, 12.
Sagenaria rimosa,	1.
Actinozoa.	
Cyathophyllum sp. indet. (small turbinated corals),	10, 16.
Lithodendron affinis,	16.
Syringopora geniculata,	×11.
Zaphrentis sp. indet.,	3.
Polyzoa.	
Fenestella antiqua,	4.
Brachiopoda.	
Athyris ambigua,	×1, 4, 9.
„ planosulcata,	3, 11, 13, 14, ×15.
Chonetes Hardrensis,	××3.
Orthis resupinata,	1, 3, 5.
Productus giganteus,	3, 4, 13, 16.
„ punctatus,	3, 4, 16.
„ scabriculus,	×15.
„ semireticulatus,	1, ××3, 4, 5, 14, ×15.
Rhynchonella pleurodon,	3.
Spirifera bisulcata,	3, 9.
„ glabra,	9, 14.
„ striata,	3, 4, 10, 15.
Spiriferina cristata,	15.
Streptorhynchus crenistria,	3, 4, 5, 13, 14, 15, 16.
Terebratula hastata,	9, 13.
Lamellibranchiata.	
Aviculopecten plicatus,	4.
Axinus carbonarius?	4.
Cucullæa sp. indet.,	3.
Dolabra „ „	1, 4.
Sanguinolites discors,	4.
„ plicatus,	4.
Small Bivalves, Axinus, Nucula, &c.,	××××4, , 12.
Gasteropoda.	
Natica sp. indet.,	4.
Heteropoda.	
Bellerophon apertus,	4.
„ sp. indet.,	3.
Pteropoda.	
Conularia quadrisulcata,	3.
Cephalopoda.	
Cyrtoceras Gesneri,	4.
Orthoceras Goldfussianum,	4, 5.
Crinoidea.	
Actinocrinus amphora (collected by Mr. Thomas Plunkett),	7.
Actinocrinus lævis,	7.
Platycrinus „	7.
Poteriocrinus crassus,	7.
Crinoidal remains,	1, 3, ×××4, 5, ×××7, ×××8, 10, 11, 13, 14, ××15, 16.
Blastoidea.	
Pentremites Derbiensis (collected by Mr. Thomas Plunkett),	7.

Remarks on the Fossils.

Plant remains were found to occur at seven localities; at No. 1, a well-marked plant, in sandstone, I have referred to *Sagenaria rimosa*, was collected by Thomas Plunkett, esq., M.R.I.A., of Enniskillen, other fossils in strata associated with it are Brachiopod shells, *Athyris ambigua* and *Productus punctatus*.

At Nos. 6, 8, 12 the Plant remains occur in flaggy and micaceous shales, at No. 8 being associated with beds of arenaceous limestone containing crinoids.

Of the other fossils, Actinozoa were remarkably few, except small turbinated corals *Cyathophyllum* and *Zaphrentis*, there were but two others identified, *Lithodendron affinis* at loc. No. 16, and *Syringopora geniculata* in the black massive and horizontally-bedded limestone at Blaney bay, No. 11, correctly designated as Lower Limestone. Of Polyzoa only one species was noticed—*Fenestella antiqua*—at loc. No. 4.

Brachiopoda were the most prevalent of all the fossils, nine genera, including fifteen species, having been collected at eleven localities. Of these *Athyris planosulcata* occurred at five localities, *Productus giganteus* at four, *P. semireticulatus* at six, and *Streptorhynchus crenistria* at seven localities; *Chonetes Hardrensis*, a characteristic Lower Carboniferous and Upper Devonian species, was collected at loc. No. 3, where it was abundant.

Lamellibranch bivalve shells were noticed at five localities, being most prevalent at loc. No. 4. Gasteropoda (univalve shells) were remarkably few.

A Pteropod shell, *Conularia quadrisulcata*, is of great interest. It was collected by Mr. R. Clark, at loc. No. 3, and has only hitherto been found in Irish strata, at Hook-head, county Wexford, in Lower Limestone shale.

Crinoidal remains were remarkably abundant at one locality (No. 7). —the high cliffs over Screenagh river at Rossinuremore, about two and a-half miles west of Derrygonnelly, where a section is exhibited of a great thickness of limestone, resting on 30 to 40 feet of shales and thin beds of limestone, full of crinoidal remains; higher up this river Mr. Plunkett obtained heads of *Actinocrinus amphora*, and *Pentremites Derbiensis*, a small Echinoderm prevalent in the limestone cliffs of Ben Naughlin, near Florence-court; also found by me in a limestone quarry a little north-east of Manorhamilton.

December 23rd, 1884. William Hellier Baily.

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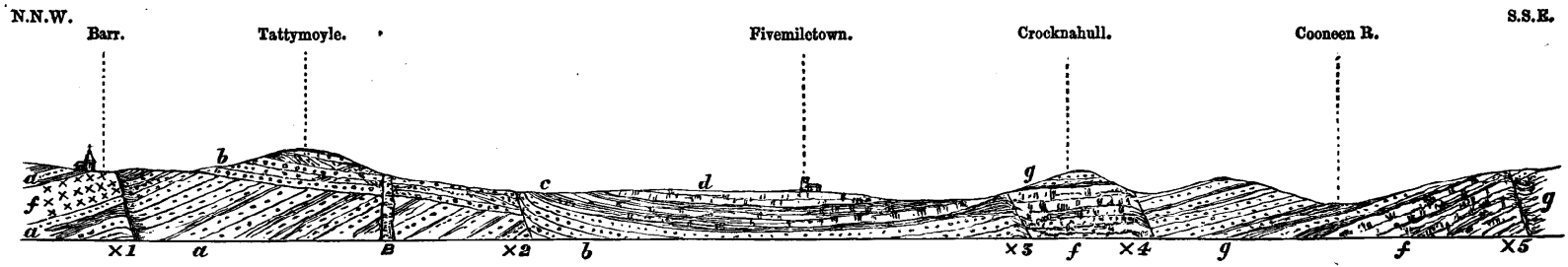
FRONTISPIECE.

Horizontal Section in a N.N.W. and S.S.E. direction across Sheet 45 to illustrate the relations of the formations, and the structure of the district.



Section (5) across the country by Fivemiletown.

a. "O.R.S." (Dingle Beds).
b. Quartzose (Lower Carboniferous) Conglomerates.
c. L.C. Shale.
d. Lower Limestone (Calp, cut out).
f. Upper Limestone.
g. Yoredale Beds.
F. Felstone.
B. Dolerite.

× Tempo (1), Aghintain and Clabby (2), Brookeborough (3), Alderwood (4), and Jenkin Lough (5) faults.