Memoirs of the Geological Survey.

EXPLANATORY MEMOIR

TO ACCOMPANY

SHEET 56 OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND,

INCLUDING THE

DISTRICT AROUND SWANLINBAR, FLORENCE-COURT, AND DOWRA.

BY

S. B. WILKINSON AND RICHARD J. CRUISE, M.R.I.A.

WITH

PALÆONTOLOGICAL NOTES BY W. H. BAILY, F.L.S., &c.

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PREFACE.

THE district included in this Explanatory Memoir rests altogether on Lower Carboniferous beds, if we except the very small tract of Bencroy at the southern margin. It forms a portion of the Carboniferous region of the North-west of Ireland, where the different divisions are developed on a grand scale, and are disposed in the form of an elevated plateau deeply eroded into wide valleys, so that only fragments of the original upper surface of the plateau remain, as in the cases of Cuilcagh, Bencroy, and Lackagh. It is to be recollected, however, that even the highest beds capping these heights are by no means the uppermost strata of the Carboniferous series, and that there is every probability that productive coal-measures of the Upper Carboniferous age once covered this whole region.

The denudation, owing to which so large a portion of the Carboniferous strata has disappeared, commenced with the close of that epoch itself, and has continued, more or less uninterruptedly down to the present day. The process of rain and river erosion is finely exemplified in the broad glens bounded by steep, sometimes precipitous, slopes and escarpments, by which the district is diversified.

The greater part of the Map was geologically surveyed by Mr. Wilkinson; the portion along the southern and part of the western margins by Mr. Cruise and Mr. Hardman.

EDWARD HULL,
Director.

March, 1886.

THE

GEOLOGICAL SURVEY OF THE UNITED KINGDOM

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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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EXPLANATORY MEMOIR

TO ACCOMPANY

SHEET 56 OF THE MAP

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The district included in Sheet 56, and described in this memoir, lies partly in three counties, viz.—Fermanagh, Cavan, and Leitrim.

The northern margin may be said to run very nearly along the coach road from Manorhamilton on the west, to Black Lion and on through the middle of Lough Macnean Lower, and along the Arney river, on the east.

The southern limit runs south of Brackley Lough, passes through Bencroy, and crosses Lough Allen at St. Patrick's church.

The eastern margin runs on an average half a mile east of the coach road, from Florencecourt to Brackley Lodge.

The western boundary runs S. from Glenboy House, passing Lough Allen about one mile west of Lecarrow.

The only town in the district is that of Swanlinbar, the other places of note being the small villages of Black Lion and Dowra.

The Enniskillen and Sligo railway traverses the northern margin, opening out, to a certain extent, the district south; which is very badly accommodated with means of traffic.

Physical Geography and Geology.

Cuilcagh Mountain forms one of the chief features in this area; it attains the height of 2,188 feet. It is flat-topped and runs in a N.W. direction for three miles, being about half a mile wide at the N.W. end, where it is called Tiltinbane, and is 1,949 feet above sea level. It presents a very fine escarpment on its N.E. side, and then slopes gradually down to the shores of Lough Macnean Lower. It continues on the S. in the form of an arc for about two miles, the termination of the arc called Bin Beg (1,774 feet), being exactly due S. of Cuilcagh. Here the chain of hills is cut by the gap of Bellavalley, 1,139 feet. Immediately south of the gap the hills rise abruptly, and sweeping round in a north-westerly direction, terminate in the grand hill called Slievenakilla, 1,793 feet, immediately overlooking the village of

Dowra, forming as it were with Tiltinbane the portals of a huge amphitheatre.

The ground from Slievenakilla slopes gradually south to the Yellow river, rising again southwards from the valley to Bencroy or Gubnaveagh Mountain, 1,707 feet.

In the N.W. of the sheet the ground undulates at heights ranging from 1,400 to nearly 1,600 feet.

These higher hills are nearly all capped by Millstone Grit, and form in most cases, table-lands breaking off into steep escarpments, thus showing the former extension of these beds over the entire area.

The escarpment of the Upper Limestone formation is a most striking feature in the district, forming a serrated ridge at the base of the Yoredale Sandstones, and at Benaghlin it takes the form of an isolated bluff, standing well out from the main chain of hills.

This district is drained by the Shannon and Erne rivers. The head waters of the former being the Owenmore, which together with the Yellow river to the south, collects the numerous streams that drain the valleys and high moorlands, and discharges them into Lough Allen.

This fine sheet of water forms a great natural reservoir for the upper waters of the Shannon, its summer level being 159 feet, and its winter level 163 feet over ordnance datum.*

The "Shannon Pot" (as it is termed by the natives), is a deep round hole in the limestone, from which the water bubbles up. We believe the true source of the Shannon however to be really Lough Garvagh, 1½ miles to the N.E. This little lake drains a considerable area of ground at the base of Tiltinbane, its waters escaping in an underground channel communicating with the Shannon Pot, one of the tributaries of the Owenmore river. This view is confirmed by the observation of people living in the district, who state that, on one occasion when sacks of chaff were emptied where the small river which drains the Lough disappears, after a short interval the chaff re-appeared in the Shannon Pot.†

The water-shed between the tributaries of the Shannon and Erne rivers, commences near the N.W. margin of the sheet at Lough Kip, thence trends along the escarpment of Millstone Grit, to the N. of Loughs Doo and Naweeloge. Descending from the table-land, it reaches the Carboniferous Limestone near Brackley's Lough, and continuing by the "Giant's Leap," turns to the south, towards the northern extremity of Tiltinbane; then following the table-land of Cuilcagh and descending by Benbeg it crosses the Gap of Bellavally, and ascending to the table-land of Benbrack takes a southerly course, leaving the sheet at the submit of Bencroy. Thus the water-shed takes an almost semicircular course

* For the formation of this Lake, see Ex. Mem., Geo. Survey, 66 and 67, p. 9, and Dr. Hull's "Physical Geology and Geography of Ireland," p. 189.

† Dr. Hull refers to this fact in his "Physical Geology and Geography of Ireland," p. 172.

between the northern and southern margins of the map, following the crests of the higher ridges.

The great effects produced by denudation are well illustrated in this district, the entire area having been one vast table-land, after the close of the Carboniferous period.

Its present physical features are almost entirely due to the gradual deepening and widening of the valleys by the action of the rains and rivers leaving the table-lands of Cuilcagh, Slivenakilla, &c., standing out boldly in the landscape as remnants of more extensive formations.

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

AQUEOUS ROCKS.

Recent and Post-Pliocene.

Name.	Colour and Sign on Map.
Alluvium, Bog, and other Superficial Covering,	*Raw Umber.*
Drift, or Post-Pliocene,	*Engraved Dots.*

Carboniferous.

Lower Coal-Measures,	d^5. *Lampblack.*
Millstone Grit,	d^4. *Indian Ink, light.*
Yoredale Shale,	d^3. *Indigo, light.*
„ Sandstone,	d^3. *Yellow, with Red Dots.*
Upper Limestone,	$d^{3///}$. *Prussian Blue, dark.*
Middle Limestone (Calp),	$d^{3//}$. *Indigo.*

IGNEOUS ROCKS (INTRUSIVE).

Diorite,	D. *Burnt Carmine.*
Basalt,	B. *Burnt Carmine.*

CARBONIFEROUS BEDS.

Middle (or Calp) Limestone.

This division of the Carboniferous Limestones occupies the N.E. portion of the sheet, and is the lowest member represented. Commencing at the N.E. of the sheet, it follows the line of the Swanlinbar valley. In the N.E. portion the beds are rarely seen, owing to the large quantities of Drift and alluvial flats and bogs. A good section is observable at the "Marble Arch;" where the beds are nearly horizontal or dip at low angles under the Upper Limestone.

The formation consists of shales and argillaceous limestones containing many fossils; *Zaphrentis cylindrica* being especially abundant. The beds are not met with again until a considerable distance is travelled in an E. direction, owing to the large Drift deposits; but where these are cut through by the streams (as in Florencecourt Park) the same earthy, soft, impure, dark blue shales are seen, highly fossiliferous and dipping S.W. at not more than 5°. On the coach-road from Swanlinbar and a little S. of Bumper Lodge cross-roads, they are also visible. In the stream running

down from Benaghlin, being the southern boundary of Doohatty and Coolinfin Glebes, there is a very good section. The beds dip due W. under the Upper Limestone at an average of 5°, and consist of black shales, with a few impure limestone bands, very fossiliferous. A little S. on the road side, at the boundary of the townland of Corranaheen, black shales with bands of impure limestone lie horizontally and contain fossils. About half a mile S., where the coach road forms an angle, horizontal shale beds are seen, and following the road some three or four hundred yards down they are again visible dipping W.S.W. at 5°.

So far it will be seen that the beds have retained their low angle of dip and steadiness of direction; but on entering the valley between Swanlinbar and Brackley Lough, the beds are much disturbed owing to several faults traversing the valley.

A little S. of Swanlinbar, the beds dip N.W. at 10°. This is near where a large fault runs, bringing the Yoredale Sandstone and these beds into contact and cutting out the Upper Limestone. Following the Claddagh (Swanlinbar) river a mile up its course, highly fossiliferous blue shales, with bands of impure sandstone, are found dipping at 25° N.W., and striking against the Upper Limestone which is here brought down by a fault.

The area occupied by the Middle Limestone is very much reduced as compared with that S. of Lough Nilly.

In the stream which runs from the hills and joins the Blackwater at the townland of Drumboory a fault running N. & S. disturbs the shales which retain their highly fossiliferous character. Immediately E. of the line of fault they dip S.E. at 20°, and immediately W. of the same fault due W. at 30°. To the east of this about one mile, at Drumcar corn-mill, beds bearing exactly the same character are much disturbed, dipping at high angles from 20° to 40° in an easterly direction.

South-west of Scrabby hill (338 ft.) in the stream, the beds are much broken. There is a good section, the fault running N. & S., and joining the larger fault to the N. Beds of impure limestone, highly fossiliferous, with some evenly bedded blue crystalline bands, appear on the W. of the break, dipping N. at 5°. On the E. they are vertical, the line of strike running N. 10 E. Following the stream towards Brackley Lough the beds gradually bend round to S.E., and the angle of dip decreases from 60°–25°–15° getting lower further away from the break.

These rocks are only exposed to view once more, owing to the thick Drift deposits, viz., a little west of Brackley Lough, dipping E. at 10° where they consist of blue shale and impure flaggy limestone.

S. B. W.

Upper Limestone.

This division of the Limestone series in this district often forms a most striking feature. It enters this Sheet on the N. at Red Lion and Corry Point, and ranging in a S.E. direction, forms a ridge at the base of the Yoredale Sandstone, round by Florencecourt, Swanlinbar, getting gradually narrower west of Brackley Lough, where it leaves the sheet.

On the east of the Swanlinbar valley it forms a low saddle-backed ridge, leaving the sheet south of Brackley Lough; on the north it is abruptly terminated by the large fault previously mentioned as passing to the south of Swanlinbar.

There is also another area occupied by this formation, viz., the extreme N.W. corner of the sheet, round Glenboy. The formation consists of massive crystalline Limestone, Coralline and Crinoidal, with occasionally numerous beds of chert (or flint), as for example on Benaghlin near Florencecourt.

Taking the central and larger area first, the dip is generally at a low angle. The rock in places is disturbed by breaks and faults, and often, owing to its being so soluble, masses have fallen in where the water has dissolved the lower beds. The rivers running down the slopes of Cuilcagh over the Yoredale shales and grit, sink underground on reaching the limestone, and re-appear at its base. A good example of this is seen at the Claddagh river (Marble Arch), where the three streams—the Owenbrean, the Aghanrahn, and the Croppa, sink at their respective "swallow holes"—Pollawaddy, Pollasamera, and the Cat's hole, and re-appear at the Claddagh river above mentioned, where there are several very large caves. These streams can be traced for some considerable distance underground by a series of swallow holes through which the sound of the stream ascends, especially after floods.

In this district the rock is very massive, and sometimes the beds appear to be of enormous thickness, as at the escarpment known as the "Hanging Rock," between Florencecourt and Black Lion.

To go more into detail; at Red Lion the beds are dipping at angles varying from 10° to 30° in a due westerly direction. This high dip is owing to the rather sudden bending round of the beds. A little south of Red Lion a small fault disturbs the regularity of the bedding, where the rock dips S. at 20°, the beds, however, soon become nearly horizontal until again disturbed by a fault running from Upper Lough Macnean to the "Shannon Pot," which brings the limestone considerably up the hill side. Between Loughs Macnean and Garvagh, owing to the absence of Drift deposits, the rock is generally exposed at the surface, and forms broken craggy ground suitable for sheep pasturage, the dip where it can be ascertained is at a low angle. The rock weathers white and contains large stools of coral, besides other fossils, together with nodules and bands of black chert; when fractured it generally presents a highly crystalline structure.

At the junction of the Limestone and Sandstone in the Croppa river the limestone dips at 20° under the sandstone, and a

little further down the dip is only 5° N.N.W. This variation of dip is, I think, caused by the limestone underneath having given way, owing to the lower beds being water-worn; with this exception the limestone dips at a low angle under the sandstone (Yoredale) all along the northern junction of these rocks.

The lower beds form a fine escarpment from Marlbank, by Skreen hill, Florencecourt deer park (where it forms a natural wall), round by Benaghlin to the boundary between co. Fermanagh and co. Cavan; they dip evenly at low angles, and retain the same appearance. Benaghlin stands out in bold relief, having a steep escarpment on its eastern side; the beds are almost horizontal, and very cherty.

At the county boundary, N. of Swanlinbar, the escarpment is broken through by a fault which has a downthrow to the south.

North of this fault the rock lies in horizontal beds, and immediately south it dips N.N.W. at 25°. The beds soon recover their low angle of dip, but the area occupied by the Upper Limestone is much curtailed. About one and a half mile south of the county boundary another fault occurs, which runs nearly E. and W., and throws the limestone further down the slopes of the valley, but it is soon cut out again by the large fault before mentioned which runs parallel with the Claddagh river. After this little is seen of the rock owing to Drift deposits, but in the stream running down from Benbrack the limestone dips at 5° immediately under the Yoredale Sandstone.

At the east of the Swanlinbar valley, and immediately south-east of the village, the large fault above mentioned cuts off the limestone abruptly at its northern limit, but travelling S. the beds dip evenly under the Yoredale grits at a higher average angle than in the northern part of the sheet.

In the N.W. corner of the sheet, in the vicinity of Glenboy House, the beds of the Upper Limestone are very much faulted. It is a hard blue crystalline and cherty rock—fossiliferous, with stools of coral, as noticed throughout the Upper Limestone in this district. In Glenboy river, the beds are affected by a fault, and dip from 15° to 40° in a N.W. direction; the main break runs N. and S. a little to the W. of the river. About a mile up the course of the stream the same fault crosses where the beds are vertical, striking N. 10° E. West of this line of fault, they are much broken up, and disturbed. Some little distance W. the beds seem to recover more or less their horizontal position.

Yoredale Sandstone.

This member of the Carboniferous series occupies a large area in the middle of this sheet, besides some three or four smaller detached areas. The first named enters the sheet in a narrow strip at Red Lion, but almost immediately it is displaced by a fault, which throws the beds up the hill W. of Eskey Bridge—here they dip S.W. 15°.

The average dip of the Yoredale Sandstone is low, and only where disturbed by faults is it very variable. This rock consists of massive light yellow or white quartzose grit with occasional shale partings. Towards the southern border of the map it becomes very thin and ultimately disappears. At the northern part of the map the rock extends eastwards in a curve, getting considerably broader, till it is terminated somewhat suddenly by a fault running from Lough Macnean Upper to the "Source of the Shannon." Along this line of fault the beds dip at 45° E., or directly towards the Upper Limestone. From the "Shannon Pot" it extends to the Dowra and Glengevlin valleys, and traverses the base of the Yoredale Shales on the N. slope of Cuilcagh round to the eastern side, past Binbeg, and gradually narrowing leaves the sheet S.E. of Benbrack.

Taking the Dowra valley first, at Lough Aglour the beds are nearly horizontal, sometimes dipping at 5° W., where the uppermost beds consist of massive, white, highly quartzose sandstone, the lower beds appear to be more flaggy.

At Carrickacladdy Lough, beds of quartzose white sandstone dip. S.W. at 5°. Along the coach road, beds of quartzose sandstone crop out, at the base of the shales, dipping 3° W. Further S., massively bedded, highly quartzose, white grit and sandstone appear in the River Shannon. From here very little rock is to be seen, owing to drift deposits and tracts of alluvium.

The little island of Inishmagrath in the extreme northern part of Lough Allen, is formed of sandstone which is well exposed at the base of the Yoredale shales of Slievenakilla, dipping steadily, and at a very low angle, immediately under the shales. The rock consists of massively bedded white and yellow sandstone, and in the stream in the townland of Moonenabone, yellow, massive quartzose sandstones with ripple-marks may be observed.

The sandstone makes a capital building-stone, but is liable to stain a deep rust colour on exposure. As road-metal it would be hard to find a worse material, as it crumbles into sand on very slight pressure, and the first shower cuts the road into watercourses, which if not immediately filled in, would cause it to become impassable.

On the northern slope of Cuilcagh sandstones of the same class are well exposed in the streams, and a good section is seen close to Lough Allen where the beds are horizontal. At the county boundary N.W. of Swanlinbar, S. of the fault, they dip. S.W. at 25°, but soon recover their low dip and retain it till the Owensallagh river is reached, when they dip at a somewhat higher angle, 15° to 30° N.W., under the shales; here the beds seem to become very thin before leaving the region of this Sheet.

On the east of the Swanlinbar valley another band of Yoredale Sandstone divides the Upper Limestone from the shales; the beds dip at a higher angle than those on the W. of the valley.

Above Brackley Lodge the beds lose the massive character under which they occur to the N.W.

On the other side of the valley, there are yellow argillaceous

sandstones, well bedded impure limestone and shale. then beds of sandstone, and thick beds of shale and ironstone. This is characteristic of the Yoredale beds of the Ballyconnell hills as mentioned in the Memoir of Sheet 57.

East of Tircahan Lodge, fine yellow sandstones, in places becoming fine quartzose grits, dip. S.E. at 20°.

S.E. of Swanlinbar, highly quartzose grits and sandstones occur; sometimes the beds are almost conglomerates, massively bedded, and dip a little S. of E. These beds are cut off abruptly by a fault.

About three miles W. of Red Lion, a small area is occupied by Yoredale Sandstone; there is strong evidence of a fault which appears to have developed itself more at this point than anywhere else along the line of break.

In the N.W. corner of the sheet a band of sandstone traverses the valley, forming a kind of plateau. It dips at a low angle, viz., from 3° to 5° under the Yoredale shales, and gradually getting narrower leaves the sheet about 2 miles S. of Glenboy, where it is massively bedded, and sometimes finely conglomeratic. South of Hollymount massive sandstones are brought down by a fault which is well marked. This sandstone would make a good building stone.

S. B. W. & R. J. C.

Yoredale Shale.

This division is well represented, dividing the Millstone Grit from the Yoredale Sandstone. In the streams running down the slopes of Cuilcagh, and indeed through all that range of hills, good sections are to be seen. The average dip is low, and the beds abound in nodules and bands of ironstone, which in some instances contain a fair percentage of iron, but owing to the difficulties and distance of carriage it probably would not prove remunerative to work them.

The shales of Cuilcagh mountain, Benbeg, Benbrack, and Slievenakilla, are identical throughout. On the slopes of Cuilcagh, more particularly those on the north and east side, the streams cut deep into the shale beds; the dip may be taken at an average of 5° under the Millstone Grit. They are highly fossiliferous, and contain bands and nodules of ironstone, the shales in some instances have apparently weathered and left large saucer-shaped nodules, as it were, bedded in the shale.

South of the gap of Bellavalley, in the stream which forms the boundaries of the townland of Altateskin, the shale beds have been deeply cut into, and a good section of them is visible. They are somewhat contorted, but the true dip is about 5° W. and N.W. The ironstone bands and nodules are more numerous, of greater thickness, and, as far as one can judge without an analysis, contain a larger percentage of iron. There are signs still visible where this stone was removed many years ago for smelting; and, at a lower elevation, where the natural wood that was used

to smelt the ore formerly grew, mounds of ferruginous-looking clay and charcoal are still to be seen.

In the stream S. of Benbrack, shale beds are seen dipping under the grits, and immediately at the base of the cliff the shales are horizontal, having the Millstone Grit resting on them.

In the valley of Glengevlin, the hill slopes are traversed by innumerable little streamlets, cutting deeply into the shales; which are nearly horizontal and must be at least 500 feet thick: they are highly ferruginous, but the ironstones do not appear to be so thick as south of Bellavalley gap.

West of the village of Dowra near the margin of the sheet in the stream S. of trigonometrical station 1,037, black shales are seen to dip in a N.E. direction at a very low angle.

West of Ardlaughter Lough, the shale beds and ironstone are seen dipping under the grit at 5°, the grit here being slightly thrown down the slope by a fault.

The boundary between the shales and grits S. of L. Natire, has been marked by Mr. Hardman as a fault, the dip being suddenly changed along the line. In the stream which forms the county boundary I observed deep cuttings in beds of shale nearly horizontal, containing ironstone nodules. The shales occupy the slope of the hill N. of Tober, but owing to the great banks of Boulder clay the beds are barely seen; N. of Carrakeldrum Lough, they dip into the hill from 3° to 5°. E. of Tents Lough there are some very slight indications of coal, utterly worthless; but there are some of the oldest inhabitants who remember some English miners having lived in a hut on the hill side for the purpose of working the coal.

Deep masses of Boulder clay are banked against the hill, and nothing more is seen of the beds for some distance Further N., where they appear again they are nearly horizontal, fossiliferous, and ferruginous, dipping under the Millstone Grit: they get gradually thinner to the W., and where they leave the sheet, two miles S. of Glenboy, they are very thin.

Millstone Grit.

The Millstone Grit caps all the higher mountains, such as the Cuilcagh range, Benbrack and Slievenakilla, and the hills above Tober, with the exception of Bencroy, on which occurs a small outlier of Coal-Measures. The beds may be described as massive, varying from a coarse sandstone to highly quartzose conglomerate, and contain large fossil plants. The average dip is low. On the top of Cuilcagh the beds seem to undulate very slightly. On the N. and E. face of Cuilcagh and Benbrack and the N. of Slievenakilla the grits form a grand escarpment, the beds not dipping at more than 5°.

The table-land above Tober on the other side of the valley between Loughs Avanny and Doo is formed of massively bedded quartzose grit on which a large quarry has been opened. The

beds are very fine grained, flaggy, white, and quartzose; the flags can be raised to almost any necessary size; they are much used in the towns of Sligo and Enniskillen for paving the streets, &c.

S. B. W.

Lower Coal-Measures.

The beds of this division of the Carboniferous Series are but sparingly represented. They form the cap or dome of Bencroy mountain at the southern margin of the sheet. The beds, which consist altogether of dark brown and black fissile shales, are about 100 feet thick, and dip, saucer-like, at very low angles towards the centre of the mountain. Their southern boundary is a nearly E. and W. fault, bringing up the Millstone Grit against them.

R. J. C.

IGNEOUS ROCKS.

A trap dyke about 30 feet wide, running in a N.W. and S.E. direction, cuts through the limestone between Skea Hill and Cat's Hole; it is seen in section in the three streams just before they disappear in the limestone. It consists of a dark bluish-green crystalline granular diorite or dolerite, weathering into ferruginous nodules, and containing crystals of a dark greenish mineral, probably olivine.

West of the junction of the Yoredale Sandstone and Upper Limestone in the Claddagh (Swanlinbar) river, a similar dyke occurs, and probably the same dyke crops up at the corn-mill N. of Brackley Lough and a little E. of the boundary of the Upper Limestone and Yoredale Sandstone.

Immediately under Benaghlin there is a very decomposed dyke apparently of basalt, weathering into a ferruginous sand, and ranging in a N. and S. direction for a short distance. There is no other evidence of igneous rocks in this district.

S. B. W.

POST-PLIOCENE (Drift).

The Drift of this district consists entirely of Boulder clay—composed of tough blue or yellow clay, having boulders of different sizes imbedded in the mass; they are chiefly formed of limestone, sandstone, and occasionally some are of dolerite and basalt.

In the case of the limestone, they are well rounded, having a polished surface, very often striated. In the low-lying ground the round hog-backed hills are composed of Boulder clay, generally surrounded by alluvium or peat bog, and having a slight inclination to trend N. and S.

Wherever the Drift has been deposited the land for agri-

cultural purposes is of an inferior description; the clay being of such a retentive nature that the rain water has great difficulty in draining off, and owing to the presence of a certain amount of sandy matter, drain pipes when used very soon get filled.

S. B. W.

On the west of Lough Allen, close to Lecarrow, pipes and tiles were manufactured, the clay being of a suitable character.

Half a mile N. of the latter locality boulders of gypsum were observed in the Drift.

R. J. C.

Glacial Striæ observed in this District.

Townland.	Direction.	Remarks.
Legreane, . .	N. 70 E. or S. 70 W.	W.S.W.
Camderry, . .	E. and W.	doubtful.
Knockgorm, . .	N. 70 W. or S. 70 E.	,,
Commas, . .	N. and S.	,,

Recent and Post-Glacial.

Alluvium and Brick Clay.

In the N.E. corner of the sheet the alluvial deposits yield a stiff blue clay, which when burnt makes a very fair brick.

The Earl of Enniskillen has a large brick-field at Arney (see page 16, Memoir of Sheet 57).

In the low lands, such as those of the Arney valley, very deep peat bogs surround the Drift hills, and there are vast tracts of mountain bog on the high ranges of the hills, sometimes attaining a great thickness. In the lower bogs, the remains of the old forests are seen, consisting of oak, fir, and probably hazel.

The fir sells well in the towns under the name of "bog wood;" it contains a large quantity of resinous matter and burns very rapidly.

When any tract of mountain side is fenced in and kept clear of cattle, and particularly goats, in a very few years a natural growth of blackthorn, hazel, and alder grows up.

S. B. W.

Palæontological Notes—Sheet 56.

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.
		County of Cavan.	Carboniferous Series.
1	2/3 & 4	Tuam, . . .	Quarries on east shore of Lough Macnean, half a mile north of Red Lion; "Upper Limestone," on Map.
2	2/3 & 4	Do., . . .	Rocks in fields, left side of road, about one and a half miles west of Black Lion; "Upper Limestone," on Map.
3	2/3 & 4	Kinnabo, . . .	Cliffs one mile and a half south of Red Lion; "Upper Limestone," on Map.
4	6/2	Commas, . . .	Top of Cuilcagh Mountain, south end, six miles south-west of Florence-court; gray sandstone; "Millstone Grit," on Map.
5	6/2	Do., . . .	Rocks in stream under south end of Cuilcagh, dark gray shales; "Yoredale Shales." on Map.
6	6/4	Do., . . .	Rocks in stream under Cuilcagh (north end), dark gray shales; "Yoredale," on Map.
7	6/4	Altnadarragh, . .	Rocks in stream near Lord Annesley's Lodge, road to Bellavally Gap, five miles south-west of Swanlinbar; dark gray shales; "Yoredale," on Map.
8	6/4	Bellavally, Upper, .	Rocks in same stream nearer the gap; dark gray shales; "Yoredale," on Map.
9	6/4	Do., . . .	Rocks in stream a little beyond preceding locality; gray sandstone; "Yoredale," on Map.
10	6/4	Bellavally, . .	Rocks in stream close to bridge, a little beyond at Bellavally Gap; dark gray earthy limestone and shales; "Yoredale," on Map.
11	7/1	Gortacashel, . .	Quarry on left side of road to Brackley Lough, half a mile south-east of Swanlinbar; light gray limestone; "Upper Limestone," on Map.
12	7/1	Monydoo or Tonycrom.	Quarries on ridge of hill, about two and a half miles west of Swanlinbar; dark gray compact limestone with cherty layers; "Upper Limestone," on Map.
13	7/2	Uragh, . . .	Rocks in stream at boundary of the counties Cavan and Fermanagh, on road from Long Bridge, one mile north-east of Swanlinbar; dark gray shales; "Calp or Middle Limestone," on Map.
14	7/3	Killaghaduff, . .	Rocks on left side of road from Swanlinbar to Brackley Lough, a little north of Tircahan Lodge, two miles south of Swanlinbar; compact light gray limestone; "Upper Limestone," on Map.
15	7/3	Dunglave, . .	At a quarter of a mile south of preceding locality, similar limestone; "Upper Limestone," on Map.
16	7/3	Drumcar, . .	Rock in stream near Corn Mill, three miles south of Swanlinbar; dark gray shales and earthy limestone; "Calp or Middle Limestone," on Map.
17	9/1	Prospect, . .	Quarry and rocks close to road to Bellavally Gap, north side of Brackley Lough; compact light gray limestone; "Upper Limestone," on Map.
18	9/1	Garvarry and Curraghabweehan.	Rocks on east bank of Owensallagh River, a little north of New Bridge, close to road to Bellavally Gap, three miles south-west of Swanlinbar; dark gray earthy shales; "Calp or Middle Limestone," on Map.

PALÆONTOLOGICAL NOTES.—LOCALITIES from which FOSSILS were collected—*continued*.

No. of Locality.	Quarter Sheet of 6-inch Map.	County and Townland.	Situation, Geological Formation, and Sheet of 1-inch Map.
		Co. of FERMANAGH.	
19	22/1	Carrigan, . .	Rocks on Claddagh River, at Claddagh Bridge dark gray shale and thin beds of limestone "Calp or Middle Limestone," on Map.
20	32/1	Skreen, . . .	Rocks on Claddagh River, near Marble Arch three miles west of Florence-court; "Upper Limestone," on Map.
21	32/4	Drumharriff, . .	Rocks in stream close to bridge, on road from Swanlinbar to Enniskillen; dark gray shales; "Calp or Middle Limestone," on Map.
22	32/4	Coolinfin Glebe, .	Rocks higher up the same stream, on opposite side of road; similar dark gray shales; "Calp or Middle Limestone," on Map.
23	32/4	Do., . . .	Rocks in same stream, near to Doohat Bridge, on road from Swanlinbar to Enniskillen; dark gray shales; "Calp or Middle Limestone," on Map.
24	32/4	Doohatty Glebe, .	Loose blocks from cliff at Benaghlin, two miles south of Florence-court; cherty gray limestone; "Upper Limestone," on Map.
25	32/4	Boundary of Corranaheen and Mullan,	Rocks in small stream on cross road from old Enniskillen-road to new do., half a mile west of Cornacrea National School; dark gray shales and thin beds of limestone; "Calp or Middle Limestone," on Map.
26	37/2	Boundary of Stumpy's Hill and Mullen.	Rocks in stream at Coffey's Ford, crossing old Enniskillen-road, two miles north-east of Swanlinbar; dark gray limestone and shale; "Calp or Middle Limestone," on Map.

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

The numbers opposite each species refer to the places at which they were collected, and the × placed before some of them is intended to denote their comparative abundance.

CARBONIFEROUS LIMESTONE, SANDSTONE, AND SHALE.

PLANTÆ.

	Localities.
Lepidodendron Sternbergii (var. obovatum) coal measure sandstone, "Millstone Grit," .	4.
,, (Sagenaria) Veltheimianum, . .	4.
Plants (branching), "Yoredale beds," . . .	9.
,, (fragments), ...	6, 8.

ACTINOZOA: *Corals*.

Amplexus coralloides, ...	2, 3.
Chætetes tumidus, ...	16, 18, 19, 20, 21, 22, 23, 24, 25, 26.
Cyathophyllum ceratites, ...	16, 22, 23.
,, (Zaphrentis) cylindrica, . .	16, ××× 19, 22, 23, ×× 25, 26.

	Localities.
Cyathophyllum or Zaphrentis,	15, 16, 17, 18, 22, 24, 25
Gorgonia Lonsdaleana,	13.
Lithodendron affinis,	1, × ×19, 21, × × ×22, 23, 24, × ×25, × × ×26.
„ junceum,	2, 14, 22.
Lithostrotion (Isastrea) Portlocki,	22.
Syringopora (Aulopora) young of,	13.
„ (Cladochonus) do.,	19.
Zaphrentis Enniskilleni,	18.
„ Phillipsi,	18.
ECHINODERMATA: *Crinoidea.*	
Actinocrinus lævis,	11, 18, 22.
„ triacontadactylus,	18, 22, 24.
„ sp. inc.,	15, 23, 24.
Crinoid stems and joints,	1, × × ×2, ×3, 10, 11, 12, 14, × × ×15, × ×16, × × × ×17, × × × ×18, 19, × × 20, × × 21, × × × 22, × ×23, × × × ×24, × × ×25, 26.
Cyathocrinus planus,	18.
Platycrinus sp.,	18
Rhodocrinus verus,	18.
Blastoidea.	
Schizoblastus Rofii n.s. (Carpenter and Etheridge) (Pentremites Derbiensis),	× × ×24
CRUSTACEA: *Ostracoda.*	
Leperditia Okeni,	× ×7, × ×23, × × ×24.
Polyzoa.	
Ceripora interporosa,	22.
„ rhombifera,	20, 21.
Fenestella antiqua (plebeia),	1, 2, 11, 13, ×14, 20, × ×22, × ×23, × ×24, 25, 26.
„ ejuncida,	1, 24.
„ membranacea,	25.
„ Morrisii,	1, 20, 25.
„ tenuifila,	2, 20, 21, 22, 23, 24, 26.
Polypora fastuosa,	11.
Ptylopora flustriformis,	22.
Brachiopoda.	
Athyris ambigua,	22, 24.
„ planosulcata,	8, 11, 12, 14, 18, 19, 21, 23, 24.
Chonetes Hardrensis,	16, 18, × ×22, 23, 24, 26.
Leptagonia plicatilis,	2, 25.
Productus aculeatus,	11, 15, 17, 24.
„ fimbriatus,	22, 23.
„ giganteus,	18, 21, 22, 23.
„ margaritaceus,	16, 18.
„ mesolobus,	14, 17.
„ scabriculus,	11, 23, 25.
„ punctatus,	11, 13, 14, 15, 21, 22.
„ semireticulatus,	1, 2, 11, 16, 17, 18, 20, 21, 22, × ×23, 24, × ×26.
Rhychonella pleurodon,	5, 14, 20, 22, 23, 24, 26.
Spirifera bisulcata,	8, 11, 14, 18, 20, 21, 22, 23, 24, 26.
„ glabra,	5, × ×8, 10.
„ laminosa,	13, 18.
„ pinguis,	5, 24.
„ striata,	1, 5, 11, 13, 16, 18, 22, 23, 24.
Spiriferina cristata,	14, 19, 21, 26.
Streptorhynchus crenistria,	11, 21, 23, 26.
Terebratula hastata, var. sacculus,	11.

Lamellibranchiata.

	Localities.
Avicula (Gervillia), lunulata,	× × 26.
Aviculopecten concentricostriatus,	5.
,, dissimilis,	5.
,, Forbesii,	26.
,, interstitialis,	5.
,, variabilis,	5.
,, sp. indet,	26.
Modiola Macadami,	7.
Nucula? sp.,	5, 8.
Pleurorhynchus minax,	21.
Posidonomya Becheri,	× × × × 5, × × 6.
,, vetusta,	× × 5, × × 6.

Gasteropoda.

Acroculia vetusta,	18.
Euomphalus pentangulatus,	21.
,, pileopsideus,	7.
,, serpens,	23.
Loxonema sp. inc.,	12.
Pleurotomaria sp. inc.,	5, 6.

Cephalopoda.

Goniatites sphæricus, var. crenistria,	× × 5, 6, × × 10.
,, striolatus?	6.
Nautilus sulcatus (Discites),	10, 24.
Orthoceras Steinhauerii?	5, 6.
,, sp. inc.,	8, 10.

Remarks on the Fossils.

Those from beds described as Upper Limestone on the Map at localities 1, 2, 3, 11, 14, 15, are of the ordinary Carboniferous Limestone type. At locality 24, the hill called Benaghlin, the abundance of the small Echinoderm formerly called *Pentremites Derbiensis* is remarkable. Under this elevated ground the various streams cut through black shales and earthy bands of limestone, which are called Calp or Middle Limestone on the Map; their fossil contents, however, (as at localities Nos. 7, 8, 13, 16, 18, 19, 21, 22, 23, 25, and 26), are such as usually occur in the Lower Limestone Shale.

The lowest bed in loc. 4, top of Cuilcagh mountain is a sandstone referred to the Millstone Grit, containing fossil plants only of Carboniferous species.

William Hellier Baily.

March 30, 1885.

Minerals and Principal Faults.

Minerals.

Iron Ore.—In this district the Yoredale shales contain a large amount of ironstone; in any section where these rocks are laid bare, they are seen in thick bands and nodules. Owing to the difficulties of carriage, it would not at present prove a remunerative business to work them, and generally where there appears to be a larger percentage of iron the difficulties of transit are greater.

S. B. W.

East of Lough Allen, along the Yellow River and its tributaries innumerable bands and nodules of iron ore occur in the Yoredale shales. In these shales, which are here about 500 feet thick, the nodules and bands of the ore are most numerously disseminated in a zone lying between 200 to 300 feet from their base. In flood times the rains washing away the easily decomposing shales expose the nodules in great abundance and frequently carry them down towards the shores of the lake. They were formerly collected and smelted in a small Furnace or Bloomery. This Furnace near Drumshambo at the southern end of Lough Allen, ceased working about the year 1765.* Sir Robert Kane states that in purity the ore is somewhat superior to that which is found on the western side of the Lake† in the Arigna District, which is described, and of which an analysis is given, in a former memoir.‡

Coal.—Two seams of coal were noted in this district corresponding to the middle and lower coals of the western or Arigna division of the Connaught coal-field. The seams occur in similar beds, viz., the Millstone Grit.

They are well seen in cliff sections, in the townlands of Cornashamshoque, Cornamucklagh, and Barnameenagh West. In the latter townland, trials were made some time ago on the lower or "Crow Coal" by driving an adit into the hill. The thickness of the seam was 4 feet 6 inches, but it was so slaty and impure as to be valueless. The seam did not improve as it was explored, and the workings were subsequently abandoned. Fire clay of an impure character is in this particular part of the coal-field usually associated with this seam, but not to the same extent as it occurs on the extension of the seam to the south. The seat and roof of this coal are the same as that in other parts of the coal-field, a hard silicious sandstone.

The middle coal is separated from the lower by about 60 feet of grits and flags, and where observed ranged from 10 to 14 inches in thickness. The seat of this coal is similar to that of the lower seam, but the roof is usually composed of from 3 to 6 feet of shales and thin flags.

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* Sir R. Griffith's Mining Report on the Connaught Coalfield, p. 57.
† Sir R. Kane's Industrial Resources of Ireland, p. 125 and 126.
‡ Ex. Mem. Geo. Survey of Ireland, 66 and 67, p. 36.

Along these cliff sections the seams are slightly disturbed by some E. and W. faults, terminating against a N. and S. fault which runs along the face of the cliff.

On the eastern slope of Bencroy some slight trials were made on the middle coal, but for some reason the proprietor of the Royalty stopped the works. Where the seam was opened on here the coal was of fair quality, ranging from eight to fourteen inches in thickness.

Owing to the covering and thickness of the bog few more sections are exposed, and the outcrops as shown on the map had to be drawn from the shape of the ground.

In the S.W. corner of the sheet, W. of Lough Allen, a small area of the two seams of coal occurs. There are no workings on them in this district, but on their continuation to the S. in the townland of Selteenaveny, the middle seam was extensively worked—it ranged from 20 to 23 inches in thickness.

Just at the southern margin of the sheet these two seams are slightly shifted by a N. and S. fault. Farther N., but close to the western margin of the map, a thin seam of coal was noted by Mr. Hardman.

Faults.

The faults traversing this district have already been so fully described when treating of the characters and range of the different formations that further reference to them here appears unnecessary.

R. J. C.

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