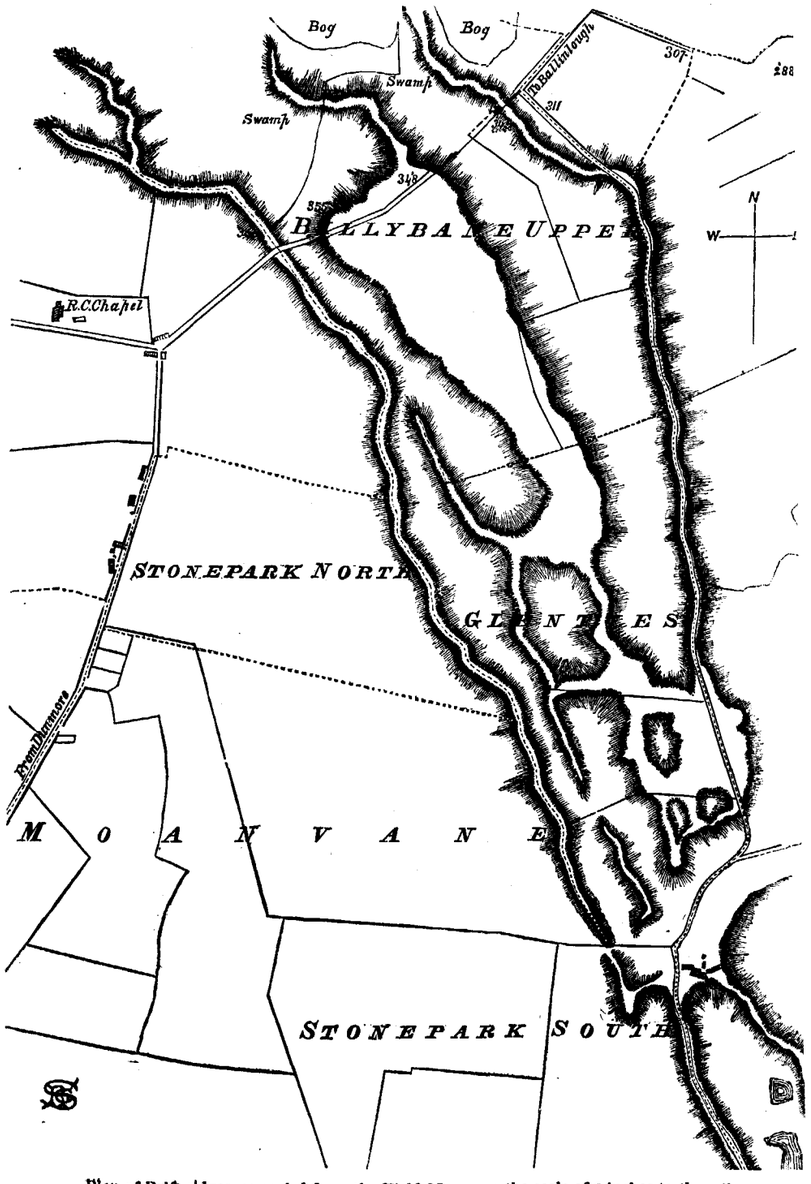

Plan of Drift ridges, as copied from the Field Maps; on the scale of 6 inches to the mile.

Memoirs of the Geological Survey.

EXPLANATORY MEMOIR

TO ACCOMPANY

SHEETS 86, 87, 88, AND EASTERN PART OF 85

OF THE MAPS OF THE

GEOLOGICAL SURVEY OF IRELAND.

ILLUSTRATING PARTS OF THE COUNTIES OF MAYO, GALWAY, ROSCOMMON, AND LONGFORD.

BY

G. H. KINAHAN, M.R.I.A., AND R. G. SYMES, F.G.S.

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

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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 are 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.

It has been considered advisable—regard being had to the physical geology of the district—to make the eastern shore of Lough Mask the margin, in a westerly direction, of the district embraced by this memoir, and thus to include the eastern portion of Sheet 85. The western part of the same Sheet, consisting of Lower Palæozoic rocks, belongs physically to the mountainous tract which extends from Lough Mask to the ocean, and will be described with that region in a future memoir.

Of the district embraced in this explanatory memoir, a portion (Sheet 88, and the eastern half of 87) was surveyed by the late Mr. F. J. Foot, who unhappily did not survive long after its completion. The western portion of 87, together with Sheet 86, was surveyed by Mr. R. G. Symes, who has drawn up the description both of his own and Mr. Foot's work. The portion of 85 included in this memoir, has been surveyed and described by Mr. G. H. Kinahan. The Palæontological portions have been prepared by Mr. W. H. Baily.

In arranging the extent of area which it was thought proper to embrace under one memoir, I have followed very nearly the intentions of my predecessor, the late Professor Jukes, who very properly considered it unnecessary to publish three separate memoirs, corresponding to the divisions of the maps, where the geological structure is but slightly diversified throughout.

EDWARD HULL,
Director of the Geological Survey of Ireland.

Geological Survey Office,
1*st February*, 1871.

EXPLANATIONS

TO ACCOMPANY

SHEETS 85 (EAST PART OF), 86, 87, 88, OF THE MAPS

OF THE

GEOLOGICAL SURVEY OF IRELAND.

General Description.

The district included within the limits of these Sheets lies in the counties of Galway, Mayo, Roscommon, and Longford.

It contains the following towns and villages. In Sheet 85, the town of Ballinrobe; the villages of Hollymount, Ballyglass, Mayo, and Crossboyne. In Sheet 86 are the small towns of Dunmore, Clare, Ballyhaunis, and the villages of Ballinlough, Ballindine, Williamstown, and Milltown. In 87 are the towns of Roscommon and Castlereagh, and the villages of Ballymoe, Glenamaddy, and Castleplunket. In 88 is the town of Longford and the villages of Newtownforbes, Cloodara, Killashee, Keenagh, Ardagh, Lanesborough, and Termonbarry.

1. *Form of the Ground.*

There are five hills in the district with similar gentle slopes and round-backed summits.

Slievebawn, attaining to a height of 857 feet above the level of the sea.

Lisduff Hill, close to Longford, 381 feet.

Slievegalry, lying about five miles S.S.E. of Longford, and having a height of 650 feet.

Slieve Dart, about two miles N. of the small town of Dunmore, having a height of 492 feet; and

Course Top, N. of the village of Ballinlough, having a height of 497 feet.

The remaining portion of the district is comparatively flat or gently undulating, with a considerable amount of bog on the east and west of the district, while in the centre, the country is formed for the most part of bare, or nearly bare, crags occupying a considerable area.

The outline of the eastern shore of Lough Mask (Sheet 85) presents a remarkable contrast to that of the western. For while the latter ranges in a nearly even line from the Srah on the N.E. to the entrance to Kilbride Bay on the S.W., the eastern shore is indented

by numerous bays and inlets, ranging in a N.N.E. direction, and running far into the heart of the limestone country, where they spread out into wide but shallow loughs, such as those of Loughs Carra and Carrownacon. It will be afterwards shown that the general direction of these arms and inlets is parallel to the glacial striations of the district. (See p. 55.)

The bogs and intervening ridges of high ground assume in many places a certain parallelism to the drainage of the district; those in the western portion of the district running E. and W. or nearly so, while towards Castlereagh, in the centre of the district, they run N.W. and S.E. as well as E. of Termonbarry and Lanesborough in the eastern portion of the district.

The eskers, or tortuous gravel ridges, assume very conspicuous features in the western portion of the district. They will be treated hereafter under the heading of "Drift."

The mean elevation of the district above the level of the sea is, probably, about 300 feet, but towards the west the ground falls to about half this amount.

River Basins.—The eastern portion of the district is drained by the Shannon. The centre is drained by the Suck which flows into the Shannon in Sheet 108. The western side is drained by the Dalgin, Clare, and Robe rivers, with their several tributaries, which flow into Loughs Corrib and Mask, and finally into Galway Bay.

The watershed between these two basins enters the district from the south at the S.E. corner of Sheet 86, near the hamlet of Shannaghmore, about a mile and half S.W. of the village of Glenamaddy; thence it runs northwards for about six miles in a zig-zag direction through large bogs, passing about a mile west of the village of Williamstown, where it turns abruptly north-west for about five miles, passing across the chain of eskers and over high ground about 400 feet above the sea; thence it takes an irregular line towards the north over the high ground of Course Top, and passes out of the district on the north, about a mile east of the small town of Ballyhaunis.

The eastern portion of the district, lying wholly in the basin of the Shannon, is drained by that river and its tributaries.

The Shannon enters the district about two miles west of the village of Newtown Forbes (Sheet 88) at a height of about 128 feet above the sea level. It flows thence in a narrow circuitous channel southward for about three miles to Termonbarry, where it continues its course in a wider and much more irregular form through vast areas of flat bog by the town of Lanesborough, at which village it expands into the fine broad sheet of water known as Lough Ree, which is 122 feet above the level of the sea. Thus, in a direct distance of twelve miles, or twenty miles circuitously, there is only a fall of six feet, or six inches per mile direct.

The chief tributaries of the Shannon in this district are the rivers Suck, Scrammogue, Feorish, and Camlin.

The Suck takes its rise in this district in the county of Mayo, adjoining the county boundary of Roscommon, and about three and a half miles east of the small town of Ballyhaunis (Sheet 86), at a height of about 320 feet above the level of the sea; thence it flows

east through Lough O'Flyn one mile north of the village of Ballinlough, where it passes out of the district, but re-appears about five miles east of Lough O'Flyn, where it passes through the town of Castlereagh; it then flows in an irregular course south-east, being joined at the village of Ballymoe by its chief tributary from the west, the Roseberry river, which rises about one mile south of Lough O'Flyn. It then flows through long tracts of bog to Dunamon, where it takes a southerly direction, leaving the district on the south side of Sheet 87 about two and a half miles south of the castle of Dunamon, and at a height of about 160 feet above the level of the sea.

The Scrammogue river rises in the district a short distance west of Shad Lough, which is about three and a half miles south-east of the village of Castleplunket (Sheet 87). Passing through Shad Lough it flows eastwards for about three miles, there entering into Fin Lough, then into Cloonfree Lough, from which it emerges on the south side, and flows southerly for about one mile and a half; then it suddenly changes its course to the north-east (receiving as tributaries the mountain streams from the western flank of Slieve Bawn), and passes out of the district on the N.N.W. corner of Sheet 87 into Sheet 78, where it joins the Shannon.

The Feorish river, and its numerous small tributaries, rises on the eastern flank of Slieve Bawn, and flows eastward through large tracts of flat bog into the Shannon about one mile south-east of Termonbarry.

The Camlin river enters the district on the north-east (Sheet 88) and flows westward, passing by Cloonee and Carrickglass, into the town of Longford; it then takes a north-westerly course for about four miles as far as Brianstown House, where it separates—one channel passing into the Shannon a little north of the hamlet of Fisherstown, two miles S.W. of Newtownforbes, while the other takes a south-westerly course, and falls into the same river near Cloondara.

The Clare* river rises in the district a little west of the watershed, and about one mile and a half south-west of the village of Williamstown; it then flows through the small lough of Lisrivis, on emerging from which it takes a winding course westwards and south to the village of Dunmore, where it assumes the name of the Dunmore river; thence westwards through large tracts of low flat bogs for about five miles, where it receives its tributary the Dalgin river, and takes a south-west course for about two miles to the village of Milltown, passing in its route Millbrook House and Dalgin House; thence passes out of the district at Liskeevy, about two miles south of Milltown (Sheet 86).

The Dalgin river enters the district about half a mile N. of the small town of Ballyhaunis (Sheet 86), and flows south through narrow and parallel tracts of bog for about nine miles as far as the bridge of Doonmacreena, having received in its course numerous tributaries from the east, which drain the south-western flank of Course Top and the north and east flank of Slieve Dart; thence it

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* This river derives its name from the village of Clare, Galway, Sheet 106, and not from the town of Clare in the district.

takes a course in the figure of the letter S for about four miles, and flows into the river Clare a little below Dalgin bridge.

The Robe river, which, with the Aille, drains the extreme western portion of the district, rises about three miles south-west of the town of Ballyhaunis,* and flows south-west in a circuitous course for about seven miles, receiving numerous small tributaries from the east and north-west, and after passing with a circuitous course the villages of Crossboyne and Hollymount, enters Lough Mask below the town of Ballinrobe.

The Aille. This stream, which, along with Lough Mask, forms the western boundary of the district here described, rises at the head of Glen Mask, in the Slieve Partry hills, and enters Lough Mask from the northward, after passing through Cloon Lough.

R. G. S.

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

Name.		Colour on Map.
Alluvium, Peat Bog, &c.		*Pale Sepia.*
Drift Gravel, Clay, and Boulders.		*Engraved dots.*
Carboniferous — Upper, Middle, Lower,	Limestone d^2.	*Prussian Blue.*
Yellowish Grits and Conglomerates d^1.		*Prussian Blue and Indian Ink.*
Lower Silurian Rocks b^2.		*Pale Purple.*
Felstone F.		*Vermillion.*

b^2. *The Lower Silurian Rocks.*—These beds are only visible in the central portions of the axes, or dome-shaped ridges, which rise above the general plain at Slieve Bawn, Slieve Galry, and Lisduff Hill near Longford. They have yielded no fossils in these localities by which their age can be identified; but are in all probability on the same geological horizon with the Lower Silurian rocks of Cavan, Monaghan, and Armagh.† They consist of thin-bedded fine-grained grits, and slates; both varying in colour from pale greenish-gray to a dull purple. The beds are generally much disturbed; and are found either dipping at high angles or crumpled. This disturbance of the stratification has taken place for the most part before the Carboniferous period, and was followed, or accompanied by extensive denudation, or planing away of the strata themselves. At a subsequent period the Lower Carboniferous beds were distributed over this denuded surface.

d^1. *Lower Carboniferous Grits and Conglomerates.*—Resting discordantly on the denuded edges of the Lower Silurian beds above

* Within a circuit of four miles of Ballyhaunis the chief tributaries of some of the large rivers in Ireland rise, *i.e.*, the Suck, which is one of the main tributaries of the Shannon; the Dalgin river, which is one of the main tributaries for supplying Lough Corrib; the Robe river, for supplying Lough Mask; and the Mannin river, which flows into the Moy and eventually into Killala Bay. This is the more remarkable as the general elevation does not exceed 360 feet.

† "Caradoc, or Bala Beds."

described, we find a series of pebbly sandstones and conglomerates generally of a gray or yellowish-brown colour, and often consisting altogether of rounded pebbles of quartzite, or vein quartz, compacted together by sandy material. From this extreme character as a conglomerate, the rock passes into a pebbly yellowish-brown sandstone, and then into a grit or micaceous flagstone. Higher up still in the ascending series are beds of micaceous and speckled gray and yellowish grits with blotches of reddish slate (probably of Lower Silurian origin), and traversed by planes of current-bedding or oblique-lamination. These grits are in some places considered to be interstratified with the lowest beds of the Carboniferous limestone, as shown very well in the neighbourhood of Granard immediately north of this district; hence it is clear that these latter beds are intimately connected with the Carboniferous limestone series. That the quartzite conglomerates underneath are but the lower portion of the same series appears equally certain; so that we are compelled to regard the whole as the natural base in this district of the Carboniferous system of rocks.

Mr. Symes considers that in the district of Castlebar a similar gradation from a conglomeratic base up into the limestone itself can be clearly made out. In the Westport and Newport districts we have conglomerates both of the Old Red Sandstone and Carboniferous series in close proximity and contact; and it is to the latter that the Longford conglomerates seem to be referable.

This view of the Carboniferous age of the Longford conglomerates was adopted by Mr. Symes, while engaged in drawing up an account of these rocks for this memoir; and it is one in which after a personal examination of the district I fully concur—though with reluctance—as it obliges us to differ from the opinion of Sir Richard Griffith, as indicated in his excellent geological map of that district. This is only one of those cases where much uncertainty arises in determining the true limits of the Devonian and Carboniferous systems, owing to similarity of structure and composition.

That the age of these conglomerates was left an open question by Mr. Jukes, is clear from a statement of his in the "Explanation to Sheets 96, 97," &c., p. 8, where he says:—

> "But certainly if the sandstones of the hills about Longford, or those of Slieve Bawn or Mount Mary be Old Red Sandstone, or even if they lie in the lower part of the Carboniferous Limestone, they prove the beds immediately above them to be the Lower Limestone, and there is no possibility of drawing any lithological, palæontological, or other boundary line which could be used to separate these lower beds from the beds above them in those regions."

This expression of opinion at once removes any hesitation I might naturally have felt in adopting the arrangement here proposed, if it had been opposed to the views of the late Director of the Geological Survey.

d^2. *The Carboniferous Limestone.*—This formation as exhibited in this district consists of gray fossiliferous limestone, sometimes massive, in others flaggy, and containing earthy and carbonaceous matter. Towards the base bands of grit make their appearance. As shown

by the fossils, the beds are referable principally to the "Lower Limestone." The calp, or middle limestone, seems to be represented near Roscommon and some other places. In general the strata are horizontal or nearly so, except when they appear at the margins of those tracts where the Silurian rocks have been thrust up into arches or domeshaped hills. The character of these beds in special localities will be found in the detailed descriptions. No attempt has been made in this district to subdivide the limestone series, the late Mr. Jukes having come to the conclusion that the classification into a lower, middle, and upper series could not be maintained.*

E. H.

3. *Palæontological Remarks.*

The fossils from the Carboniferous rocks of this district are those which usually characterize the lower part of the limestone. The sandy beds and those of a shaly character contain numerous fossils, of species prevalent in the lower limestone shale. At one locality (No. 15), on the west slope of Slieve Bawn hill, argillaceous shales are exposed, some of the beds being full of the small bivalve molluscan shell, *Modiola Macadami*, associated with minute shells of entomostracous crustacea, *Leperditia*, so common in the lowest shales of the Carboniferous series of both the north and south of Ireland. No organic remains were observed in the conglomerate beds below the limestone, or in the Silurian rocks. The following is a list of the fossils of the Carboniferous formation, and the localities from which they were obtained:—

LOCALITIES from which FOSSILS were collected.

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of MAYO.	SHEET 86.
1	93/3	Bracklaghboy, . .	On road about a mile west of Ballyhaunis; Carboniferous limestone.
2	93/3	Hazlehill, . . .	Half a mile south-west of Ballyhaunis; Carboniferous limestone.
		County of GALWAY.	
3	16/3	Liskeevy, . . .	Liskeevy bridge, seven miles west of Dunmore; Carboniferous limestone.
		County of ROSCOMMON.	SHEET 87.
4	27/1	Ardass, . . .	Quarry close to Southpark House; Carboniferous limestone.
5	27/1	Lissalway, . . .	North side of road to Castleplunket, four miles east of Castlereagh; Carboniferous limestone.
6	27/1	Mewlaghmore, . .	Quarries at west side of road, four miles south-east of Castlereagh; Carboniferous limestone.

* See Explanation Sheets, 102 and 112, p. 7, 8.

LOCALITIES from which FOSSILS were collected—*continued*.

No. of Locality.	Quarter Sheet of 6-inch Map.	Townland.	Situation, Geological formation, and Sheet of 1-inch Map.
		County of GALWAY.	
7	7/1	Ussey, ...	Quarries east side of road, two miles south of Ballymoe; Carboniferous limestone.
8	7/1	Turlough, . . .	A little west of preceding locality; Carboniferous limestone.
9	7/1	Ballincurry, . .	Close to road, about four miles west of Ballymoe; Carboniferous limestone.
10	19/2	Corlackan, . . .	On same road, two miles south of preceding locality; Carboniferous limestone.
		County of ROSCOMMON.	
11	35/1	Ballymacurly, South, .	A little north of Ballymacurly House, seven miles north-west of Roscommon; Carboniferous limestone.
12	39/1 & 2	—	Several exposures on road from Roscommon to Clover hill, between two and three miles north-west of Roscommon; Carboniferous limestone.
13	39/4	Ardnanagh, . . .	A little west of Roscommon; Carboniferous limestone.
			SHEET 88.
14	29/2	Castlenode, . . .	West side of road, near Castlenode House; Carboniferous limestone.
15	29/2	Boundary of Corhawny, &c.	West slope of Slieve Bawn hill, in brook; Carboniferous shale.
		County of LONGFORD.	
16	19/3	Garrycam, . . .	Near Ardagh; Carboniferous sandstone (in loose blocks).
17	14/1	Whiterock, . . .	A little north of Barrack, half a mile east of Longford; Carboniferous sandstone.

LIST of the SPECIES of FOSSILS collected from the preceding LOCALITIES.

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

	Localities.
Plant stems (branching) - - - -	15.
CŒLENTERATA.	
ACTINOZOA (CORALS).	
Amplexus coralloides, - - - -	8.
Aulopora campanulata, - - - -	9, 10.
Cyathophyllum ceratites, - - - -	7.
Lithostrotion affinis, - - - -	1, 2, 3, × × × 5; × 6, × 7, × 8, 12, 14.
,, junceum, - - - -	8, 14.
Syringopora geniculata, - - - -	× × 14.
Zaphrentis cylindrica, - - - -	3, 10, 14.
,, Griffithii, - - - -	3, 5, 6, × × 7; × × × 8.
,, Phillipsi, - - - -	10.

MOLLUSCA.

POLYZOA.

Fenestella antiqua,	5, 9.
Ceriopora interporosa,	10.

BRACHIOPODA.

Athyris ambigua,	7, 8, × 10, 17.
,, glabristria,	14.
,, plano-sulcata,	× 10.
Atrypa reticularis,	14.
Chonetes Hardrensis,	9, 10.
,, papilionacea,	14.
Orthis resupinata,	6, 10.
Productus aculeatus,	× 10.
,, fimbriatus,	14.
,, giganteus, var. hemisphæricus,	1, 2, × × × 14.
,, punctatus,	1, 2, 3, 5, 6, 10, 14, 17.
,, scabriculus,	× × 7.
,, semireticulatus,	1, 2, 3, 5, 6, 9, × × 10, 14.
Rhynchonella pleurodon,	10, 17.
,, pugnus,	10.
Spirifera striata,	9, 10, 16.
Spiriferina cristata,	5, 6, 10, 16, 17.
,, laminosa,	8, 10, 14, 17.
Terebratula hastata,	6.

CONCHIFERA.

Modiola Macadamii.	× × × 15.

GASTEROPODA.

Euomphalus pentangulatus,	14.
Loxonema Lefebvrei,	14.
Small univalve shells, probably belonging to Loxonema and Macrocheilus,	9, 10.

HETEROPODA.

Bellerophon apertus,	5, 6.

CEPHALOPODA.

Orthoceras—species undetermined,	10.

ECHMODERMATA.

Crinoid joints and stems,	1, 2, × × × 3, × 4, 5, × × 6, × 7, 8, 9, 10, 14.
Platycrinus granulatus,	10.

CRUSTACEA.

Phillipsia Derbiensis,	9, 10.
Leperditia Okeni, var.	× × × 15.

WILLIAM HELLIER BAILY.

March 9th, 1870.

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

These relations are very simple and are well exemplified in this district.

The low undulating ground is all composed of the beds of the Carboniferous Limestone and Sandstone, while the hills of Slieve Bawn, Lisduff, and Slieve Galry, consist of the older rocks, Silurian, and Lower Carboniferous Grits and Conglomerates. The former occupy the top, and the latter the flanks, of the hills.

In the case of Slieve Dart no rock is seen *in situ*, but the quantity of tossed angular blocks on its summit and flanks, have been taken as sufficient evidence that it is formed of the Lower Carboniferous Grits.

On Course Top there was but one exposure of Lower Carboniferous Sandstone observed along its whole length, which was considered evidence sufficient to place it also in that formation. At one period when the country was beneath the sea the limestone extended over the whole district, covering up the lower rocks. The forces of elevation acting in the direction of the axes of these hills set in; and as the land slowly and gradually emerged from the sea, through denuding agencies the limestone was removed, so as to lay bare the subjacent beds of sandstone and conglomerate. These in their turn were also worn away so as to expose the unconformable beds of the Silurian age. As the elevation proceeded the rocks were during several geological periods exposed to various agents of denudation, and the country eventually assumed the features which it has at the present day.

It will be observed that the direction of the longer diameter of Lough Mask, and of the islands therein, ranges in a nearly N.N.E. and S.S.W. direction, approximately parallel to that of the mountain ridge known as Slieve Partry, which rises from the western shore of the lough. Moreover, on an examination of the Admiralty Chart it is found that the deeps in the lough have a similar bearing. On the east coast of Lough Mask, the drift hills with the alluvial flats and bogs as far east as the flat N.N.E. Ballinrobe, and the S.E. part of Lough Carra, have also a nearly similar direction.

R. G. S.

Detailed Descriptions.

5. *Position and Lie of the Beds. Sheet* 86.

This Sheet admits of being sub-divided into three districts for the purpose of better description :—

I. The Dunmore District, including Slieve Dart.
II. The Clare or Claremorris District.
III. The Ballyhaunis District, including part of Course Top.

I. *The Dunmore District*, occupying the south and south-east portion of the Sheet, is for the most part covered with large tracts of flat or slightly undulating bogs, or undulating ground covered with thick drift; so that no area for any considerable distance exposes the rocks that are beneath.

The chief exposures occur in the neighbourhood of the village of Williamstown, which is at the extreme eastern portion of the Sheet, and about eight miles N.E. of the town of Dunmore.

At Kilnalag, which is nearly a mile W. of Williamstown, the roadway exposes beds of dark gray and black limestone, similar to that called *calp* in other districts, dipping to the N. at 5°. Half a mile S.E. of this, at one hundred and fifty yards N.W. of the trig. point △ 350, which is on the top of the Esker, a swallow hole exposes beds of dark gray crumpled limestone, which dips S. at 20°. Three hundred yards N.W. of the swallow hole the ground is thickly strewn with angular blocks of dark yellow, and yellowish green sandstones, and from information received on the spot, I learned that formerly there was a quarry opened there of the sandstone, which subsequently was filled in. Half a mile W.N.W. of this, in the townland of Pollremon, and adjoining the boundary of the townland of Cartron East, a very similar locality was observed, and the information received went so far as to say that the sandstones had a quaquaversal dip. Immediately N. of this a swallow hole exposes black earthy limestone, but no dip was observed.

One-third of a mile W. of the hamlet of Pollremon, there is a small exposure of dark gray crystalline limestone, lying horizontally. Quarter of a mile W. of Polleagh Lough, a quarry of dark gray limestone was opened in the turlough, but is now filled in. A little S. of the village of Williamstown, on either side of the road leading from Kilnalag to Glenamaddy, there are several exposures. On the western side of the road at the House of Carrowroe, large blocks of dark gray limestone are seen, supposed to be *in situ;* while S. of this, and on the same side of road, a swallow hole at N. side of Lisrivis Lough exposes beds of fine-grained gray crystalline limestone, which dip to the E. at from 5° to 7°. One-third of a mile N.E. of Lisrivis Lough, and on the eastern side of the road, a swallow hole exposes dark blue fine-grained limestone, dipping N.N.E. at 5°. One-third of a mile S. of this, and on same side of road, another swallow hole exposes beds of black crystalline limestone; dip S.E. at 5°.

N.E. of the village of Williamstown, in the bed of the Roseberry river, where the road leading from Williamstown to Castlereagh crosses it, beds of very brittle, flinty, and flaggy limestone, were observed to dip at angles varying from 3° to 10° towards S. and S.E. One-third of a mile E. of this, and to the S. of Croaghill Lodge, the rock is apparently very close to the surface for a considerable area, and several quarries were opened, but are now closed; however, close to the house two small quarries are now open, which expose gray highly crystalline compact limestone; no dip was observed.

Four miles S. of Williamstown, at a point a quarter of a mile S.E. of the trig. point △ 333, which adjoins the hamlet of Esker, a small exposure

was observed of thin beds of dark yellow and yellowish green sandstone, which were lying horizontally. Nearly a mile N.W. of the last exposure, a swallow hole shows beds of hard dark gray compact limestone, which dip S.E. at about 2°, while at a similar distance on the S. side a quarry in Shannaghmore exposes similar beds.

In the neighbourhood of Dunmore there was but one exposure of limestone observed, and that occurs about two miles and a half N.E. of the town, in the townland of Ballintava, where there is a quarry of gray well-bedded limestone, where the dip varies from near the horizontal to 5°.

Six miles to the W. of the town of Dunmore several exposures occur. In the bed of the river adjoining Millbrook House, which is about one mile N. of the village of Milltown, there is a large exposure of very black shaly limestone, very similar to that called *calp* in other districts, which when quarried and exposed to the atmosphere decomposes very rapidly. The beds here were observed to dip at various angles to the N.N.W. from 10° to 40°.

Three-quarters of a mile W. of Millbrook, the road leading from the village of Milltown to that of Ballindine exposes beds of gray limestone, lying horizontally, while in the field to the S. a quarry exposes beds of dark blue limestone, which dip at 3° to the S. A similar quarry was observed on the roadside a quarter of a mile S.E., the beds of which were dipping at a similar direction and angle. In the village of Milltown limestone was observed in the bed of the river, underneath the bridge; but owing to the quantity of water always there, no regular examination of it was made. One mile and a half S.W. of the village of Milltown the bed of the river at Liskeevy Bridge exposes beds of dark gray well-bedded limestone, with occasional bands of chert and some shale partings. Some of these beds are fossiliferous, and for the most part are horizontal; but immediately S. of this (in Sheet 96) they have a slight dip to the S. A little S.W. of Liskeevy Bridge the high ground exposes beds of dark gray limestone, cut up by numerous joints, and which dip S.W. at angles varying from 2° to 10°. A third of a mile E. of Liskeevy Bridge there is a quarry opened, E. of Quarrymount House, in which are very thin beds of black shaly limestone, and so cut up by joints that they are almost useless for any building purposes. About 150 yards S. of this quarry there is an exposure of well-bedded dark gray limestone, which dips at about 3° to the S., and which is best seen in Sheet 96.

Half a mile N.E. of Quarrymount House there is a small quarry in the townland of Bawnmore, which adjoins that of Quarrymount, in which are very thin beds of black shaly limestone, which are only used for burning purposes.

To the W. of Milltown, and to the N. of Belmont House, which lies about three miles W. of Milltown, the high ground exposes crags of well-bedded dark gray highly crystalline limestone, which dip to the S. at about 7°.* One mile and a half S.W. of Belmont House, in a field adjoining the county boundary, beds of dark gray highly crystalline limestone are exposed, similar to those N. of Belmont House, but dipping S.E. at from 7° to 10°.

A mile and a half N.W. of Belmont House, the roadway running S.W. from the Roman Catholic chapel, exposes thin beds of black cherty and shaly limestone, dipping S.W. at about 3°. To the N.W. of Milltown there are but three exposures of limestone, and they occur in the neighbourhood of Bellisland Lough, which is nearly two miles from Milltown. On the N.

* On the top of these crags there is a very large rath, inside which is a burial-ground: the inner diameter of this rath is from 150 yards to 200 yards.

shore of the lake there is an exposure of black shaly and slaty limestone, which is easily split into flags, and which when exposed to the atmosphere decomposes rapidly. The beds here are horizontal. Half a mile N. of the lake there was an exposure seen between two tracks of bogs of dark gray cherty limestone, much crumpled, dipping north at about 3°. Nearly a mile W. of this, an exposure occurs in the parish boundary of dark gray limestone, much jointed, which had an apparent dip of about 2° to the N.

Slieve Dart. This hill lies about two miles N. of the town of Dunmore, and runs in a N.E. and S.W. direction for about six miles, while its greatest breadth is not more than a mile and a half. Over this large area not one exposure was observed, as already stated (p. 15). On the top and southern slope, which is covered with heathery moorland, the blocks of sandstone are split into flags for flooring, while some are split as fine as to be useful for slating purposes.*

On the N.E. flank of the hill there is a large exposure of felstone, and for a considerable area around the exposure, the fences and ditches contain small angular pieces and *debris* of this rock, from which I infer that it is close to the surface. The locality where the felstone is exposed is in the townland of Flaskaghmore, about five miles N.E. of the town of Dunmore, on the W. side of the road leading from Dunmore to Ballinlough, and adjoining the county boundaries of Galway and Roscommon. The felstone is of a pale yellowish gray colour, and granular in texture, as well as being very hard and compact; some small crystals of iron pyrites were observed with the lens, which accounted for the rapid weathering brown of the felstone when exposed to the atmosphere.†

II. *The Clare‡ or Claremorris District.*

This district, occupying the N.W. portion of the Sheet, is for the most part covered with low tracts of narrow bogs, which follow the drainage of the district. Few exposures of the subjacent rock occur for any considerable area; the chief being generally observed in quarries in the neighbourhood of the town of Clare.

In the town of Clare no exposure was observed; but in the fields W. of the Glebe-house, half a mile N. of the town, there is a very large exposure of light gray crystalline limestone, well-bedded, and composed almost entirely of fossils, the beds of which dip S.S.E. at about 3°. A quarter of a mile due W. of this spot, in the field adjoining the watch-house of the railway, similar fossiliferous and evenly-bedded limestone was observed to dip in the same direction at 5°.

A mile N. of the town, about 300 yards W. of Castlegar House, the low ground exposes beds of black cherty and shaly limestone, but no dip was observed. A mile and a half N.N.E. of Castlegar House, the low ground W. of the Roman Catholic chapel exposes in the townland boundary beds of dark blue limestone, with occasional shale partings. Similar beds were also observed in the village of Ballinphuill, 150 yards S. of the last exposure.

In the neighbourhood of the hamlet of Kilcolman, which is at the most extreme N.W. corner of the Sheet, the high ground is for the most part covered with very large angular blocks of light gray crystalline limestone, some of which are apparently *in situ*, but no dip could be observed. Two

* The towns of Tuam and Dunmore are roofed for the most part with the thin flags from this hill, which makes the roof so weighty that in about twenty years after the slating the whole roof falls in.

† The mould which covers this exposure is so thin that during the summer of 1865, which was very warm, all vegetation ceased.

‡ In the district there is no such town as Clare recognised; it is always called Claremorris.

miles W. of Kilcolman, the neighbourhood N. of Rockfield House exposes some good quarries of limestone, which will be mentioned in the "Explanations" to accompany Sheet 76. All around Beckan Lough, and on the high ground W. of the lough, the ground is strewed with very large angular blocks of black limestone, which contains nodules and thin layers of black chert, but no evidence was obtained there of their being *in situ*.

Four miles E. of Clare, and about 200 yards S. of the trig. point △ 285, the railway cutting exposes beds of black thin-bedded crystalline limestone, dipping E.N.E. at 7°.

A quarter of a mile S. of the exposure in the railway, a brook at the edge of the bog exposes a section for about 300 yards, of similar black crystalline limestone, the beds of which were nearly horizontal, but where a dip was observed it was to the N. or N.E. at about 3°.

A mile and a half N. of the exposure in the railway, the parish and barony boundary, which crosses the road leading from Clare to the chapel of Beckan, exposes beds of black cherty limestone, but no dip could be observed owing to the water in it.

Seven miles and a half E. of the town of Clare the railway cutting exposes a good section of thin beds of dark blue and black limestone, also bands of black shale and chert, all more or less crumpled, and having a dip to the N.E. at about 5°. This exposure is very like that already described as occurring in the bed of the river a mile N. of the village of Milltown, and shows beds extremely like those which are called *calp* in other districts.

A quarter of a mile W. of the exposure in the railway cutting just described, the embankment appears to have been erected on a quarry or exposure of black thin-bedded limestone, similar to that in the cutting, as on either side of the embankment *debris*, as well as thin flags of the limestone, is everywhere strewn about.

Three-quarters of a mile N.W. of the last section a large quarry is opened on the N. side of the road leading from Clare to Ballyhaunis, in which were observed beds of dark blue and black limestone, well-bedded, and having small cubes of iron pyrites scattered through them;* these beds had a dip of about 3° to the N.

Half a mile to the N. of Ballinvilla House, which is about five miles E. of Clare, a brook exposes a good section for about a quarter of a mile, of dark blue limestone, the beds of which dipped to the N. at about 3°. A similar distance to the N.W. of Ballinvilla House, the brook which passes by the mill exposes a good section of thin-bedded black limestone, with bands of black shale, which dip to the N.N.E. at 5°. No bed of limestone was here observed to exceed nine inches in thickness.

A mile S.E. of Ballinvilla House a quarry on the N. side of the road leading from Clare to Williamstown exposes beds of black highly-crystalline limestone, dipping S.S.W. at 5°. The chief fossil observed here was the stems and fragments of encrinites, which presented a very varied form on the surface of some of the weathered beds.

A mile N.E. of Ballinvilla the drain which flows through the bog in a N.W. and S.E. direction, exposed beds of black cherty limestone, while one mile and a half E. of the house the high ground exposes large blocks of cherty limestone, which were supposed to be *in situ*, and which weathered a good white colour.

To the S. of Clare the best exposures occur in a brook in the demesne of Castlemagarrett, about half a mile W. of the house, and S. of the town of Clare. Here were observed beds of blue well-bedded limestone, lying

* Blocks quarried here weathered rapidly.

horizontal; while 200 yards S. of this, and further down the brook, thin beds of black and dark blue, finely crystalline, and compact limestone were observed undulating at low angles N. and S.

In the village of Ballindine, which is about four miles S.S.E. of the town of Clare, there is a large exposure of limestone which is totally different lithologically from any other limestone in the district, and is similar to that called *Burren* in other districts. This limestone outcrops in the street, as well as in the small gardens attached to the several houses in the village; and from the dips, which on the N. side of the village are S. at about 10°, while in the S. part of the village the angles vary from 10° to 30° N., has led me to infer that it is only a basin of what may be considered the highest beds in the whole district, and which would be called *Upper* limestone, if the limestones in this district were separable into distinct groups, as they are in other districts in the S. and E. of Ireland. This limestone is generally pale gray in colour, as well as being highly crystalline and fossiliferous, and towards the centre of the village is crumpled and much jointed.

A mile S.E. of Ballindine, on the S. side of the roadway leading from Ballindine to Dunmore, there is a quarry underneath a bank of drift, in which are exposed beds of dark gray and black crystalline limestone, and which were lying horizontal. To the N.E. of Ballindine the low country is strewn with large rounded and angular blocks of limestone, and but few exposures occur. A mile N. of Rockfort House, which is four miles N.E. of Ballindine, the townland boundary between Carrowkeel and Bunduff, exposes beds of bluish black limestone which dip about 3° to the S., while at the same distance N.E. of Rockfort House, in the N. side of the new road which communicates Rockfort House with Lugboy House, two large quarries are opened in which are beds of black and bluish black fetid limestone, but no dip was observed. On the road-side, half a mile S.W. of Rockfort House, one or two quarries were opened, but are now filled in.

A mile and a half S. of Rockfort House, a laneway running E. from the mills at Doonmacreena Bridge, which is four miles E.S.E. of Ballindine, exposes a large quarry of black well bedded crystalline limestone, the beds of which were dipping S.W. at angles varying from 10° to 15°. A quarter of a mile N.W. of Doonmacreena Bridge, on the N. side of the road, large angular blocks having a tendency to stratification was observed, but no actual bedding could be noted.

To the S.W. of the village of Ballindine there was but one exposure seen, and that occurs in the brook which passes through the wood adjoining Heath House, which is about a quarter of a mile S. of the trigonometrical point △ 211, and about a mile and three-quarters S.W. of Ballindine. Here were observed beds of black cherty and shaly limestone.

III. *The Ballyhaunis District, including part of Coarse Top.*

This subdivision occupies the northern and north-western portion of the sheet, and though comparatively high ground, has its share of flat or gently undulating bogs, which cover the top or gentle slopes of Coarse Top, as well as the low ground interspersed among the eskers and drift hillocks, which occupy a good portion of the district under explanation—consequently the subjacent rock is nowhere exposed, except in quarries which have been opened for building purposes or for manuring the land.

A mile to the W. of Ballyhaunis, a large quarry is opened on the N. side of the road leading from Ballyhaunis to Clare, in which is exposed well bedded highly crystalline black fossiliferous limestone, the beds of which were lying horizontal, and were raised in large blocks suitable for steps or window sills. Half a mile nearer Ballyhaunis, in a field about one

hundred and fifty yards S. of the road already alluded to, there is another large quarry opened, which exposed beds of dark gray and nearly black highly fossiliferous limestone, well bedded and lying horizontal.

Two miles S. of the town, the road leading to Lugboy, passes over a rather large exposure in the bed of the upper waters of the river Dalgan, of ordinary dark gray rather well bedded limestone, which was observed to dip every way, being horizontal underneath the bridge, and then dipping at low angles varying to 5°.

Three and a half miles S. of the town, the road leading from Ballinlough to Clare passes over a tributary of the Dalgan River in which is exposed thin bedded black cherty limestone, which decomposes rapidly, and in which the beds dip every way at low angles to 10°. Nearly half a mile E. of this last spot, and in the same tributary, there is an exposure at the corn mill of hard, brittle, well bedded black limestone, dipping N.E. and E.N.E. at about 10°.

In the neighbourhood of Lugboy House there is but a thin scanty soil, and where the land is tilled, small angular pieces of black and dark blue limestone are turned up; so that here the rock is very close to the surface.

In the demesne of Lugboy House there are two quarries opened, one of which is nearly half a mile N.W. of the house, and adjoining the road leading from Ballyhaunis to Ballindine, in which is exposed thin bedded, bluish, fine-grained, compact limestone, which dip W. at about 2°. The coating over these beds was composed of small angular pieces of the subjacent rock which was used in the neighbourhood for road metalling. The other quarry lies in the same direction from the house, but nearer; in it was observed well bedded, fine-grained, compact limestone, the beds of which had a very slight dip to the E. at about 2°.

A little over half a mile S.W. of the house, there was a quarry opened near the cross roads, in which were observed thin beds of black, fine-grained compact limestone with thin bands of black shales, generally between each bed; dipping W. at about 3°.

About four miles S.S.E. of Ballyhaunis, a narrow laneway running N. from the roadway leading from Ballinlough to Ballindine exposes thin beds of dark gray much jointed limestone, which dip N. at about 2°.

Four and a half miles S.E. of Ballyhaunis, the brook, which is about 150 yards E. of the trig. point △ 464, exposes beds of dark gray subcrystalline limestone, much jointed.

A mile and a quarter E. of the last exposure the high ground adjoining the Roman Catholic chapel is for the most part thickly strewn with (angular and rounded) blocks of hard dark gray crystalline limestone, beds of which were observed to outcrop at about 150 yards N. of the chapel, as well as at the same distance to the S.; those to the N. have been extensively quarried for building purposes,* and dipped S.S.E. at about 2°; at the S. of the chapel the beds were much jointed, and supposed to be lying horizontal.

A mile E.S.E. of this last exposure similar blocks of similar limestone were observed.

About seven miles S.E. of Ballyhaunis, and about a quarter of a mile N.W. of Coolcam Lough, the laneway running parallel to the esker, as well as the ground at the break in the esker, exposes a good quarry of very hard dark gray compact limestone, the beds of which dip at about 3° to the S.E.

Coarse Top.—This hill stretches E. and W. between the towns of Bally-

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* The crystals generally observed in the beds of this limestone, were black crystals of carbonate of lime.

haunis and Castlereagh (Sheet 87), and is about nine and a half miles long, while its breadth varies from a mile to three miles. The chief opening that occurs is seen in the E. portion of the hill near to the town of Castlereagh, and which will be described in a future page (*page* 27).

The only exposures that are seen in this subdivision occur about a mile and a half N.W. of the village of Ballinlough, and to the S. of the road leading from that village to Ballyhaunis, where two quarries are opened, one of which is about 300 yards W. of the other. The eastern quarry shows thin beds of brownish yellow flaggy sandstone, which dip every way, while the west quarry exposed similar sandstone, yet thick bedded and lying horizontal. The remaining portion of the hill is covered with tossed blocks (angular and rounded) of yellow sandstone, also purple girts and coarse conglomerate.

R. G. S.

Sheet 87.

This sheet has been subdivided into two districts for the purpose of better explanation.

I. The Castlereagh District, including the eastern flank of Coarse Top.

II. The Roscommon District, including the northern flank of Mount Mary.

I. *The Castlereagh District.*

This district, occupying the western portion of the sheet, is for the most part covered with thick drift ridges, and low undulating flats, and boggy as well as swampy ground; all more or less having a tendency to parallelism with the natural drainage of the district. The chief exposures occur in the neighbourhood of the town of Castlereagh, as well as in the comparatively high ground lying between the village of Castleplunket and Dunamon Castle. In the bed of the river Suck, which flows through the W. portion of the town of Castlereagh, there is a large exposure of hard, dark gray, well bedded limestone, much jointed, the beds of which dip to the N. very slightly; while N. of this exposure and higher up the river there are numerous exposures of similar limestone, which will be described in the explanations of Sheet 77.

Half a mile W. of the town of Castlereagh, and on the N. side of the road leading to the village of Ballinlough, a large quarry has been opened, which exposes thick beds of well bedded light gray, slightly oolitic limestone, which dipped to the W. at about 3°.*

A mile to the S.E. of the town, a new drainage cut, which is under the road leading to the village of Castleplunket, exposes thick beds of grayish black crystalline limestone resting horizontally; while half a mile still further in the same direction, and to the S. of Glebe House, there is a large quarry of whitish gray, very thin flaggy compact limestone; in some of the flags there was a very slight oolitic structure perceptible; dip to the S.S.E. from 5° to 10°.

Two miles E. of Castlereagh in the desmesne of Southpark, there is a large quarry in the wood, in which is exposed beds of black compact cherty limestone with shale partings dipping S.E. at 7°, while, resting on these were beds of very dark gray, nearly black, subcrystalline compact limestone.

North of this last quarry, there is another one opened opposite the farm-

* This quarry has been very extensively used by the Great Northern and Western Railway Company, both for manuring purposes and for the masonary (rubble as well as cut stone) for station and goods stores at Castlereagh.

yard, and on the W. side of the road which leads to the village of Bellanagare (Sheet 77) in which was observed dark gray compact speckled limestone highly crystalline and containing pockets of calcspar, the beds dipping S.E. at 7°.

To the S.E. of Southpark House, and outside the demesne wall, in the low ground, the rock outcrops in several places, and several quarries were here opened, but subsequently filled in; where an exposure occurs, it shows dark gray crystalline limestone; dip S.E. at 3°.

Three quarters of a mile N.E. of the low ground just mentioned, and about half a mile E. of Rathra large fort, the high ground exposes several outcrops of light gray crystalline limestone, the beds of which were observed to dip S.S.E. and E. at angles varying from 3° to 7°.

Two miles E. of Southpark House, and to the N.W. of the cross roads, two large exposures of dark gray crystalline limestone occur, the beds of which were lying horizontal; while to the S.E. of the cross roads three quarries were opened in which are exposed beds of bluish gray crystalline limestone abounding in corals, and much jointed; no dip was here observed to exceed 5°, and it varied from S.W. to S.S.W.

In the neighbourhood of the village of Castleplunket, which lies about six miles E.S.E. of the town of Castlereagh, are several exposures of limestone, which differ lithologically very much from one another. In the village the houses are built on light gray crystalline limestone, the beds of which dip S.S.E. at about 7°, and roll gently in a E.N.E. and W.S.W. direction. A mile N.N.W. of the village, and at the back of Fern Hall House, a quarry is opened in which is seen dark gray crystalline limestone, dipping S.E. at 5°; while a little further N., and in the townland boundary E. of Roman Catholic chapel, similar limestone was observed out-cropping in several places, and dipping in the same direction. In the neighbourhood of Heathfield House, several holes were observed over the country, which looked like filled up quarries, and from information received, the rock was supposed to be very close to the surface. The walls here are built of angular blocks of gray crystalline limestone, which weathers red and purple. To the E. of Heathfield House, and about three-quarters of a mile N. of the village, there is a large quarry opened in which were observed beds of dark gray highly fossiliferous limestone, dipping N.N.W., and S.S.E., at about 2°.

Half a mile N.E. of Castleplunket there is a quarry opened on the N. side of the road, in which were observed dark blue and black compact thin flaggy limestone, and black slates. No accurate bearing was here observed, as the quarry was mostly filled with water.

One mile and a half N.E. of the village, a narrow lane running northwards exposes beds of fine blue and black flaggy limestone, dipping E. and W. at very low angles; while a little further north the ground is thickly strewn with black chert, most of which weathers dull gray, and becomes more or less porous.

Between Emlagh House and Milltown House, S.S.W. of the village, a drain runs on the eastern side of the road, in the bottom of which is seen thin bedded, dark grayish blue limestone, dipping W., at about 5°. North of the last locality, and in the neighbourhood of Bohagh Lodge there are numerous large exposures, as well as miniature crags of light and dark gray highly crystalline limestone, any dip here observed was very slight, and only one note was made of a dip of 5°, which occurred a short distance east of the Lodge.

To the N. of Enfield House, which is about a mile and a quarter S.S.E. of Bohagh Lodge, there are similar outcrops of similar limestone, but finer grained; in each case the beds are lying horizontal.

About a mile S.W. of Milltown House at, and near the cross roads, there

is a large exposure of, indistinctly bedded, steel gray limestone, in which the beds were observed to have a very slight dip of about 2° to the S. Half a mile N.N.E. of the last locality, the parish boundary exposes exactly similar limestone, but no actual dip was noted.

Half a mile N.W. of the demesne of Wills Grove, which lies about four and a half miles S.E. of Castlereagh, a long narrow tract of high ground occurs, in which the rock outcrops in numerous places. All the beds here lie horizontal, and chiefly consist of fine-grained, well-bedded, yet much jointed, light gray crystalline limestone, and when struck with a hammer gives out a clear ringing sound.

Three-quarters of a mile S.W. of Wills Grove, and to the N. of the hamlet of Ballintober, there is a large exposure of well-bedded dark gray crystalline limestone, which was observed to outcrop in many places, especially in the vicinity of the Roman Catholic chapel, and the beds of which dipped S.W., at from 3° to 5°. Half a mile S.S.E. of Ballintober, a small exposure of dark gray limestone was observed in a drain which forms the parish boundary, and which runs underneath the road leading to the town of Roscommon.

Two miles to the S.E. of Ballintober, the high ground exposes numerous outcrops and small crags of the subjacent rock, which extends over a considerable area, consisting of light and dark gray highly crystalline bituminous limestone, and which undulates at very low angles in every direction; most of the observations taken here showed the beds to be lying horizontal, or nearly so. A mile further in the same direction, a quarry is opened close to a large well, in which was exposed well bedded fine-grained bluish gray concretionary limestone, with very thin black shale partings, having a slight dip of about 3° to the S.E. Three-quarters of a mile in the same direction, and a similar distance N.W. of Runnamoat, a large quarry is opened, chiefly along the face of beds, which are dark gray limestone, and which dip E.S.E. at 5°.

Two miles and a half S.S.E. of Ballintober, the railway company have opened a quarry at the Tinney Park crossing, in which was observed light gray evenly-bedded crystalline limestone, with a very slight dip of about 2° to the E.

W. of Tinney Park numerous small quarries have been opened, generally along the large walls which are built there, and which consist of dark gray compact limestone; the beds in all the quarries were here observed to be lying horizontal. To the S. of the graveyard, which is at Oran cross-roads, and about a mile and three-quarters S.E. of Tinney Park, a small quarry has been opened, in which was observed thin bedded dark gray limestone, slightly rolling, and having a dip to the S. of about 2°. Two-thirds of a mile E. of the last quarry, there is another large quarry of similar limestone, opened in the low ground, the beds of which were lying horizontal, and on top bed about four feet of white shell marl was observed. One mile S. of Oran cross roads, and on the W. side of the road leading to Dunamon Castle, a quarry is opened which exposes black shaley limestone, similar to the *calp* of other districts, and the beds of which were lying horizontal. Half a mile S.W. of the last locality a quarry of exactly similar, as well as similarly bedded limestone, has been opened, of which all the neighbouring walls have been built, and which are gradually decomposing.

In the neighbourhood N. of Dunamon Castle, which is on the southern bank of the river Suck, numerous small quarries have been opened, but are now chiefly closed. In some of these was observed light gray crystalline evenly-bedded limestone; generally speaking the beds were lying horizontal.

Four miles W.N.W. of the village of Ballymoe there is a considerable area which is known as the townland of Moneenally, which is more or less

destitute of drift, and where there are several exposures of limestone, which is chiefly light gray granular, and which was most frequently observed in the very numerous swallow holes which occur in that part of the district. Any dip here noted was to the S., and at low angles varying from 2° to 7°.

A mile and a half S.W. of the village, and in the fields on either side of the road at Hamlet Cottage, there are extensive quarries opened, in which was observed dark blue, and sometimes black compact fine-grained flinty limestone, in which the beds dipped S.W. at 3° N. of the road, and due W. at the same angle S. of the road.

A quarter of a mile further W., and on the opposite side of the road from the chapel in ruins, there is another quarry similar to those last-mentioned, in which the beds dipped N.S.W. at 5°.

Four miles W.S.W. of the village of Ballymoe, and on the road leading to Williamstown (Sheet 86), a quarry was opened at the gate-lodge of Springfield House, in which was observed black crystalline limestone resting on bluish flaggy limestone. S. of this quarry, on the high ground W. of Springfield House, there are several quarries opened, as well as numerous exposures through the very thin coating of drift, of fine-grained, well-bedded, bluish gray, much jointed limestone, in most cases resting horizontal.

Half a mile S. of Springfield House, and ajoining the hamlet of Pollaneyster, there is an outcrop of dark gray limestone, in which the beds dipped S. at 2°. Three-quarters of a mile further S.W. there is a similar outcrop in a laneway, but no dip was noted. Similar limestone was observed W. of Gorteen, dipping S.E. at 7°. Three miles S. of Springfield House, and on the extreme W. portion of the sheet, there are two townlands called Stonetown and Stonepark, which are covered by numerous angular blocks and *debris*, apparently of the subjacent rock. Some of these are evidently *in situ*, but sufficient evidence was not obtained in any case to note a dip. A short distance E. of the hamlet of Ballinapeaka, there is a large turlough, which is dry in the summer months, and on the N. side of which is a large swallow hole, in which was well-bedded, hard, dark blue, very compact, fine-grained limestone, which breaks with a concoidal fracture, and differs very much in lithological characters from the neighbouring quarries; these beds had a slight dip S.E. at about 3°. To the S. of Ballymoe there is a considerable area covered with thick drift, and but few exposures are seen consequently. N. of the hamlet of Tober, there is a large quarry adjoining the bog, in which was observed dark gray limestone, resting horizontally. A mile further S.W., and about half a mile W. of Turlough House, two large quarries of similar limestone, having a slight dip to the E., are open on the S. side of the road, leading from Springfield House to Glinsk House.

A mile S. of Turlough House there is some high ground in which several quarries were opened, chiefly for rough-wall building. The best quarry occurs nearly a mile S. of the house, on S. side of main road, and consists of dark gray crystalline limestone, in beds of about two feet thick, and are raised of considerable lengths, especially suitable for gate-posts. Half a mile E. of this quarry there is another similar quarry of limestone, the beds of which are much jointed. In both these quarries the beds lie horizontal or nearly so. S. of these, and on the southern flank of this undulating ground, there are three or four exposures of similar, and similarly bedded limestone, which are not so extensively quarried as those on the N. side.

A mile and a half W.S.W. of the exposures just mentioned, is the hamlet of Kilsallagh Lower, which lies on the slope of one of the numerous drift ridges surrounded by bog, which are so frequent in this portion of the district, and in the roadway of which, a small quarry of dark gray limestone was opened, the beds dip about 3° to the N.N.E.. Two miles E.S.E. of Kilsallagh Lower, there is an extensive outcrop on either side of the road leading

from Turlough House to Keeloges, of whitish gray magnesian limestone, the beds of which are horizontal. Two miles and a quarter W.S.W. of the last exposure, in the parish boundary, on the western side of the bog, there is sufficient evidence to show that the rock is very close to the surface and to consist of the ordinary dark gray limestone so common in this neighbourhood.

Two miles and a half S.E. of Turlough House is Glinsk House, in the demesne of which, and in the small streams adjoining same, there is a quantity of black shaly debris scattered about. At the S. end of the demesne wall there is a quarry which consists of very thin bedded bluish flaggy limestone, with shale partings and occasional nodules of chert; the beds are very slightly crumpled and appear to be horizontal, and resembling very much the limestone of the *calpy* type. Three quarters of a mile N.E. of this exposure, and to the W. of the hamlet of Curranagh, there is another very similar quarry yet more cherty, and the bedding decidedly horoizontal. Similar limestone is seen in two quarries nearly three miles S. of Glinsk House, on the road to Crosswell, in which the beds are very flaggy and shaly and slightly crumpled, dipping to the W. at about 5°. At the cross roads of Crosswell, which is six and a half miles S.E. of Ballymoe, there is a large quarry, which Mr. Foot notes as containing thin bedded black compact, and dark gray finely crystalline limestone, with shale partings, and occasional nodules of chert; some of the beds which dip S. and S.S.W. at 10° were flaggy. Two miles and a quarter W. of Crosswell, and in the parish boundary W. of the hamlet called Pass-if-you-can, there is a good exposure of dark blue thin bedded flaggy limestone; some of the flags contain nodules of chert, and dip E. at 5°. A similar quarry of limestone was observed a mile N.E. of the last quarry, and to the N. of the hamlet of Corlackan, in which the beds dip similar. A mile and a half N.E. of Crosswell, on the road to Dunamon Castle, and W. of the hamlet of Carrowkeel, there are some quaries opened, of dark and pale bluish gray crystalline limestone, abounding in corals, in which the beds dip W. at 5°. When the drift was removed from the upper beds glacial striæ was observed W. 35 N. Four hundred yards S. of the road, in the parish boundary, an exposure of similar limestone was observed, but no dip was noted. One-third of a mile E.S.E. of the hamlet of Carrowkeel, a quarry is open in which was observed dark gray crystalline limestone, dipping N.W. at 3°. The glacial striæ here noted was W. 30 N.

Three hundred yards N. of the village of Glennamaddy, which is at the extreme S.W. corner of the sheet, there is a large quarry opened on the E. of the road, consisting of hard dark gray limestone, which dips at about 2° to the S.E. Similar beds were observed in the drain which communicates this quarry with Mill Lough, about half a mile N.E. of the village.

Two miles and a half E. of the village there is a quarry opened in a field S. of the hamlet of Sonnagh, in which is thin bedded light gray crystalline limestone, dipping at low angles to the N. and S.E. A mile and a half N.E. of Sonnagh, on the high ground at Keeloges cross roads, there are crags of black crystalline limestone well exposed in nearly all the fields, which dip to the N.N.E. at 5°.

The eastern flank of Coarse Top.—Although a considerable area of the N.W. corner of the sheet has been coloured as Old Red Sandstone,* the only evidence

* As this Explanation has been published at a much later period than the coloured one-inch sheets, it was considered necessary before writing it to make a further examination of the several saddle-backed hills which occur in the districts under explanation; and Mr. Hull agreed with me that all the yellow sandstones and conglomerates which flank, as well as cap these hills, belong to the Lower Carboniferous group; consequently those portions of the maps which heretofore have been coloured as Old Red Sandstone, must now be considered as formed of the sandstones of the Lower Carboniferous period.

Additional light has also been thrown on this question by Mr. Baily, by the discovery of Lower Carboniferous fossils in nearly all the quarries in which the yellowish brown sandstones have been found. R. G. S.

we have, is the very numerous angular and flaggy blocks of yellow, red, and purple sandstones, and some few blocks of conglomerate. The only real exposure is seen in the railway cutting, half a mile S.W. of the town of Castlereagh, and about 150 yards N. of Arm Lodge, where the railway passes through a large quarry of well bedded yellow sandstone, with occasional flags, and thin blue shale partings. The beds here are slightly crumpled, and dip S. and S.W. at about 5°. Two other quarries occur, but sufficient evidence was not obtained to show that the stones raised were *in situ*. One of these quarries occurs about two miles and a half S.W. of Castlereagh, a little E. of Coolougher Wood, in a drain 150 yards W. of Church, where yellow and purple flags have been raised. The other quarry occurs in a narrow laneway, a mile S. of Coolougher Wood, where purple grits were raised, and which seemed to be the upper beds of a quarry, but on by no means reliable evidence.

II. *The Roscommon District.*

This subdivision, occupying the eastern portion of the sheet, has numerous large exposures and crags (covered with a very scanty coating of drift over them) of limestone chiefly of that type known in the county of Clare as *Burren*. The best exposures in the neighbourhood of the town are seen in large quarries about a quarter of a mile N.W. of the railway station, and consist of steel gray, as well as dark gray crinoidal limestones which dip N.W. at angles varying from 3° to 10°. A mile W. of these quarries, on the road leading to Fuerty, are similar quarries, in which the beds dip in the same direction at about 5°. A quarter of a mile further W. silmilar limestone was observed in the old road which runs S. from the Fuerty road, in which the beds were dipping N.N.W. A quarter of a mile further S. in this old road are crags of similar limestone, in which the beds dip W. at 10°. A mile still further S., and about 150 yards W. of the small hamlet of Stonepark are similar crags, but no dip was noted.

To the N. of Fuerty, which is little over three miles S.W. of Roscommon, are numerous exposures and crags of dark gray limestone, which dip to the N.W. and N.N.W. at 10°. Three hundred yards N.W. of Fuerty, and to the E. of the Glebe are similar crags, but no dip was noted.

S. of Fuerty, and on the East side of the road from Coolmeen House, are large crags of dark gray limestone, which dip S.W. at about 2°. Similar crags occur in the demesne of Rockfield (which adjoins that of Coolmeen), and in the hamlet of Carrowstellan, which is nearly a mile E. of Rockfield House. In both the beds were horizontal.

A mile to the N.W. of Fuerty, and to the W. of Castlecoote House, are large crags of dark steel gray limestone, which dip W. at 10°. Nearly a mile S.W. of these crags there is a small quarry at the edge of the low flat, consisting of dark bluish gray compact limestone, which Mr. Foot considered was of the *calpy* type, and the beds of which were dipping N.

To the S. of the town of Roscommon the country is chiefly very low, and undulating, and covered with probably a good thickness of local drift, so that no rock is anywhere seen. On the S.E. of the town the chief exposures occur in the neighbourhood of Carrowroe. On the eastern shore of the lake, which is opposite to the gate-lodge of Carrowroe, there is a large exposure of dark gray compact limestone, the beds of which are

horizontal and much jointed, chiefly N.W. and S.E., which cut the beds into regular flags which might be mistaken for bedding. A short distance N.E. of this there is another exposure of very dark compact and finely crystalline limestone, some of the beds of which are very thin and siliceous, and dip S.S.W. at 2°. A quarter of a mile further, and in the same direction, there are crags of dark gray compact limestone, the upper surface reduced to debris; the lower beds of these crags are very thin, and dark gray, while the upper beds are of a darker colour and more siliceous, as well as being compact, and having occasional shale partings.*

In the demesne of Carrowroe, and about half a mile E.S.E. of the house, there is a quarry of dark gray limestone, the beds of which dip S.W. at 2°, and which are cut up by numerous vertical joints which run in a direction N. 40 W. Three hundred yards S. of this quarry, and on outside of the demesne wall, there is another quarry of gray limestone rather flaggy at top. Similar limestone is seen in the hamlet of Lisbride, in which the beds dip N.W. at 10°.

A mile and a half N.W. of the town of Roscommon, the parish boundary S. of the hamlet of New Town, exposes thin dark gray cherty shales, exfoliating, which lie horizontal, or dip at 2° to the E.

Half a mile N.W. of the parish boundary there is a good quarry of light gray limestone, the beds of which are slightly oolitic, and dip N.W. at 10°.

Three-quarters of a mile S.W. of this quarry, and in the low ground W. of the trigonometrical point △ 234, there is a quarry of dark bluish gray compact limestone similar to that in Lisbride, E. of Carrowroe.

To the N. of the hamlet of Old Town, which lies about two miles N.W. of Roscommon, there are large crags of dark gray limestone, the upper surface of which are reduced to debris. A quarter of a mile N.E. of these crags similar ones were observed, in the neighbourhood of the abbey in ruins, with a well defined dip of 15° to the S.W.

A mile and a half N.W. of the town of Roscommon, there are large quarries opened on either side of the road from that town to that of Castlereagh, consisting of dark gray highly fossiliferous (chiefly corals) limestone, in which the beds dip S., S.S.E., and S.S.W., at very low angles, and which are cut up by numerous main joints running N. 25 E. Half a mile W. of these quarries, and on either side of the same road, there are crags of similar yet more compact limestone which lie horizontal. Half a mile S. of these crags, there are other crags of dark steel-gray limestone which lie horizontal. To the S. of these crags, and where the laneway crosses the railway, two miles W. of Roscommon, there are large exposures of dark gray limestone, which dip S. S.S.W. and S.S.E. at various angles, one dip being so high as 40° to the S.S.W. Between this point on the railway and that of Clover Hill, which lies a mile and half N.W., there are numerous small quarries opened of dark gray compact fossiliferous limestone, but no dip of any note was observed. Similar limestone was observed N.W. of Clover Hill on the roadside, as well as in the fields opposite the police station, where the beds dip S. at 3°, and are much jointed, chiefly in a N. 20 W. direction. Half a mile W. of police station there are crags of dark gray limestone forming a synclinal, and of which the dip does not exceed 5° N. or S. A quarter of a mile N. of the synclinal, and at the edge of the large bog, there is a large exposure of

* From these three exposures just mentioned, Mr Foot endeavoured to draw a boundary from their lithological characters, and called the exposure at edge of lake Burren or *Upper* limestone, while the middle exposure and upper portion of the third he designated *Calp*, and the lower part of the third exposure he called *Lower*. As these sheets have been published irrespective of subdivisions in the Carboniferous limestone, no particular notice of such distinction has been observed. R. G. S.

dark gray limestone resting horizontal, and cut up by numerous main joints, chiefly N. 10 W. Similar crags occur on the N. side of the bog, about 100 yards to the W. of the grave-yard. To the N. of Roscommon, all along the road as far as Cargin's House, which is at the extreme N. of the sheet, and about ten miles N.N.W. of the town of Roscommon, very numerous exposures of the subjacent rocks can be seen, which undulate N. and S. at low angles, forming a series of anticlinal and synclinal curves, all more or less on the same horizon.*

Proceeding along the road northwards from the town of Roscommon, the first exposure met with, is at the junction of the old and new road, N. of the Charter-house school. The beds here are of dark gray limestone, and rest horizontal. In the demesne of Derrane, about a mile and a half N.E. of the school already mentioned, there are large exposures of craggy limestone, which dip N. at 5°. Returning to the Roscommon road, large crags of the dark gray limestone occur for a considerable distance all around the cross roads, three miles N. of the town: these crags are much jointed (the main joints being from N. 10 to 20 W.), and are mostly horizontal. Three-quarters of a mile N. of the cross roads the rock has a steady dip to the S. of 3°.

In the country W. of the cross roads, as far as the thick bog, are numerous small quarries, and small crags of exactly similar limestone dipping at very low angles, and with main joints in same direction.

To the E. of the cross roads, there is a large area N. of Holly-well House, of craggy steel-gray limestone covered with a thin coating of grass; all the beds here lie horizontal.

Four hundred yards S. of Holly-well House there is an exposure of the dark steel-gray limestone, where the beds dip W. at 30°. Three-quarters of a mile N.E. of this exposure, there are regularly bedded crags of dark gray crystalline limestone, the beds of which dip N. at 10°, N.W. at 15°, and S at 3°.

In the neighbourhood of the Roman Catholic chapel, which is about a mile and three-quarters N. of the cross roads previously alluded to, the ground is strewn with the *debris* of the subjacent rock, which outcrops in very many places, exposing beds of dark steel-gray limestone, which dip N. and N. 10 W. at about 3°.

On the E. side of the hamlet of Clogher, which lies about one mile W. of the Roman Catholic chapel, there are extensive crags of very dark gray, in some places nearly black crinoidal limestone, slightly oolitic and magnesian, which extend for about a mile and a quarter N. and S., and which dip at various angles; at the northern extremity a dip was recorded of 20° to the S.S.W., while a quarter of a mile S. of that there is a synclinal curve, the beds dipping N. and S. at only 2°. S. of this the beds dip for about half a mile at 2° to the S., and at the southern extremity of the exposure a dip of 10° to the S. was noted.

Two miles and a half W. of Clogher, two quarries occur, one on roadside, the other a quarter of a mile S. of it; in these quarries were observed black very compact fetid fossiliferous limestone, with occasional shale partings, and in some places slightly oolitic and magnesian; in the quarry at roadside the beds dipped at 5° to the N., while in the other quarry they dipped

* These curves must tend to prove that in this portion of the district, no real thickness of the Carboniferous limestone can be relied upon. Also, if we suppose the ridge of Mount Mary, which lies about four miles S.W. of Roscommon, to be of Lower Carboniferous grit, this large area now under consideration could not be *Upper* limestone, or, as Mr. Foot has described it, to be of the Burren type, which in the county Clare was proved to be *Upper*. R. G. S.

S. at same angle. East of the Roman Catholic chapel, in the neighbourhood of the ruined abbey, several small exposures of dark steel-gray limestone were observed, which were lying horizontal; while half a mile N., and a similar distance S. of the ruins, the beds were dipping N. at 3° and E. at 5° respectively.

On the old road to Strokestown, about a mile N.E. of the Roman Catholic chapel, crags of evenly bedded limestone were observed stretching for a considerable distance, and the surface-bed, which dipped at 3° to the S.S.E., could be traced back for many hundred yards.

Large exposures are met with, three-quaters of a mile E. of the last crags mentioned, of thick and thin bedded dark-gray limestone, which appear to converge towards a centre, as the beds were dipping to the S., S.S.W., S.W., at angles varying from 5° to 15°, and are cut up by numerous main joints running N. 15 W. A half a mile S.E. of this large exposure, a ruined castle stands on crags of similar limestone.

Returning to the old road we find in the fields adjoining the police barrack, beds of pale gray oolitic, and dark gray limestone dipping to the S.S.E. at low angles varying from 2° to 8°. East of the police barrack, no rock is seen, as the country is covered with thick bog and drift.

Two miles W. of the police barrack, the country around *Grange Abbey* (which is in ruins) exposes crags of dark gray compact limestone, which for the most part are horizontal; but a well marked dip of 10° was noted at the trigonometrical point △ 371, which is about 300 yards S. of the ruins. Half a mile N.E. of the ruins, there are large crags of dark gray subcrystalline limestone (in which corals were most abundant), much jointed and dipped S.S.E. at 2°. Half a mile E. of this, an old road passes over similar limestone which was horizontal.

A mile to the N. of this old road, and to the W. of Loughandoughil, are large crags of dark gray subcrystalline limestone which undulate N. and S. at angles varying from 5° to 10°. Half a mile W. of these crags, similar limestone was observed at the cross-roads to lie horizontal. On the road E. of Aghclare church, which is about a mile S.W. of the cross roads, there is a large exposure of black and dark gray compact, often flaggy, limestone, with shale partings and chert, the beds of which were lying horizontal. A quarter of a mile N. of this quarry, there is another in which the beds are dark gray subcrystalline, and are cut up by numerous joints, chiefly running N. 10 W., the dip observed here was to the S.W. at 5°. A mile and a half W. of this quarry, and at the W. side of the boggy flat, several small quarries of dark gray limestone are open; only the surface-beds were raised for wall building, so that no dip was noted. A mile S.W. of these quarries, similar small quarries were opened to the E. of the hamlet of Caran Beg, which exposed similar limestone with a steady dip to the S. of about 5°.

In the demesne adjoining Cargin House, there are several exposures of dark gray and steel-gray limestone, all of which appeared to lie horizontal. A mile and a half W. of the house, there is an exposure of dark bluish gray limestone in which the beds dip S. at 8°, while a half a mile S. of this there is a large exposure of dark gray limestone, which dips W.N.W. at about 2°.

In the high ground adjoining the demesne wall of Cargin, on the W. as well as S.W. side, the rock outcrops in many places for a short distance, but no dip of any consequence was noted, except in a quarry adjoining boggy flat, which is about a mile and a half S.W. of the wall, where there is a dip of 5° to the S.S.E. To the S. of the demesne, and on either side of the main road, there are large crags of dark gray limestone, of which the beds are gently rolling N. and S., their greatest dip being 10° to the N.

Half a mile N. of these exposures, and on the side of the road, there are

similar crags, yet cherty, in which the beds dip S. at 3°, and are cut up by numerous vertical main joints which run N. 10 W., and in some places are so close that they cut up the rock into vertical flags. A mile N.E. of these crags, similar crags were observed on the N. side of the road from Cargin to Strokestown, where the beds dip S. E. at 2°. Three-quarters of a mile E. of these crags several small quarries are open, the only dip noted was 3° to the N.N.W.

A mile W. of these quarries, similar limestone quarries were opened close to one another on the roadside N. of Ardakillin Lough, the beds of which dip N.E. at 3°. To the E. of these quarries, the only exposures seen occur in the river at Cloonfinlough Bridge, and in river W. of Cloonconny Bridge, which is about a mile S. of the former bridge. In both these rivers there is dark gray limestone; the only dip was in Cloonconny river, and that was of 3° to the N.N.W.

The northern flank of Mount Mary.—Only a small portion of this ridge of Mount Mary occurs in this sheet. It enters this district on the southern side, about six miles S.W. of the town of Roscommon; the larger portion, which is in (sheet 97), has been already described in the Explanations to accompany that sheet, by the late Mr. Foot, and the only evidence for prolonging the ridge into this district, consists of a few small exposures of well-bedded conglomerate, which are found W. of the hamlet of Lisclogh, and which dip N. 20 E., from 2° to 10°.

All the high ground, extending for about a mile and three-quarters S.W. of Lisclogh is nearly bare, or covered with a scanty coating of heather, exposing beneath it *débris* and numerous tossed angular blocks of conglomerate, and occasionally some of red sandstone. Some of these blocks are supposed to be the upper surface of the quarry, but no reliable evidence could be obtained for the assuming of such.* R. G. S.

Sheet 88.

For convenience sake we will divide this district into—I. *The Longford District*, including *Lisduff Hill;* II. *The Ardagh District*, including *Slievegalry Hill;* III. *The Lanesborough District*, including *Slievebawn*.

I. The Longford District.

To the north-east of Longford town, we find the limestone exposed in many places in the neighbourhood of Carrickglass and Milltown, the beds having a general dip to N.N.E. at about 5°, but being often horizontal.

The best exposures are in quarries in the Deer-park at Carrickglass, and on the roadside at Creeve, near Milltown. Here we find beds of black compact limestone, often containing chert nodules, and light gray crystalline limestones, with partings of black shale, containing plant stems, and stems of crinoids, with other fossils. These limestones are rather extensively quarried for building and other purposes. The worked beds vary in thickness from twenty-two inches to flags of one inch. They are well jointed; the main joints bearing W. 10 S., the cross joints N. 15°, 20° W.

The following information was obtained at the quarry. There are fifteen or eighteen feet of workable material in the quarry; the lowest bed or floor was blasted to a depth of eighteen feet, without meeting with bedding.

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* Although the conglomerates of Mount Mary have been coloured and described as Old Red Sandstone by Mr. Jukes and his assistant, Mr. Foot, it is clear from the language employed that these authors had no very good grounds for this view, and were not unwilling to admit their connexion with the Carboniferous series. See "Explanation to accompanying Sheets, 96 97, p. 8. E. H.

The crystalline beds are locally called *White*, the dark and more compact *Black*. The six-inch bed is considered the most valuable. From the two and a half inch bed, flags of twenty-two feet square can be raised.*

The uppermost beds in these quarries is light gray crystalline crinoidal limestone, the crinoids weathering out in a singular manner.

East and S.E. of Sraid, along the eastern edge of the map, and in the direction of Oldtown, are numerous exposures of dark compact cherty limestone, and sometimes pale gray and crystalline, undulating at low angles in different directions. About three-quarters of a mile S.W. of Sraid, a tolerably good section may be seen for a short distance, in a drain near the road leading from Longford to Ardagh, in beds of black flaggy limestones, with chert and shales, dipping S.E. at from 5° to 25°. North of this, close to the railway, at the east side of the brook which forms the boundary between the parishes of Templemichael and Ballymacormick, is a small quarry of yellow flaggy sandstones, lying horizontal, or nearly so.

Northwards, in the bed of the same brook, and at the N. side of the Edgworthstown road, we find bluish and greenish gray calcareous grits and shales, dipping E. at 10°. These appear to be interstratified with dark gray compact limestones, which may be seen in several quarries at the west side of the brook; at the east side the beds dip E. or E. by S. at 15°, while at the west side they seem to have turned over, showing a dip to N.E. at 15°.

Further north, near Barrack, we again find yellow flags and sandstones, dipping N.E. at 3°, with calcareous bands, containing fossils such as *Terebratula, Spirifera, Rhynchonella, Productus*, &c. These sandstones appear also to be interstratified with limestone, which may be seen in several adjacent quarries.

In the townland boundary between Templemichael and Ardnacossagh, and about one mile east of Longford, a quarry exposed regularly bedded dark blue and black compact limestone, curiously streaked, and spotted with veins and nests of pink and white calc spar. The dip is to the N.E. at about 13°. Two hundred yards east of this, similar beds were observed, dipping in the same direction at a lower angle.

In the town of Longford, in the bed of the river, the limestone is of a dark bluish gray colour, the beds being thin and flaggy, with shale partings, and veins of calc spar. These have a general dip to the N.W. at 15°.

About one mile north of Longford, and to the S.E. of Cloonbault House, a quarry was observed of a bluish gray finely crystalline limestone, in places magnesian, and having occasionally a slightly oolitic structure. The beds are fossiliferous, and dip to the N.E. and east from 10° to 15°. Near to this last-mentioned quarry several smaller ones were opened, but are now filled in.

Three miles N.N.W. of Longford, several exposures of limestone occur, especially in the demesne of Castleforbes, which is situated to the west of the village of Newtownforbes. The limestones here are thick bedded, and of a dark bluish gray colour, dipping steadily from 5° to 10° to the south.

At Cloondara, four and a half miles west of the town of Longford, there is a large exposure of dark gray compact and finely crystalline limestone, which is traversed by numerous joints, the main joints being very close together;† this limestone is nearly horizontal, no dip was observed of more than 2° to the south. At Castletown, one mile N.N.W. of Cloondara, a

* When at the quarry I measured one myself 25 feet by 28.

† This table at p. 41 gives a general description of the main and cross joints observed in the district.

similar exposure was observed, having a dip to the south at 10°. A mile north-west of Castletown, in the hamlet of Fisherstown, the rock is of a steel-gray colour, and of a texture approaching that called "burren" in the County Clare.

West of the road between Cloondara and Killashee, and close to Middletown House, a quarry was observed of dark gray subcrystalline limestone, the beds of which are horizontal, and traversed by numerous joints. A mile to the S.W. of this, and to the N. of Ballynamona, several small exposures occur, of a somewhat similar limestone, cavernous, and traversed by numerous joints.

To the south of Wood Town, which lies three miles S.W. of Longford, two quarries are opened. They are of a dark and pale gray colour, highly crystalline, and dip to the S.W. at 5°.

Lisduff Hill.—This hill lies about a mile and a half S.E. of the town of Longford, and stretches in a N.E. and S.W. direction for about two miles, while its greatest breadth is not more than half a mile. The summit of this hill is composed of grits and shales of the Silurian age, while the base is of grits and conglomerates, forming, as is supposed, the base of the Carboniferous series. Tolerably good sections of both are seen in the townlands of Garvagh, Lisduff, and Knockahaw. In the hamlet of Garvagh the beds are of gray shale, macaceous ashy-looking gritty shales, and finely laminated grits, with occasional bands of green shale. These have a general dip of from 50° to 60°, in a N.N.W. direction. West of this, on the road between Longford and Killashee, the shales are darker in colour, in some places black, apparently vertical, and rounded and scratched by ice (see Table of Glacial Striæ, p. 44). About 300 yards east of this, at the trig. point △ 287, there is a large boss of crumpled black shales, with numerous quartz veins, and hard grits traversing them.

At the cross roads in Lisduff village, which lies to the east of Garvagh, a good section is seen of hard greenish and bluish gray grits. These beds appear to be vertical, the strike being E. 35 N. At the trig. point △ 381, and in the pathways and fences adjoining, a number of exposures occur of green grits and shales dipping N.N.W. at 50°. Half a mile to the north of this, and in the lane which runs south from the road leading from Longford to Sraid, the section exposes grayish green and purple slates resting on green grits and grayish micaceous shales and grits, these in their turn resting on brownish gray and purple grits and shales, the whole having a general dip to the N.N.W. at about 50°.

About a mile and a half E.S.E. on the road to Sraid, the cutting exposes coarse conglomerate. West of this, at the foot of Lisduff hill, there is a large exposure of coarse conglomerate and yellow grits and flags, resting unconformably on the Silurian rocks, and dipping to the north from 5° to 15°. Immediately to the S.W. of this, and to the south of the road, the conglomerate has no apparent dip, but is cut up by numerous joints, the main joints bearing N. 40 E.

Along the N.W. flank of the hill there is no evidence of the sandstone or conglomerate, and but little on the S. and S.W. flank.

At and adjoining Dash Bridge, which is two and a half miles S.S.W. of Longford; the country is strewn with numerous angular blocks of conglomerate and grits. A small exposure of the conglomerate being *in situ* at the S.E. of the bridge, lying horizontally.

On the S.E. flank there are but two small exposures of the conglomerate, one two hundred yards S.W. of the trig. point △ 381, dipping at 10° to the S.S.E., the other two hundred yards S.W. of the village of Garvagh, without any apparent dip.

II. *The Ardagh district, including Slievegalry.*—This district lies to the

S.E. of the town of Longford, and occupies the south-eastern portion of the sheet.

The lowlands of this district are for the most part covered with bog and limestone drift, so that comparatively few exposures of the limestone occur. The best exposures are in quarries to the N.W. of Ardagh, in the townland of Richfort, the beds of which are more or less arenaceous.

The cross roads to the W. of trig. point △ 293, exposes yellowish brown sandy flags and blue grits, calcareous in places, soft and decomposing when exposed to the atmosphere for a short period. About three hundred yards north-east of this, on the road to Drimbann, beds of dark blue crystalline limestone, and blue calcareous grits with rusty bands, occur. They are obliquely laminated, and dip to the N. and N.N.W. from 5° to 10°.

Similar beds occur in the fence, two fields west of Richfort. To the north of this fence the limestone is more shaly, and is speckled with calcareous spar, and dips to the N.E. at about 5°.

In the townland of Laughill (which adjoins that of Richfort), and to the south of the National school, are two exposures of blue calcareous grits and shales full of fossils, which dip to the N.N.W. at about 3°. Immediately to the N.W. of the National school, the beds are somewhat darker in colour, and dip at a higher angle in the same direction.

In the barony boundary between Moydow and Ardagh, and to the north-east of Bawn House, a fair section can be seen for about a mile, the dark blue compact limestone which dips to the N. at 5°, resting on the fossiliferous shaly limestone, and that again resting on the calcareous grits.

At the Castle adjoining Bawn House there is a small exposure of very dark blue and black shaly limestone, similar to that designated as "calp" in other districts.

At the N.E of the Ardagh district, on the road between Drumbawn and Oldtown, and adjoining Oldtown demesne, is a quarry of thin irregularly bedded dark gray and black limestone, with black shale partings. Dip to the N. at 8.

About 300 yards to the N.W. and W. of this quarry are two exposures of pale gray crinoidal limestone, which dip to the E.N.E. at from 15° to 20°.

Half way between Oldtown and Ardagh to the E. of the road, thin flaggy beds of limestone were seen in a well. In the townland boundary to the N. of Ardagh House, are beds of blue compact limestone, and dark blue and black shaly limestone, which have a very slight dip to the N. At the cross roads half a mile W. of this, are beds of a very dark compact limestone, streaky and speckled, dipping to the N.E. at 15°. These beds rest on blue and dark blue calcareous grits with rusty bands, which dip to the E. at about 10°.

Mr. Foot has remarked that these beds are similar to those already mentioned, as occurring in the bed of the brook between the parishes of Templemichael and Ballymacormick. In the village of Ardagh, to the south of the road leading to Slievegalry, there is but one small exposure of dark gray compact limestone speckled with calcareous spar.

About half a mile to the west of this, and to the south of the same road, there are beds of bluish gray limestone resting on calcareous grit which dip to the S.S.E. at 3°.

Three miles to the south of Ardagh, and to the N. of Richmount Hill, large bosses of pale gray amorphous limestone occur, while to the S. of Richmount Hill, and west of the road, there is a dip of 40° to the W. A mile S. of this, at the cross roads, there is a large exposure of the pale gray amorphous limestone which crops out in several places, towards the W. as far as Loughan House, and to the S.W. as far as Kilcommock, which is one mile and a half S. of Keenagh village.

On the road E.N.E. of Keenagh village there is a quarry of black shaly and cherty limestone, the beds of which dip about 8° to the S. and S.W.

A similar quarry occurs half a mile S. of Keenagh, the beds of which dip to the N.E. at from 15° to 20°. These apparently form a basin resting on the pale gray amorphous limestone. Two miles N.E. of Keenagh, at Abbeyderg, in the brook which forms the boundary between the parishes of Taghsheenod and Moydow, a small section is seen of blue grits and yellow flags, resting on dark blue limestone and yellow flags, which dip to the S.S.E. from 5° to 10°.

Half a mile to the N. of Keenagh a small anticlinal occurs, the beds of which are of a dark blue colour, rather thick, and dip to the N. and S. at about 10°.

Half a mile west of Keenagh, near Corlea, are quarries of pale gray amorphous and fossiliferous limestone, the beds of which dip to the S.W. from 5° to 10°, the upper beds being well scored by ice, and mentioned in the Table at page 44.

About 300 yards N.W. of this, there is a quarry on the roadside, of dark bluish gray cherty limestone, magnesian, and arenaceous at top, the beds of which appear horizontal E. of this, and in a drain adjoining Derryglogher Lodge, beds of bluish gray calcareous grit with rusty bands were seen lying horizontal. To the N.W. of Derryglogher Lodge beds of yellow sandy flags occur, which dip to the W. at 5°.

To the N. of Killashee there are large quarries of pale and dark gray thick bedded limestone, in which the magnesian character is well shown on the weathered surfaces. This limestone is much cut up by joints, and the beds dip to the W.N.W. at from 5° to 10°.

About one mile to the S.E. of Killashee, and to the E. of Lyneen Bridge, are large crags of gray cherty limestone, locally magnesian, and which dip to the S.S.W. at 10°. Half a mile to the N. of this are similar crags which dip to the S.W. at 8°. Half a mile still further N. the crags are pale bluish gray in colour, finely crystalline, and slightly oolitic, dipping to the S.W. at 5°.

To the E. of Aghantrah Bridge (which is one mile and a half E. of Killashee) a small brook exposes dark bluish gray finely crystalline limestone, which dips to the S.E. at 3°. These beds rest on bluish gray compact limestone streaked with calc spar.

Slievegalry Hill.—This hill is about five miles in length, while its greatest breadth is less than one mile and a half. The principal rocks that are seen occur on the N.W. flank of the hill, and are chiefly coarse conglomerate, and sandstone flags. On the S.E. flank exposures of Silurian shale occur.

A by-road from Ardagh to Keenagh passes along or near the summit of the hill; on this road several exposures occur. The first seen on leaving Ardagh is to the N.W. of the Park House, to the S. of the road, where the conglomerate dips E. at 5°. One hundred yards W. of this it slightly rolls, and dips N.N.E. at the same angle.

At the trigonometrical point △ 650, the conglomerate is very coarse, and the beds lie horizontal.

To the N. and S. of this point the beds dip from it at low angles, none greater than 10°.

About 200 yards east of Lenaghans, a quarry exposes yellow grits and flags, also conglomerate and bands of yellow and green shale lying horizontally. To the S.E. of this quarry are two old quarries in which are yellow flags which dip to the S.E. at 20°.

To the E. of Lenaghans the road exposes a large area of the conglomerate dipping to the W. and N.W. from 5° to 10°. The conglomerate is formed of rounded pebbles of white saccharoid quartz, coloured quartzite, and pieces

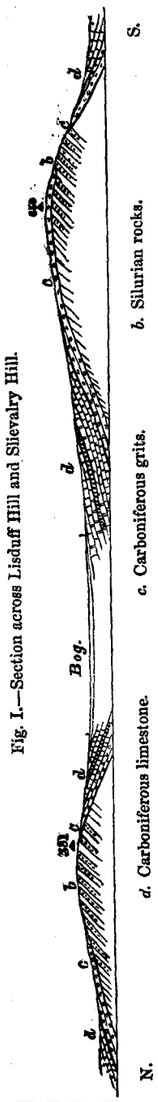


Fig. I.—Section across Lisduff Hill and Slievalry Hill.

of Lydian stone. The quartzite pebbles are sometimes four or five inches in diameter.

A little more than a mile S.W. of Lenaghans, at the trig. point △ 359, there is a large exposure of thick bedded conglomorate lying horizontally. S.W. of this, large angular blocks occur tossed in every direction.

A mile to the N. of Slivegalry, on the road to Bawn House, two exposures of conglomerate are seen, both of which dip to the N. from 5° to 10°.

One hundred and fifty yards to the S. of the trig. point △ 650, lies one of the areas occupied by the Silurian shales and grits, while the other area lies about half a mile further west.

In the lane leading from Garrycam hamlet to the summit of the hill the east exposure occurs. Here there are black and green shales and grits, exposed for about 350 yards, the beds of which are slightly contorted and dip to the N.N.W. at angles from 25° to 40°. East of this lane, in the townland boundary, there is a small exposure of green shales; no dip was observed. Half a mile W. of the laneway *debris* of gray shales occur in the fences and townland boundary, without any apparent dip.

In the second area of the Silurian beds, the only evidence *in situ*, occurs in the parish boundary between Moydow and Kilglass, and on the road E. of same, where there is olive and gray shale without any apparent dip.

Fig. I. is an explanatory section across Lisduff Hill and Slievegalry Hill.

The Lanesborough district, including Slievebawn Hill.

This district occupies the western portion of sheet 88; the rocks to the N.E. and S. being of the Carboniferous period, while the N.W. are of the Carboniferous grit and Silurian.

The best exposures of the limestone in this district occur in the town, and for five miles to the south of Lanesborough.

In the town of Lanesborough, to the N. of the Roman Catholic chapel, there is a large quarry of dark gray limestone, that known as the "burren" type, the beds of which dip to the E. at about 5°. South of the chapel the beds dip to the N.E. at about 2°.

About 100 yards S. of this is the townland of Commons north, which is one large exposure of a similar limestone, the beds of which are much jointed, and seem to undulate in different directions.

At Rathcline House* the crags form a large circle, in the centre and on top of which Rathcline House is built. On the W. of the house the crags are dark gray in colour, the beds well bedded and horizontal, and

* It was from the shallow water at the W. of this house that the limestone boulder, about two tons weight, was removed by ice during the great frost of January, 1855, an account of which was communicated to the Royal Geological Society, by Mr. Foot.

traversed by joints, some so close that they cut the beds into vertical flags; while on the E. the beds are dark gray, thin bedded and shaly, and dip to the N. at 3°.

Half a mile E. of Rathcline House, and from that to a mile are several large exposures of dark steel-gray limestone, which have a well marked dip to the N. and N.N.E. from 2° to 5°.

A mile and a half S.E. of Rathcline House the road passes over crags of thick well bedded steel-gray limestone, which dip to the N.N.W. at 5°, and are cut up by numerous main joints. A mile S.W. of this the road from Lanesborough to Caltragh, exposes beds of black compact earthy limestone, which dip to the N. at 5°, under beds of pale gray, often white limestone, occasionally slightly oolitic in structure, the upper beds of which are nearly horizontal and are traversed by numerous joints, so close together that they reduce the rock into vertical flags.

At the entrance to New Park House which is N. of Caltragh, there is a quarry of very pale gray limestone, which Mr. Foot notices as like the Cloondara limestone already described.

Four miles S. of Lanesborough, close to St. Martin's Well, are large exposures of limestone crag, much jointed, the beds of which lie nearly horizontal.

One mile S.E. of St. Martin's Well there is a large area of bare crag of dark gray limestone generally reduced to *debris*; where bedding was observed it was horizontal. One mile and a half E. of St. Martin's Well, similar beds of limestone occur, which dip to the N.N.E. from 3° to 5°. On Inchenagh and Clawhinch islands, which are in Lough Ree, and lie about one mile W. of St. Martin's Well, no rock was observed *in situ*, but the shores were strewn with angular blocks and *debris* of dark steel-gray limestone. To the W. and S.W. of Lanesborough but few exposures of limestone were observed, owing to the great accumulation of drift over that country.

At Ballyclare which adjoins Lanesborough on the western side of the Shannon, the promontory is thickly strewn with large and small angular blocks and slabs of blue calcareous grits with rusty bands and some few blocks of conglomerate. A small exposure of gray compact and subcrystalline limestone much jointed was observed on the western shore of the promontory, having a gentle dip of from 2° to 5° to the E.

A quarter of a mile S. of the police barrack, which is about two and a half miles west of Lanesborough, on the road leading from Lanesborough to Roscommon, are two large quarries about 200 yards apart, the one adjoining the large rath on its western side, while the other occurs on the S.E. side of it. These quarries are composed of dark gray compact limestone very much jointed, the main joints of both being parallel.

Half a mile south of this, on the western shore of Lough Ree, and 300 yards north of the hamlet of Gallaghmaghery, there is a very small exposure of dark gray limestone, the beds of which were horizontal.

One mile S. of this, and 100 yards west of the shore of the lake, and the same distance north of the hamlet of Gallaghcullia, an exposure was observed of similar dark gray limestone, so reduced to *debris* that any dip was obliterated.

One hundred yards north of Grove House, which is about four miles W.S.W. of Lanesborough, the road from Beechwood exposes beds of dark gray limestone, while in the fields E. of the road large crags were observed of the dark gray limestone, similar to the "burren" type already alluded to.

About seven miles to the N.W. of Lanesborough, and in the low ground N.W. of Slieve Bawn Hill, several large exposures of limestone occur. At Castlenode House are crags of dark blue limestone, and finely-crystal-

line bluish gray limestone, the beds of which are horizontal. One mile S.W. of Castlenode House the low ground is covered with loose blocks of limestone, tossed in every direction, the rock being apparently close to the surface. Close to the Roman Catholic chapel, beds of dark gray limestone and flags were observed, dipping N.N.E. from 2° to 5°.

A quarter of a mile S. of Castlenode House there is a large tract of low ground, which stretches for a mile and a half S., and which was originally covered with water, but now has been drained and reclaimed. This low ground is but partially covered with a very thin coating of alluvial deposit; where there is no deposit the rock was observed to be lying nearly horizontal, and of a dull gray colour.

One mile S.E. of Castlenode House, on the N.W. flank of Slieve Bawn, tolerably good sections were observed, which will be alluded to again, when describing Slieve Bawn Hill.

Two hundred yards S.E. of Ballinafad House two quarries were observed, the top beds of which are very pale, nearly white, speckled flaggy limestone, while the lower beds were dark and pale bluish gray, abounding in corals and brachiopods. These beds are much jointed and horizontal.

East of the road from Lanesborough to Strokestown, and about four and a half miles N.N.W. of the first named village, are three or four small exposures of blue compact limestone weathering bright blue, and calcareous grit bands, the beds of which have a steady dip to the S.E. from 3° to 10°.

Three-quarters of a mile E. of this, in the large bog, is a small quarry of dark bluish gray shaly limestone, thin bedded, and full of fossils. Mr. Foot remarks that these beds are similar to those at Roosky. At Termonbarry, which lies six miles N.N.E. of Lanesborough, and on the W. bank of the River Shannon, a few small exposures of dark gray compact limestone were observed, the beds of which dip S. at 10°.

Two miles N.W. of Termonbarry, in the hamlet of Tobernaskeha, the rock was observed to be dark gray compact limstone, and dipping S.E. at 10°. Two-thirds of a mile S.S.W. of this are two small quarries of finely-crystalline, iron gray, compact, thin-bedded limestone, in some places slightly magnesian; the dip S. 30 E. at 5°.

At the Roman Catholic chapel, one mile and a half N. of Termonbarry, the roadway exposes steel gray and light bluish gray limestone, the beds of which were full of fossils, and are horizontal.

Half a mile S. of Ballagh House, which is about three miles and a quarter W. of the town of Lanesborough, the road exposes gray and dark bluish crystalline limestone, very crinoidal, some beds magnesian, with nests of calc spar. These beds are horizontal.

Slieve Bawn Hill. This hill is about four or five miles N.W. of Lanesborough. It stretches in a N.N.E. and S.S.W. direction for about seven miles, while its greatest breadth is not more than two miles.

In describing this hill, I shall note the older rocks first, proceeding from the north of the hill southwards, and using the townlands and their boundaries as the localities in which the chief evidence was obtained.

The Silurian Rocks. About 450 yards to the E. and N.E. of the trig. point △ 506, a small lane exposes greenish gray grits, very hard, and fine grained, weathering brown, which have a variable dip to the E. of from 15° to 35°.

About the same distance from the same point, but to the S.E., the brook which forms the boundary between the townlands of Bunnageddy and Kilmacananneny exposes a section of green and gray grits, and green grits with yellow shales. No actual dip was noted here, although two uncertain ones to the S.E. at 30° and to the S.W. at 50° were noted.

One-third of a mile S.W. of the trig. point △ 506, the townland boundary exposes bright red indurated shales; no dip was observed.

Half a mile S.E. of the trig. point △ 506, there are several large outcrops of irregular bosses of very hard bluish green fine grits, having a steady dip to the E. at angles varying from 45° to 50°.

Immediately south of these bosses, in the townland boundary between Kilmacananneny and Trila, a beautiful junction was observed of the conglomerate at the base of the Carboniferous rocks, dipping at 5° to the E., resting on upturned edges of green and purple shales and grits of the Silurian, which dip at 80° in the same direction.

In the townland of Frila there is a lane leading from the low country on the east side of the hill to the top. In this a fine section was observed.

Section—copied from Mr. Foot's notes.

	Deg.
Hard grits,	—
Black and gray shales, with calcareous bands, dip S.E. at	55
Hard greenish grits, curiously contorted, with fossils apparently, dip E. at	50
Two sets of ice striæ were observed here.	—
Hard green grits, fine grained, and gray shales, dip S.E. at	60
Greenish gray grits and shales, dip S.E. at	50
Ditto ditto dip W. at	45
Ditto ditto dip S.E. at	60
Massive grits and green grits and shales, dip S.S.E. at	55

Total thickness about 760 feet,

the general strike of these beds being N.E. and S.W.

Half a mile W. of this section just described, in the boundary between the townlands of Carroward and Ballyduffy, a large exposure occurs of fine yellowish green grits and shales which have an uncertain dip to the S.E., resting on decomposing yellowish green grits and shales, in places having a spheroidal structure, and probably rolling. In the western portion of the townlands of Trila Martin and Trila Dillon, there are large exposures of much weathered, hard, fine-grained micaceous grits. In most places the bedding was obscure, but two certain dips to the S.E. at 6° were noted.

Two hundred yards west of the trig. point △ 839, a road runs N. and S. for about one-third of a mile. Here good exposures were observed of greenish ferruginous grits and green and red shales, which are much crumpled, dipping to the S.E. at from 70° to 80°.

Three-quarters of a mile S.E. of the trig. point △ 839, in the brook running through the townland of Tullyvarran, the following section was observed: pinkish gray micaceous shales and green grits, resting on black shales and grits, and these resting on gray and black shale and green and gray grits, all dipping to the S.E. at 60°, and traversed by calcareous bands. The strike here noted was N. 40 E.

In the small townland of Felton, south of the brook, the rock is well exposed, showing hard weathered green grits and green shales, dipping S.E. from 50° to 80°, the general strike being N. 20 E.

West of the townland of Felton, in the townland of Lackan, a lane ascends from the low ground on the west side of Slieve Bawn to the hill top. In this laneway were observed decomposing greenish gray grits. The dip noted showed them to be rolling E. and W., the greatest dip being 40 to the S.E., while in some places the beds were horizontal, or dipping S.W. at 20°.

South of the townland of Lackan, in the boundary between it and Reagh, the beds were observed to be rolling in a W.N.W. and E.S.E. direction, at angles varying from 2° to 40°, and to be composed of greenish gray and yellowish green grits and shales, with occasional pink specks.

East of this, and on top of hill, but more especially adjoining the trig.

point △ 857, the rock is much exposed; bosses of hard greenish grit, weathered, and green shales were observed in almost every fence and field, some of the beds near the top being vertical, or dipping E. at 80°, while along the eastern flank they were of a much lower angle, varying from 40° to 60°. Half a mile S.E. of the trig. point △ 857, in the parish boundary, between Kilgefin and Cloonfinlough, a section was observed of hard bluish grits, dipping E., to rest on hard green and gray grits and green shale, which were dipping N.E. and S.E. at 60°.

West of the parish boundary, and half a mile S.S.W. of the trig. point △ 857, low cliffs of hard green grits were observed. The dip is here uncertain.

To the S.W. of the hill but few exposures occur, as the flank is covered with thick drift. The road leading from Strokestown to Beechwood exposes the only section in this direction.

Five hundred yards E. of Fairymount Castle, on the east side of the road, the following section was observed:—Crumpled brownish and greenish gray grits and shales dipping E.S.E. at angles varying from 5° to 20°, resting on green shales and fine conglomeritic green grit and green shales, dipping at 15° to the S.E.

Two hundred yards N. of this section, and west of the trig. point △ 476, on the eastern side of the road, *debris* of red shale was observed; while still further north, in the field to the east of the road at Glebe House, a small exposure of green grits and shale was observed. Going still further north along this road, the parish boundary N.W. of the hamlet of Ballingatta exposes brownish ferruginous grits and red shale, resting on crumpled brownish grits and shales which dipped N.W. at 20°.

Lower Carboniferous grits and conglomerates.—These beds for the most part occupy the lower ground on the flank of Slieve Bawn, and are best seen on the N.W., N., and N.E. sides, as well as two small areas on the extreme summit. Its thickness on the eastern flank is probably not more than 100 or 150 feet thick, while on the north and south flank no attempt at accuracy was made, owing to the amount of drift concealing the beds.

One-third of a mile S.S.W. of Strokestown, a brook in the townland of Scrammogue, about 150 yards west of the cross roads, exposes red shales and red micaceous flags resting on coarse brownish yellow obliquely laminated grits and conglomerate, dipping to the N.W. at 20°, these again resting on decomposing sandy conglomeritic flags, which outcrop at the cross roads.

One mile S. of the cross roads, on the road to Lanesborough, a brook exposes hard reddish grits, and flags, and fine conglomerate dipping S.E. at 10°, while 150 yards further south on the road, coarse quartzose conglomerate lying horizontally, occurs.

North-west of the last-mentioned place, a lane running W. through Ashbrook exposes coarse greenish sandstones and yellow flags, dipping S.E. at 10°, resting on decomposing red and greenish shale lying horizontal; while 300 yards further west in the same laneway, conglomerate was observed dipping N.W. at from 10° to 15°.

One-third of a mile E.S.E. of the trig. point △ 506, on the north-eastern slope of Slieve Bawn, a brook in the townland of Bunnagheddy exposes yellowish brown grits and conglomerate, which dip at angles varying from 10° to 20°, resting on coarse conglomerate and yellow flags, dipping E. and much crumpled. One-third of a mile due S. of the last locality, a similar brook exposes coarse conglomerate and brown flags, with faint ice striæ, which dip E. at 10°.

A little further south, the townland boundary of Kilmacananneny and Trila Martia, exposes greenish gray grits, and flags, and conglomerates,

slightly rolling and dipping at angles varying from 5° to 10° due E.; whilst beneath these were observed quartzose conglomerates, dipping E. at 5°, resting on the upturned edges of the green and purple shales and grits of Silurian age, as already described, p. 39.

A quarter of a mile further south, in the townland of Trila Martia, there are three small exposures of coarse grits passing into conglomerates, all of which dipped at about 10° to the E.

Half a mile E.S.E. of the trig. point △ 839, a brook in the townland boundary, between Trila Dillon and Tullyvarran, exposes yellowish brown conglomeritic flags, which dipped E.S.E. at 10°, resting on rolling beds of coarse conglomerate, dipping E. at from 5° to 10°.

One-third of a mile due S. of this, a brook S. of the roadway which runs across Slieve Bawn, exposes soft red sandy flags resting on red and gray flags which dip E. at from 5° to 10°, and which were more or less crumpled. Underneath these, about 100 yards up the brook, were observed green and yellow flags dipping N.E. at 15°, resting on reddish gray micaceous flags, and gray flags, and conglomerates which dip E. at from 2° to 10°.*

East of the trig. point △ 857, very few exposures were noted Two-thirds of a mile E. of the point, a small exposure was observed in the townland boundary between Tullyvarran and Killavackan, of coarse conglomerate, dipping E.S.E. A quarter of a mile south of this, a small exposure of similar conglomerate was observed, dipping S.E. at 5°, and to rest on yellow flags dipping same way.

One mile S.E. of the trig. point △ 857, the townland boundary between Doughil and Kilnasillagh, exposes for about half a mile a continuous section of strong yellow grits, resting on coarse conglomerate, which dipped to the E. at about 5°. In the small brooks nearly half a mile S. of the last-mentioned locality, small exposures of coarse conglomerate were observed, which dipped S.E. at low angles, while 150 yards east of these exposures, a considerable area of ground was covered with large angular blocks of conglomerates and grits.

On the southern flank of Slieve Bawn only three exposures of the Carboniferous grits were observed, and these very close to one another.

One exposure occurs on the eastern side of the road leading from Strokestown to Beechwood, in the townland of Cooltacker, the other two a quarter of a mile E. and W. of the roadway, and of the first exposure. The roadway exposes green micaceous grits and gray shales, dipping to the south at 30°, to rest on red gritty shales, dipping same way at 25°, while these in their turn rested on a very hard ferruginous red amorphous rock, brecciated. The exposure a quarter of a mile E. of the roadway, is composed of red grits and shale bands, which dip S. at 20°. The exposure a quarter of a mile W. of the roadway, is composed of yellowish grits and sandstones, which dip S.E. at 10°: large angular blocks of conglomerate rest on them. No evidence of the conglomerates was observed on the S.W. flank of the hill, but on the W. and N.W. especially, some good exposures were observed.

One mile W. of the trig. point △ 839, and about a quarter of a mile S. of the roadway which runs across Slieve Bawn, a brook exposes yellow flags and grits, which dip W. at 25°, to rest on yellow sandstones and conglomerate, which dip in the same direction at 35°. In the roadway a quarter of a mile N. of this, a brook crosses the road, exposing yellow sandstones and flags, which rest on reddish grits, and flags and conglomerate, which dip N.W. at 30°. A hundred yards higher up the brook, hard reddish grits and shales, and yellowish shales were observed, but no dip was noted.

* Millstones were formerly raised here; the cuttings may still be seen in the bed of the stream.

One mile W.N.W. of the trig. point △ 839, and one-third of a mile N. of the roadway already alluded to, the townland boundary between Ballybeg and Ballymore, exposes brownish gray calcareous grits and yellow flags, which dip N.W., while 100 yards east of this, and in the same boundary, yellowish flags and conglomerates were observed to dip at 35°.

One mile N.N.W. of the trig. point △ 839, and a third of a mile E. of the hamlet of Green Hill, a fence which runs parallel to, and is about 150 yards south of the townland boundary between Aghadangan and Cloonycarranmore, exposes a very good section, which is as follows :—*

	Dip.	Deg.
Yellow grits,		
Bluish gray shales and yellow grits alternating,	N.N.W.	35
Red grit and yellow flags,		
Red breccia in bed of stream under yellow flags,	N.W.	5
Yellow flags,	N.W.	20
Decomposed yellow flags,		
Red breccia, rolling	N.W.	5
Red flags and sandstones, rolling,	N.W.	20
Reddish yellow flags,	N.W.	20

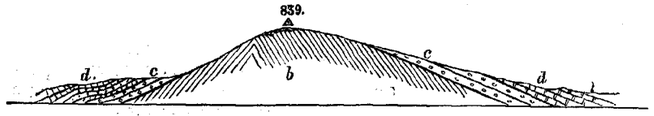
Probable thickness, 450 feet.

One third of a mile W. of the last locality, a similarly good section was observed in a fence communicating with the northern and southern boundary of the townland of Aghadangan, as well as in the brook which forms the northern boundary of the townland, of reddish gray grits and flags, which dip N.W. at 45°, resting on reddish ferruginous grits and shales, and flags with a remarkable conglomerate or breccia of fragments (both angular and rounded) of Silurian grits, in a base of red sand, all dipping at angles varying from 30° to 50°, and the strike varying from N. 30° E. to N.E.

One-third of a mile still further north, in the brook which forms the townland boundary between Ashbrook and Corhawny, yellow flags were observed to rest on coarse conglomerate; the beds dip at various angles from 5° to 30° N.W. One hundred yards E. of this, and higher up the brook, red ferruginous, grits and shales were observed, but no dip was noted. On the top of Slieve Bawn two patches occur of the grits. The largest surrounding and running N. of the trig. point △ 839, while the smaller one occurs about a quarter of a mile N.W. of the trig. point △ 857.

The larger patch is about half a mile long, and its breadth does not exceed a quarter of a mile. Here was observed a very hard pinkish white amorphous silicious rock, mottled with red oxide of iron. The smaller patch is not more than 450 yards long by 300 broad, and is for the most part composed of bright red amorphous jasper rock. In some places it was decomposed and mottled with iron specks.

Fig. II.—Section across Slieve Bawn Hill.



W. *b.* Silurian rocks. *c.* Carboniferous grits. *d.* Carboniferous limestone. E.

* This section gives the greatest thickness of the Lower Carboniferous grits and conglomerates on the western flank of Slieve Bawn; on the eastern flank no section was observed to exceed 150 feet.

Shaly beds in the Limestone.

These beds are only observable on the W. and N.W. flank of Slieve Bawn, and are confined to a very small area. The principal exposures occur in the townlands of Ballymore, Ballybeg, Aghadangan, and Corhawny. In the two last-mentioned townlands the junction is seen of the shales, with the yellow flags and conglomerate underneath.

In the townland of Ballymore, which lies about one mile W. of the trig. point △ 839, a brook exposes bluish shales and flags, and pearly gray limestone resting on yellow grits, and dipping W. at 60°. A quarter of a mile W. of this, in the townland bounding between Ballymore and Ballybeg, and 100 yards E. of the road leading from Strokestown to Beechwood, the following was observed; a bed of brown dolomite resting on pearly gray compact and thick bedded limestone which dipped N.W. at 30°.

Fifty yards further E. and in the same townland boundary, dark bluish gray shaly limestone was observed to rest on gray grits, more or less calcareous, and dark blue shaly bands, all of which dipped to the N.W. at from 10° to 30°.

In Aghadangan, which lies about half a mile N. of the trig. point △ 506, and at a point about a third of a mile N.E. of Green Hill, a brook exposes olive gray fossiliferous shales, to rest on bands of yellow clay, these again resting on olive and gray mottled flags and shales, all of which dipped N.W. from 50° to 90°.

A third of a mile N.E. of this, in the townland boundary between Aghadangan and Carhawny, olive and blue sandy shales and flags, more or less calcareous, were observed to rest on blue shales, and these to rest on fine olive highly calcareous grits mottled with dark blue patches, which looked like fossils, dipping N.W. from 20° to 40°. Still further N. in the townland boundary between Carhawny and Ashbrook, a good section was observed of olive micaceous and fossiliferous flags and shales, to rest on olive and blue calcareous shales and grits, which dipped N.W. from 5° to 30°; these again were observed to rest on micaceous sandstone and olive shales and flags, which dipped N.W. at 10°. Beneath these were the yellow flags and conglomerate already alluded to.*

R. G. S.

* The fossils observed in these shaly beds was *Modiola Macadami*.

* The fossils observed in these shaly beds was *Modiola Macadami*.

GLACIAL STRIÆ observed in the LONGFORD DISTRICT.

County.	Townland.	Situation.	Sheets. 1-inch.	Sheets. 6-inch.	True merid. bearing.
Galway, .	Carrowkeel, .	6 miles W. of Roscommon,	87	20/1·2	W. 30 N.
Roscommon, .	Trila Martin, .	East flank of Slievebaun, .	88	29/4	W. 35 N. N. 5 E. N. 70 W. N. 20 W.
Longford, .	Corlea, . .	4⅓ miles S. of Killashee, .	88	22/1	N. 25 W.
,, .	Gowlan, . .	1¼ miles W.N.W. Killashee,	88	18/2	N 25 W.
,, .	Cloonahard, .	Rail-cutting 4 miles E.S.E. of Longford.	88	14/4	N. 20 W.
,, .	Lisduff, . .	Slievegalry, . . .	88	19/1	N. 30 W.
,, .	CastlereaMountain	Slievegalry, . . .	88	19/3	N. 30 W.
,, .	Castlerea, . .	Slievegalry, . . .	88	19/3	N. 30 W.
,, .	Cartrongolan, .	2 miles S.E. Drumlish, Carn Clonhugh.	78	5/3	N. 25 W.
,, .	Lehery, . .	2 miles S.E. Lanesborough,	88	17/4	N. 30 W. faint.
,, .	Cartronageeragh,	1¼ miles S.S.W. Longford,	88	13/4	N. 30 W.
Roscommon, .	Kilmacananneny,	E. of Slievebaun, . .	88	29/4	N.5 E.faint.

TABLE of OBSERVATIONS of JOINTS in the LONGFORD and ROSCOMMON DISTRICTS.

Observation.	Main.	Cross.	Townland, Locality.	No. of Ordnance Sheet, &c.
1	N. 20 E.	E. 30 S.	Killoe Glebe, Longford, . . .	9/4
2	N. 18 W.	E. 10 N.	Creeve, quarry, ...	14/1
3	N. 20 W.	–	Carrickglass, quarry, Deerpark, . .	14/1
4	N. 40 E.	–	Glack, near Workhouse, . . .	13/2
5	N. 25 W.	E. 25 N.	Castle Forbes, quarry, demesne, . .	8/4
6	N. 10 W.	W. 20 S.	Newtown Forbes, quarry, Methodist Chapel,	8/4
7	N. 25 W.	E. 20 N.	Aghnagore, Cloondara, . . .	13/1
8	N. and S.	N. 5 W.	Ballycore, quarry, ...	13/3
9	E. 25 N.	–	Killeeny, quarry, ...	13/3
10	N. 25 W.	–	Killashee, quarries, N. of Glebe House, .	18/1
11	N. 20 W.	W. 30 S.	Cloonfuigh, quarry, ½ mile S.W. of Killashee.	18/1
12	E. 20 N.	S. 20 E.	Carrigeen, crags, 1 mile E of Killashee, .	18/2
13	N. and S.	–	Abbeyderg, W. of corn mill, . .	18/4
14	N. 25 W.	–	Rathcline, S.S.W. of Boley Hill, . .	17/3
15	N. 20 W.	–	Commons North, S.W. of town of Lanesborough.	17/1·2
16	N. 20 W.	E. 20 N.	Carrigeens, on road to Killinure, . .	17/4
17	N. 15 W.	–	Carrigeens, quarry at Turlough, . .	17/4
18	N. 10 W.	–	Tullyvrane, on crags, . . .	17/4
19	N. 18 W.	–	Rathcline, on crags E. of road, . .	17/4
20	N. 20 W.	–	Leanavoher, crags, ...	21/1
21	N. 20 W.	E. 20 N.	Agharanagh, crags N. of St. Mortin's Well,	21/1
22	N. 20 W.	–	Rathcline, quarry N. of Boley Hill, .	17/3
23	N. and S.	–	Newpark, on road ½ mile N. of house, .	21/2
24	N. 20 W.	–	Commons, quarry, ...	21/2
25	N. 40 W.	W. 35 S.	Ballymore, S.E. of Ballinafad House, Roscommon.	29/3
26	N. 15, 20, 25 W.	–	Ballyclare, W. of Lanesborough, on promontory.	37/3·4
27	N. 25 E.	N. 30 W.	Coolshaghtena, quarry, 3 miles W. of Lanesborough.	40/2
28	N. 25 E.	N. 30 W.	Gardentown, quarry, ditto .	40/2

R. G. S.

SHEET 85 [Part of].

Country north and west of Lough Carra. Beginning at the N.W., dark blue limestones that dip E. at 3° were observed on the N.E. of Luffertaun Castle. Farther east, at and to the north of Ballintober Abbey, are blackish limestones and shales, while east of the abbey, and extending for a considerable distance into the district on the north is a long narrow crag of limestone. A little farther east is another long crag, the lowest bed being slightly magnesian and full of chert [silicified] corals. Farther east to the S.S.W. by S. of the old church are dark gray limestones with a few chert layers. Between Mount Pleasant and Clogher, limestones are exposed in some parts of a new cut; those at Mount Pleasant dip south at angles varying from 3° to 15°, while those S.W. of Thomastown are horizontal, and those N.W. of Cloonboorhy Lough dip S.S.W. at 3°. West, east, and S.W. of Carrownacon Lough, east and south-west of Tower Hill, and a little east of Burriscara Abbey, are dark gray, blue, or blackish limestones, while in the vicinity of Lough Carra, S.W. of Clogher House, in the neighbourhood of Castle Carra, and in the promontory south of Moore Hall, are crags and cliffs. In the first of these places the lower beds are blackish and blue limestonse with a few shale partings; over them are magnesian beds, one bed at least being a dolomite and full of large corals that are now chert; and above the magnesian beds are compact blackish limestones with shale partings and nodules of chert. In the neighbourhood of Castle Carra the rocks are principally dark blue limestones lying either horizontal or with a very slight dip to the east. In one place the rock is effected with so fine a parallel jointing that it is cut into plates like flags and slates. In the previously mentioned promontory are dark blue and blackish limestones also lying nearly horizontal, and at the hamlet south of Lough Nagoyne they form a perpendicular cliff. The rocks half-way between Moore Hall and Tower Hill are slightly magnesian and oolitic.

North of the N.W. extremity of Lough Carra are darkish blue and gray limestones forming crags. In one place, a mile north of Castle Burke, a bed was noted as "magnesian with chert corals." The tract west of Lough Carra, and of the narrow tract of alluvium, the continuation of its N.W. creek, and east of the Ballinrobe and Castlebar road, is occupied nearly entirely by broken crags or rocky drift; and at the south overlooking the lake are low cliffs. These limestones are dark blue and dull gray, and all of them are jointed, the bearing of the principal systems being about N. 20 E.

West of the road, and bounding the flat of the Aille river, is a sloping escarpment in which rock exposures occur in various places. These usually consist of bluish limestones that dip east at a low angle (1° to 3°); however at the hamlet called Cartron Lower, dull gray or blackish shales were observed interstratified with the limestone, and south of that village are yellow sandstones under blue limestones, while farther south, immediately S.S.E. of the block of houses called Carnmore, are beds of green fossiliferous flaggy sandstone about two feet in thickness, and shale about a foot thick, also interstratified with the limestone.

Between Cloon and Carra Loughs are dull, blue, and gray limestones, forming crags and low cliffs. In the escarpment bounding the Aille river flat and Cloon Lough on the east, are blue limestones, with sandstones and shales interstratified; the latter occurring west of Derrew Lough, east of Cloon Lough, in two places, and S.W. of that Lough. The limestones dip east, except on the east of the Lough where a slight roll comes in and causes north dips on the N. and N.E. of Cloon Island. The promontory extending north into Lough Carra, south of Bonniamillish Island, is a limestone

crag that dips W.S.W. at 3° with cliffs to the north and west; and Mr. Symes found "in a new drain, nodules of *native sulphur* in the limestone."

Southward of Cloon Lough, the line of boundary between the limestone and the sandstone forms a marked escarpment, a mile eastward of the Cloon river; and it appears remarkable, that while all the limestones seem to have a steady strike and dip, the sandstones between the Cloon river and the boundary, as previously mentioned, are undulating in sharp curves and flextures. Due east of Long Island under some of the limestones, and interstratified with those to the south, are greenish yellow and brown sandstones with gray and blue shales. These become thin as they are followed southward, and may eventually disappear, and they thicken as they go north to join the mass of the sandstone. On the sandstones are well preserved ripple marks with some annelid tracks.

East of the escarpment, extending southward from the road south of Cloon Lough to Lough Mask, and along it to Carrowaneeragh, is a sloping escarpment of dark or dull blue limestone, with, in a few places, magnesian beds and shale partings, all dipping S.E. at 3°. In the islands and promontories are similar limestones. Northward in two or three places east of the village called Knocknagool, and farther northward in the neighbourhood of Kilkeeran, are dark blue limestones. Those south of Kilkeeran are remarkable for containing geodes and drusy cavities in which are crystals of native sulphur. In the promontories west of the south-end of Lough Carra are crags and exposures of dark blue limestones that dip S.E. at angles varying from 1° to 5°. The limestones hereabouts are all more or less jointed, the bearings of the principal systems ranging from N. 20 W. to N. 10 E. and from W. 10 N. to W. 20 S.

Country about Ballinrobe. N. and N.W. of Creagh House and on Inishrobe are dark blue limestones that dip S.E. at 3°. Some of these are cut up by systems of parallel joints, and at the point opposite Castlehag, the lower beds are flaggy. On Inishdurra are blocks of a dull gray colour, that look like magnesian limestone. The rock in Lough Mask, called Kialisk, west of Curramore House, is a dark blue limestone that dips east at 3°. Similar rocks occur off the shore west of Curramore House, while S.S.W. of the same place are cherty limestones, and west, south, and N.E. of Caher are blue limestones. At Rock Park are gray and blue limestones; half-a-mile south of Rock Park are gray limestones, in some of which are peculiar balls of calcspar, while others have geodes and drusy cavities containing pearl and fluor spar crystals, while one bed was observed to be magnesian. A little S.S.E. of Clogher is a calcspar vein, bearing N. 5 E. and five inches wide. At Ballynamona the limestones are cut up by a system of parallel joints; moreover half-a-mile south of that village, a fine jointing occurs, dividing the rock into plates somewhat similar to thin flags or very coarse slates. South of the last locality and west of the Carn, the limestones dip E. at 3°, while on Inishmaine and the neighbouring mainland are sheets of limestones, some of which are cherty.

East, north, and west of the Glebe the limestones dip south at angles varying from 3° to 15°, while a mile north of the Glebe they dip S.S.E. and S.E. at 5°. In the last locality the rocks form cliffs and peculiar elongated large bosses.

In this neighbourhood Mr. Baily observed the following fossils in the Carboniferous limestone.

ZOOPHYTA.

Lithostrotion striatum (stools).
" Portlockii
Chætetes tumidus.

ECHINODERMATA.

Crinoid stems and joints.

MOLLUSCA, Polyzoa.

Fenestella antiqua (plebeia).

BRACHIOPODA.

Spirifera cristata *var* octoplicata.
Terebratula hastata.
Productus giganteus.

In the neighbourhood of Curraboy and Cahernablauhy are gray and blue limestones that dip S. S.E. and E. at angles varying from 3° to 10°, while farther S.E. and E. they are nearly horizontal; and still farther east in the vicinity of Fortville they dip E. at 2°. North and north-west of Fortville, between Carranvilla and Cregduff, are blue and gray limestones occurring in detached exposures of different extents, some occupying only a few square perches while others are acres in area. They are sometimes nearly level with the general surface of the ground, while in other places they form low cliffs. N.E., S.E., S. and S.W. of Ballinrobe are very similarly situated exposures, and at Kilkeeran, west of Ballinrobe, are similar limestones. North-west of Ballinrobe, the country is very craggy, the rocks blue and gray limestones, and two well developed sets of cherty beds were observed, and all the rocks seem to be cut up by systems of parallel joints, the most prevalent varying in bearing from N. 5 W. to N. 20 W. N., E., S.E., S.W. and W. of the village called Knockglass, are dark gray jointed limestones, and a mile east of Lake View are crags. N.E. of Ballinrobe the limestones dip S.E. at 3°, while north of Cloonagashel House is the debris of limestone, and half a mile N.W. of the same place are nearly horizontal dark blue limestones; in the river, at the ruins of Cloonark bridge, and on the south of Hollymount, they are nearly horizontal. In Bloomfield demesne are blue limestones, and a mile N.E. of Bloomfield House are dark blue limestones. S.E. of Robeen cross-roads are dark blue limestones that lie nearly horizontal; west of it are gray limestones, and north of it are extensive crags that have a slight dip to the E.S.E. At the cross-roads north of Cornfield House are blackish and compact limestones, also in the deerpark and to the south thereof. A little south of Brownstown House are cherty limestones, and farther southward are dark blue limestones, while N.E. of Brownstown House are limestones in two or three places, one being a blue rock that weathers brown.

Country about Ballyglass, Newbrook and Mayo. Immediately east of Mullingar Bridge are black limestones with shale partings; farther west on the shore of Lough Carra and half a mile S.E. of Moor Hall, are horizontal black limestones, and a mile to the eastward are dark blue limestones, some being full of chert. South and North of Newbrook House is a crag of dark blue limestone. Dark gray nearly horizontal limestones much cut up by N. 80 E. joints occur half a mile N.E. of Summerhill House; while blackish horizontal limestones were observed N.W. and S.E of the cross-roads a mile N.E. of Summerhill House, and three-quaters of a mile farther N.N.W. are black and dark blue limestones. Near the cross-roads the rocks possibly might not be *in situ*, but if they are, they have a remarkable high dip of 25° to the W.S.W. At the road nearly a mile west of Newbrook are rusty limestones with shale partings that dip S.E at 3°, and north of these along the road leading to Ballyglass, and near the Lough, in various places are black horizontal limestones with shales. In a turlough half a mile

north of Ballyglass are blackish and oolitic magnesian limestones. Alongside a turlough a mile N.E. of the same village are black limestones, and under another turlough that lies about half a mile farther west are horizontal magnesian oolitic limestones. Immediately S.E. of Rosslee chapel are finely oolitic limestones, and about a mile E. and E.S.E. of this locality in the river are nearly horizontal black and blue limestones. At the village of Mayo are limestones that dip S.E. at 5°, some of them are of a dull blackish colour and magnesian. Three-quarters of a mile east of Mayo are nearly horizontal blackish limestones, and half a mile S.S.E. of the same place they are gray. At the cross-roads, more than half a mile north of Coarsefield, are cherty limestones. North-west of the cross-roads, and half a mile west of the north end of Drumady Lough, is the debris of cherty limestones, while a mile and a half N.E. of that lake are dark blue very argillaceous limestones.

Two and a half miles east of Drumady Lough, at the road, Mr. Symes has noted "dark gray crystalline limestone probably *in situ*," and a mile farther south "gray crinoidal crystalline limestone" that dips S. at 3°. A little S.W. of the latter in the railway cutting "gray limestones" are exposed, and farther south, north of Mayfield Lough, are "light gray evenly bedded crystalline limestones," while still farther southward, a little S.W. of Brookhill, are "horizontal light gray crystalline limestones. A mile and a half S.S.E. of Drumady Lough, at the bifurcation of the road, are blue limestones with chert layers and gray magnesian limestones that have a slight dip towards the east. West of this, a little N.W. of Clogher M'Adam, is dark gray limestone debris, while more than a mile to the southward are horizontal cherty black limestones. In the river near Hollybrook House, are nearly horizontal dark blue limestones, and N.W., N.N.W., N. and E. of Purrauns are small exposures of limestone. Two miles and a half S.E. of Purrauns, at the old road from Crossboyne to Headford, Mr. Symes observed black flaggy limestones.

Country about Mount Jennings. At Coonard are horizontal blue limestones, and S.E. of that hamlet along the road are gray limestones. S.W. of Coonard, at and to the north of the old Roman Catholic chapel, are gray limestones; a mile N.W. of the chapel, and near Roundfort cottage are gray limestones, east of Roundfort are horizontal gray limestones forming a cliff; and N.W., S.W., E. and N.E. of Annefield are gray limestones, those on the N.W. being noted as very fossiliferous. Half a mile W.S.W. of Greaghans are blue and gray limestones, and north of Rathgranagher are blue limestones, while east of it are black limestones and shales. E.S.E. of Annefield, and north of Carras Lough, are quarries of gray limestone, and in one the beds were remarked as magnesian.

To the northward of Carras Lough, in the neighbourhood of Pollnalingy, Mr. Symes has noted "horizontal bluish cherty and blue flaggy limestones," while a little to the N.E. he found "blue crystalline well-bedded limestones, and thin flaggy limestones with bands of chert and partings of shale." Farther south at Frenchgrove House are "bluish flaggy limestones and bluish shaly limestones" that "dip eastward at 20°, and S.E. at angles varying from 10° to 15°." Still farther south, in the vicinity of Carras Roman Catholic chapel, there is a large exposure of rock, which he has described "dark blue shaly limestone, and dark gray crystalline limestone." Of the rock in the quarry at the margin of the flat, due south of the chapel, Mr. Symes says, "bands of limestone crumbled to a size suitable for road metal."

G. H. K.

Drift Deposits. [Sheets 86, 87 and 88.]

Three-fourths of this large area now under consideration is covered with a thick mantle of drift, while the remaining portion is bare rock or nearly bare with a coating of drift (of not more than three or four inches), and swampy flats and small bogs, filling up the hollows formed by the undulating limestone crags. The drift in this district is subdivisable into

I. Boulder Clay.
II. Eskers.

I. *The Boulder Clay.* This is composed of boulders, pebbles, and fragments of all sizes, rounded and angular, chiefly of the subjacent rocks, lying loosely, or cemented together into a mass of stiff coarse gravelly clay, in which the rounded boulders are much scratched and striated.

This drift may be considered for the most part of local origin, inasmuch as the erratic blocks were found to be fragments of those of the district consisting of Carboniferous limestone, yellow sandstone, and Silurian rocks.

II. *Eskers.* These tortuous gravel ridges only occur in the western portion of the whole district, and are composed of rounded, with occasional angular, blocks of the boulder drift compressed into a mass, or of fine or coarse sand and gravel showing rude stratification, or of alternate layers of fine sand, coarse gravel, and large blocks, alternately forming well stratified layers or beds in those ridges; examples of different kinds of deposition being often seen in the same esker. These ridges for the most part run in a N.E. and S.W. direction, and generally have abrupt or steep slopes on the western side, while the eastern side is a gentle slope descending to the undulating surface formed by the boulder drift of the remaining portion of the district. Four distinct ridges were observed in going from the E. to the W., the first and third being prolonged from the district S. of this Sheet, and which have already been described in the "Explanation" of Sheet 96 as the second and fourth ridges of that district. The first esker enters the district at the S.E. corner of the Sheet 86, a little W. of the hamlet of Shannaghmore, which is on the watershed of the district, and is traceable in an unbroken, irregular N.E. course for about a mile and a half as far as the hamlets of Old and New Esker.* North of this it is 60 feet above the surrounding country, and runs northwards for about a mile in a series of isolated mounds or ridges through vast bogs. When next seen, which is in the bog E. of Cloonkeen, it has turned more to the W., and occurs in small low detached hillocks not more than 20 or 30 feet above the surrounding bog. Where it emerges N. of Meelick it is traceable for about half a mile unbroken in a N. direction, as far as the large bog S.W. of Kilnalag, at which it stops abruptly. A little further north it is again seen continuing its course in the bog for about three hundred yards. North of this it continues unbroken for about three-quarters of a mile, and having a N.W. curve as far as the main road between the village of Williamstown and the town of Dunmore, where it terminates. On reappearing on the south side of the road it throws out two spurs, one to the W., and the other to the N.W., which gradually converge to a point a little more than half a mile N. of the road already alluded to. Proceeding in a N.W. direction for about one hundred and fifty yards, it is joined by the second esker and ends abruptly, but again makes its appearance fifty yards further N. in the form of a single ridge, and continues as such its N.W. course very irregularly for about half a mile, when it throws out four spurs, one to the S. for about a hundred yards, one to the N., and

* Both of these hamlets occur on the slope of the esker, and take the name of Esker accordingly.

two parallel ones to the N.W., which gradually converge, but before joining terminate abruptly. At a similar distance N. of the western of these converging ridges, a single ridge is perceptible which runs in a N.N.W. direction for about a third of a mile as far as the high ground on which is the hamlet of Stonepark South, and where it is joined by the third series of eskers, as shown in the plan of a portion of the esker seven and a half miles N.E. of Dunmore. (See frontispiece). The fourth spur which runs in a northerly direction proceeds unbroken for about a mile as far as the mill, having received in its course a spur from the S.W. North of the mill the esker is seen at the extreme W. side of the large bog, along which it winds its way unbroken for about three-quarters of a mile in a N.N.W. direction. On either side of this esker at its northern end there are smaller hillocks which are parallel to the main ridge. To the N. of these hillocks there is one large circular hillock about eighty yards in diameter and fifty feet above the surrounding country. Half a mile N.E. of this circular mound, a single ridge is perceptible in the bog which after crossing the Ballinlough road has numerous small hillocks contiguous to it on its eastern side, some of which are parallel to, but the most of them are round and join in with the undulating ground around Ballinlough. This ridge runs N.W. for about a mile and a quarter, being only broken once in that distance, and finally terminates on the southern flank of Course Top, a mile and a quarter W. of the village of Ballinlough.

The second esker is seen about two miles W. of the first, and about three-quarters of a mile from the southern border of the Sheet. Its southern extremity tapers gradually down to a very fine point, as far as the drain running through the large bog, which is for a considerable area a boundary for this esker on its western side.

Three hundred yards N. of its most southern point and on the summit of the esker is the trig. point △ 250, which shows it to be only twenty feet above the surrounding country, while two miles to the N. of this the trig. point △ 222, is also on the top, and about fifty feet above the adjoining country, showing that the esker undergoes a gradual diminution in height to the southward.

This second esker runs nearly N. and S. Where first seen on its southern side it is only a single ridge running N. for about half a mile where it bifurcates, one ridge running N.E. for a short distance, and then gradually curving round to the N.W. where it joins the other ridge at Boyounagh Bridge, which is on the main road between the town of Dunmore, and the village of Glenamaddy. The other ridge takes a zig-zag yet northerly course for about a mile, and joins in with the eastern spur at the place already alluded to. Between these two ridges is the large hamlet of Lisheenaheltia. North of Boyounagh Bridge the esker proceeds as a single ridge for about a mile northwards, as far as the hamlet of Ballymagig, where all trace of it is lost. However, a quarter of a mile W. of Boyounagh Bridge a long low ridge is perceived coming from about half a mile to the southward in a N. direction and although not connected by any spur with the ridges already alluded to, may now be considered the direction of the second esker.

North of the main road between Dunmore and Glenamaddy it assumes a northerly course without any remarkable windings for about a mile as far as Lough Nabrackloon, where there is a gap, at the other side of which it continues its course for about a quarter of a mile where it is seperated from the main ridge by a narrow strip of bog. North of this the esker has a semi-circular curve of about one hundred and fifty yards diameter, and then proceeds N. for about a mile unbroken as far as the road between the town of Dunmore and the village of Williamstown, having received from the S.W. a small winding branch about a quarter of a mile in length. To the S. of the road, the western flank of the esker was only well marked, the eastern

mingling with the undulating and rather high ground, which is made up of thick drift. North of the road the ridge continues its winding course unbroken for about a mile as far as the main road between the town of Clare and village of Williamstown, which cuts through it, and is still traceable on the other side, for about three-quarters of a mile in a N.N.E. direction, where it joins the first series of eskers already alluded to.

The third series of eskers is the continuation of the set which is described in the explanations of Sheet 96, as the fourth set of eskers in that district, and which enters the area now under explanation at a place called Strawberry Hill, about three miles S.W. of the town of Dunmore. Two parallel ridges are seen at Strawberry Hill which gradually die away in the undulating country thereabouts, but gradually assume the esker form a mile N.E. of Strawberry Hill, where three distinct short parallel ridges are perceived running E. as far as the Dunmore and Tuam road, where they stop abruptly opposite to a long spur coming from the southward which continues in a broken and irregular course as far as Dunmore House. At Dunmore it is broken up into small circular detached hillocks. East of the Dunmore river a single ridge is perceived taking a winding course first E. and then N.W. as far as Sion Hill. North of Sion Hill a single ridge is perceived to run N. for about a mile in the low country, and to end abruptly, but immediately on the W. is a small ridge which continues the N.E. course as far as the Holy Well. North of the stream issuing from same the ridge is again perceived taking a winding course for about three and a half miles along the southern flank of Slieve Dart as far as the hamlet of Flaskagh More, where it breaks up into five diverging and converging ridges running every way, yet the mass of offshoots finally taking a N.N.E. course as far as Coolcam Lough, where they converge into two ridges, one running to the W. and the other to the E. of the Lough, both finally converging about half a mile N. of the Lough and proceeding as a single ridge for about two-thirds of a mile as far as Stonepark South, where it joins with the first and second series already described. The arrangement of the eskers in this district is shown in the frontispiece. In the neighbourhood of Coolcam Lough the hollows that occur between the eskers are filled with swamps and small boggy flats which must tend to prove that the gravel hills in this neighbourhood are very retentive of moisture.

To the N. of Stonepark South three parallel ridges run in a N.N.W. direction for about a mile; of these, the two eastern are more or less joined, as well as having broad table lands or comparatively flat ground on their summit, occasionally broken by a gentle declivity or hollow. The western one proceeds parallel to the other two, it neither joins nor is broken until it gradually dies out, having given out two short spurs at its most N.W. extremity which is contiguous to the Roman Catholic chapel of Garranlahan. The other two eskers gradually die away in the boggy ground which is on the low ground S. of Course Top.

The fourth set of eskers enter the district on the extreme western side, about a mile and a half W. of the village of Ballindine, and runs in a broken yet regular N.N.E. course as far as the Robe river in the demesne of Castlemagarret. North of the river the ridge runs eastward for a short distance, and then turns N.E. continuing in detached portions among the bogs for about two miles, when it terminates abruptly. It is next seen about a mile and three-quarters E. of this, in a small hillock to the S. of Kilknock Bridge.

Two miles N. of this, it is again seen where the railway cuts through it about four miles S.W. of the town of Ballyhaunis and having a steady N.E. direction for about three miles, where it bifurcates, throwing out one spur for about a mile to the E.N.E. while the other of the same length is in a S.E. and E. direction. In the angle formed by these two ridges are minor

ridges of about half a mile in length each, which diverge, and converge again, filling up the low ground as far as the town of Ballyhaunis, through which two distinct large ridges run in a northerly direction, which, after about a mile gradually blend into the undulating ground N. of Ballyhaunis.

Independently of these four distinct series of eskers, there are numerous minor ridges in the district, chiefly formed in the same way in which the long eskers were made, but which do not extend for any considerable length, nor are they in any way joined or connected with the main chains. The only analogy they bear to the long eskers, is in the direction in which they run, which is more or less N. and S.

A mile to the E. and S. of the town of Ballyhaunis such eskers are to be seen. That to the E. the railway runs through showing a fine section of large and small boulders, gravel and fine sand all made up into a compound matrix without any clear stratification discernible in any part of it. The ridge a mile to the S. of Ballyhaunis is higher in comparison to the long eskers, and shows a steep abrupt side to the west into the bog, while on the east there is a gentle undulating slope.

Three-quarters of a mile S.E. of this ridge there is another similar ridge unstratified and stretching N.N.E. for about three-quarters of a mile.

In the neighbourhood of the town of Clare and to the E. of Castlegar House there are several small and similar ridges which run N. and S. for about two miles. Four miles to the W.N.W. of Dunmore similar unstratified hillocks and ridges were observed in the bogs and flat grounds.

Bogs. The bogs vary very much in size, as well as in thickness. In the low country adjoining the river Shannon they occupy large tracts, and their depths are unknown, while in the compartively high grounds of Ballyhaunis and Dunmore, they rarely exceed more than twelve feet in thickness, and rest, generally speaking, on shell marl, except on Course Top and Slieve Dart. Between the bog and shell marl, quantities of hazel nuts are found, the shells of which are perfect but the kernels entirely gone. Associated with the nuts are numerous branches and roots of the hazel, the bark of which is in a tolerably perfect state and retaining the natural gloss of the fresh hazel bark; other trees are frequently found, such as red deal, yew and massive baulks of black oak, which show in section a gnarled and contorted appearance.

Frequent stools of these trees are to be seen in the shallow lakes.

Alluvial deposit, sometimes to a depth of four feet, is found resting on shell marl, adjoining the tributaries of Robe and Dalgan rivers in the N.W. corner of Sheet 86. In winter these alluvial flats, or callows, as they are designated by the country people, are covered with water, while in summer time they afford a rich soft herbage, and capital meadow.

Turloughs and swallow holes. These are very very frequent in the neighbourhood of the village of Williamstown on either side of the water-shed of the district. In fact nearly all the exposures of limestone seen there, occur in swallow holes, which are necessary adjuncts of the turloughs. The turloughs appear to communicate with one another by subterranean streams, although they may be miles asunder, as they fill generally about the same month in the year and are generally dry again about the first of April.

Crannogues. Mr. Foot notes the occurrence of a crannogue in Fin Lough, as well as two in Ardakillin Lough; both loughs are in the N.E. corner of Sheet 87. I myself observed from the shore traces of crannogues in Altore Lough and Bellisland Lough, which are in the neighbourhood of Milltown, Sheet 86. As no boat was to be had, no verification of same could be made.

Pottery clay. Bluish red plastic clay suitable for pottery work is to be found on the south-eastern flank of Course Top, in the townland of Curries. A large pottery was once worked there, and the clay was about three feet thick, but all traces of the works are now gone. Similar potteries were rather

frequent in the district, but the only trace now existing of them is their mention in the Ordnance maps.

A famous pottery is worked at Knockcroghery, which lies between Roscommon and Athlone, and which supplies the whole county of Roscommon with earthenware.

Mines. About two miles E.S.E. of Longford town [Sheet 88] there are good surface indications of lead ore, but no regular mining operations have been proceeded with. From information on the spot I learned that formerly a considerable quantity of argentiferous galena was extracted from the surface, where small excavations can now be seen.

R. G. S.

SHEET 85 [Eastern part of].

On the low country east of the Aille river and the north part of Lough Mask the drift is principally boulder-clay-drift, however in the neighbourhood of Loughs Mask and Carra it seems to be a mixture of this and boulder-drift.

On the south-east of the area contained within the limits of this part of the Sheet the drift is undulating, and seemingly the mounds have no general bearing, however the turlough west of Annefield ranges nearly N.W. and S.E. while the bogs to the east and south of the same place have a general N.N.E. and S.S.W. direction. Farther east the drift is usually undulating irregularly.

In the vicinity of Carrowmore there is a gravel-drift also south of Fortville. In this locality two white vein granite boulders were observed, one on a fort called Cahernagooagh at the extreme limits of the district, and the other a little on the N.W. of Fortville. A mile and a half E.N.E. of Ballinrobe are a few small somewhat esker-shaped ridges of rocky drift, and N., N.W., and W. of Ballinrobe are well defined N.N.E. and S.S.W. mounds of boulder-clay drift. Farther west, in the vicinity of Lough Mask, are well defined mounds or drumlins of boulder-clay drift that strike N. 15 E., having a similar bearing to the newer ice striæ. These drumlins continue up into the country between Loughs Mask and Carra, but their bearings vary from N. 10 E. to N. 20 E.

East of the south part of Lough Carra the country is principally occupied by bog, alluvium or drift. The latter, although in undulating masses, forms rude ridges, some being well defined and having a general bearing of about N.N.E. and S.S.W. To the north of Cloonagashel there is a gravelly drift, containing in places large blocks; it occurs in irregular small mounds having a general east and west bearing.

In general the bogs and flats extend with a similar general bearing to the drift. East and south-east of Hollymount the drift is undulating irregularly causing the bogs, flats, &c., which occupy most of the hollows to have no general direction. N.E, and S.E. of Coonard is a gravelly drift overlying the boulder-clay drift which seems to be part of the more recent gravels that farther east form eskers. On this esker, according to Mr. Symes' observation, part of the road from Crossboyne to Headford was made. The esker begins in a regular ridge at the parish boundary, a mile east of Bushfield, and runs N.E. for about a mile, while farther N.E. are sand-dunes and short ridges seemingly making a connexion between this esker and that which lies farther east, south-east, and north-east of the village of Crossboyne. Farther north a little west of Brookhill, there is a nearly N.W. and S.E. mound of drift, and of the S.E. end Mr. Symes makes the following note: "This high ground is probably a large boss of rock having a slight coat of drift over it;" and two miles north of Mayfield Lough that observer has noted a short N.W. and S.E. ridge of gravel.

Farther north the drift, although it is not in such characteristic mounds

as farther west, yet is inclined to form ridges that extend either in a N. and S. or N.N.W. and S.S.E. direction, the latter being the prevailing bearing to the northward in the neighbourhood of Claremorris, where each ridge is bounded by large long bogs. To the S.W. and N.E. of Lough Deen there are a few well defined hills that extend N.N.E. and S.S.W. North of Ballyglass and south of Roslee chapel, a small remarkable boulder of a hard jasper conglomerate was observed. In the country north of Lough Carra the drumlins of drift with the bogs and flats have a tendency to extend in N. and S. directions, coinciding with the direction of the newer ice striæ as will be seen by a reference to the table given hereafter. The drumlins are composed in part of the boulder-clay drift and of the boulder drift, but against many of them gravels and sands have been banked, and the south and south-east parts of some of those that appear never to have been cultivated, are covered with large blocks; moreover the nuclii of many appear to be rock.

In the neighbourhood of some of the turloughs is a gravelly drift that seems to have been formed by the waters of the turloughs when they were of larger dimensions, and the bottoms of most of the turloughs are lined with a white calcareous marl, which is sometimes interstratified with peaty layers. This marl has evidently been deposited from the waters as the turloughs dry up during the summer, while the peaty layers are vegetable matter that has been washed or blown into the water. At a few of the turloughs from which the subterranean passage is perfectly open and free, and egress is therefore given for the waters without filtering, there is a clayey deposit nearly free from limy matter, which seems to be the insoluble residue of the decomposed limestone, while the soluble portions were carried away.

In Carrowmacon Lough there is an island which appears to be a crannoge or artificial island; however, when the district was examined no boat in which to examine it could be procured.

Between Lough Carra and the Aille river are a few drumlins that run N. and S.; there is also a remarkable feature, an esker-like ridge of rocky drift, south of the east bay of Cloon Lough, and parallel to the low perpendicular limestone cliff previously mentioned. Further north between the flat and the road there are long ridges of a drift containing limestone and sandstone fragments and blocks, the ridge nearest the flat being composed almost entirely of the latter and therefore of rocky drift.

Striæ supposed to have been cut by ice. In this area there are older and newer scratches similar to those formed by ice in Arctic and Alpine regions at the present day. The oldest here observed, which may be called the Primary, have a general bearing of N.E. and S.W. or nearly so. These are supposed to have been made by the ice that overspread the central plain of Ireland and formed the boulder-clay-drift—the others all seem due to a large glacier that had its source in the mountains W.S.W. and S. of Lough Mask, and that partly flowed northward to Killala Bay and partly westward towards Clew Bay. The main branch of this glacier would seem to have come down the valley of Lough Mask; however, a large branch would seem to have joined it, from the valley of the Aille river. In the following table an attempt has been made to class the different striæ observed, in relation to the different systems to which they seem to belong. The striæ A are supposed to be the primary striæ, striæ B those cut by the Lough Mask glacier that seems to have flowed north to Ballina, and westward to Clew Bay; striæ C seem to have been engraved by tributaries of the Lough Mask glacier, and striæ D by minor or branch tributaries.

TABLE OF SUPPOSED ICE STRIÆ.

County.	Map.	Townland and Locality.	Striæ A.	Striæ B.	Striæ C.	Striæ D.	Remarks.
Mayo,	88/4	Tieveinish, on the N.W. slope of hill,	–	N. 15 W.	–	–	These seem to have been cut by ice flowing into the Clew Bay.
	"	Tobberrooaun, on the north slope of hill.	–	N. 25 W.	N. 65 W.	–	Both these systems seem to have been cut by ice flowing to Clew Bay, but the latter are newest.
	"	Tobberrooaun, a little lower (north) than last.	–	–	N. 45 W.	–	A furrow 5 yards long, 1 inch wide at S.E. end, and 5 inches at N.W. end, showing that the ice came from the S.E. There is a drumlin of boulder drift immediately north of these striæ that has an oblique bearing of N. 25 E.
	"	Aille, on the low ground, a little east of last, near the Aille river.	–	–	N. 45 W.	–	—
	90/4	Rathnacreeva, on the north of Ballyglass.	–	–	–	–	A remarkable boulder of hard compact fine jasper (green and red) conglomerate. Query: where did it come from?
	98/2	Tieveinish East, Tieveinish West, In neighbourhood of nearly N. & S. road west of Tonlegee Lough.	–	N. 60 W.	N. 15 E.	N. 10 W.	On the slope of the hill above the Aille river valley these three sets of striæ are well marked; the oldest seem to have been formed by ice that flowed across the ridge to the northward into Clew Bay; the second, by the ice of the Aille river glacier; and the third, by ice sliding down into the Aille river valley. The third we remarked is older than the second, as it evidently was a tributary to the N. 5 E.; but as the glacier may have existed after the ice disappeared off the low hill to the northward, the striæ of the valley would be the newest.
	98/4	Arderry, in the Aille river valley,	–	–	–	–	The N. 5 E. striæ coincides with the bearings of the associated drumlins; and in the district on the west there are striæ N. 10 E. older than others that are N. 25 W.
	99/1	Devleash East, Devleash West, and Maunmeen.	–	–	–	–	Drumlin of boulder drift; one nearly a mile long N. 10 E. with bearing of valley.
	99/2	Part of Quarter Sheet west of Lough Carra.	–	–	–	–	Irregular drumlins, but with N.N.E. by N. bearing with the fall of the Aille valley.
	"	Part of Quarter Sheet east of Lough Carra.	–	–	–	–	Drumlins N. 10 W.; no striæ observed.
	99/3						
	99/4	Part of Quarter Sheet west of Aille river.	–	–	–	–	Drumlins N. & S.; no striæ observed.
	"	Part of Quarter Sheet between Aille river and Lough Carra.	–	–	–	–	Drumlins N. & S. to N. 10 W.; no striæ observed.
	100/1	Castle Burke, on shore of Lough Carra, east of Castle Burke.	–	N. 7 W.	N. 53 W.	–	Drumlins N. & S.; no striæ observed.
							The first belong to the ice of the Lough-Mask-glacier. The last are unaccountable; they are newer than the others.

TABLE OF SUPPOSED ICE STRIÆ.—*continued.*

County.	Map.	Townland and Locality.	Striæ A.	Striæ B.	Striæ C.	Striæ D.	Remarks.
Mayo—*continued.*	100/1	Cloonboorhy, a little S.E. of Clogher House.	–	N. & S.	–	–	These all seem to have been cut by the glacier from Lough Mask to Ballina. Drumlins well marked, and bear nearly N. and S.—south end of some of the drumlins covered with blocks.
	,,	Lisrobert, at west margin of Lough Frank.	–	N. 7 E.	–	–	
	,,	Burren, a little S.S.E. of Mount Pleasant.	–	N. 10 E.	–	–	
	100/2	Slishmeen, in turlough, close to parish boundary.	N. 53 E.	N. & S.	–	–	The first seem to be the primary striæ; the others those of the Lough Mask and Ballina glacier. The drumlins run N. and S., or nearly so. A little west of Ballyglass Lough is a drumlin with a rock mass forming its south end.
	100/3	Castlecarra, on shore of lake S.E. of Caille.	–	N. 10 E.	–	–	Drumlins have a nearly similar bearing, so have the parts of Lough Carra that come into this quarter sheet.
	,,	Annies, on shore of Lough Carra, .	–	N. 10 E.	–	–	
	100/4	North-west part of quarter sheet, .	–	–	–	–	Drumlins have a bearing of about N. 5 E. to N. 10 E.; no striæ observant.
	,,	East and south-east parts of quarter sheet.	–	–	–	–	Drift undulating, but with a tendency to run north and south.
	101/1	—	–	–	–	–	Bogs and mounds of drift bear about N. 20 W.
	101/3	—	–	–	–	–	Bogs and drift mounds irregular, but seem to have a general bearing of about N. 10 W.
	108/2						
	,,	Glennagashleeny, at west turn in road.	–	–	–	N. 5 W.	Seems to be cut by ice flowing down small valley to join valley of the Aille river.
	108/4	Ballybana, on mountain at road and stream.	–	–	–	N. 15 E.	Seems to be cut by ice sliding down slope into small valley, the latter being a tributary of Lough Mask, or they might possibly be primary striæ deflected by the hills on the west.
	109						
	109/2						
	,,	Goats' island, at the mouth of the Cloon river.	–	N. 15 E.	–	–	Drift hills on mainland run N. 10 E. Rocks forming islands all dressed and planed, sloping to the southward.
	,,	Otters' island (Island in N.E. bay of Lough Mask,)	–	N. 10 E.	–	–	
	,,	Curlew island (Island in N.E. bay of Lough Mask,)	–	N. 20 E.	–	–	
	,,	Kilkeeran, near village on shore of Lough Carra.	N. 25 E.	N. 10 E.	–	–	In the first locality the older striæ are nearly obliterated. The drumlins of drift have a similar bearing to the newer striæ.
	,,	Kilkeeran, south part of townland on border of the flat.	N. 25 E.	N. 10 E.	–	–	
	109/3	Ballybanaun mountain, at road-side,	–	–	–	N. 10 E.	These seem to be cut by ice sliding into a small valley, a tributary of Lough-Mask-glacier, or they might possibly be primary striæ deflected by the hills on the west.
	109/4	Carrowaneeragh, on shore of Lough Mask.	–	N. 12 E.	–	–	Drumlins have a nearly similar bearing.
	,,	Aughinish, on shore of Lough Mask,	–	N. 28 E.	–	–	These seem to have been cut by the ice of the Lough-Mask-glacier, as the drumlins hereabouts turn with the glacier, facing the S.W. corner of the Lake, where the principal source of the glacier seems to have been.
	,,	Aughinish, on side of alluvial flat, .	–	N. 23 E.	–	–	
	110/1	Ballycally, found on the shore of Lough Carra, N.E., N.W., and at other point.	–	N. 10 E.	–	–	
	110/2	Parknakid, at margin of bog, . .	–	N. 5 E.	–	–	Drumlins run north and south, but on the east of Lough Carra, near Brownstown House, the bearing is about N. 15 E.
	110/3	Cloonkerry, on edge of bog, . .	–	N. 5 E.	–	–	Striæ very faint. The drumlins in the vicinity of road to the east bear about N. 10 E., while the drumlins on the N. springing from this boss of rock bears nearly N. and S.
	117/1						Drumlin to the north-east, east of Lakeview, bear N, 10 E. The three last sets of striæ belong to the Lough-Mask-glacier.
	117/1						
	117/2	Inishrobe, Island at mouth of Robe river.	–	N. 15 E.	–	–	This island is a drumlin, and has a similar bearing, as also has all the island and the "deeps" in Lough Mask.
	117/3	Islands in Lough Mask, ...	–	–	–	–	
	117/4	Inishmaine, on shore of lake at the Abbey.	–	N. 15 E.	–	–	These have a bearing of N. 15 E.
	,,	Knocknamucklagh, near the shore of the lake.	N. 55 E.	N. 15 E.	–	–	—
	118/1	North and west of Ballinrobe, .	–	–	–	–	The oldest are supposed to be the primary striæ, while the newer have evidently been made by the same force, as carved out the islands and deeps in Lough Mask.
	118/2	Cregduff, by road side, . . .	N. 30 E.	–	–	–	Drumlins bear N. 20 E.; no striæ observed.
	118/4	Ellistronbeg, ...	–	–	–	–	These seem to have been cut by ice comiag from the N.E. However, these may possibly have been made by secondary in coming from the hills on the S.W.
	118/4	Rausakeera, north, ...					White granite boulders. Query: where did they come from? They may have come either from the S.W. or north.

G. H. K.

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