ANNUAL REPORTS

AND

PROCEEDINGS

OF THE

BELFAST NATURALISTS' FIELD CLUB.

Series II.

VOLUME II. 1880-87.

BELFAST:
PRINTED FOR THE CLUB.

1888.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

1880-81.

Series II. Volume II. Part I.

PRINTED FOR MEMBE

PRICE TO MEMBERS

S. 15.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

FOR THE

Year Ending 31st March, 1881.

(NINETEENTH YEAR.)

SERIES II. VOLUME II. PART I.

Belfast:
PRINTED FOR THE CLUB
BY ALEXANDER MAYNE, CORPORATION STREET,
PRINTER TO THE QUEEN'S COLLEGE.

1882.

REPORT

OF THE

Belfast Naturalists' Field Club

FOR THE

Year ending 31st March, 1881.

YOUR Committee, in bringing before the members the eighteenth Annual Report, do so with the pleasing knowledge that the Club continues to enjoy increasing success, not only in regard to the interest evinced by its members in its aims and objects, but in the cordial sympathy felt by the general public in the work in which you are engaged. The membership is still well maintained, and it is encouraging to note that some of those who have lately joined are earnest students of Natural Science, from whom the Committee hope to receive good help. While expressing our hope for the future, we cannot do so without noticing the necessity which still exists for exertions to secure new members, many having been lost to us during the past year by death and removal.

The programme of excursions arranged by your Committee for last season was carried out. The places selected were admirably suited for the pursuit of the Club's work, and gave

general satisfaction. The attendance at each was slightly above the average.

Your Committee had the pleasure of inviting the members of the Royal Historical and Archæological Society of Ireland to join in the Club's excursion to Newtownards and Greyabbey on 8th July. Several of the members of that Society accompanied, and freely expressed their pleasure and enjoyment in this interesting excursion.

Your Committee take this opportunity of thanking those who so kindly assisted the Club on the occasion of their various excursions, and would especially mention the generous hospitality and kindness the Messrs. Waddell extended to the members who had the pleasure of visiting Dromore and Magheralin. Also, that of the Messrs. Musgrave, who courteously entertained the party, and to whose suggestions and guidance much of the success of the excursion to South Donegal is due; and of Mr. Alexander Sutherland, in entertaining the members, and conducting them through the extensive mines of the Irish Hill Mining Company on the occasion of their excursion to Larne and Ballyclare.

The following is a list of the places visited, notices of which will form part of your proceedings:—

I.—Dromore and Magheralin ...	... 22nd May.
II.—Cultra	... 5th June.
III.—Charlemont	... 26th.
IV.—Newtownards and Greyabbey	... 8th July.
V.—South Donegal	... 10th to 14th August.
VI.—Larne and Ballyclare ...	... 4th September.

A conversazione was held in the Museum on 22nd October, which proved a success; and your Committee would again take the opportunity of thanking the members and friends who gave their assistance and contributed so freely the interesting objects exhibited on the occasion.

The Winter Session was opened by an address by the President. At the ordinary meetings seven papers were brought forward, the subjects of which, and the interest taken in them, evinced a healthy tone in your Society's work.

The following are the titles of the various papers, abstracts of which will also appear in the Proceedings :—

14th Dec. I.—"Some Account of a 3,000 Miles Summer Ramble in Norway and Round the North Cape." By Mr. John Pim.

4th Jan. II.—"On the Crucifixion and other Sculptures of the Old Church at Maghera, Co. Derry." By Mr. F. W. Lockwood.

" III.—"On the Boulder Clay of the North-East of Ireland." By Mr. S. A. Stewart.

" IV.—"On a Collection of Birds shot in Belfast Lough since August last, with Exhibition of Specimens." By Mr. Thomas Darragh.

1st Feb. V.—"Some Account of a Late Visit to County Galway." By Canon Grainger, D.D., M.R.I.A.

8th March. VI.—"On Carnivorous Plants: their Structure and Habits, with Notices of some of the Insects which frequent them." By Mr. W. H. Phillips.

29th March. VII.—"Glacial Notes amongst the English Lakes: Are they Rock Basins?" By Mr. F. W. Lockwood.

The part of the Proceedings for the year 1879-80 has been distributed amongst the Members, and in addition to the usual matter, it contains an appendix by Messrs. Wright and Stewart, which form valuable contributions to our knowledge of the Boulder and Post Tertiary Clays of the North-East of Ireland.

Your Committee continue to receive the Transactions and Proceedings of kindred societies in exchange for your Proceedings. They have also the pleasure of acknowledging from the United States Government Reports of the Natural History and Geological Surveys of the States and Territories.

Two sets of drawings were sent in by members, in competition for the special prize No. 21. The following are the remarks and award of the judges appointed to report on them :—

"For this prize there are two competitors, who have between them sent in eight drawings—viz., three drawings by the Rev. H. W. Lett, M.A., and five by Mr. Richard Niven. We are of opinion that none of the drawings completely fulfil the objects for which this prize was offered, which is to preserve as complete a record as possible of monuments liable to destruction; but we,

nevertheless, consider that the drawings submitted by Mr. Niven possess a certain artistic merit, and some of them at least in part meet the objects of the prize. We, therefore, recommend that half this prize—viz., 10s 6d—be awarded to him.

"WILLIAM GRAY,
"JAMES MOORE, M.D., } *Sub-Committee.*"
"F. W. LOCKWOOD,

The following is the report of the judges appointed to examine the Natural History collections submitted in competition for the Club's prizes:—

"The judges report that the Rev. H. W. Lett's collection of flowering plants number nearly 200 species, labelled with dates and localities of collection. The specimens are fairly mounted, and fulfil the conditions of Prize II., and they accordingly award that prize to Mr. Lett.

"The judges further report that they have awarded Prize No. III. to the Rev. H. W. Lett for a collection of mosses numbering over 40 species, and complying with the conditions attached to that prize.

"The judges also report that the Rev. H. W. Lett has sent a collection of Ferns, but they have awarded no prize in this case, as no member is eligible to receive more than two of the Club's prizes in any one year. (See Conditions).

"HUGH ROBINSON,
"JOSEPH WRIGHT, } *Sub-Committee.*"
"S. A. STEWART,

Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1879-80	...	...	...	£24	14	5		
„ Subscriptions—248 at 5s	...	...	...	62	0	0		
„ Gain on Excursions	...	...	...	1	6	6		
				£88	0	11		

By Loss on Conversazione	...	...	...	£9	8	5		
„ Printing Annual Report	...	...	...	24	3	2		
„ Advertising, Printing, and Stationery	...	...	...	10	8	4		
„ Delivery of Circulars	...	...	...	1	10	0		
„ Postages ...	...	...	...	3	15	2		
„ Prizes	...	...	...	1	0	0		
„ Museum Expenses	...	...	...	8	8	0		
„ Balance on hands	...	...	...	29	7	10		
				£88	0	11		

Audited and found correct,

JOSEPH WRIGHT, *Treasurer.*

WILLIAM SWANSTON, *Hon. Secretary.*

SUMMER SESSION.

The following Excursions were made during the Summer Session:

On 22nd May, to

DROMORE AND MAGHERALIN.

The Summer Session was opened by an excursion to Dromore and Magheralin, on Saturday, 22nd May. Starting by the 11 a.m. train, the party found themselves in about an hour at the picturesque and ancient town of Dromore.

Their first visit was made to Dromore House, formerly the Bishop's Palace, now the residence of John Quin, Esq., J.P. The house and grounds were courteously shown by Mr. Richard Culley. Here Bishop Percy, the author of the "Reliques," lived, and wrote several of his songs and poems. In the immediate neighbourhood of the house is a very perfect fort, with rampart and moat; also, St. Colman's Well, which dates from about A.D. 550. The stocks in the market-place were next visited and sketched, and it is much to be regretted that the fragments of a fine old Irish cross, into which they are secured, should any longer be permitted to serve so base a purpose. The great fort, just outside the town, was next reached; this has a triple fosse and rampart, and in addition a square enclosure on

the side next the River Lagan, supposed to have been for cattle. The fort, from its position and its fine state of preservation, is one of the finest examples of these numerous earthen erections in the North of Ireland. The next visit was paid to the cathedral, where Jeremy Taylor and Bishop Percy are buried, as also Mr. Stott, who had a bleachgreen at Dromore, but who is, perhaps, better known to posterity as the "grovelling Stott" of Byron's "English Bards and Scotch Reviewers." The cathedral is modern, the older portions having been erected in great part by Bishop Percy about 1808.

The party then started on cars along the Magheralin Road, which runs picturesquely along the banks of the Lagan, giving from the loftier points a striking panorama of the Mourne Mountains, and a wide stretch of beautifully diversified country. Another fine fort near Gill Hall was examined; it is thought by many to have been erected to command a pass over the Lagan, but as the river in this neighbourhood is easily fordable, there hardly seems sufficient ground for this view.

By the courtesy of Richard Brush, Esq., J.P., Gill Hall, the seat of Lord Clanwilliam, was thrown open, and many interesting relics were seen in this historic mansion, which dates from the 17th century. Perhaps the chief interest attaches to the apartment in which, during the reign of Queen Anne, the ghost of Lord Tyrone is said to have appeared to Lady Beresford to assure her of the truth of a future state. The story is related in "The Ulster Journal of Archæology." The quaint old fireplace and massive wooden cornice are in complete harmony with the popular idea of ghost chambers. The antlers of an Irish elk, dug up near Dromore, are to be seen in the hall, and are said to be among the largest found in Ireland. At present they measure above eight feet across, but some tines are missing, and they were, doubtless, originally much larger. Lewis's Topographical Dictionary gives their measurement as 10ft. 3in. A walk through the woods, densely carpeted with wild hyacinths in bloom, was much enjoyed—the view from the higher ground over a blooming country raising a doubt in the minds of some

whether this could in truth be the Ireland about whose distressed state we have lately heard so much.

A brisk drive past Islanderry and Kircassock brought the party to Magheralin, where they were most hospitably entertained at Drumcro House by Richard and Coslett Waddell, Esqrs. After inspecting a fine collection of limestone fossils, a meeting was held on the lawn, when several new members were elected; and on the motion of Canon Grainger, D.D., M.R.I.A., seconded by Mr. Mann Harbison, a vote of thanks was passed by acclamation to our hosts and hostess for their kindness on the occasion of the Club's visit to the neighbourhood.

A visit was then paid to Mr. Waddell's whiting works, and to his extensive limestone quarries adjoining. On the way the site of the great battle of Magh Rath (fought in the year 637, between Congal Eloain and Donald King of Ireland, where the former and his British allies were totally defeated) was pointed out; and Mr. Waddell stated that he remembered when he was a boy immense quantities of bones being removed from the site, besides brass buckles of the old Irish garments, which latter were unfortunately all destroyed by the labourers in the hope of their containing gold.

At the edge of the limestone quarry were recently exhumed some very fine cinerary urns, besides a quantity of partly calcined bones, which were exhibited at a recent meeting of the Club. A further examination by some of the members resulted in the discovery of more fragments of bones and the bottom of an urn. From the charcoal streak beneath the remains, it would appear that the bodies had been cremated, and the urns baked on the spot, and as several other charcoal bands are to be seen along the face of the quarry, it is not unlikely that a careful search would reveal the existence of an extensive burial-ground here. To any members of the Club who desire to make a thorough investigation of the spot Mr. Waddell kindly promised to give his hearty co-operation. Time did not permit more than a moment's inspection of the ivy-covered ruins of Magheralin Church, which was used as a cathedral by Bishop Jeremy

Taylor while he was re-building the one at Dromore, which, with the greater part of that town, was destroyed in the great rising of 1641. The party returned by rail from Moira, having spent a most instructive and enjoyable day.

On 5th June, to

CULTRA.

The second excursion of the Society for the season took place on 5th June, the place selected being Cultra. A party of about twenty members met at Marino, and proceeded at once to the shore, where are exposed rocks of various formations, exceedingly interesting to geological students. As an examination of these rocks constituted the main feature in the afternoon's programme, many of the party were provided with hammer and bag. Zoology had also its votaries: the recent gales had favoured their pursuits by scattering a rich harvest of marine life along the beach. The arenaceous cases of several species of Tubicola were in immense profusion, and many specimens of *Alcyonium digitatum*—the dead man's fingers of the fishermen—ascidians, sponges, &c., were secured for microscopic examination. The mud and sand left in the rock pools by the receding tide is known to be rich in microscopic life, especially that interesting group, the Foramanifera, upwards of eighty species of which have recently been detected in gatherings made in this neighbourhood by Dr. Samuel M. Malcomson, among which was a specimen of *Ammodiscus Shoneana*, new to our Irish coasts, and but recently discovered in England, and named in honour of Mrs. Shone, an eminent English lady naturalist.

The rocks exposed at the point where the road from the railway station debouches on the shore are reddish, clayey sandstones of the Triassic age. Passing along towards Cultra, we find the strata varying slightly in character, and dipping seaward at a low angle. Near the old pump they are well seen in

a small cliff section, and here are exposed several of the dykes which cut through the strata every hundred yards or so along this part of the beach. The effect of such masses of molten rock as filled up these fissures, either from volcanic overflows or from being pushed upwards by subterranean forces, was such as to alter the adjacent friable sandstone into compact crystalline rock, and in many cases to bend the strata in a remarkable manner. Judging from the fact that these dykes vary in their lithological character, and that in some places they intersect one another, we may safely infer that they are of different geological ages, and many of them may be contemporaneous with the basaltic plateau of County Antrim.

Still proceeding in the direction of Cultra pier, we come abruptly upon a set of stratified rocks, dipping northward at a higher angle than the former. The different character of these rocks at once strikes us; and as they are found a little further on to be fossiliferous, and the species referable to the Carboniferous series, it is evident that there is a fault in the section, bringing up these beds into juxtaposition with the Triassic (new red) sandstone. This fault is supposed, by the officers of the Geological Survey, to be an upthrow to the east of about 300 feet, but how the figures are arrived at it is difficult to see, as there appear to be no data upon which to base a calculation. These Carboniferous rocks continue along the shore for upwards of a mile, and consist of thin-bedded limestone, red and grey shales, sandstones, and clays. A few of the bands are fossiliferous, and specimens of *Modiola MacAdami* and other species were obtained.

A little to the north of Cultra bathing-place, and at about half-tide, buff Magnesian Limestones occur. The stratification of these beds is somewhat obscured by sand and shingle. It was to the examination of these beds especially that the Club wished to give attention, but the incoming tide left too little time for this part of the work. After a short search, fossils were found in them, but rather obscure for determination. They are interesting, however, as belonging to the Permian series—a

formation very sparingly represented in Ireland. No field offers such attractions to the members of the Belfast Naturalists' Field Club as these Permian beds, their fauna being entirely unrepresented in our local Museum, and almost equally so in members' private collections. Much, also, remains to be learned regarding their relation to the other formations in this particular locality. The fast rising tide compelled the party to beat a steady retreat, and direct their attention to the beds nearer high-water mark. Several members, zoologically bent, had a search for the boring Mollusca in the clayey bands, *Pholas dactylus* being the most conspicuous. Although the space between tide marks cannot be said to be very favourable for archæological pursuits, yet some of our members were on the alert for anything of that nature which might turn up, and a few well-formed flint flakes were found; but the grand prize of the day was a magnificent flint celt, beautifully chipped, and measuring $4\frac{1}{2}$ inches in length by $2\frac{1}{4}$ across. These remains have, doubtless, been derived from the upper gravels which skirt the shores, and which at some points are slowly giving way before the action of the sea. Perhaps no better monument of such inroads can be seen along our coasts than the "old pump" already referred to; its timbers are still comparatively stout, but it now stands, unsupported, upwards of fifty yards from the low sea cliff, and surrounded by several feet of salt water at every high tide. The party returned to town by rail about half-past seven, many determined on making a further acquaintance with so interesting a piece of geology near their own doors.

On 26th June, to

CHARLEMONT AND BENBURB.

The third excursion of the Society was made to Charlemont and Benburb, on 26th June. Leaving the Great Northern terminus at 10 o'clock, Trew and Moy station, on the Dun-

gannon line, was reached in little over an hour. Here the party was met by the Rev. Edward Whitty, rector of Charlemont, who kindly acted as guide for the day. A pleasant walk of about a couple of miles brought the party to one of the entrances to Roxburgh Castle, the seat of Lord Charlemont. The castle is comparatively modern, and has been recently much enlarged and beautified; it forms a noble quadrangular pile, commanding an extensive view of the surrounding country. The refined taste, and wealth of art treasures and ornaments displayed in the principal rooms, which were kindly thrown open to us, would have engaged attention for the entire day. Leaving by the principal entrance, which is in the village of Moy, and crossing the Blackwater, which here divides the County of Armagh from Tyrone, a visit was made to the dismantled fort of Charlemont. The strategical position which this fort occupied, commanding one of the principal passes of the Blackwater, has rendered it important, and given it a history. It was erected by Lord Charles Mountjoy, about the close of the 16th century, and we find it was occupied by the royal troops. In the year 1641, however, it was taken by stratagem by Phelim O'Nial, and its governor put to death. An attempt was made by General Monroe to recover it, but he had to fall back with heavy loss. It was subsequently re-taken by Sir Charles Coote. Afterwards it was sold to Charles II., and later it was garrisoned by the Irish for James II., and was compelled to surrender to Duke Schomberg. Its after history has been one of peace. Its unused entrance, levelled batteries and bastions, and filled-up fosse are now bearing a heavy crop of grass; and the massive square tower, which until quite recently served as a barrack for the troops, has an unmistakably deserted and decayed appearance. A short distance off are the cavalry stables, now fully occupied by Lord Charlemont's numerous stud, among which is some of the best blood in the country. The party were agreeably surprised to find here the celebrated horse Merv, so well known as the trusty friend of Captain Burnaby, on his famous ride to Khiva. Merv's prolonged ride seems to have told severely on

his constitution, as we were informed that every kind of food and medicine—except, perhaps, Cockle's pills—has been tried in vain to put flesh on his well-formed frame. He seems, however, safe to end the remainder of his days amid peace and plenty in his present quarters.

Leaving Moy, on cars for Benburb, a short detour was made to visit the entrenched rath on Lager Hill, from which a magnificent view is obtained, reaching from the Mourne range to far into the north of the country. The fort or rath has been taken possession of as a burial-ground—a circumstance most unusual, as those earthen erections are generally held by the country people in superstitious reverence, "too canny to be meddled with." The road runs through a richly-diversified country; in part it is parallel to the Ulster Canal, connecting Loughs Neagh and Erne. The flowering rush (*Butomus umbellatus*) was seen at various points, and the soap-wort (*Saponaria officinalis*) was collected further on.

Benburb is a neat, tidy village, beautifully situated, and its neighbourhood is full of historic interest. During the rebellion of the Earl of Tyrone, several severe engagements were fought here. In 1597 the Earl of Kildare marched against the rebellious earl, but was defeated, and forced to retire mortally wounded. Sir Henry Begnall succeeded him, and with 4,500 foot and 400 horse marched against Tyrone's army, losing his life and the greater part of the forces in an unsuccessful attempt to dislodge him. Lord Mountjoy, after several sanguinary battles and severe loss, compelled him to retreat northward. In 1641, the castle, erected by Sir Robert Wingfield, was surprised by Sir Phelim O'Nial, and its inmates slaughtered. In 1646 it was again the scene of a great battle between Sir Phelim and General Monroe. The latter, with an army of 6,000 foot and 800 horse, crossed the Blackwater near what is now Battleford Bridge, and marched against the enemy. The result was terribly disastrous to Monroe, who lost the day, 3,000 of his troops, and all his artillery and stores. The castle—which occupies a position of great natural strength close to the edge of a

perpendicular cliff of limestone, at the base of which runs the Blackwater—was about this time dismantled, and now forms a picturesque, ivy-clad ruin.

While several of the party were engaged with brush and pencil, others, intent on geology, visited the limestone quarries, a short distance off. A hurried glance showed that the place would repay a visit with hammer and bag. Among the fossils collected were specimens of *Cyathophyllum ceratites*, *Fennestella antiqua*, *Productus giganteus*, *P. semireticulatus*, *Streptorhynchus crenistria Pleurotomaria Yvanni.* The walls of the old castle and the limestone cliffs yielded to the botanists the pepper-wort (*Lepidium campestre*) and the wild wallflower (*Cheiranthus cheiri*). The almost total absence of hawthorn blossom from the hedge-rows throughout the country this season was remarked by members present, and fears were expressed that should the incoming winter prove rigorous, the birds which depend on haws and other small fruit, for their winter food, will suffer severely. Again mounting the cars, the party was, after a brisk drive to the station, soon on their way home, after a thoroughly good day's work.

On 8th July, to

NEWTOWNARDS AND GREYABBEY.

The third excursion of the season was held on Saturday, 8th July, to Newtownards and Greyabbey. The members of the Royal Historical and Archæological Association of Ireland were invited to join, and notwithstanding the downpour of rain a large party drove via Dundonald and Newtownards to Greyabbey. A short halt was made in the former town to inspect the market cross, which bears date 1636. Arrived at Greyabbey, some forty archæological students scattered through the carefully preserved ruins, and took a preliminary survey of the general features of these, the most extensive abbey ruins in the

province. There was a very lively interest exhibited as to the object and uses of the various buildings which compose the group, and sundry minor discussions on matters of detail were raised.

A gathering having been made in and around the stone-roofed chapels off the transept, a Chairman was elected in the person of Dr. Moore, Hon. R.H.A., when a short paper was read by Mr. J. J. Phillips on "The Architectural Remains of the Cistercians in County Down," which we summarise. It was taken for granted that the members were acquainted with the Puritanical aims which prompted the Cistercian reformation at the close of the eleventh century, which governed this religious order in the first centuries of its existence, and of the gradual relaxation which subsequently took place in its rules and practices. Traces of "early work" and Romanesque detail are found here, as well as the work found in the latter part of the twelfth and early portion of the thirteenth centuries, called "early English." There were deviations, though not many, from the now well-known monastic ideal of the order of men who erected the abbey. It must be stated that they, unlike the Carthusians, did not live in cells or solitary hermitages. Furthermore, it interests us to know that they were the greatest farmers and market gardeners of the age; that side by side with their religious avocations they very vigorously and successfully prosecuted many others of a secular nature. In Tintern Abbey, Fountains, Rievaulx, Furness, and in scores of other abbeys, we have a remarkable series containing some of the finest architectural erections in the empire, rivalling in vigour of conception and purity of execution the noblest and most intellectual period of Grecian art. The fact which chiefly interests the archæologist is, that of the many hundred abbeys which were erected in the early years of the existence of this order (ere the sunshine of prosperity had relaxed its severe rules and Puritan simplicity), there is such an astonishing uniformity in plan and arrangement, and the distinctive character of their architectural details. This abbey, *De Jugo Dei*, as it was ori-

ginally called, situated as it was on the extreme confines of western civilization, bears in its ruins, in the nature of its site, even in the very outlines of its foundations, evidences of its origin. There are the remains of another and very much larger Cistercian Abbey at Inch, near Downpatrick, and it also bears similar impress of its origin. Water to drink and to flush their sewers was the first object of the monks—indeed, the names of many of their abbeys indicate this uniform proximity to wells and founts of water. The well of spring water, which at Greyabbey is still a perennial stream, stands in what originally was the kitchen garden of the abbey—and Melli-font is the name of their first abbey in Ireland.

The church of every abbey had two principal divisions, the eastern portion for the ritual services of the "religious" of the community, the part westward of the rood screen being allocated to the lay monks, the conversi or working men of the community. This rood screen at Greyabbey had been swept away in Cromwellian times, in order to render the abbey church more serviceable as a barn, but mere accident has lately brought to light evidence which corroborates previous surmise as to its exact site. When in its prime, the secular buildings lay, according to rule, west and north of the wall or buildings which flanked the west side of the cloister quadrangle. As regarded the buildings devoted to the "religious" of the abbey, we have at Greyabbey very interesting remains left, showing a complete coincidence to the architectural ideal of that order. Very few abbeys have suffered so little as Greyabbey has at the hands of prosperous abbots ambitious to extend the Church, and to bring the original simple, and chaste excellence of its architecture, up to an advanced, or more decorated style, or to render it suitable for a relaxed ritual. Whatever remains of the original structure we have, are almost as left by the hands of Lady de Courcy's builders—pure early English, with occasional traces of Norman Romanesque. True, there are some few "late insertions," evidencing mediæval changes of a minor character, but not at all of the sweeping nature which affected most of the abbeys of

this order. The buildings eastward of the cloister garth were then described, starting from the south transept of the church, and the uses of each department briefly explained in the following order, viz.:—The sacristy, the chapter-house, over which was the scriptorium or library; the monks' day-rooms extended southwards, and as recent excavations had shown, were prolonged beyond the original outlines. Over these were the dormitories, which communicated with the church by a winding stone stair, termed the "night stair," of which we have the lower steps and newel, still *in situ* in Greyabbey. Bounding the cloister garth on the south, are the remains of the kitchen and of a very fine refectory of the normal type, with its now ruinous pulpit stairs. The position of the sanitary arrangements and the garderobes, is evidenced by the flushing sewer, which has lately been explored. Mr. Phillips referred to the last report of the Belfast Naturalists' Field Club, and other publications of his, for an extended account showing the coincidence of Greyabbey and Inch Abbey in their plan. Allusions were made to the "masons' marks," many of which, cut by the workmen to identify each stone and guide them to their destination in the building, are still to be seen. We owe much to the careful and intelligent conservation of these ruins by Colonel Montgomery. Over twenty years ago he undertook to clear out the rubbish and oyster-shells of a colony of beggars who had previously occupied the ruins for many years. His conservative instincts saved for the archæologist the remains of the mediæval ruin, at a time when very little information was to be had about Cistercian planning, and long before Sir John Lubbock's commendable exertions in Parliament anent ancient monuments. The present owner of this fine old abbey ruin protects the building from the weather as far as possible, so that at present, owing to his reverent care, it is admittedly one of the best preserved ruins of the kingdom.

Calling at Newtownards as they returned, the party was in full trim to do justice to the lunch provided at the hotel. This over, and after the Rev. G. Robinson had been elected repre-

sentative of the Field Club at the forthcoming meeting of the British Association at Swansea, a visit was paid to the ruins of Newtownards old church. The carvings of the entrance doorway under the ivy-clad tower, built by Sir Hugh Montgomery in the reign of James I., with its quaint texts, taken from the old translation (Henry VIII.'s) of the Bible, were examined. A few brief notes on the church and monuments, were read by the Rev. James O'Laverty, P.P., author of the "Ecclesiastical Remains of the County Down," and the company then divided, part going to visit some old gateways in the wall of the Castle gardens, now occupied by George Walker, Esq., which are supposed to form the original gateways of the gardens, formed here by Sir R. Colville in the seventeenth century. The other section of the party paid a visit to the garden of C. C. Russell, Esq., where the most improved method of keeping bees was to be seen in full operation.

The evening came out bright and warm, and the drive back to Belfast concluded an excursion of which the mingled enjoyment and instruction, despite a few drawbacks, will long remain in the memories of those who took part in it.

On 10th to 14th August,

SOUTH DONEGAL.

The fifth field meeting for the season was an extended excursion to County Donegal. Assembling at the Great Northern terminus, a saloon carriage was found in readiness to convey the party of twenty members and their friends to Stranorlar, the furthest point accessible by rail, where, after a short halt for refreshments, all were comfortably seated on cars, and a start was made for Donegal. The road at first passed through a district fairly cultivated, but as the party approached Barnesmore Gap—a wild mountain pass—it assumed a bleak and desolate character. The pass is at an elevation of above 300 feet, and is

flanked on the south by Barnesmore Mountain (1,491 feet), and on the north by Croaghconnellagh (1,724 feet). It is several miles in length, and is famous for its winds and rain. Lough Eask, with its well-wooded shores, lay a short distance beyond, hemmed in by the more distant range of the Blue Stack Mountains (2,219 feet), while the higher points on the road revealed wide stretches of mountain and moor, contrasting strongly with the cultivated district through which the road now passed, and with the rich shores of the calm lake. Donegal was reached shortly after three o'clock, and a visit was paid to the picturesque castle in the centre of the town. The present remains date from the reign of Elizabeth, and occupy the site of the castle of the powerful O'Donnells, chiefs of Tyrconnell. After dinner, the ruins of Donegal Abbey were visited. Excepting the remains of the cloisters and east window, few architectural features now remain, the material having, no doubt, been found useful by modern builders. The tracery of the windows, and other worked stones, have been freely made use of to mark recent interments in the nettle-grown grave-yard. The Abbey was founded for Franciscan friars, by Hugh Roe O'Donnell, early in the fifteenth century. In it were compiled the famous "Annals of the Four Masters," a marvellous compilation of Irish history, extending over a period of 4,500 years, and ending A.D. 1616. The compilers were four friars, of whom Michael O'Cleary was chief. The Abbey was eventually destroyed by fire during a conflict between two branches of the O'Donnell family.

Again mounting cars, the party were soon on their way to Killybegs, passing through an agreeable country giving every prospect of a good harvest. Good views of Donegal Bay were had from many points on the road, but darkness set in before the day's journey of more than 100 miles by rail, and 34 by road was completed. The resources of the hotel were severely tried by so large an influx of visitors, but proved equal to the emergency. Next morning the members were free to follow their individual pursuits. Several were early out dredging in the harbour, and returned to breakfast, happy with a bag of magnifi-

cent mud. The main party visited St. Catherine's Well and Church, and the remains of an old castle a short way south of the town, none of which possessed any features of interest.

By eleven o'clock all were again on the road to Carrick by way of Muckross Head. The day became excessively hot, the sun blazing down with great force. The character of the country, too, had changed; trees and hedgerows were in great measure left behind, their places being supplied by rocks and stone fences. At Muckross Head the party was met by Messrs. John R. and James Musgrave, who kindly acted as conductors to this very remarkable headland. A glance at its geology made it evident, we had left the contorted and barren mica schists which preponderate in the county, and were now on an area of almost horizontal beds of the Carboniferous series. On the exposed strata of the western shore of the point were observed a number of singular spherical protuberances, about two feet in diameter, the exact character of which it is difficult to conceive; they are dense segregations of lime, possibly formed over some organic centre, such as a coral; in many respects they resemble the well-known septaria of the Oolite formation. Near the point the rocks are piled up in wild confusion, the results of many an Atlantic storm. The party were fortunate in reaching the headland at low tide, and the view presented, as they rounded the most southerly point, amply repaid for all the toil of the journey. The receding tide had laid bare a wide extent of calcareous sandstone, hard and smooth as the Caithness flagging laid down on the footpaths of our own town, while overhead projected for fully forty feet solid strata of the same character. The intermediate beds, within the full influence of the sea have been excavated, and all, except a few huge blocks, removed. A most singular phenomenon is here presented: the blocks referred to, probably weighing from ten to twenty tons each, are, during the in-blowing storms, tossed about by the force of the sea, in such a manner as to grind and polish the solid floor on which they rest in an extraordinary way, and the sides of the rock-bound space in which they are confined bear

strong evidence of the heavy bombardment they have to endure, while the blocks naturally rectangular in form, are rounded and gradually reduced in size by their conflict with the firm land. Peace reigned on the occasion of our visit; the cool shelter of the overhanging rocks was most grateful after the scorching heat of the day's drive. The surface of the broad Atlantic was without a ripple, save at the intervals when the heavy ground-swell broke with giant force on the rocks outside. The scene during a strong westerly gale is described by the fishermen as something awful,—the waves often breaking with such force as to send their waters over the face of the cliffs, almost a hundred feet above. The top part of the cliffs bears out their testimony, as the soil is removed from it for many yards inland. An interesting discovery was made in the rock-pools near low water. The singular species of sea urchin,—*Echinus lividus*—was found in great abundance, firmly fixed in circular cavities in the rock. These creatures, covered with soft calcareous spines, have the power of excavating for themselves holes in the hard limestone, where they remain secure, though exposed to the heaviest thunderings of the Atlantic. Muckross head is a hitherto unrecorded locality for this interesting *echinoderm*. Immense numbers of the small *Littorina neritoides* were also observed on the rocks, and a dwarfed variety of the common mussel filled almost every rock crevice. With great regret that time was flying so rapidly, and so much of the day's programme unaccomplished, the party mounted to the top of the cliffs, and were conducted to the eastern side of the peninsula. Here the geologists present were amazed at the immense profusion of fossil remains exposed in the rocks. Several species of corals were beautifully weathered out on the surface, conspicuous among which were *Zaphrentis cylindricus*, whose numbers and appearance closely resembled the remains of a shoal of fishes, that had been suddenly destroyed by some dire cataclysm. *Michelinia favosa*, another coral, occurred more sparingly, while *Productus giganteus*, and other species of brachiopoda were in great quantities.

Returning to the cars, the party were soon on their way to Carrick, passing through Kilcar. After an arduous day's work, the shelter and comfort of Glencolumbkille Hotel, in the village of Carrick, was most acceptable, and in a remarkably short time all were soon busily discussing a dinner, admirably served in the large airy dining-room by an attentive staff of servants, under the care of the host, Mr. Walker. The evening was devoted to short excursions in the more immediate neighbourhood of the hotel, and in making arrangements for the night's stay—the influx of twenty visitors to an already well filled hotel making this latter no small task to the manager and servants. It is clear, however, that field naturalists are exceptional visitors, as five of our party insisted, in spite of all remonstrances, to camp on the top of Carrigan Head (1,024 feet) for the night. So, borrowing all the spare rugs and wrappings in the company, and engaging a guide, off they went to their airy camping ground.

Thursday morning opened fine, and promised even a hotter day than the preceding one, the thermometer registering 70 degrees in the shade before seven o'clock. The experiences of the mountain party, who put in an appearance for breakfast, seemed to have been pleasant enough. All slept soundly within a few feet of the edge of the cliffs, and making an early start, visited the top of Slieve League mountain (1,972 feet), with its holy well and church, and enjoyed the view of its stupendous cliffs—perhaps the finest in the British Isles—under most favourable circumstances. Their behaviour at the well-supplied breakfast table proved conclusively that early rising, and mountain air, are conducive to good appetites. The weather being exceptionally fine it was decided to view the famous cliff scenery from the sea. A short drive, therefore, to Teelin Point brought the party to a beautiful nook, where a small fleet of boats were discharging the results of their night's work, which consisted almost entirely of sea bream, offered on the spot at sevenpence per dozen. Three of the best boats, well manned, were soon afloat with the party, aud none of those who took part in the expedition by sea will soon forget the grandeur of the scene

when passing under Carrigan Head, and along the base of the cliffs. The sea was calm, save the never-ceasing swell from the Atlantic, on which the boats rose and fell with an easy motion—not too easy, however, for some of the party unaccustomed to Neptune's realm. The base of the cliffs is in some places pierced with caves, into one of which the boats entered. As near as could be estimated, the roof was about thirty feet above the surface, and is formed of one enormous slab of rock; its width is about equal to its height, and it runs at right angles into the cliffs for a distance of several hundred yards, where it branches right and left; the want of lights, however, prevented the following it further. Looking seaward from the farthest point reached, the view was at once sublime and novel, while the coolness of the air was most agreeably refreshing. One of the boats being supplied with sounding lines and dredging tackle, a series of soundings were taken in the cave; 3 fathoms touched bottom at the farthest point, about midway the line showed 6 fathoms, and at the entrance $8\frac{1}{2}$ fathoms; outward the water deepened to 40 fathoms and upwards. Dredgings were taken at various points and depths along the route. The result, however, so far as the larger forms of life were concerned, was disappointing, the dredge being filled with sand, which was carefully reserved for microscopic examination. All having landed and partaken of luncheon on the grass at Malinbeg, the cars, which were in readiness, were again brought into use, and the road taken for Glencolumbkille, by Malinmore. Shortly after passing the latter place, the magnificent point of Glen Head came into sight. A short halt was made near the residence of the rector of Glencolumbkille, the Rev. David Thompson, who, with a heartiness never surpassed among the many kindnesses to which the Club has from time to time been treated, asked the party into the Glebe, where he and Mrs. Thompson vied with each other in their attentions to their unexpected company.

An active section of the party, anxious to visit the shrine and well of St. Columbkille, set out on foot in light marching order, divested of coats, collars, ties, &c., to the no small surprise

of the natives, and followed by an ever-increasing number of the juvenile population. A short walk, or rather scramble, soon brought them to the Holy Well, which is in a little hollow on the mountain side, at an elevation of about 300 feet. It differs little from other holy wells, except in the enormous pile of stones with which it is surrounded. These are the offerings of the pilgrims who have come from a distance to worship. On a small eminence a little lower down are the remains of the saint's chapel and his "bed"—a flat stone in the end of the enclosure. Here, in a recess in the wall, is also the healing-stone—a quartzite block, in form and size somewhat like an ordinary brick—which is said to possess marvellous curative properties. Six or eight "stations," some having rude crosses, and all with well-trodden paths round them, complete this most remarkable penitential resort. There are others somewhat similar in the glen, and the truly devout perform the circuit of them, and of the time-worn crosses so numerous throughout the district.

Leaving the wild glen and the hospitable residence of the rector, the party drove over a rough mountain road to Carrick Lodge, where they were kindly invited to dinner by the Messrs. Musgrave, the respected proprietors of an enormous tract of country, over part of which the party had for the past two days been driving, and the coast line of which is, perhaps, unequalled in any part of the British Isles. Carrick Lodge is beautifully situated on the slope of the mountain, about a mile from the village, and commands a wide extent of scenery, including the almost land-locked Teelin Bay, and the noble headlands guarding its entrance. Although built on a wild mountain side, its gardens and grounds, which are the work of only a few years' labour, are stocked with all our choicest fruits, flowers, and vegetables, thriving luxuriously without any extra care. The praiseworthy example set here, and throughout all their wide estates, by the respected lords of the soil, will surely have a favourable effect on the people, quietly teaching them the beneficial results of thrift and increased industry. It is on the young, however, that such lessons may be expected to bear their

best results, and it was pleasing along all the route to see the comfortable school-houses, and the intelligent-looking children met with, either going to or returning from them, their clean, tidy appearance contrasting strongly with what may be too often seen in some other parts of Ireland. After dinner, a hearty vote of thanks was accorded to the Messrs. and Misses Musgrave for the kindness, courtesy, and hospitality shown to the Club during their visit to South Donegal. Without their assistance many of the most interesting features seen, would have been overlooked. The party returned to Glencolumbkille Hotel at a late hour.

Next morning the return journey *via* Glenties was commenced with much regret. For the greater part of the way it is heavy up-hill work, and many miles were walked to relieve the willing horses. The wild and picturesque pass at the head of Glenagh, is at an elevation of 900 feet, after which the road rapidly descends to 200 feet, following the course of Glengesh River most of the way to Ardara. After dinner, which was enjoyed with unusual heartiness, the ordinary business meeting of the Society was held. A number of new members were elected, and hearty thanks were accorded to the Chairman, and to the conductor of the excursion, for the manner in which the programme had been arranged and carried out. The remaining portion of the day's drive was then resumed, and Glenties was reached late in the evening. After the night's accommodation had been arranged—a matter severely taxing the energy and patience of all concerned,—a few members, anxious to see the industries of the town, were kindly shown over the extensive hand-knit hosiery warehouse, of Bernard M'Devitt, Esq. We understand there are several other firms engaged in this trade in the county, and that the demand for their productions is deservedly increasing.

Next morning required breakfast at six o'clock, and a start half an hour later for Stranorlar, in time for the train about noon. This was happily accomplished, and time allowed for luncheon at the latter place, putting all in good form for the long

run by rail. The botany of the district investigated during the five days' excursion is rather disappointing, the mica slates being poor in variety of plant life. The most interesting flowering plants collected were the Elecampane (*Inula Helenium*), and *Mimulus luteus;* the latter, an American plant of recent introduction, was found in great abundance in wet places and ditches at Malinmore. Among the Ferns, the true Maiden-hair (*Adiantum capillus-veneris*) was discovered a few years since in this county by the Rev. L. O'Brien, and was seen on the present occasion in a new locality by members of the Club. It is not considered advisable to specify the precise spot where this rare Fern is to be found, as the publication of such details sometimes leads to the eradication of valued members of our ancient flora. Many other interesting Ferns were found—the Royal Fern (*Osmunda regalis*) being frequently met with, and is especially luxuriant along the banks of the stream at Carrick. The rare filmy Fern *(Hymenophyllum Tunbridgense)*, was found, as also the sweet mountain Fern *(Lastrea Oreopteris)*, and Bree's Fern *(Lastrea œmula)*. The latter was exceedingly fine on the high ground above Glencolumbkille. The dredged material and shore gatherings collected during the excursion, all contain Foraminifera in more or less abundance. The mud dredged in 17-fathom water, a short distance outside the lighthouse, at the entrance of Killybegs harbour,* as also in 7-fathom water, inside the harbour itself, is especially rich in foraminiferal life. At 4.40 p.m. on Saturday the party was again on the platform of the Great Northern Terminus at Belfast, and parted amid many congratulations upon the delightful trip they had enjoyed, under most favourable conditions of weather, and the absence of all mishaps.

* *Bulininea subteres* (Brady M.S.), a form new to Britain as a recent species, was found in this material; also, *Ammodiscus Shoneana*, a species recorded from only two other localities—viz., the estuary of the Dee, and Belfast Lough.

On 4th September, to

LARNE AND BALLYCLARE.

The sixth, and last of the Club's excursions for the season took place on Saturday, September 4, to Larne and Ballyclare. Leaving town by the 9.30 train, the party soon passed Whitehead, getting a hasty glimpse of the extensive quarries of limestone, capped with semi-columnar basalt, and, running along the shores of Larne Lough, whose picturesque beauties were enhanced by a brimming tide, soon reached the old town and port of Larne. This place, under the combined stimulus given by the short-sea passage, the new Ballymena and Larne Narrow-guage Railway, and the attractions of the Olderfleet Hotel, has of late made rapid strides, and many new houses now offer accommodation to summer visitors. Mounting one of M'Neill's double cars, a visit was first paid to the old castle on the Curran. This is believed to have originally been founded by a Scotch family named Bisset, to whom a grant was made by King Henry III. Here Edward Bruce landed, in 1315, with six thousand men, to attempt the conquest of Ireland. The Bissets joined his fortunes, and after his defeat their lands and castle were forfeited. The English seem to have then enlarged and strengthened the castle, which became a place of some importance; so that it is stated during the distractions occasioned by the Wars of the Roses, this place and Carrickfergus were the only two stations north of the Boyne which at one time remained in the hands of the English. Queen Elizabeth granted the castle to James M'Donnell of Cantire, and his son Angus; but somewhat later in the same reign we find it entrusted to Sir Moyses Hill, as being of too much importance to remain in any but the most loyal hands. In 1598, however, it was dismantled, and ever since has remained a picturesque ruin.

Passing once more through the narrow streets of Larne, and by the handsome Town Hall, library, and museum lately erected,

the open country was reached, and the road to Ballynure and Straid was pursued. The harvesters were everywhere busy, and abundant, well-saved crops from the carefully-cultivated district were being gathered in. After a pleasant ride of two hours, the little village of Straid was reached, and here the company were met by Mr. Sutherland, of the Irish Hill Mining Company, who conducted them over these works. Undertaken originally to raise iron ore, the new mineral, bauxite, was discovered, and so abundantly, that it has been worked of late almost to the exclusion of the ore, though, should the iron trade again revive, large quantities of the ore could be supplied from these works.

Bauxite, of which large quantities are now shipped to England from the County Antrim, for the manufacture of alum, and the treatment of sewage by the precipitation system, has been so recently described in the Proceedings of the Club, and of other societies, that it need be no further described here, except to say that it bids fair, in connection with the mining of iron ore, to add largely to the prosperity of the district, which may now be fairly said to have added to its character as a manufacturing county, that of a mining one also.

The workings, of which there are several, extending many hundred yards under Irish Hill, are commenced at the lowest position from which the strata can be reached, for the convenience of drainage, and of getting out the loaded waggons, tramways being laid with a gentle incline up the adits, which run into the very heart of the hill. Two of these were entered, the small trucks being made available as an extemporised passenger train (first-class), with a stout labourer behind each as the locomotive power. The bauxite here is about six feet thick, the floor and roof being of solid basalt.

The iron ore of Antrim, as is now generally known, is found on the top of the lower sheets of basalt, and has resulted from its gradual decomposition whilst an ancient land and lake surface, which was subsequently covered over by other volcanic outflows, which form the upper layers of basalt, and are here seen as the roof of the mine.

The beds of bauxite occur in a similar manner; and a large dyke was seen and traced for a considerable distance, cutting through the layer of bauxite, the part adjacent being hardened by contact with the dyke into a porcellanous substance, thus conclusively proving that the bauxite must have attained its present condition before the overflow of the more recent volcanic lava sheets of Antrim. A bed of lignite, from one to two feet thick, is also met with; and possibly investigation would bring to light plant remains at least equal in interest to those of the adjacent works of Ballypallady, so well known to geologists. A lengthy journey in this manner into the bowels of the earth brought the company to the spot where the bauxite is being excavated, and here, leaving the trucks, climbing a few steps cut in the rock to a higher level, and going along a subterranean gallery to where part of the workings had been cleared, a transformation scene presented itself; lights were hanging all round, a table was seen spread with various creature comforts, and Mr. Sutherland and his hospitable lady were soon engaged in doing the honours of an entertainment which, 150 feet perpendicular below daylight, constituted an experience novel to all or most of those present. Lieutenant-General Smythe, R.A., F.R.S., the vice-president of the club, having occupied the chair, a vote of thanks was passed to the host and hostess, who certainly well deserved the acclamations with which the motion was greeted. The trucks were then once again entered, and the stalwart miners soon bowled the party once more to daylight and the outer air.

After a drive of a mile or so, Wiley's Fort was reached. This is a remarkably fine specimen of the earth ring to be seen in various parts of the country, having a rampart, still of considerable height, a deep fosse or ditch, and a well-defined rampart. It also contains one of the souterrains, or underground dwellings, which Mr. Wylie has made several attempts to explore, but it appears some of the roof-stones have fallen, and rendered it impassable. Though some of the earthen forts are probably older than the great stone forts, or cashels, yet, doubt-

less, others are contemporaneous, and represent the strongholds of less important or less wealthy chieftains. The party then drove on to Ballyclare station, and a spare hour was utilised by some of them in visiting two small forts half a mile from the station. These, though not specially striking, also show a rampart and outer ditch; and some speculation arose as to the singularity of two nearly similar forts, being raised within less than fifty paces of each other. The subject may not be of first-rate importance, but the earthen forts so numerous throughout Ireland are, nevertheless, deserving of more attention than appears to have been bestowed upon them.

A rapid ride to Belfast terminated as delightful an excursion as any that the present exceptional season has afforded.

WINTER SESSION.

NOTE.—The Authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

THE Winter Session was opened by a Conversazione, held in the Museum, College Square North, on Friday evening, 22nd October, and many members and their friends availed themselves of the invitations given by the Committee.

As usual on these occasions, the Museum was tastefully decorated with flags, evergreens, &c., conspicuous amongst which in the centre of the large room, was an imitation tree-fern of great size, cleverly constructed out of laurel leaves and fern fronds, by Mr. William Darragh, of the Museum, to whom, and to the members of whose family generally, the Committee are largely indebted.

The Committee carried out their plan of having some special topic for illustration each year, and on this occasion devoted a table to specimens of the volcanic rocks of the locality, and their products, many fine crystals from the basalts giving beauty to the series. A large mass of bauxite, (a resultant from the decomposition of the trap) served a further purpose of

recalling to mind the recent excursion of the Club to the large mines of that mineral under Irish Hill. Another recent excursion of the Club to South Donegal, was also illustrated by various rock specimens from that locality, exhibited by James Musgrave, Esq. Mr. T. M. H. Flynn, of the Bessbrook Granite Company, amongst a series of American and Irish granites shown by him, had a fine specimen of polished red granite from the Barnesmore Mountain, visited by the Club on same excursion, and which promises, when the Donegal railway is opened, to become of no little commercial importance. On the same table Mr. Joseph Wright, F.G.S., exhibited under the microscope a series of foraminifera, gathered during the same excursion, being the result of dredgings taken in Killybegs Harbour. Among them are the following rare forms:—*Trochammina Shoneana*, *Lituola glomerata*, *Bulimina subteres*, *Operculina ammonoides*, *&c.* Several members devoted a table to the exhibition of a tank and jars of living specimens, dredged by them a few days previously off Donaghadee, they also showed examples of dredging implements, and tackle to illustrate such work. A number of members, as is usual, had their microscopes at work. The leading feature amongst these was the fine series of slides, lent through the kindness of John Murray, Esq., naturalist to the Challenger Expedition, illustrating the results of that voyage, some of the objects shown being entirely new to science. These included a series of preparations made by the Challenger staff, of skimmings from the surface of the ocean, showing various pelagic foraminifera, and many species of minute crustaceans, &c., of most curiously interesting and instructive forms.—*Orbulina*, containing a perfect Globigerina within its delicate shell;—Orbitolites up to three-fourths of an inch in diameter; *Challengeria Naresii* and many other remarkable rhizopodal forms were beautifully shown; also, specimens from a recent dredging near Farœ, containing a great variety of large arenaceous forms. Amongst the miscellaneous microscopic objects shown were several examples of a very minute arenaceous foraminfer, *Textularia biformis*, new to

Britain, recently found by Dr. Malcomson in the rock-pools near Craigavad, where he has also found close upon ninety species of these minute organisms. A series of slides was also exhibited, the work of Mr. Harrison, of Cork. Messrs. Ward, Firth, Bulla, Gray, &c., exhibited a varied collection, illustrating the various branches of Natural History. A new feature in microscopes was the exhibition by Mr. F. W. Smyth, in the upper room, of a series of slides of Natural History objects by the magic lantern and the oxy-hydrogen light. The central table in the large room was devoted to the Club's album of sketches, illustrating the antiquities and geology of the locality, and to the various works, some of considerable value, added to the Club's library during the past year. Several interesting old books, exhibited by Miss Carruthers, A. O'D. Taylor, Esq., and others, occupied the same table. Antiquities were well represented on the present occasion; the valuable Benn collection, recently added to the Museum, was seen for the first time by many present. Robert Day, Esq., F.S.A., of Cork, exhibited some splendid jade axes, idols, &c., from New Zealand and China. The President, W. Gray, Esq., M.R.I.A., also exhibited a fine collection of stone and bronze weapons. Several sepulchral urns, found near Magheralin, were shown by C. Waddell, Esq., of that place. Along one side of the room was ranged a fine series of British ferns, including every known species except two, from the collection of S. A. Stewart, Esq., F.B.S.E., and W. H. Phillips, Esq., showed in pots some very interesting specimens of British and Foreign insectivorous plants. Several cases of local lepidoptera were exhibited by Isaac Waugh, Esq. A flint, with some curious surface markings, the impression of an unknown organism, was shown by the Vice-President, Lieutenant-General Smythe, F.R.S. Fragments of the antlers of an Irish Elk, recently disinterred at Lisnatrunk, were exhibited by J. H. Davies, Esq., of Glenmore, and a large illustrative diagram of the same was shown by Jos. Radley, Esq., Lisburn.

The pictures and drawings in the rooms were of considerable interest, foremost amongst them being a very fine group of

trees, painted on the spot by Dr. J. Moore, Hon. R.H.A. A set of drawings and studies of ancient armour were exhibited by Mr. Samuel M'Cloy, in addition to a series of very spirited sketches, chiefly of local scenery; and Mr. Wm. Darragh, jun., showed some clever landscape studies. Water-colour drawings were also kindly lent by Messrs. Wm. Firth, Joseph Hall, G. E. Bell, and R. Q. Lane. Dr. James Moore showed, also, two valuable engravings of the Giant's Causeway, executed nearly two centuries ago. Mr. J. J. Philips showed a spirited drawing of Lord Donegall's castle, Cave Hill. Amongst works of art must also be noted two groups of sculpture, exhibited by Messrs. Purdy & Millard, representing Zulu warriors, which form portion of a design recently made by a member of the Club, for a monument to an officer who fell in that war. There were exhibited, on a side table, some very handsome examples of ceramic art by Mr. M'Cormick, and a case of transparent medallions by Mr. Vinycomb. During the evening a number of new members were elected into the Club, indicating, that it still retains its popularity as a means of promoting scientific research. Refreshments were provided in the lower apartments during the evening by Mr. Walker.

PRESIDENT'S ADDRESS.

The President of the Club, Mr. William Gray, M.R.I.A., delivered his opening address at the meeting held at the Museum on Tuesday evening, 16th November, of which the following is an abstract :—"In the North of Ireland, where we are expected to acknowledge the authority of custom, it becomes our duty to conform to the practice that has grown up in this and kindred societies; and, therefore, as your President I am called upon to deliver what is termed an opening address at this the first meeting of the Winter Session. A similar duty devolved upon me last winter, which I endeavoured to discharge by an attempt to explain the aim of our organization as a Field Club, and what

should be the scope of our investigations." After referring to the subject of his address last year, Mr. Gray continued :—"On the present occasion I will, with your permission, enlarge a little upon our former subject, and endeavour to ascertain how far we have fulfilled the object of our Club, and what aids or auxiliaries are still needed for the purpose of extending or utilising the results of our investigations." Mr. Gray referred to the marked success of the Club's excursions, and said that—"On the east coast we have dredged around the bays and headlands of Down and Antrim, on the west we have scaled the magnificent cliffs of Donegal, in the north we have hunted in the sand dunes from Magilligan to Torr Head, and in the South we have extended our surveys into Monaghan, Louth, and Sligo. Within this area we have navigated Lough Neagh and Lough Erne, explored the caverns of Fermanagh, assembled around our ancient cromlechs, cairns, and earthen forts; we have met amid the ruins of churches and abbeys; we have ascended to the crests of our highest mountains, and we have descended hundreds of feet below the lowest depth of the harbour of Belfast. Then, following up the mineral and other resources of our country, we have explored the coal mines of Tyrone and Antrim, the granite quarries of Down and Donegal, the limestone exposures of Armagh and Fermanagh, the sandstones of Down, the iron mines of Antrim, and the bauxite of Irish Hill. We have also had the advantage of witnessing the processes by which many of our mineral products are utilised in the arts, particularly the methods by which the rich clays of Fermanagh can be converted into the beautiful pottery of Belleek. It is also a satisfaction to remember that our excursions have not been undertaken out of idle curiosity, but with the intelligence of inquiring naturalists." After giving particulars of the Club's prize scheme and its good results, Mr. Gray continued :—"The sole aim of the Club, however, is not merely to popularize science, hence many of our members have successfully devoted themselves to original research, and our published records of special investigations in several departments of natural science

would compare very favourably with what has been done by very much older societies. In the botanical department we are tolerably strong, and good results have been accomplished. For example, Tate's "Flora Belfastiensis," published in 1863, embracing an area of only fifteen miles from Belfast, recorded 590 species of plants, exclusive of erroneous references. Dr. Dickie, in his "Flora of Ulster," records 700 species from Ulster. In 1866 the "Cybele Hibernica," to which the members of our Field Club contributed, records 800 species from Antrim, Derry, and Down. Our "Guide to Belfast," published in 1874, gives the only reliable list yet published for Antrim and Down, from which it records 736 authentic species, all of which can be vouched by specimens. A similar advance has been made in our knowledge of cryptogams. The "Flora Hibernica" in 1836 only recorded for all Ireland 229 mosses, and the late Dr. Moore, in his report to the Royal Irish Academy, in 1872, increased the number to 370. Only two years later our Club published a list of mosses of the North-East of Ireland, recording 238 species, a large number of which were new to the North of Ireland, and 9 of the species were new to the moss flora of Ireland. We are not, therefore, surprised that Mr. Stewart, who has been chiefly instrumental in obtaining these results, has received a grant from the Royal Irish Academy to report on the botany of the western portion of Fermanagh. I may also refer to the work done by Mr. Wright in his investigation of the Rhizopoda and other lowly forms. Ten years ago only three Fossil Foraminifera had been recorded from Ireland—one from the Greensand, one from Lias, and one Permian. We find the Club now records 106 from chalk, 27 lias, and 9 from the mountain limestone; and our Report now going to press records 107 from the Post-tertiary beds, or a total of 249, against the three of ten years ago. Five years ago only 65 species of recent Foraminifera were recorded from Ireland, chiefly collected by Dr. Alcock, from shore gatherings at Dog's Bay, Connemara; now our Club records 119 species, from the North of Ireland only. In addition to the list of sponge

spicula of the Chalk published by the Club, we have also to take credit for the spicules from the mountain limestone of Benbulben, County Sligo, discovered by our members, and described by Mr. Carter in the "Annals of Natural History." If time permitted, I might detail similar work by other members of the Club—such, for example, as Mr. Gault's geological papers, Mr. Tate's contributions on the Liassic and Cretaceous rocks of Antrim, Mr. Swanston's Silurian Graptolites of County Down, Mr. Phillips' discoveries among our native ferns, Messrs. Firth's and Elcock's microscopic preparations—all representing thorough good work that would be creditable to any scientific society. . . . . The efforts of the several gentlemen I have referred to, as well as many others of our members, have not only extended our knowledge of the natural history of our own locality, but they have also added new species to the fauna and flora of Great Britain, and in many cases discovered species entirely new to science. When the British Association visited Belfast in 1874, this Club took an active part in entertaining that distinguished body. Our "Guide," presented to the members of the General Committee of the Association, was considered of such importance and value that the plan has been imitated by every town the Association has visited since the Belfast meeting. Hence Glasgow, Dublin, Bristol, Plymouth, Sheffield, and Swansea have prepared their respective "Guides." Our "Guide" was the original work of our own members, each writing from his own personal knowledge of the subject he dealt with. Our Annual Reports now contain over 150 papers, almost entirely confined to subjects connected with local natural history and antiquities. Our exchange list shows that our published Transactions are valued by many other kiudred societies, not only in the United Kingdom but on the Continent and in America. It will be unnecessary to enter more fully into details regarding the past work of the Club to demonstrate that we have to the present fairly carried out the purposes of our organization. . . . . From what has already been accomplished, and from what is now being done, I think we may

reasonably anticipate that Belfast will always have a willing band of earnest students of natural science, to carry on the work of their predecessors." Mr. Gray then referred to the material aid necessary for the study of natural history, and giving full credit for the accommodation given the Club by the Council of the Natural History Society, urged very strongly the necessity for having a town aquarium, and continued—"We have had our dredging excursions, and at several of our meetings we have made some attempts to exhibit living marine forms; but our efforts have been a comparative failure, which would not have been so complete, had we had the great advantage of permanent marine and freshwater aquaria, to which the public, as well as students of natural history, should have easy access. In these days, when we speak of having a public aquarium, visions of splendid buildings, palaces of pleasure, brilliant with plate glass, sculpture, and gilding, float before the imagination; but for the practical purposes of an aquarium—that is, for the scientific study of its inhabitants—stately palaces or costly decorations are not required. The conditions of nature may be very closely imitated without extraordinary expense. Some years ago our Field Club suggested to the Committee of the Botanic Gardens the desirability of forming an aquarium in the gardens, but from supposed financial difficulties the question itself was from that time drowned in cold water. . . . . I now come back to the question of a Museum. Referring to the early history of the Belfast Museum, we find it originated with eight individuals, who formed the Natural History Society in Belfast on the 5th June, 1821. The little society at its birth was not so strong as the Naturalists' Field Club at the same stage of its existence; yet within a period less than the present age of our Club this energetic little society, before it was thirteen years old, succeeded in erecting this building we now occupy, and opening it free of debt, after an expenditure of £2,300. That was at a time when the sites of many of our present busy streets were but open fields for the grazing of cattle, when the number of inhabitants was scarcely a fourth of what it is now, and the value of property

still less in proportion; yet it was a time when Belfast was foremost among the towns of the kingdom, for its intellectual activity, and the successful establishment of its literary and scientific societies, which, no doubt, had a direct influence in promoting the material prosperity of subsequent times. The intellects of that day were not turned from their purpose because of the difficulties they had to encounter. They manfully faced their difficulties, and failed to realise their full purpose because they were far in advance of their time. In a circular issued to the public at the opening of the Museum on the 1st of January, 1834, the promoters referred to the intention of having a library attached to the building, also provision for a series of lectures on different branches of natural history, a chemical laboratory, and a hope was expressed "that the fine arts might, at no very distant day, find under the roof of the Belfast Museum an abode worthy of their refined and elevated spirit." Forty-six years have passed, and this programme has yet to be carried into practice; forty-six years of boasted progress and accumulated wealth; forty-six years of material prosperity, and a convincing experience of the value and importance of promoting the cultivation of literature, the arts, and sciences. Surely, if we are worthy followers of our worthy leaders, we should to-day endeavour to meet the acknowledged requirements of our time. Many collections, public and private, all over the kingdom, are enriched by stone and bronze objects of antiquarian interest, purchased from the County Antrim, while we have no means of competing to prevent the permanent loss of those things from the country. As there are no funds at present available, it is fortunate that we have so many private collections of objects illustrative of the natural history and antiquities in our locality. Let us hope that many of those collections will ultimately find their way into the Belfast Museum, following the example of the Benn Collection of Antiquities. When we complete our collections of local fauna and flora, a very wide range of objects is still admissible into even a provincial museum, all more or less illustrative of some department of biological

science. If we wish to illustrate the habits, customs, and peculiarities of the various races of ancient and modern mankind, there may be some difficulty in determining what should be excluded. . . . . The primary object of diffusing useful information and cultivating the public taste should never be lost sight of. With this view, such a town as Belfast should have its technical or economic museum, in which our mineral and other natural products should be exhibited, and their several uses in the arts illustrated, and the processes by which they are rendered available fully explained. This industrial museum of patterns, processes, inventions, improvements, and suggestions would tend to improve and give a healthy direction to our manufacturing skill. Closely connected with manufacturing skill comes the question of artistic design ; and this is again governed by the question of public taste. For the last few years our School of Art has been steadily working, and many of its students have taken high places in artistic designing. The school, with a staff of able teachers, under the management of an active committee, was never more promising or worthy of public support than it is at this moment. But its students labour under the great disadvantage of not having an art museum, in which the best examples of artistic products should be exhibited, and also the process of manufacture, in which art work is necessarily involved. Without some technical knowledge of these several processes, the designers cannot produce suitable designs for the manufacturer. A true artist must be a field naturalist, not a mere admirer only, but an accepted lover of nature, wooing her in her own retreats, and acting under the spell of her influence; a "naturalist," in fact, who endeavours to express the æsthetic aspects of nature as the geologist interprets the revelations of the rocks. It, therefore, becomes fairly within our province to advocate the establishment of an art gallery, where works of art, purchased by, or presented to the public, may be permanently exhibited, supplemented by works lent by collectors or connoisseurs of art. Such a gallery might be appropriately connected with the art and industrial branch of the museum, and would serve as a

fitting receptacle for some of the best works from our School of Art. At present it is simply discreditable to such a town as Belfast, that we have no fit place even to exhibit the year's works of our art students.

In addition to all the wants I have already detailed, our crowning deficiency is the want of a town library—in fact, a Free Public Library. In these days of primary, intermediate, and higher education, it should be wholly unnecessary to advocate the establishment of libraries. They are essential to the success of any sufficient scheme of national education. We properly denounce all systems of cramming, and insist that the education of the schoolroom should be but the foundation on which, or the scaffolding by which, the intellectual superstructure shall be subsequently erected through the proper use of observation, and books; but, unless the student has ready access to books, his education is a sham.

The necessity, therefore, for libraries will be in proportion to the success of our educational schemes. The wealthy can procure books by purchase, or through the agency of circulating libraries, but the great bulk of the people in search of information cannot afford this, and are consequently denied the pleasure and advantage of reading, with all its elevating and refining influences. But public libraries are as necessary for men of taste and learning in every rank of life as they are for the intelligent industrial classes, or to make better citizens of the ignorant and vicious. Since 1852 when the first library under the Free Libraries Act was established at Manchester, there have been about 100 similar libraries established in the principal towns throughout the kingdom, and the uniform success that has attended the undertakings in the great majority of cases, is the strongest recommendation to Belfast to adopt the same plan. From a Parliamentary return published in 1877, I give below a tabular statement, showing the application of this system in fifteen towns of over 40,000 inhabitants. Each library, it will be seen, has a lending and a reference department. The number of books in stock for each department is given; also, the number

of issues, and the cost, in pence and decimals of a penny, for each inhabitant of the respective towns :—

	Cost per Inhabitant	Reference Library.		Lending Library.	
		Stock.	Yearly Issue.	Stock.	Yearly Issue.
Birmingham...	4·11	41,539	189,073	37,943	305,958
Blackburn ...	3·18	10,414	11,592	10,275	35,523
Bolton ...	3·11	25,930	76,399	12,971	71,658
Bradford ...	3·40	11,464	18,920	12,860	109,261
Coventry ...	2·97	5,534	no return	14,777	79,626
Derby ...	3·05	1,910	1,940	9,385	146,017
Dundee ...	4·53	5,073	89,316	23,942	136,162
Exeter ...	4·01	1,904	127	8,672	20,831
Leeds ...	3·80	18,317	38,306	34,800	339,622
Leicester ...	2·36	3,786	6,829	10,532	105,244
Liverpool ...	5·94	63,146	409,114	42,035	416,099
Manchester ...	5·08	134,509	211,915	79,650	554,779
Norwich ...	1·41	3,354	10,450	no return	no return
Paisley ...	2·84	4,870	2,418	11,651	75,795
Sheffield ...	6·73	6,208	16,519	29,835	276,546

Stimulated by the provisions of the Public Libraries Act, the authorities of the principal towns of the kingdom have been stirred into action, and everywhere there are arising noble buildings, as the appropriate homes of literature, science, and art—all of them open free to the public, under very reasonable and necessary regulations. This is the intended result of the several Acts, the advantages of which should be secured by every enlightened community. Claiming to be included within this category, Belfast, too, should forthwith adopt the provisions of the Public Libraries Act, and take steps to secure a suitable central institution of literature, science, and art. With this view I would suggest that the proprietary rights in the existing institutions affected by the undertaking, should be secured by purchase or otherwise, and, if possible, the Belfast Library, Belfast Museum, and School of Art should be amalgamated. Difficulties will, of course, arise, the history of all similar

undertakings shows how difficulties beset and harassed each project at its outset; but persevering effort has invariably surmounted the difficulties, and the results were more than compensation for the toil. As a rule, it has been found more difficult to obtain reasonable terms from individuals than from societies, and I have no doubt, that the authorities of our present library and museum, would generously facilitate the suggested scheme, particularly as it would be one of the very best methods of realizing more fully, the original intentions of the founders of the respective institutions. It is by no means necessary that the functions of those societies should cease. They should be affiliated, *but not absorbed, by the proposed central institution*, and relieved from the responsibilities attached to the maintenance of property, they would be more free to prosecute their own system of usefulness for the common good. To relinquish this duty would be disastrous to the success of the scheme. It only remains for me now to show what is necessary to give effect to the proposal. By the adoption of the Act an income of about £2,300 per annum would be secured from the town rates at one penny in the pound, which could not be exceeded under any circumstances whatever. This sum would not be more than a charge of 2½d per head, per annum, for each inhabitant of the town, who would have free access to the museum, art gallery, and the use of the lending and reference libraries. Compared with the secured advantages, or with what is spent on tobacco, snuff, and intoxicating drinks, the cost would be a mere bagatelle. Having secured this income of £2,300 per annum, it will accrue during the time that must be taken to make all necessary arrangements for securing property, providing the building, fittings, and stock. The necessary capital can be had from the Treasury, secured by the rates, and repayable at five per cent. for thirty-five years, which would still leave a sufficient margin for the annual cost of maintaining the institution. When thus properly placed before the public, the project would forthwith be supported by generous contributions of money, books, pictures, and other works of art, objects of natural history, &c., &c.,

from all who are truly anxious for the advancement of popular education, as has been the experience in the majority of the towns in England and Scotland, where the Act has been adopted. I need not further endeavour to fortify my statements, as I might do, by a detailed reference to the history of similar movements elsewhere; for I am assured that in Belfast the same generous spirit that has been manifested in connection with our public charities, and all other objects worthy of support, will be prominently exhibited in connection witn this movement, so as to secure an establishment in every respect worthy of the practical ability, refined taste, and cultivated intelligence of "The Athens of the North."

Mr. Gray, on the conclusion of his address, invited the expression of opinion on the matters which he had brought forward, and in response Dr. James Moore, Mr. J. R. T. Mulholland, Mr. James Wilson, jun.; Mr. Lockwood, Mr. Joseph Wright, F.G.S., and other gentlemen addressed the meeting, the establishment of a free library and of a public aquarium being strongly commended.

Mr. S. A. Stewart then showed specimens of a very rare moss —*Gymnostomum tenue*—hitherto only reported as occurring on Brandon Mountain, County Kerry. The specimens exhibited were found by Mr. J. H. Davies on sandstone at Glenmore, near Lisburn.

On 14th December—The second meeting of the society was held in the Museum, College Square North—the President, Mr. William Gray, M.R.I.A., in the chair—when a paper was read by Mr. John Pim, entitled "An Account of his Three Thousand Miles Summer Ramble in Norway and Round the North Cape."

Mr. Pim commenced with a brief description of the prettily-situated town of Stavanger, where he landed early in July of 1880. He noticed the interesting Norwegian custom of ornamenting coffin and bier with beautiful flowers, so that the

wood is entirely hidden, and in churchyards fresh flowers and vases are regularly renewed on the graves for many years. Passing on to the busy town of Burgen, where are numbers of most elegant wooden villas nestling amongst the plantations at the base of the steep hill, one of the most attractive being within a few yards of the Leper Hospital, where are about 120 inmates afflicted with true Asiatic leprosy, caused by a diet of salt fish—flat brod—he sailed up the Hardanger Fjord, one bank of which has some valleys so sheltered that grapes and peaches ripen in the open air, while the other side is barren and desolate. After visiting the Voringfos, which falls 475 feet at a single bound, he drove through the charming Nœrodal, or narrow valley, whose sides are precipitous mountains of 2,000 to 3,600 feet high, separated at the base by a space just sufficient for the road and river. He mentioned the immense depth of the Sogne and Nord Fjords, the maximum in the former being 3,800 and in the latter over 5,000 feet, These soundings are surprising, especially as the average depth of the North Sea is only about 1,200 feet. He rowed up a narrow lake called Olden, surrounded by most picturesque mountains (some of which are over 6,000 feet high), patched with snow, and the summits and upper valleys covered with glaciers, which looked most beautiful under the brilliant noonday sun. Numberless waterfalls enliven the scenery ; but these are even more numerous on the Geiranger, which, though short, he considers the finest fjord in Norway. Just on the edge of its precipitous sides are sectors, or summer farm-houses. The children and cattle should certainly be tethered up there, as they are said to be on the North Fjord. Passing up the lovely Romsdal, and over the extremely desolate table land of the Dovrefjeld, he embarked at Drontheim in the mail steamer for the north. The outward and return voyages, which occupied ten days, were amongst the myriads of islands, which so fringe the coast, that but rarely does one get into the open ocean. The scenery presents such a wonderful variety that it is intensely interesting. The weather was delightfully fine, and the thermometer inside the Arctic circle was for days

together not below 60 Fahrenheit, the maximum being 71. Though too late for the midnight sun, he saw some of the gorgeous and enchanting sunsets for which Norway is so famous. The North Cape, which is in lat. 71 N., long. 25 E., is a strikingly bold, precipitous mountain, about 1,000 feet high, but is wrongly named, a neighbouring headland, named Knivskjierrodden, being more northerly. Although the evening was raw and strong, yet the thermometer did not fall below 45. Returning to Hammerfest, the most northerly town in the world, situate in lat. 70-30 N., and containing 2,200 inhabitants, the olfactory nerves prove it to be the metropolis of cod-liver oil making. The desolation of all this far northland is extreme. Instead of the natural green grass colour to which we are accustomed, the vast barren and extremely desolate table lands and hills, are occasionally tinged with what appears like verdigris, and everywhere patched with remains of the winter snow, not a tree or habitation visible for miles and miles. Here the barometer is not reliable, and frequently rises before rain, and falls on approach of fine weather. Near Tromso, a French-like town of 6,000 inhabitants, in lat. 69-40 N., beautifully situated on a sunny slope, rising gently from the water's edge, and where groves of trees again appear, he visited an encampment of Laplanders, who in summer inhabit miserable earthen huts. They had about 500 reindeer in a paddock close by. These nomads are a repulsive and diminutive race, about 4ft. 9in. high, dressed in skins trimmed with blue and red, and are thought to be descended from the same race as the Magyars. Several times during the voyage the mirage, with its surprising changes, was noticed. From Drontheim he went by rail to Christiania, a distance of 350 miles. There is only one train starts each way daily; but the line being usually narrow gauge, the speed slow, and stoppages long and frequent, two days are occupied. Instead of travelling on continuously, the trains stop for the night half-way at a hamlet of hotels called Koppang. The scenery for the first one hundred miles is charming. The line runs along through valleys, whose sides are diversified with

pine and other trees. He gave a vivid description of the manners and customs of the Norwegians. The universal and genuine politeness is particularly striking, and this, accompanied with a kind and simple homeliness and extreme honesty, is perfectly refreshing to the tourist. He showed a specimen of the tasteful costume of the peasant women of the Hardanger district, and which is still the ordinary dress. Norway formerly was a notoriously drunken country, but under the beneficial influence of legislative restrictions, including the Gottenburg system, by which a town gives all the licenses to a company, which, after dividing amongst its shareholders 5 per cent. on the capital, hands over the balance to the authorities to pay for schools, and the total closing of public-houses from 5 p.m. on Saturday until 7 or 8 a.m. on Monday, drunkenness has nearly disappeared. Education is compulsory, and there is an excellent series of schools open to all classes at moderate fees. Travellers must be prepared to rough it in the country districts, the food being neither attractive nor nutritious. Coffee of excellent quality is usually obtainable even in very poor places. Cheese seems a staple article of diet, not unfrequently five different descriptions being on the table at once. The steamers plying on the fjords, which sometimes extend 150 miles into the country, form a ready means of communication, but land travelling is tedious. The post is slow, and telegraph offices are rare, except along the coast. The scenery is strikingly beautiful, the air clear and refreshing, and altogether Norway offers peculiar advantages to tourists who wish, during their holidays, to secure absolute freedom from the cares of business.

In the conversation which took place after the conclusion of the paper, Mr. Joseph Wright, F.G.S., mentioned that he had examined three little parcels of mud which Mr. Pim had taken off the anchor when it was raised at several places in the N.W. Coast of Norway. Two proved extremely rich in foraminifera. Although each parcel weighed only about one ounce, he found in that from Vikholmen, lat. 66.20 N., no less than sixty-one different species, many of them represented by

hundreds of examples, five of these species being of great rarity. Amongst them were fifteen species not recorded in Mr. Brady's recently published list, which gives only eighty-eight species yet found in all the mud brought home by last Arctic expedition. He hoped this surprising result would be an encouragement to other travellers to bring home specimens of anchor mud.

Mr. John Carson, who accompanied Mr. Pim during the first half of his tour, and Messrs. W. Gray and John Workman also joined in the discussion.

On the 4th January—The third meeting of the Winter Session was held in the Museum, College Square North—the President, Wm. Gray, Esq., M.R.I.A., in the Chair—when three papers were read. The first was by Mr. F. W. Lockwood, on "The Crucifixion, and other sculptures of the ruined church of Maghera, County Londonderry," of which the following is an abstract: The ruined church at Maghera presents features perfectly unique amongst Irish ecclesiastical remains, in its square-headed west doorway, above which is carved in relief, according to Lord Dunraven, the crucifixion, the figures of the eleven disciples, and the two soldiers, with spear and sponge. In Miss Stoke's work it is described as "the crucifixion, with lance and sponge, the figure of the Saviour, draped to the hands and wrists, the three disciples, and the women standing near," &c., &c. Mr. Lockwood, who showed a drawing the full size, made by himself, explained that the decay of the stone rendered it difficult to identify some of the figures, but the two Roman soldiers, the Virgin Mary, and probably nine disciples, with the position of the tenth, are clearly to be made out. Angels are also to be seen hovering above the cross. Several similar features are also to be seen in the sculptured crosses of the ninth and tenth centuries at Monasterboice and elsewhere. The probable date of this interesting relic is between the years 960 to 1000 A.D. Through the care of the Rev. B. B. Gough,

Rector of Maghera, it is in a pretty good state of preservation. At the close of the paper remarks were made by the Rev. Canon Grainger, D.D., and the president, on the care now exercised by the Board of Works over our ancient monuments.

Mr. S. A. Stewart then proceeded to read a paper on "The Boulder Clay of the north-east of Ireland." In opening, he stated that it has only been of late years that the Boulder Clay has been at all studied, and that because it is even yet misunderstood by many geologists, he thought he was justified in bringing the subject under the notice of the Belfast Naturalists' Club. The older geologists had either known nothing of the deposit, or, if they did, their knowledge was extremely limited, and their ideas as to its origin and importance very vague. General Portlock was the first in Ireland who discriminated the Boulder Clay from other deposits of Post Pliocene age. By him it was termed calcareous clay, and truly defined as characterised by the presence of *Nucula oblonga*—a bivalve shell not now living in British waters. It was to be regretted that succeeding writers have not emulated even the moderate amount of precision that was possible to Portlock, and that when treating of superficial deposits containing shells, they usually have not attempted to refer these to their proper class, or else they classify them erroneously. Quotations were given from the report of the British Association meeting in Belfast in 1852, and from the Memoirs explanatory of sheets 38 and 39 of the Geological Survey maps, to show that shell-bearing beds of various age and origin are indiscriminately lumped together. The reader next referred to the error into which Mr. Hardman had fallen when he announced the finding of a clay bed of Pliocene age, and fresh water origin, on the banks of the Crumlin River. This bed of clay had been investigated by Mr. Swanston, Hon. Sec. of the Club, and it had been clearly shown by him that the bed in question was a true marine Boulder Clay. Mr. Hardman is no more correct when he refers to the summit of Divis Mountain, and describes it as marked by faint glacial striæ, when in fact the summit is so covered by bog and heath that no

markings, either faint or strong, can be seen. Mr. Stewart next described the Boulder Clay occurring in this district as a marine shell-bearing deposit, of such distinct and remarkable character that it has no parallel in the sedimentary beds of any other age. The descriptions of it given by various geologists were cited, and these accounts agreeing very well, and giving a fair statement of the physical characters and structure, might be accepted as, on the whole, correctly representing the deposit as it occurs here. As to the origin of the Boulder Clay, it is commonly attributed to the action of land ice, in the form of a great Polar ice-cap. There are, however, two fatal objections to the land ice theory: First—no clay could be formed beneath a mass of moving ice, the rock would be swept quite bare: Second—the marine shells embedded in the clay, many of which cannot be suspected of being either derivative or transported, render it impossible to suppose that the beds are other than marine. Portlock stated the true nature of these glacial clays, but his account being either overlooked or ignored, it was time to put it on record, in the most decided manner, that the Boulder Clay of the North-East of Ireland is a marine sedimentary rock, the materials composing it having been deposited in the sea during the glacial epoch. It has no doubt been rapidly accumulated, and its components but slightly assorted by currents of water, but, nevertheless, unquestionably marine. Lists of the Boulder Clay shells and foraminifera will shortly be published. Mr. Stewart concluded by referring to the theory propounded by the Rev. Maxwell Close, and advocated by Professor Hull—that the glaciation of Ireland resulted from a central snowfield, stretching from Antrim to Galway. This centrifugal theory was highly improbable, and not justified by such inferences in respect of the ice movement as we can draw from the striated rocks and the boulders in the till.

An animated discussion followed the reading of the paper. Regarding the origin of the clay, the various theories afloat seemed each to have a supporter at the meeting. The reader was, however, strongly supported—those members who had closely

examined the deposit in the field, and under the microscope, giving the full weight of their evidence in favour of Mr. Stewart's views.

Mr. Thomas Darragh was then requested by the president to favour the meeting with his notes on the fine series of birds which occupied the table. He commenced by stating that the birds formed part of a collection made by a gentleman in town since the month of August last, and which he had the pleasure of setting up. They were almost all shot in the Lough, and are consequently either swimmers or waders. The following are worthy of notice, from their being such fine specimens, or showing some peculiarities of plumage :—The golden plover, in full winter plumage, a very large-sized specimen ; ringed plover, young bird. The grey plover, which so nearly resembles the former, had its distinctive features pointed out. The green plover, or pewit, was represented by a beautifully crested example. The oyster-catcher, a striking bird, with brilliant red bill, was shown in both winter and summer plumage. The whimbrel, a summer visitant, and the curlew, a fine specimen, both shot in County Down, were exhibited. The redshank—a young specimen. The little dunlin, or sandlark, and its much rarer cousin, the purple sandpiper, were represented. The scoter—another rare visitant to our Lough—and the red-breasted merganser were the only representatives of their family, but were good examples. The king of the collection was a magnificent specimen of the great Northern diver, in full summer plumage. A more beautifully marked bird it would be impossible to procure; its graceful outline and bold, but easy, position, were much admired. Mr. Darragh, who had evidently prided himself in setting up so imposing a bird, stated that it was remarkable to find the summer dress in this species so late as the end of October, when this was shot. The black guillemot showed admirably the changes from summer to winter dress. The puffin and razorbill, and the common and green cormorant, were shown—the latter bold and powerful birds. The common tern, so well known to summer residents at the sea-side, and four species of

gulls, in various stages of plumage, completed the series exhibited. Regarding the colour of the black-headed gull, the head of which in early summer is, as its name indicates, quite black, but in winter almost white, the following remark was made :— Late observations testify the remarkable fact that the change in colour is not, as would at first be supposed, caused by moulting, but by a change in the colouring pigment of the feathers, and that this change takes place in some specimens in a few days. After the notes, members gathered round the table, and Mr. Darragh answered many questions, and received hearty congratulations as to his success as a taxidermist, which the collection fully warranted.

On 1st February—The fourth meeting of the society was held in the Museum—the President, Mr. Wm. Gray, M.R.I.A., in the chair—when a lecture was given by Rev. Canon John Grainger, D.D., M.R.I.A., of Broughshane, on "A late Visit to the County of Galway."

The lecturer, before proceeding, stated that he had been requested to come forward that evening to supply the place of Canon MacIlwaine, who was, he regretted to say, absent from illness, and in whose company he had the pleasure of this journey to West Galway in the month of October last. He trusted, therefore, that, as he was only a stop-gap that evening, the audience would pardon his hurriedly-prepared account of their autumn ramble. Meeting his colleague at Portadown, the lecturer stated that, after mutual congratulations in prospect of a pleasant holiday, *Science Gossip* was produced, in which it was pleasing to find that they were both contributors to the October part of that popular journal on subjects relating to local zoology. Reaching Galway too late for anything but rest, a start was made in the morning to do the lions of the city, the most popular of which is the site of Lynch's gibbet. Canon Grainger illustrated the unreliable character of tradition by the fact that the supposed site of this unnatural execution had con-

siderably changed position since a former visit which he made to Galway in 1851, and, worse still, the event itself, supposed to have taken place in 1491, was now more than doubted, and it most probably never took place. Another great sight in Galway is Lynch's Castle, or the Spanish House, in one of the main streets. It is curiously ornamented with armorial bearings of nondescript character, and it has certainly a foreign aspect. That it was of Queen Anne age the lecturer did not doubt, but he had little belief in its Spanish origin, and what little faith he had was rudely shaken, when on examining a staircase in a side street, and on one of the party exclaiming, "What a splendid example of Spanish architecture!" the owner, who had been an interested observer, replied, "Yes, it is, for I built it myself!" A hunt through curiosity shops gave no results worth recording, and next day a start was made for the country. Visiting Tuam Cathedral, the lecturer said that much of the ancient building remained, possessing many features of interest, part of which was linked with the more modern work. King Cormac's arch was specially noticeable. A peculiarity was observed in the supports of the desks of the canons' stalls, each desk being supported by a pillar of Galway marble, a novel and suggestive feature. The lecturer, after further details, proceeded to speak of other ecclesiastical buildings. Among Cistercian Abbeys, that of Clare-Galway was noticed, the steeple of which, a slender erection, quite distinct from, though touching, the walls of the abbey, formed perhaps a link between ancient round towers and modern spires. At Abbey Knockmoy the remains of a fresco are still visible. The usual state of neglect of graves, and general want of respect for the remains of the dead were described, many bones and portions of skulls being seen lying about the weed-encumbered graveyards. The so-called Seven churches of Kilmacduagh were next visited, where is a round tower recently repaired with much judgment by the Board of Works. Castles, round and square, were numerous over the country, many proving worthy of close inspection. Crossing to the islands of Arran, the lecturer said, we find erections of

various classes, and of still more ancient character than those on the mainland. Taking first the Christian structures, of which there is a perfect series, the lecturer said that unfortunately many are often used as quarries by the inhabitants, no respect whatever being paid on the islands to buildings of antiquity when their materials are found convenient for use. The Seven churches, though as in the case of Kilmacduagh the number Seven is by no means applicable, are the most important group of this class. Strange features in some of the Seven churches are stones projecting from the gables resembling handles, the use or origin of which is uncertain. It was observed that these early churches were not in every case in an East and West position. Looking still farther back in time, the lecturer noticed the Cahers or Cashels, lofty, fort-like erections, and described the famous one of Dun Ængus, which is situated on the edge of a lofty precipice overlooking the Atlantic. It is considered possible that this structure, now semicircular, was once fully circular in form, resembling the royal fort of the Grianan of Aileach in County Donegal, and that half was lost by the falling away of a portion of the cliff at some distant period. This fort is remarkable for its extensive chevaux-de-frise of sharp pieces of limestone, set firmly into the ground to protect the narrow entrance. Regret was expressed at the sad way in which this most important early historical structure is suffering from the entire want of sympathy of the inhabitants, and the reckless way in which rabbit-hunting is carried on among its ruins. The flagstone houses, and the probably still more ancient bee-hive-shaped houses, were next described. After an account of the physical geography of the islands, and a historical resumé of the many vicissitudes of war which they, in common with the West of Galway, have passed through, the Canon congratulated the present race on their peaceful times, but regretted that the Land League, which had reached even these distant islands, was making a sad change in the kindly feeling for which their primitive people were so noted.

Referring to the zoology and botany of the trip, the lecturer

mentioned several of the rarer British mollusca, both land and marine, as having been collected, and stated that the lateness of the season was against much botanical work; he could not, however, but admire the luxuriance of many limestone-loving ferns. Geology also had been attended to, as was evidenced by a large series of mineral and rock specimens exhibited. Ice action had been everywhere observed, either on the polished surfaces of the limestone or in the deposits of clay containing glaciated pebbles and boulders, the latter often of immense size. The principal rock exposed is the carboniferous limestone, which is in places rich in fossils, often beautifully weathered out, and is, especially in County Clare, singularly terraced, possibly the result of exposure to the action of the sea at various elevations.

After the lecture a discussion took place on many of the points referred to, and the election of a new member brought the meeting to a close.

On 8th March—The fifth meeting of the Society was held in the Museum, College Square North—the President, Mr. William Gray, M.R.I.A., in the chair. A paper was read by Mr. W. H. Phillips, on "Carnivorous Plants: their structure and habits, with notices of some of the insects which frequent them." The reader commenced by stating that "The carnivorous plants are a most interesting race of true vegetable sportsmen, seeking their food from the decomposing bodies of insects, which they capture by various methods, and digest and absorb by means of their leaves, and not through their roots, as do almost all other plants. These plants are numerous, and are found in many parts of the world. The peat bogs in Great Britain and Ireland furnish several species of Drosera, Pinguicula, and Utricularia, but in the swamps of Carolina the giant forms of Drosera and Sarracenia are to be met, and in the Sierra Nevada of California, the curious Darlingtonia. The most common is the Drosera rotundifolia, or round-leaved

sundew, which can be easily obtained in almost any peat bog. Its leaves are reddish, and from one to two inches long, growing close to the ground, in the form of a rosette ; the blade of the leaf is round, and the whole upper surface is covered with erect, hair-like objects, called tentacles, with a rounded head, covered with a sticky fluid ; each leaf contains about 192 of these tentacles. The tentacles in the centre of the leaf are short, and become longer and more inclined outwards as they approach the margins ; the fluid on the glands is very sticky, and can be drawn into threads like mucilage. If any small object, such as a fly or seed, fall or alight on the sticky stuff, it is at once caught, as a bird would be by birdlime, with this result—that the tentacle will very soon, often in less than a minute, begin to bend itself toward the centre of the leaf, and will continue to bend until the centre is reached, and the tentacles near will begin also to bend towards it, and continue until the prey is reached. The sticky fluid secreted by the tentacles begins to increase in quantity and envelop the fly, which is soon killed by the secretion filling up its breathing-holes. The fly is carried by a rolling motion of the bending tentacles towards the centre of the leaf, and deposited among the shorter tentacles, the outer and longer ones being all incurved upon it, and holding it there, and the margin of the leaf incurved also. After remaining in this position for many hours, or days, the tentacles begin to unbend, and gradually return to their erect position. The leaf becomes flat, the secretion dries up, and nothing is left of the fly but the outer skin and wings, all the soft contents have disappeared, the wind blows away the refuse parts, and the leaf begins to secrete again, and is ready for another victim. Many experiments have been made with the secreted fluid, to test its action on nitrogenous matters, and it has been found that it acts on albuminous compounds exactly in the same way as the gastric juice of animals. That the glands possess the power of absorption is shown by their turning dark-coloured when given a minute quantity of carbonate of ammonia, and a pale colour with other fluids. The tentacles,

although sensitive to the touch of a minute struggling insect, are rarely inflected if touched by a pin or falling water, and this is useful to the plant, as it would be a great evil if it closed when touched by rain or grass, as the re-expansion takes some time, and the leaf cannot catch its prey unless expanded. Drosera anglica, and D. intermedia, both natives of Great Britain and Ireland, were then described; next, the Drosera capensis, differing but little from them. Drosera filiformis, which grows so abundantly in New Jersey as almost to cover the ground, catches an extraordinary number of small and large insects, even great flies of the genus Asilus, moths, and butterflies. Drosera dichotama is an almost gigantic Australian species. The rush-like footstalks are about twenty inches in length, the blade seven inches, which bifurcates at the junction with the footstalk. Pinguicula vulgaris, also a British plant, grows in damp, peaty places, bears thick, oblong, light green leaves, which are deeply concave in the central ones, and the outer flat or convex, lying close to the ground, the margins of the leaves incurved. The texture of the leaf is thick and succulent; its upper surface is studded with glands, from which is secreted a colourless sticky fluid. If a row of dead flies or minute pieces of meat are put on a leaf, parallel to the curled up margin, the edge of the leaf will gradually curl over still more, and if the objects are not too big, or too far off, it will in time cover them; the leaves remain incurved but a short time, even although the exciting object is left upon them. Drosophyllum lusitanicum, a rare plant found on the sides of dry hills near Oporto, in Portugal, captures a vast number of flies. The villagers hang it up in their cottages for this purpose, calling it the fly catcher.

In the case of Drosera the insect is captured by sticking to the glands and carried by their movement to the centre of the leaf, in Drosophyllum this is effected by the crawling of the insect, as from its wings being clogged it cannot fly. *Dioniæa muscipula*, venus flycatcher, is perhaps the most interesting of all the carnivorous plants, from the shape of its leaves and the extreme rapidity of its movements, which can be easily seen.

Its only habitat is North Carolina, growing in damp situations, with very small roots springing from a bulbous enlargement, which only serve for the absorption of water. The leaf has two lobes placed at right angles to each other; from the upper surfaces of both three extremely sensitive filaments project. The margins of the leaf are prolonged into rows of long sharp spikes, and are in such a position when closed as to interlock like the teeth of a rat-trap. If these sensitive filaments are touched by a living insect, which the insect can scarcely avoid if walking over the leaf, the two lobes come together rapidly, and unless the insect is very agile it is caught and crushed between them, and its juices being squeezed out induces the secretion to flow from the numerous glands covering the lobes. The digestion and after absorption is the same process as described for Drosera. Experiments made by Dr. Burden Saunderson have shown that protoplasm exists in the leaves of this plant, the same as in the muscle of animals, and that when a leaf contracts the effects produced are precisely similar to those that occur when muscle contracts. Not merely, then, are the phenomena of digestion in this wonderful plant like those of animals, but the phenomena of contractility agree with those of animals also. There are other carnivorous plants which catch their prey by means of pitchers. The genus Sarracenia consists of eight species, all similar in habit, and natives of the Eastern States of North America, growing in bogs, or even in shallow water. The leaves are collected in tufts, springing immediately from the ground. The pitchers are trumpet-shaped, provided with lids, which in some species stand erect, and permit the entrance of rain, while in others the lids being nearly closed prevent the rain from entering. The tissues of the internal surfaces of the pitchers are very beautiful, and wonderfully adapted for capturing insects. Beginning from the upper part there are four surfaces, characterised by different tissues. First, an attractive surface, occupying the inner surface of the lid, which, in common with the mouth of the pitcher, is covered with minute honey-secreting glands, and is

often more highly coloured than the rest of the pitcher, to attract insects to the honey. Second—a conductive surface, opaque, formed of glassy cells, produced into deflexed spinous processes, which overlap like the tiles of a house, forming a surface down which an insect slips, affording no foothold to enable it to crawl up again. Third—a glandular surface, occupying a great portion of the cavity of the pitcher, formed by a layer of epidermis, with sinuous cells studded with glands, and, being smooth and polished, affords no foothold for an escaping insect. Fourth—a detentive surface, occupying the lowest part of the pitcher, and, in some cases, for nearly its whole length; it possesses no cuticle, and is studded with deflexed, rigid, glass-like, needle-formed hairs, which converge towards the diminishing cavity, so that an insect, if once among them, is effectually detained. A near ally is the Darlingtonia, a still more wonderful plant, found on the Sierra Nevada of California, at an elevation of 5,000 feet. The plant bears large sub-erect pitchers, with the tube twisted, the lip produced into a large inflated hood that completely arches over a very small entrance to the cavity of the pitcher. A singular orange-red, flabby, two-lobed organ hangs from the end of the hood, right in front of the entrance, which is smeared with honey on its inner surface. These pitchers are crammed with large insects, especially moths, which decompose in them, and result in a putrid mass, and various insects, too wary to be entrapped themselves, drop their eggs into the open mouths of the pitchers to take advantage of the accumulation of food. The old pitchers are found to contain living larvæ and maggots, and various insectivorous birds slit open the pitchers with their beaks to get at their contents, and this is probably the origin of the belief that the pitchers supply water to the birds. There are two species of insects which are proof against their syren influences, and which in turn oblige them, either directly or indirectly, to support them. The first is Xanthoptera semicrocea, a little moth, which walks with perfect impunity over the inner surface of the pitcher, which proves so treacherous to all other insects. It is found in pairs

within the pitcher, so soon as these have opened. The female lays her eggs singly, near the mouth of the pitcher, and the young larva, from the moment of hatching, spins for itself a carpet of silk, and very soon closes up the mouth by drawing the rims together, and covering them with a delicate web, which debars all outside intruders. It then frets the leaf within, commencing under the hood, and eating downwards on the cellular tissue, leaving only the epidermis. As it proceeds, the lower part becomes packed with its droppings, and the upper part collapses. It feeds on Sarracenia variolaris and S. flava, and there are two broods in the year. The second species is a still more invariable living accompaniment of these plants. By the time the whitsh efflorescence shows round the mouth of the pitcher, the moist and macerated insect remains at the bottom will often be found to contain a single whitish legless grub, about as large round as a goose quill. This worm riots in the putrid insect remains, and when fed to repletion, bores through the leaf and burrows in the ground, where it shrinks into the pupa state, and in a few days emerges as a large two-winged fly, called Sarcophaga sarracenia, the Sarracenia flesh fly. These two insects are the only species of any size that can with impunity invade the death-dealing trap while the leaf is in full vigour; all other insects, as far as is known, tumble into the tube, and there meet death.

On 29th March—The sixth meeting of the session was held in the Museum, College Square North—Joseph Wright, Esq., F.G.S., in the chair—when a paper was read by Mr. F. W. Lockwood, Hon. Secretary, entitled "Glacial Notes amongst the English Lakes—are they rock basins?" The lecturer pointed out the attraction the English Lakes must always have to residents in Belfast, owing to their great facility of access, and the striking phenomena illustrated in them. Besides the principal lakes, which are long, narrow, groove-like depressions in the rock, there are upwards of forty tarns amongst the

mountains, most of which appear to be hollows ground out of the solid rock. There are in addition a number of lakes which have now become silted up, which in their position resemble those that still remain. A map was shown exhibiting all the ground in the district more than two thousand feet above the sea, and it was pointed out how the lakes radiated out from this, their upper ends invariably having a group of high mountains around them. It was now generally admitted by geologists that the whole district had either been filled up with large glaciers which rose above the brim of the valleys, or else entirely covered with a dome-shaped mass of ice, that spread far out to sea, and joined with an ice sheet from Wales, Ireland, and the South of Scotland. The lecturer then described a tour through part of the district, starting from Windermere, the islands in which appear as though ground to the water's edge by some abrading force. Great and Little Langdale were then described, and a survey taken from the summit of one of the Langdale Pikes, which lie about the centre of the district. It was shown on the map that at the head of each lake one or more streams of ice from the mountains had united, and that wherever this took place there would be caused an increased flow; the narrowing of the valley, or the presence of an obstacle, would also cause an additional pressure of the ice upon its bed; and in each of these spots was to be found either a lake now in existence or one which had been silted up since the glacial period. The same result, of immense pressure and more or less rock excavation, would follow when the ice, after a descent of one thousand or fifteen hundred feet, came upon a more level bed. It is in such positions that the tarns generally occur. Looking from the summit of Langdale Pike, 2,400 feet above the sea, the hills, 800 feet lower, which enclose Langdale on each side for miles, appear as if something had flowed over them; they are all ice-ground, in fact. A drawing was shown of Side Pike, a hill exactly the height and size of Cave Hill, over which the ice had gone bodily, rounding and smoothing it to the very top. As a contrast to this, a view of the summit of

Langdale Pike was given, proving that this peak, probably rising above the surface of the ice, had been exposed to another class of influences, riven asunder by the frost, and shattered by the lightning. A section to a scale of six inches to the mile was shown from this point through Codale Tarn, Easedale Tarn, Grasmere, Loughrigg Fell, and Windermere, which showed what extremely shallow hollows the lakes really formed when contrasted with the height of the hills on each side, and the probable thickness of the ice, which, judging by the traces it has left, may have been in some places from two to three thousand feet thick. Easedale Tarn and Grasmere were instanced as special cases of ice excavation, an ice-ground hill in each case having blocked the flow of ice, and caused an immense pressure just where the tarn and lake now are. Windermere was cited as the chief difficulty in the way of accepting this theory. It was shown, however, that the drainage of an area of fifty square miles of high ground united at the head of the lake, and that, given a sufficient snowfall, there was nothing to hinder the ice from having flowed even farther, provided there were banks on each side high enough to retain it, it was entirely a question of an adequate supply from the feeding grounds above. The present rainfall of that district is sometimes over two hundred inches per annum, or more than five times the average of Belfast, and may, during the glacial period, have been even larger. The author gave his experience in the Hawes Water and Kentmere districts, and stated, as the result of personal examination, that Blea Water, Small Water, the Kentmere Reservoir, and two other lakes now drained, in that valley, were all basins excavated out of the solid rock by the action of the ice.

The author referred in addition to the following of the smaller lakes and tarns he had visited and examined, and gave a summary of their position and probable origin :—

Grasmere lies at the union of several long and deep valleys—a mountain blocks the lower end of the lake, and turns the river which issues from it off at a right angle.

Upper Grasmere, now silted up, has its lip formed by a well marked roche moutonnée.

Easedale Tarn lies at the foot of semi-precipitous slopes, is 70 feet deep, and the lower end is enclosed by an ice-rounded hill, partially covered with moraine matter.

Codale Tarn, also at the foot of a precipitous slope—the lip of the tarn is of glaciated rock.

Stickle Tarn, at the foot of lofty precipices—the lip was not examined, but is said to be of rock.

Angle Tarn, at the foot of lofty precipices—the lip is a ledge of rock.

Filled up lake at head of *Langdale*, at the union of Mickleden and Oxenden, just where the glaciers that once filled these hollows must have united upon comparatively level ground, with a great increase of pressure.

Blea Tarn (of Wordsworth's solitary), just where the ice overflowed from Langdale, by Wall end, and met with two side streams from the mountains at each side. The flow would be checked by the ice worn hummock which still closes in the mouth of the tarn.

Little Langdale Tarn.—After leaving Blea Tarn the stream meets the valley coming down from the west, and just below their union this tarn is found.

Levers Water, near Coniston, lies at the union of two "coums," or steep heads of valleys, and at the foot of a precipitous slope—the mouth is blocked by a mass of rock.

Low Water—at the foot of precipices on Coniston Old Man.

Looking at these conditions, it is certain that many of the above, and highly probable that all, are for the greater part of their depth *rock basins*, which can have been excavated by no other agency than moving ice exerting an enormous pressure. The only legitimate way to deal with the subject is, to take the tarns, and having satisfied ourselves as to the agent, of which there can be very little doubt, by which they were formed, to then examine whether the known conditions of the larger lakes will permit of a similar hypothesis in their case. Perhaps the

phenomena when investigated in this order may not appear so startling as if the reverse mode of procedure had been adopted. Nearly every lake and tarn in the district is more or less surrounded by moraine matter, which has somewhat obscured the question, early observers having inferred that the tarns were entirely due to this cause ; but a careful examination will show them to be rock basins, whose holding capacity has been somewhat increased by the moraine banks which, at a later period of the Glacial epoch have been deposited around them.

A discussion followed, in which several members expressed their interest in the subject, but expressed doubts regarding some of the more extreme conclusions of the geological surveyors.

On 13th April—The eighteenth Annual General Meeting of the Society was held in the Museum, College Square North, on Wednesday Evening, 13th April—the president, Mr. William Gray, M.R.I.A., in the chair.

After some remarks from the PRESIDENT,

The Senior HON. SECRETARY was called upon to read the Annual Report, from which it was gratifying to learn that the Club continued to enjoy increasing success not only in regard to the interest evinced by the Members in its aims and objects, but in the cordial sympathy extended by the general public.

The HON. TREASURER also reported favourably on the financial state of the Society for the past year, and stated that after defraying all expenses, including the volume of Proceedings, he was enabled to carry forward a satisfactory balance.

After hearing the report of the judges who had examined the various collections submitted in competitions for prizes offered by the Club, and by the retiring President, the Election of Officers was proceeded with.

Dr. JAMES MOORE, M.R.I.A., Hon. R.H.A., in complimentary terms proposed that Robert Young, Esq., C.E., be elected as president for the ensuing year.

Mr. F. W. Lockwood having seconded the motion, it was passed by acclamation.

Mr. William Lamb proposed, and Mr. Joseph Wright seconded the motion, that Lieutenant-General Smythe, R.A., F.R.S., &c., be re-elected vice-president for the ensuing year.

The motion having been put to the meeting, it was carried unanimously.

The election of secretaries, treasurer, and committee having been gone through, Mr. Gray then left the chair, which was taken by the vice-president.

Mr. Joseph Wright, rising, said he had a pleasing duty to perform, in which he was sure he would have the hearty support of the members present. It was to move—"That the best thanks of the Society be given to the retiring president for the valuable services he has rendered to the Club." Mr. Gray's attention to, and interest in, the Club's work not only during his term of office, but from a very early date in the Club's history, are so well known to all the members, and the results of his labours have so often enriched our proceedings, that he need not do more at present than refer to them, and would conclude by stating that, though not in office, he was certain the Club could still count upon his valuable assistance and advice.

The Chairman, in a very pleasing manner, spoke of Mr. Gray's services, and put the motion to the meeting, which was carried with applause.

Mr. Gray, in acknowledging the thanks, spoke of the great pleasure he had always experienced in co-operating with the committee, and though now taking his place again in the ranks, it would afford fresh delight to penetrate into new fields of investigation, under the able leadership of the newly-elected officers.

Mr. F. W. Lockwood said he had pleasure in proposing the following resolution:—"That the members of the Belfast Naturalists' Field Club have great pleasure in acknowledging the uniform courtesy they have received from the local Press

in the publication of the reports of their meetings and excursions."

The resolution being put to the meeting was carried unanimously.

This concluding the business of the annual meeting.

Mr. Joseph Wright, F.G.S., brought forward a short communication, giving the results of his microscopic examination of some sand and mud gathered during the Club's recent excursion to South Donegal. (For full details of the results see Appendix, at the end of this part of the Proceedings.)

Mr. W. A. Firth exhibited some very rare diatoms of the genera *Aulacodiocus*, *Entogonia*, *Triceratium*, &c., obtained from Barbadoes chalk. In three small samples of the material sent him for examination he found no less than fifteen genera, comprising quite a number of rare and interesting species. These results are of interest, as the late Dr. Greville, in communications brought before the Royal Microscopical Society of London, in 1861-65, figured and described several new species of diatoms obtained from a small sample of chalk from Cambridge Estate, Barbadoes, which proved to be extremely rich in these minute organisms; and although numerous examples of this chalk have since been examined, few of them have yielded diatoms.

An interesting microscopic slide of gold dust was exhibited, the material having been sent to the Club by a late member—Mr. John Moore Johnston—who washed it from the bed of a stream, at Mataura, New Zealand.

The election of new members, and the examination of the foregoing specimens, &c., brought the interesting meeting to a close.

RULES

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that Candidates for such Membership shall be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present. Ordinary Members may compound for future subscriptions by the payment of £3 3s.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club,

and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ulster. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial

Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursion to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred except by the consent of the majority of the members present.

V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.

BELFAST NATURALISTS' FIELD CLUB.

NINETEENTH YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31st 1882 :—

I.	For the best Herbarium of Flowering Plants, representing not less than 250 Species,	...	£1	0	0
II.	For the best Herbarium of Flowering Plants, representing not less than 150 Species,	...	0	10	0
III.	Best Collection of Mosses,	... ...	0	10	0
IV.	„ „ Seaweeds,	... ...	0	10	0
V.	„ „ Ferns,	... ...	0	10	0
VI.	„ „ Tertiary and Post Tertiary Fossils,	... ...	0	10	0
VII.	„ „ Cretaceous Fossils,	...	0	10	0
VIII.	„ „ Liassic do.	...	0	10	0
IX.	„ „ Palæozoic do.	...	0	10	0
X.	„ „ Fossil Plants,	... ...	0	10	0
XI.	„ „ Marine Shells,	... ...	0	10	0
XII.	„ „ Land and Freshwater Shells,	... ...	0	10	0
XIII.	„ „ Lepidoptera,	... ...	0	10	0
XIV.	Best Set of 25 Microscopic Slides,	... ...	0	10	0

XV.	Best Collection of Archæological Objects,...	£0	10	0
XVI.	„ „ Crustacea, ...	0	10	0
XVII.	„ „ Echinodermata, ...	0	10	0
XVIII.	„ „ Geological Specimens, illustrative of the Mineral Resources of the Province of Ulster, ...	1	0	0
XIX.	Best Collection of all or any of the above Objects, collected *at the Excursions* of the Year, ...	0	10	0
XX.	6 Best Field Sketches appertaining to Geology, Archæology, or Natural History, ...	0	10	0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXI. The President offers a Prize of £1 1s for the best set of three or more original sketches to be placed in the Album of the Club. These may be executed in pen and ink, or water colour, and must illustrate one or more ancient monuments, somewhere in Ireland. In determining the relative merits of the sketches, accuracy in representing the subjects and its details will have chief place.

XXII. Mr. William Swanston, F.G.S., offers a Prize of 10s 6d for the best Two Studies, illustrative of Geology, contributed to the Club's Album. The subjects must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 × 9 inches.

XXIII. A Prize of 10s given by the late Mr. J. W. Murphy, for the best Collection of Recent Sponges, the conditions being the same as those for Prizes 1 to 20.

N.B.—The Sketches and Drawing to be Competitors' own work.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same Prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All Collections to be made personally during the Session in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.

NOTICE.

EXCHANGE OF PROCEEDINGS.

The Committee of the Club acknowledge with thanks the receipt of the following publications, which have been received during the past year:—

Berwickshire Naturalists' Field Club.

Proceedings. Vol IX., No. 1—1879; No. 2—1880.

Bristol Naturalists' Society.

Proceedings. New Series, Vol. III., Part 1—1879; Part 2—1880.
List of Officers and Members and Annual Report—1881.
Library Catalogue, May, 1881.

Cardiff Naturalists' Society.

Report and Transactions. Vol. XII.—1880.

Dublin—Royal Irish Academy.

Transactions. Vol. XXVI., Part 4; Vol. XXVII., Parts 1, 2, 3, 4, 5.
Proceedings. Polite Literature and Antiquities. Vol. III., No. 5.
,, Science. Vol. III., Nos. 5 and 6.

Dublin—Royal Geological Society of Ireland.

Journal. Vol. V., Part 3, New Series—1879-80.

Epping Forest and County of Essex Naturalists' Field Club.
Rules, President's Address, and Transactions. Parts 1, 2, 3, and 4.

Edinburgh.—The Botanical Society of
Transactions and Proceedings. Vol. XIV., Part 1.

Edinburgh Geological Society.
Transactions. Vol. IV., Part 1—1881.

Eastbourne Natural History Society.
Papers for 1880-81.

Glasgow—Natural History Society of
Proceedings. Vol. IV., Part 2.—1879-80.

Hertfordshire Natural History Society and Field Club.
Transactions. Vol. I., Parts 2, 3.

Leeds Philosophical and Literary Society.
Annual Report—1880-81.

Liverpool Literary and Philosophical Society.
Proceedings—1878-79, 1879-80.

Liverpool Naturalists' Field Club.
Proceedings for 1880-81.

Liverpool Geological Society.
Proceedings. Vol. IV., Part 3—1880-81.

London—Geologists' Association.
Proceedings. Vol. VI., Nos. 8 and 9; Vol. VII., Nos. 1 and 2.

Manchester Scientific Students' Association.
Report and Proceedings—1881.

Monthly Natural History Notes.
Vol. I., No. 8—August, 1881. Edited by Frank J. Rowbotham.

Norfolk and Norwich Naturalists' Society.
Transactions. Vol. III., Part 2.—1880-81.

Peabody Academy of Science.
Memoirs. Vol. I., No. 5. and 6.

Plymouth Institution and Devon and Cornwall Natural History Society.
Annual Report and Transactions. Vol. VII., Part 3—1881.

U.S.A.—Essex Institute, Salem, 1879.
Bulletins. Vol. II., No. 1 to 9.

Geology and Natural History of Minnesota.
Eighth Annual Report—1879.

Kentucky Geological Survey, and Bureau of Immigration.
Information for Emigrants.

New York—Lyceum of Natural History.
Annals. Vol. XI., No. 9, 10.

Philadelphia—Academy of Natural Science.
Proceedings. Part 1, 2, 3—1880.

Smithsonian Institution.
Annual Report—1879.

Warwickshire Naturalists' and Archæologists' Field Club.
Proceedings—1880.

Wiltshire Archæological and Natural History Society.
Magazine. Vol. XIX., No. 57—August, 1881.
,, ,. XX., No. 58—December, 1881.

(The above from their respective Societies and Institutions.)

Scientific Roll, conducted by Alexander Ramsey, F.G.S.
Vol. I., Part 1., Nos. 1, 2, 3, 4. (From the Author.)

BELFAST NATURALISTS' FIELD CLUB.

NINETEENTH YEAR—1881-82.

LIST OF OFFICERS AND MEMBERS.

President:
ROBERT YOUNG, C.E.

Vice-President:
LIEUT.-GENERAL SMYTHE, R.A., F.R.S., M.R.I.A., &c.

Treasurer:
JOSEPH WRIGHT, F.G.S.

Secretaries:
WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

WILLIAM A. FIRTH.

WILLIAM GRAY, M.R.I.A.

DR. JAMES MOORE, M.R.I.A., *Hon.* R.H.A.

REV. CANON MacILWAINE, D.D., M.R.I.A.

DANIEL M'KEE.

GEORGE O'BRIEN.

HUGH ROBINSON.

S. A. STEWART, F.B.S.Edin

THOMAS WORKMAN.

Members.

Any Changes in the Addresses of Members should be notified to the Secretaries.

Charlton B. Aickin, Murray's Ter.
Miss Alder, Kinnegar, Holywood.
W. J. C. Allen, J.P., Faunoran, Whiteabbey.
Edward Allworthy, Langford Villa.
John Anderson, J.P., Hillbrook, Holywood.
Robt. Anderson, Meadowlands, Balmoral.
W. C. F. Anderson, M.A., Springbank, Dunmurry.
Rev. John Andrew, Cromwell Road.
Sam. Andrews, J.P., Chlorine Place.
Mrs. Andrews, Chlorine Place.

James M. Barkley, Mountpottinger.
Robt. Barklie, F.C.S., Ovoca Street.
James Barr, Sandringham
Stewart Baskin, Rathmines, Dublin.
Mrs. Baskin, Rathmines, Dublin.
J. W. Beck, M.D., Claremont Ter.
William Batt, Ormeau Road.
E. H. Bell, Knockdara, Strandtown.
Miss Bell, Greencastle.
Geo. E. Bell, Lombard Street.
A. W. Blackwell, Wandsworth Villas.
W. J. Boucher, Mountpottinger.
Davys Bowman, University Street.
C. H. Brett, Laurine, Antrim Road.
James Berkley Bristow, St. James's Parsonage, Antrim Road.
Col. Brooke, R.E., Mountcharles.
D. H. Brown, Crumlin Terrace.
John Browne, J.P., Ravenhill.
John Browne, M.R.I.A., Drapersfield, Cookstown.
W. J. Browne, M.A., Longford.
W. W. Brydon, Greenisland.
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Holywood.

J. Campbell, Rathfern, Carnmoney.
R. G. Campbell, do.
Wm. Campbell, F.P.S., Ponsonby Avenue.
Miss Carruthers, Claremont Street.
E. T. Church, Donegall Place.
J. C. Clarke, Dunedin.
John M. Clelland, Model School, Coleraine.
William Clibborn, Windsor Terrace.
Foster Coates, Derryvolgie, Windsor,
Sir Ed. Coey, J.P., D.L., Merville.
Miss Connery, Mountcharles.
David Corbett, Coolavin.
T. H. Corry, M.A., F.Z.S., M.R.I.A., Caius College, Cambridge.
W. F. C. S. Corry, Chatsworth.
George Coulter, Dunmurry.
Major J. Sharman Crawford, J.P., D.L., Crawfordsburn.
Elisha Crawford, Fortwilliam Park.
James Creeth, Brookhill Avenue.
Wm. M. Cunningham, Sydenham.

Rt. Hon. Lord Dufferin and Clandeboye, K.P., Clandeboye (Hon. Mem.)
John H. Davies, Glenmore, Lisburn.
Robert Day, F.S.A., M.R.I.A., Cork.
George Donaldson, Church Street.
Charles Dundee, Carnmoney.
Robert Dunn, Queen's Square.

Charles Elcock, Dunluce Street.

William Faren, Mountcharles.
W. J. Fennell, Donegall Place.
J. H. Ferguson, Antrim Road.
Joseph S. Firth, Whiterock.
Wm. A. Firth, Whiterock.
S. Joseph Flynn, Franklin Place.
T. M. H. Flynn, Bessbrook.
Thomas Fraser, Wellington Park.

R. M. Gilmore, Portstewart.
W. J. Gilmore, Holywood.
D. Corse Glen, F.G.S., Annfield Place, Glasgow.
George Glen, Durham Street.
G. T. Glover, Holywood.
Major Goldsmid, Hopefield Avenue.

James Goskar, Carlisle Circus.
Jas. Gourley, Derryboy, Killyleagh.
Robert Graham, Cliftonville.
Rev. Canon Grainger, M.A., D.D., M.R.I.A., Broughshane (Cor. Mem.)
Rev. J. Graves, M.R.I.A., Inisnaig, Stoneyford, Co. Kilkenny (Cor. Mem.)
Wm. Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
Miss Frances Gray, Mountcharles.
Miss Greer, Tarbat Villa, Sydenham.
George Greer, Dungannon.
Miss Sara T. Greer, Seville Lodge, Strandtown.
Edward Gregg, Virginia Street.
H. H. Greenhill, Banbridge.

Joseph Hall, Windsor Avenue.
W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Thomas Hampton, Upper Crescent.
Mann Harbison, Ravenhill Terrace.
Mrs. Harbison, do.
Adam Harbison, do.
John Harrison, Gardiner's Hill, Cork
W. Harte, C.E., Buncrana (Cor. Mem.)
Rev. E. J. Hartrick, A.M., Ballynure.
J. Haslett, J.P., Princess Gardens.
W. D. Henderson, Castle Chichester
F. A. Heron, Greenmount, Craigavad
Mrs. Heron do.
Prof. J. F. Hodges, M.D., F.C.S., Derryvolgie, Malone.
J. Sinclair Holden, M.D., F.G.S., Sudbury, Suffolk (Cor. mem.)
Alexander Hunter, Northern Bank.
Miss Hunter, University Street.
Thomas Hunter, Holywood.

James Imrie, Fitzroy Avenue.
Rev. R. Irvine, A.M., Hampton, Windsor.

J. Jaffe, Cambridge Villa, Sydenham.
Mrs. Jaffe, do.
Hugh Jamison, Duncairn Terrace.
R. M. Jennings, Cork (Cor. Mem.)
James Johnston, West Elmwood.
Miss Johnston, Glenavy.
W. J. Johnston, J.P., Dunesk.

Robt. Kent, Dunedin, Antrim Road.
Wm. Kernahan, Antrim Terrace.
Rev. J. A. Kerr, LL.D., Whiteabbey
George Kidd, Suffolk, Dunmurry.
Henry Knight, Antrim Villa, Weston Super-Mare.
W. J. Knowles, Cullybackey.
Robert Kyle, Richmond.

W. W. Lamb, Divis View.
Miss Lamb, Divis View.
Prof. Chas. Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem.)
George D. Leathem, Osborne Park.
F. R. Lepper, Avonmore, Derryvolgie.
Rev. H. W. Lett, M.A., T.C.D., Ardmore Glebe, Lurgan.
Prof. E. A. Letts, Ph.D., D.Sc., F.R.S.E., F.C.S., Professor of Chemistry, Queen's College, Belfast, University Terrace.
Joseph F. Lewis, Lothair Avenue.
Joseph Lewis, Schomberg Terrace.
F. W. Lockwood, Brookhill Avenue.
W. Lowry, Oakley, Strandtown.
W. B. Lowson, Chichester Park.
Dr. Luther, Chlorine House.

John Mackenzie, Balmoral,
Henry Magee, Eglantine Avenue.
S. J. Magowan. Granville Villas.
Rev. J. J. Major, Belvoir Hall.
Greer Malcomson, Shamrock Lodge.
Jas. Malcomson, Rosemount, Knock.
Mrs. Malcomson, Rosemount, Knock
Samuel Murphy Malcomson, M.D., Margaretville, Strandtown.
John Marsh, Richmond.
Mrs. Marsh, Richmond.
J. C. Marsh, Castleton Terrace.
Rev. James Martin, Eglintoun.
Mrs. Martin, Eglintoun.
A. S. Merrick, M.D., Belfast District Asylum.
W. R. Molyneux, Florence Place.
James Moore, M.D., M.R.I.A., *Hon.* H.R.H.A., Chichester St.
John Moore, M.D., Carlisle Terrace.
David Morrow, Colinview Terrace.
John Morton, Donegal Terrace.
J. R. T. Mulholland, J.P., Northumberland Street.
Jos. J. Murphy, F.G.S., Old Forge, Dunmurry.

J. R. Musgrave, J.P., Drumglass.
John M'Callum, Fitzroy Terrace.
James M'Clenahan, Tennant St.
Samuel M'Cloy, Cromwell Road.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London (Cor. Mem.)
Sir Thomas M'Clure, Bart., M.P., Belmont.
Fras. P. M'Clean, Huntley Villas.
W. J. M'Clure, Divis Street.
Jas. M'Connell, Caledonia Terrace.
John M'Connell, North Street.
E. J. M'Ervel, Elmwood Avenue.
J. H. M'Ferran, Elmwood Terrace.
J. M'Hutchinson, Wesley Terrace, Cook Street.
Rev. Canon MacIlwaine, D.D., M.R.I.A., Eisleben, Stranmillis Road.
Mrs. MacIlwaine, Eisleben, Stranmillis Road.
John MacIlwaine, Sydenham.
Mrs. MacIlwaine, Sydenham.
Mrs. M'Ilwrath, Dunluce Street.
Daniel M'Kee, Adela Place
W. S. M'Kee, Fleetwood Street.
Alexander MacLaine, J.P., Queen's Elms.
W. Mac Millan, Sallowmount, Ballinasloe.

Lucien Nepveu, Fitzwilliam Street.
Thomas C. Nevin, Wellington Park.
William Nicholl, Adela Street.
Rich. Niven, Chrome Hill, Lisburn.

John D. Osborne, Carrickfergus.
Thos. Edens Osborne, Pier, Cultra.
George O'Brien, Botanic Avenue.
Joshua O'Brien, Botanic Avenue.
W. D. O'Brien, Botanic Avenue.
F. H. O'Flaherty, Fitzroy Avenue.
Mrs. O'Flaherty, Fitzroy Avenue.
Dr. O'Flaherty, R.N., Botanic Ter.
Rev. Jas. O'Laverty, P.P., M.R.I.A., Holywood.
Jas. O'Neill, M.A., College Sq. East.

D. C. Patterson, Holywood.
R. Lloyd Patterson, Croft House, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Strandtown.
George Pelan, Kinnaird Terrace.
J. J. Phillips, Granville Terrace.
W. H. Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, Bonaven, Antrim Road.
Joshua Pim, Crumlin Terrace.
T. W. Pim, The Lodge, Strandtown.

Jos. Radley, Prospect Hill, Lisburn.
William Rankin, York Street.
John Rea, M.D., Great Victoria St.
Jas. Theodore Richardson, Glenone, Lisburn.
David C. Ritchie, Donegal Terrace.
Mrs. Ritchie, Albion Place.
Rev. George Robinson, A.M., Tataraghan, Armagh.
Hugh Robinson, Donegall Street.
Mrs. Robinson, Donegall Street.
J. R. Robinson, St. Helen's Terrace.
W. A. Robinson, Crofton, Holywood.
Wm. G. Robinson, Tartaraghan, Armagh.
R. Ross, M.D., Wellington Place.
Mrs. Rowland, University Street.
Charles C. Russell, Campmar Villa, Newtownards.

Wm. J. Simpson, Earlsfort Terrace.
Charles Smith, F.G.S., Barrow-in-Furness.
Edward Smith, Chichester Terrace.
F. W. Smith, Rugby Road.
George K. Smith, Meadow Bank, Whitehouse.
Rev. Geo. C. Smythe, M.A., Coole Glebe, Carnmoney.
Lieut.-Gen. Smythe, R.A., F.R.S., M.R.I.A., Abbeyville, Whiteabbey.
Rev. J. H. Smythe, Fortwilliam.
C. Sparkes, Prospect Hill, Lisburn.
Adam Speers, B.Sc., Holywood.
Sir N. A. Staples, Bart., Lissan, Dungannon (Life Member).
J. H. Staples, Lissan, Dungannon.
John Stears, Gasworks, Holywood.
J. M'N. Stevenson, Carrickfergus.
Richard Stevenson, Ashley Avenue.
S. A. Stewart, F.B.S.E., North St.
Peter Stirling, Queen Street.
Miss Swanston, Annalee Terrace.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.

Samuel Symington, Jun., Ballyoran House.

Prof. Ralph Tate, F.G.S., A.L.S., University of Adelaide, South Australia, (Hon. Mem.)
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
Prof. Sir C. Wyville Thomson, LL.D., F.R.S., etc., Edinburgh, (Hon. Mem.)
George Thomson, Falls Road.
H. Thompson, Crosshill, Windsor.
Prof. James Thomson, A.M., LL.D., F.R.S., etc., Glasgow, (Hon. Mem.)
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Ballymena.
James G. Turtle, Cambridge Terrace.

John Vinycomb, Melrose Terrace.

Rev. H. C. Waddell, B.A., Lnrgan.
W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.)
Thos. R. Walkington, Laurel Lodge, Sydenham.
Isaac W. Ward, Colinview Terrace.
J. Ward, F.R.G.S., F.G.S., Lennoxvale.
John S. Ward, Lisburn.
Marcus J. Ward, Royal Ulster Works, Bedford Street.
Thomas R. Ward, Holywood.
E. H. Watson, Ardmore, Windsor.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, do.
Robert Welsh, Lonsdale Street.
T. K. Wheeler, M.D., Clarendon Pl.
W. Whitla, M.D., Great Victoria St.
John C. White, Lombard Street.
James Wilson, Jun., Albion Place.
J. Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
C. Workman, M.D., Balmoral Ter.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thomas Workman, Craigdarragh.
Joseph Wright, F.G.S., Albertville.
Mrs. Wright, Albertville.
S. O. Wylie, College Square North.
William Wylie, Belgrave Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

1881-82.

Series II. Volume II. Part II.

PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES TO MEMBERS, 1/-

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

FOR THE

Year Ending 31st March, 1882.

(NINETEENTH YEAR.)

SERIES II. VOLUME II. PART II.

Belfast:
PRINTED FOR THE CLUB
BY ALEXANDER MAYNE, CORPORATION STREET,
PRINTER TO THE QUEEN'S COLLEGE.

1883.

REPORT

OF THE

Belfast Naturalists' Field Club

FOR THE

Year Ending 31st March, 1882.

YOUR Committee, in meeting their fellow members at the close of the nineteenth year of the Club's existence, and rendering up the trust conferred upon them, are gratified to be able to report that the Club continues to show signs of increasing popularity and usefulness.

The excursions arranged for at the commencement of the summer session were all carried out, the programmes being adhered to, with the exception of the visit to Rathlin Island, intended to have formed part of the fourth excursion, which had to be omitted on account of unsuitable weather for crossing. The remainder of this excursion, however, and all the others were fortunate in this respect, and were numerously attended, being, as regards alike the general enjoyment of those present, and the particular objects of the Club's work, quite as successful as those made in any previous years. Detailed accounts of these excursions are appended.

The places were as follow:—

1.—Lough Mourne and Carrickfergus, on the 14th May.
2.—Downpatrick and Strangford, „ 11th June.
3.—Squire's Hill and Carr's Glen, „ 25th June.
4.—Ballycastle and Neighbourhood, „ 19th, 20th, and 21st July.
5.—Larne and Island Magee, „ 20th August.
6.—Newtownards and Conlig, „ 10th September.

As in many former years, the Club have again been partakers of the hospitality of their friends on several of the excursions, and the Committee have pleasure in recording their indebtedness in this respect to Mr. and Mrs. Stevenson, Carrickfergus, on the occasion of the excursion to Lough Mourne; to Mr. and Mrs. Whiteside, Downpatrick, on that to Downpatrick and Strangford; to their President, Robert Young, Esq., C.E., on that to Squire's Hill; and to Mr. Mann Harbison, upon that to Conlig. They are also much indebted to the courtesy of Mr. Charles Dundee on the occasion of their visit to his quarries at Ballintoy during the Ballycastle excursion; and to the various noblemen and gentlemen who kindly granted access to their grounds on the different excursions.

A report having reached the Committee that a traffic was being carried on in the stones of the Giants' Causeway, a communication was addressed to Alex. M'Donald, Esq., J.P., agent to the Earl of Antrim, from whom a courteous reply was received, expressing readiness to act upon any information we could procure him. Should, therefore, any members of the Club at any time become aware of such acts of vandalism, it is hoped they will communicate with the Secretaries, who will promptly take care that such information reaches the proper quarter.

At the opening of the Winter Session a Conversazione was held in the Museum, which proved one of the most successful recorded in our annals. Your Committee must again express their thanks for the valuable assistance rendered by many of the members, and for the objects for exhibition, flowers, evergreens, and other decorations contributed for the occasion by them and their friends.

During the Winter Session, six regular meetings have been held, at which the following communications were read, abstracts of which will be found in the Proceedings :—

Nov. 15th. I. "The Opening Address." By the President, Mr. R. Young, C.E.
"On Records of a Former Level of Lough Neagh." By Rev. H. W. Lett, M.A., T.C.D.

Dec. 20th. II. "Some Thoughts on the Development Theory of Creation." By Rev. John Andrew.

Jan. 24th. III. "Diatoms : What they are, and where and how they are found." By Mr. William A. Firth.

Feb. 21st. IV. "Recent Discoveries in the Lower Palæozoic Rocks." By Mr. William Swanston, F.G.S.
"Notes on the English Castles of Strangford Lough." By Mr. F. W. Lockwood.

March 21st. V. "Wax Cells, a Ready Method of Mounting for the Microscope." By Mr. William Gray, M.R.I.A.
"Notes on Knockmore and Glangavlin." By Mr. S. A. Stewart, F.B.S.Edin.

April 18th. VI.—"Early Irish Art Metal Work." By Mr. J. J. Phillips.

The Committee have again to acknowledge the courtesy with which they have been treated by the local press, and the promptitude shown in the insertion of abstracts of the papers read at their meetings, and accounts of their excursions. In connexion with this they think themselves justified in pointing out that the wide publicity thus given to their Proceedings, and especially to the accounts which often appear of ancient monuments, and places of antiquarian interest, can hardly fail to be of service in promoting a healthy public sentiment likely to bear fruit in the greater respect felt for, and protection shown to such objects.

As a proof of the interest which continues to be manifested in our work, in some degree doubtless due to the publicity given to it, we have to report that a larger number of new members have been elected during the past year. As, however, death and other causes are from time to time removing old and tried members, we still urge upon our friends to induce as many as they can to join our ranks. Such may not in every case be able

to devote much time personally to natural research, but their presence and sympathy with our work will not fail to encourage those, whom we hope will always constitute the larger proportion of our members, who are actively engaged in those pursuits which the Club was organized to promote.

The usual interchange of our Proceedings with other kindred societies has been maintained, and we are indebted to this source for some valuable additions to our library.

As the Report and Proceedings for 1879–80 formed the conclusion of the first volume of the second series, your Committee, during the course of the year, prepared and issued an index to the whole, in such a form as to admit of being bound up with the volume. Appended to it was also an index to the Club's album, which may prove useful in keeping the existence of this valuable repository before the notice of the members.

The Club's Guide to Belfast and neighbourhood, which was prepared on the occasion of the visit of the British Association, in 1874, continues to be in demand. Upwards of one thousand copies have now been disposed of, but a few are still on hand which can be obtained through members of the Committee at a reduced rate, by any who desire to possess this interesting and instructive volume.

We append Report of the Sub-Committee appointed to adjudicate upon the collections, &c., submitted in competition for the prizes offered by the Club.

Mr. Charles Bulla submits a collection of Cretaceous fossils in competition for prize 7, it embraces 40 recognisable species, represented in most cases by several examples ; besides several mounts of specimens not sufficiently well preserved for identification. One specimen, *Salenia geometrica*, an echinoderm in the collection, deserves special notice, it being new to the Antrim Chalk. The judges have pleasure in awarding the prize to Mr. Bulla.

In competition for Prize 14—For the best set of 25 microscopic slides, there are two collections submitted—one by Mr. Gray, and one by the Rev. H. W. Lett, both possess sufficient

merit; the judges have, however, awarded the prize to Mr. Gray, his set being more varied in character, and exhibiting more manipulative skill. Mr. Lett's set is confined to Botany, and includes many excellent stained wood sections, well worthy of examination.

S. A. STEWART, F.B.S.Edin.
JOSEPH WRIGHT, F.G.S. } *Sub-Committee.*
WM. SWANSTON, F.G.S.

Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1880-1	...	...	...	£29	7	10	By Loss on Conversazione	£8	0	2
,, Subscriptions—240 at 5s.	...	...	...	60	0	0	,, Printing Annual Report	23	1	9
,, Gain on Excursions	...	...	...	0	13	4	,, Advertising, Printing, and Stationery ...	10	8	0
,, Guide Account ...	...	...	...	8	12	9	,, Delivery of Circulars	1	10	0
,, Proceedings ...	...	...	...	0	13	6	,, Postages	3	19	4
							,, Prizes	1	0	0
							,, Museum Expenses	8	8	0
							,, Balance on hands	43	0	2
			£99	7	5			£99	7	5

Audited and found correct,

JOSEPH WRIGHT, *Treasurer.*

WILLIAM SWANSTON, *Hon. Secretary.*

SUMMER SESSION.

The following Excursions were made during the Summer Session:

On 14th May, to

LOUGH MOURNE AND CARRICKFERGUS.

A large party started from the Northern Counties terminus, by the twelve o'clock train for Carrickfergus, whence, after being joined by several friends from that ancient town, they proceeded on foot to the lake. The road, with its picturesque views of the Belfast Lough and mountains, presented no features of special interest to the naturalist, except that the unusual luxuriance of some of our commonest wild flowers in this favourable season was noted, until the Carrickfergus Commons were reached. Here there are many signs of improvement, due to the recent settlement of the long pending dispute respecting them. New roads have been made, new houses built, and bog and moorland are rapidly being brought under cultivation. After coming in sight of the lake, the curious swallow-holes of Lignaca formed the first place of attraction. Here a considerable rivulet, which seems to be making straight for the lake, plunges in a small cascade down into an oval hollow or basin, about one hundred and fifty yards long, at the bottom of which it disappears through a number of "swallow-holes." Whether

it ultimately reaches the lake has been the source of much conjecture, but the general opinion is that the water finds its way again above ground in the form of the springs of Sullatober, nearly two miles lower down. To test this the Belfast Water Commissioners have made various experiments. A ton of salt, a quantity of copperas, and several bags of what a neighbouring farmer denominated "shillun seeds," were put in at Lignaca, but of the salt and chemicals no trace was found in the water at Sullatober, and of the chaff only a few doubtful grains came out again at the springs. When the Lignaca stream was temporarily diverted some years ago, however, the Sullatober spring almost entirely ceased. Possibly, as in the case of other limestone rocks, the stream may pass through underground basins capable of holding a large quantity of water, in which whatever was put in above would be lost, so that, although the flow of water might remain even, it would be almost impossible to trace anything from its entrance at the swallow hole above to its exit by the spring below. On the other hand, when Lough Mourne was frozen over during the recent severe winter, there were always dangerous spots on the ice, which marked the presence of hidden springs, so that it is still an open question whether some of the water does not go into the lake. The swallow-holes occur in the line of a fault, the basalt of one side of the hollow being replaced by the white chalk on the opposite side. The hollow itself has been probably excavated chiefly out of the chalk, the solid matter having been removed by the carbonic acid of the water in a state of solution.

Before leaving Lignaca a meeting was held—the President, R. Young, Esq., C.E., in the chair—and several new members were elected.

The party then proceeded along the shore of the lake, which has recently been acquired by the Water Commissioners. The land round has also been purchased, and a very moderate embankment will enable a large quantity of the winter rains to be stored here. The lower end of the lake is formed by a bank of boulder clay: through this several shafts have been sunk over forty feet to

the underlying basalt, for the purpose of running a tunnel from the lake to the Copeland Water Reservoir, now being formed about a mile and a half further down. As the lake is only forty-five feet in its deepest part, we may assume that it is in the main the result of this natural dam of boulder clay, whilst the deepest portions may have been originally a shallow, ice-excavated hollow in the basalt, but the absence of any special obstacle to the floor of the ice sheet would not lead us to expect more ice excavation here than the relative depth of the clay bank and the lake would appear to indicate.

The shafts and cuttings sunk through this boulder clay, which extends down the Copeland water valley nearly to the new reservoir, have yielded an immense number of ice-worn, polished, and striated boulders, chiefly of basalt and hardened chalk, some of the latter showing a high polish. Of the smaller stones most of the party brought away specimens. In excavating the Copeland water dam, which was next reached, a magnificently ice-scored and polished boulder of chalk limestone, several tons in weight, was found. This, unfortunately, has been blasted into two or three pieces, but one of them, very beautifully striated, and from half to three-quarters of a ton in weight, was inspected. This is so fine a relic of the "great ice age" that an effort ought certainly to be made to have it secured for our local museum.

The Rhœtic fish bed was dug into whilst making the puddle trench of the reservoir, but is now covered up again. Some interesting fragments, however, were found amongst the debris, including a shell apparently new to the district.

The party now divided, some hurrying off to catch the train at Carrick, the remainder paying a visit to the springs at Sullatober. Here the water, supposed to have disappeared at Lignaca, comes boiling and bubbling out of the earth again in two deliciously-clear ice-cold springs, to soon lose its purity, however, in the printworks of Sullatober. On the tired party reaching Carrickfergus, the generous hospitality of Mr. and Mrs. Stevenson, of the Model School, soon gave them new

vigour, and enabled them to spend an interesting twilight hour in visiting the pier and outside of the castle; and the new harbour works, with their blocks of concrete. The stone on which the foot of King William III. is said to have first touched Irish soil, and which was brought from Kilroot, is now built into the quay wall below the castle. Hurrying to the train, a short run to Belfast brought the day's work to a close, all parting with the unanimous feeling that the Belfast Naturalists' Field Club had most successfully commenced the nineteenth year of its existence.

On 4th June, to

DOWNPATRICK AND STRANGFORD.

Though the steady rain of the day preceding frightened a good many, yet a fair number met at the County Down station, and were rewarded with a calm, grey summer's day, free alike from dust or glaring sunshine. Downpatrick, though so full of interest, only figured in the programme as a starting point, so the party left at once for Saul, the ruins of which were, a century ago, very extensive, though carelessness and cupidity have left now only two or three shapeless fragments to mark the original extent of the abbey, founded by St. Patrick, of which St. Modun was the first abbot. The stonework now remaining being built with mortar, must be of a much later period than St. Modun's original church, of which no trace now exists. Built into the wall near the churchyard gate is a very fine tombstone, having the emblem of St. Peter's keys, or key, carved upon it. It is a great pity this should be left in so exposed a situation, where it is fast hastening to decay, and in a few years will be completely effaced. Could it not be procured for the Belfast Museum? The Rev. Bernard M'Cann, of Saul, here met the party, and pointed out a number of interesting relics, of which the vicinity of Downpatrick is so prolific. Amongst others is St. Bridget's

well, which is a small stone-roofed spring by the way-side, though how it got the name is not clear, for St. Bridget spent her life at Kildare, and was only removed to Downpatrick after her decease. There is also a curious rock called the "mass rock," with an illegible inscription, though apparently of no great antiquity. Here, it is said, an open-air mass was sometimes performed, possibly during the severity of the penal laws.

The ruins of Raholp Church were next visited. These are, perhaps, with the exception of the church on St. John's Point, near Ardglass, the oldest in the county, and it is quite possible that its rude builders may have spoken with some of those who derived their teaching from the lips of St. Patrick himself. It is a simple oblong structure without any chancel, about 30 feet, by 20 feet, evidently built before the period not later than A.D. 600, when lime mortar was introduced from the Continent. It is almost unique in Ireland, however, in having the joints of the stonework filled with a stiff yellow clay, which may have been tolerably efficacious in keeping out the wind and rain. The east window was apparently covered by a stone lintel, and enough of the north wall is still remaining to show that the unusual arrangement was adopted of placing the door on that side of the church, instead of, as is usual, in the west gable. A little judicious care promptly applied might long preserve this interesting relic, which will otherwise before long meet the fate of so many others.

After a delightful drive through Lord Bangor's beautiful demesne, the two fine castles of Castleward and Audley's Castle were reached, and a considerable time spent in their examination, the sketch books of some of the party being brought into requisition. Then another short run along the picturesque shores of the little bay of Strangford brought the party to that quaint old town, where is another old castle, still used by Lord de Ros as a store-house, and which, backed by the old houses and the woods about Strangford House, forms a charming little scene.

Unfortunately time would not permit of a visit to Kilclief

Castle, a little further down the channel, the original part of which is almost a duplicate, but in better repair, of Audley's Castle, and is now in occupation as part of a farmsteading.

From Strangford the party were soon on their way back, *via* Slieve-na-Griddle, whose rocky summit, though only 420 feet above the sea, conveys the impression of being nearer a thousand. Passing close by Lough Money, whose name it was suggested might mean the "boggy lake," a short halt was made at the so-called "Druidical" circle, of which seven stones are yet standing. There is also a sort of passage of stones leading up to it, but the whole is insignificant compared with others of its class. It is pretty generally admitted now that these were monumental rather than religious in their origin. The last place visited was the wells of St. Patrick at Struell, once from their reputed miraculous virtues resorted to from all parts of Europe, but now nearly deserted. There is the "eye" well, and the "drinking" well, the water of which was pronounced by the members to be "delicious," each well enclosed under a stone-arched canopy, and near by in a small bath-house, is the third or bathing well. The walls of an unfinished chapel of no great age are close at hand, and on the side of Struell Hill, from the foot of which the springs issue, is St. Patrick's chair, which some of the party climbed to. Residents not very old can still remember the time when a sort of fair—presumably a "pattern" —was held at the wells on St. John's day; but no longer encouraged, or at least winked at, by the clergy, these curious old customs have now practically died out, a result, perhaps, more satisfactory to the moralist than to the antiquarian.

The antiquarian side of the Club's pursuits was in the ascendant during the excursion, leaving the record of the naturalist almost a blank. Some of the broader geological features of the country were noted, especially the glaciated rock surfaces recorded by the officers of the survey, but geology from a jaunting car is necessarily rather superficial. An interesting theory of the surveyors was left undecided—viz., whether Strangford Lough was not once a fresh water lake, originally excavated

out of the carboniferous limestone, of which a patch still remains at Castle Espie, the surplus waters of which lake escaped before the present deep channel was in existence, by a river running from the Quoile, near Downpatrick, past Saul and the west end of Slieve-na-Griddle, and thence south-eastward to the sea near Killough, along which route are found patches of ancient river gravels and sands. This offers a good subject for some members of the Club to work out. A few hurried minutes were agreeably spent in partaking of Mr. and Mrs. Whiteside's hospitality, and a new member having been elected, a dash was made for the station just in time to catch the last train for Belfast, arrived at which the members parted, congratulating themselves that Field Club days, like "Queen's weather," almost always turn out fortunate.

On 25th June, to

SQUIRE'S HILL AND CARR'S GLEN.

Notwithstanding the threatening appearance of the weather, the moment a smart shower had passed over, a score of members started from the Museum, and drove on cars up the Crumlin Road to the horse-shoe bend, just below the quarries which line the face of Squire's Hill. Entering one of these the party were soon busy—some breaking up flints in search of the soft chalk powder now so well known as containing *foraminifera*, some searching for larger fossils, and others taking note of several fine basaltic dykes which here intersect the limestone, the heat from which has had in many places the usual result of altering the white chalk to a grey, semi-crystalline marble. The bed of chalk is here of apparently greater thickness than in the Cave Hill quarry, and cropping out where the slope of the hill is gradual there is a much smaller quantity of the overlying trap and basaltic rocks to be removed, and the quarrying appears to be effected with comparatively little expense or difficulty, the

distance from town being the chief drawback. Searching for fossils in the chalk is rather tedious, but several specimens were secured—amongst others Rhynchonella, Pecten, &c., but none of any great rarity. Whilst in the quarry the old question was discussed again as to the cause which has produced the difference between the Chalk of the South of England and the North of Ireland. Both are part of the same geological formation, both contain the same fossils, and are precisely identical in chemical composition, but whilst the English Chalk is soft and friable, the Irish is extremely hard, brittle, and splintery. Neither the theory of heat from the superincumbent Basalt, which was once molten lava, nor that of pressure from the weight and mass of the same, nor of heat and pressure combined, seems altogether satisfactorily to explain it. Have these theories ever been put to the test in the laboratory? From the quarries the distance is short to the top of the hill, 1230 feet above the sea, the botanists of the party picking up on the way several specimens of the minute and somewhat rare fern, the moonwort (*Botrychium lunaria*), which, as it dies down in the autumn, can only be easily found during the months of June and July. From the cairn, on the summit, the broad extent of Lough Neagh was seen glittering in the west; the Mourne Mountains were obscured by a flying rain cloud, whilst emerging from another squall on the north the conical top of Slemish came into view. The strong breeze rendered a long stay the reverse of pleasant, and the party were soon descending towards the large basaltic quarry on the eastern face of the hill, near which the dynamite used in the locality is stored. In this quarry, the basaltic blocks of which are rudely columnar, an excellent road metal is obtained, and some of the stones are squared into sills, steps, and setts for paving. This is the stone which an unscientific correspondent of the papers described some time ago as "granite," the discovery of which was to open up another source of industry to the artisans of Belfast. Though granite and basalt are both igneous rocks, yet the circumstances of their origin, their mineralogical characters, and the positions

in which they are found are so totally different that the most superficial student of geology would never be likely to confound them. A hasty visit was paid to the upper waters of the Carr's Glen stream, where the *Pinguicula* was found in some profusion. This little plant, with its moist, hairy, slimy leaves, bears the reputation of being, to some extent at least, insectivorous. The party then descended through the Cave Hill quarries, stopping to note how one of the dykes, which penetrate the chalk, could be seen cutting through the overlying basalt as well, thus giving evidence that the basalt must have been originally of much greater thickness; that it must then have been disturbed by more recent volcanic action, of which the cooled lava in the fissure or dyke is now the sole remnant, and then must have been greatly denuded, for the whole of this last outflow has disappeared, by marine, glacial or sub-aerial denudation. Half-an-hour now brought the party to Chichester Park, where the hospitality of R. Young, Esq., the president of the Club, formed a very acceptable termination to the day's proceedings. In spite of showers and wet grass, the Committee were furnished with an additional proof that the short excursions to the environs of Belfast are by no means the least popular of those organised by the Club.

On 19th, 20th, and 21st July, to

BALLYCASTLE AND NEIGHBOURHOOD.

Leaving town by the Northern Counties, and changing at Ballymoney into the carriages of the narrow-gauge line of the Ballycastle Railway, the party were in high anticipations of the pleasant day to be spent on the sunny heights of Benmore. Scarce, however, had the merits and demerits of the narrow-gauge system of railway as branch lines for Ireland been discussed, when the speed gradually declined, and a stand-still was made near Stranocum. This on a comparatively new line was

not considered remarkable, but on inquiry it was ascertained that something was wrong with the locomotive. Wiring for additional power was of no avail, and field naturalists and others were alike compelled to wait with such patience as they could command the arrival of the next train their way, thus losing about two hours of the best part of the day. Eventually reaching Ballycastle, Mr. Wagg, of the Antrim Arms, intuitively took in the position of affairs, and the desire to make the most of the fine evening, and certainly no time was lost on his part in laying out, or on that of his guests in disposing of, a substantial dinner. A forgiving spirit seemed to have entered into the party with the good things partaken of, the tedious delay at the uninteresting wayside station of Stranocum being forgotten as we whirled along on well-appointed vehicles towards Murlough Bay.

Tourists "doing" the Antrim coast too frequently omit this —one of its most charming pictures. Mr. and Mrs. S. C. Hall, though visiting it under the disadvantage of rain and clouds, pronounced it "a scene of unspeakable grandeur and beauty;" and, certainly, the view presented as the party approached the edge of the cliffs was one not soon to be forgotten. The bright sunshine and light-flying clouds imparted the play of light and shade so necessary for an extended landscape. The imposing cliffs rising from the richest of foliage on the broken ground at their base, and the snug homesteads nestling midway between them and the rugged shore,—the distant headlands with their varied colourings, and the bright sparkling sea, with ships whose sails caught the evening sunshine,—combined to form a scene of rare and pleasing beauty. Slowly wending along the edge of the giddy cliffs, evidence of ice-action was pointed out in the rounded bosses on the upper surface of the Basalt—known to geologists as *Roches montonnee*—and in the perched boulders near Lough-na-Cranagh.

The culminating point of the coast is Benmore (the great peak), more popularly known as Fair Head, 636 feet, which is by far the finest headland on the Antrim coast. The height is

about equally divided between the perpendicular wall of basalt and the talus of debris, which reaches from its base to the sea. The "grey man's path" is a natural cleft in the headland, probably formed by the weathering out of a dyke of basalt of later date than the columnar cliffs. Here the party divided, the majority returning by Lough-na-Cranagh, where the cars were awaiting, while others, bent on making the most of the evening, descended the grey man's path to the base of the columns. On the way down, almost under the monolith with which nature has spanned the chasm, was found in some profusion the Welsh poppy (*Meconopsis cambrica*)—a rare northern plant. Picking their way over or around the blocks, as circumstances allowed, those who descended the cliff soon found they had undertaken a severe evening's work. The scene is one of wild grandeur, the cliffs on one hand towering up quite perpendicular to their giddy height, while far below, over the ruins of fallen columns, the sea was surging in regular swellings from the ocean. The greatest care is necessary on this route to avoid the many chasms among the blocks. Ferns and other wild plants often hide these dangerous pitfalls, and some anxiety was felt, as evening was closing in, to bring this part of the journey to an end. A halt was made at the stream which finds its way down from Lough Doo (Black Lough), and it was decided to ascend by its course, and take the way on the leveller ground above. Night setting in, accompanied by mists and rain, gave true character to this dismal sheet of water termed a lough; but the main feature now in view was to get into Ballycastle, some five miles off. After considerable wanderings over craggy and boggy ground, a house was reached, and, under the pilotage of a light-footed damsel, the road by the collieries close to the sea was gained after ten o'clock, and some distance on, a car, sent out in search, was met, which soon brought the rambling section to the hotel, where some anxiety had been created by their prolonged absence.

To reach Rathlin Island was the aim of the second day's work, but the morning opening with wind and heavy rain made

this part of the programme doubtful. On reaching the quay, however, all doubt was set at rest by the appearance of the sea that was running, and the squalls which came down with the flying showers. On returning to the hotel the programme was wisely changed for Ballintoy and Carrick-a-raide. The rain having cleared off, the company, under the guidance of Charles Dundee, Esq., a fellow-member resident at Ballintoy, set out on cars by the new line of road. No halt was made till reaching White Park Bay, where the cars were dismissed for a time. On the roadside here, and in patches along the shore, was found the beautiful blue meadow cranesbill (*Geranium pratense*), a most conspicuous but local plant. A most interesting time was spent among the sand dunes of this charming bay. The locality has long been famous for its human remains of the rude stone period, and soon the members were in possession of undoubted works of the ancient settlers. Portions of urns, probably cinerary, were abundant, several pieces having rude sculpturings, flint scrapers, flakes, and cores were bagged; but perhaps the most interesting relic was the roughly-paved floor of a house of the early inhabitants, some of the stones of which are quite smooth, and still retain their clay setting. Burned stones—the remains of ancient fireplaces—were everywhere scattered on the slopes; several excellent specimens of the stones upon which grain was ground were seen, but they proved too heavy for removal; a flat, disk-shaped stone of quartzite conglomerate, much worn by grinding, was picked up and handed over for the Museum collection; portion of a hand-quern of the same material was also found. Several excellent examples of kitchen middens—the kjökken-möddings of the Danes, being vast collections of the shells of such edible molluscs as the shore yields, were pointed out; but not the least interesting remains of a long-forgotten race was the sepulchral mound with its circle of stones near the centre of the bay. This latter had been lately examined by the ex-president of the Club, Wm. Gray, Esq., M.R.I.A., and found to contain the remains of a skeleton on a rude pavement of flat stones.*

* Journal of the Royal Hist. and Archæol. Assoc. of Ireland, July, 1879.

Time would not allow of more than a hurried glance at the exposure of Lias cut into by a stream near the west of the bay, and onward the party was led to the church. The beautiful piece of coast-line between White Park Bay and Carrick-a-raide is entirely lost to those who keep the road, or even the cliff path. Few points would, however, equally repay the time spent upon them. The basalts are here irregularly columnar, and the strata of the Chalk are much broken by faults, so that in some places it is found at higher elevations than the former. Detached outliers of both occur, carved with natural arches and caves, in a most remarkable manner. Passing through the village of Ballintoy, the next halt was made at the extensive basalt quarries of Mr. Dundee. The prevailing form in which the denser varieties of this rock occurs along these shores is the columnar, more or less regular in its character. Here, however, it may be more correctly termed massive, and more strictly defined as crystalline granular dolerite. For some time past preparations had been made for an extensive blast, which Mr. Dundee had kindly reserved for the visit of the Club. All being now ready, and the members being safely located, the fuse was lighted, which soon fired the charge, bringing down a large face of the cliff with a deep, sullen roar. On close examination, it was estimated that upwards of 500 tons had fallen; but so tenacious is the rock that many of the blocks, without any apparent flaw, could not have weighed less than 30 tons. The principal use to which the stone is put is making square setts for street pavement, a purpose for which it is admirably adapted, its exceeding hardness, and crystalline granular composition, ensuring a permanent pavement, and what is equally desirable, a firm foothold for the horses. All present were surprised at the cleavage of this rock, and the readiness with which it can be worked. Blocks can readily be split, showing several square yards of fractured surface as level as if worked with the chisel. These clean surfaces answer admirably, and save much labour in sett cutting, or for curbing blocks. As time was hurrying on a run was made to the swinging bridge at Carrick-a-raide

(the rock in the road). In the stiff breeze that was blowing along the shore, the swing of this frail structure was too perceptible, and the members begged to be excused from crossing. Reaching the road, the cars are again mounted, and no further halt made till the hotel is reached and a dinner found in readiness. The remainder of the evening was spent as the members listed. The strand and cliff attracted some ; the desolate ruins of Bon-a-Margy Abbey had a fascination for others. Here lie the bones of many leaders and followers of the great Macdonnell family ; here were interred the remains of Sorley Boy Macdonnell, whose history—as written by the facile pen of the Rev. George Hill, the historian of the clan—reads like a romance. The following passage is from the "Macdonnells of Antrim :"—" A Macdonnells manuscript affirms that Sorley Boy died at Donanyvie Castle in 1589 (old style), and was buried at Bunamairge. The faithful clansmen carried the remains of their brave old chieftain down the slope of the castle hill, past the harbour, where he had so often welcomed his Clandonnell kinsmen to the Antrim shore, and across the ford of the mairge, where the Irish caoine and the Highland coronach mingled in one wild wail for the dead." Next morning being bright, after breakfast the chairman of the excursion, the Rev. J. H. Smythe, led the way to Dunineny Castle, a small remnant of which overlooks the sea a short distance west of the town. Nothing remains but a portion of the entrance, close to the deep fosse which is cut into the living rock. Natural position, easy of defence, and difficult of assault, was the first point with the ancient builders of the castles along the Antrim coast, and scarce a headland possessing such advantages is without some remnant of shattered wall, sunken fosse, or overgrown fort. The view from here is magnificent. Rathlin Island lying before us in its bright setting of waters : Cantire, Ailsa Craig, Islay, and even the more distant mountains of Arran and Jura were easily discernible, while our own coast, with its rugged outline, extended on either hand. From the castle hill the way along the cliffs and by the bright

strand was taken to the collieries. The rocks between tide-marks beyond the Bath Lodge proved attractive to a few, and specimens of Sigillaria and Lepidodendron were in some demand. These, with masses of Stigmaria—the probable root-branches of the latter—indicate the lacustrine character of these beds, and their associated coal seams. Further on are limestones and shales of undoubted marine origin ; the latter were especially rich in polyzoons, encrinite stems, brachiopods, and other bivalve mollusca, beautifully weathered out. Time would scarce permit of a visit to the "output" of coals near the pier ; it is small compared with what has been done here in times past, while the present unfavourable condition of the iron trade has apparently put a stop for a time to this industry. On the way back to the hotel the beautiful plant known as the grass of Parnassus (*Parnassia palustris*) was found in some profusion along the slopes. Returning by the sand dunes, and after partaking of luncheon, the party were soon seated again in the comfortable carriages of the narrow-gauge line, and this time performed the return journey to Ballymoney with speed and pleasing smoothness. At the Belfast terminus mutual expressions of pleasure at the delightful and profitable trip now brought to a close were mingled with the hurried partings at separation.

On 20th August, to

LARNE AND ISLANDMAGEE.

The fifth excursion of the season was to Larne and the north end of Islandmagee. No doubt, the continuous rain of the preceding day damped the ardour of many members, but those who had the courage to venture were rewarded with the usual field club experience of a brilliant day. Upon leaving the train at Larne a visit was first made to the raised beach at the Curran, which has yielded so many flint flakes, several fine

specimens of which were secured by the members, but it would require a more careful search than time then permitted to decide whether they are confined to near the surface only, or are found throughout the whole thickness of the bed. A little further on, the same beach is found resting on the Estuarine clay, full of *Foraminifera* and other organisms. Crossing by the ferry the party turned their steps to the "Druids' cottage," before the hall door of which stands a fine cromlech, the table-stone of which is symmetrically balanced on four upright ones. It is said that when the cottage was commenced appliances were in course of erection for removal of the cromlech, but that at the earnest remonstrance of some gentlemen now members of the club, who chanced most opportunely on the scene, the builders relented, and this fine monument was spared.

Some iron ore workings a few hundred yards off were next visited, and the party then bent their steps to Brown's Bay, noting with many expressions of admiration the splendid views that every step opened out before them. Black Cave Tunnel, Ballygalley Head, Glenarm Head, Garron Point, with its landslips, and the lofty headlands beyond Cushendun, all told of the rugged and picturesque nature of the Antrim coast. The Paps of Jura floated like three cloudy haycocks on the northern horizon; "Wild Cantire" stood out clear and prominent; the Isle of Arran, with Goat Fell, showed as lofty but less distinct; and the familiar outline of Ailsa Craig led the eye onward to the long stretch of Scottish coast, which shone faint or distinct as the sunbeams lit up some mellow cornfield, or the cloud shadows rested upon some distant inland mountain. Nearer at hand the white rocks and lighthouses of the Maidens glittered in the sun, whilst a hardy Scotchman, settled on this coast, found time in the intervals of his haymaking to relate an appropriate tale of shipwreck or danger for every rock and headland within view. At Brown's Bay was found in full flower the beautiful grass of Parnassus, which grows only at two or three localities along the coast. The geological features are rather interesting, a fault having brought up the Keuper marls

on to the same horizon along the beach with the white chalk and Greensand, full of fossils, whilst the hard trap rocks which form the escarpment on the east side of the bay are finely ice-rounded and striated. The trend of the bank lies nearly north and south, with its face to the west, and the ice movement which has ground them would appear to have come from the northward ; but if so, from where, and in what manner ? Did the ice-cap, which some eminent geologists assert once covered the whole of Scotland, rode over the Hebrides, and pushed southward the ice from Westmoreland mountains, reach also across the Channel to Islandmagee ? or was the glaciation we see here, and also that on the rocks about Bangor, done by floating ice, driven before an Arctic current ? The rocking-stone, itself an ice-dropped boulder, which weighed about six tons, was soon reached, and rocked ; the headlands, with their picturesque stacks and pinnacles, were clambered round or over ; the remaining fragment of the old castle at Portmuck was visited and sketched ; and, after watching an interesting haul of fish in the little bay, the party struck across the island, past well-tilled fields and comfortable farm-houses, for Niell Bay, from whence a pleasant sail, before a fair wind, brought them to Magheramorne, having, whilst witnessing torrents of rain pass to right and left, succeeded by the usual club's luck, in getting back as dry as when they started.

On 10th September, to

NEWTOWNARDS AND CONLIG.

Alighting from the train at Newtownards shortly after eleven o'clock, the party at once set out on foot, deciding to visit the remains of Movilla Abbey on the way. A short time was pleasantly spent examining the old tomb stones, but the great attraction here is the series of monumental crosses. Until quite recently some of these stood in different parts of the

burial ground: one with an ancient Irish inscription was rescued from a rubbish heap in an adjoining field by Robert Jamison, Esq., of Movilla House; the preservation of the largest—a fine example, with a foliated cross carved in relief—is also due to that gentleman's exertions. All have for safety been securely built into the old abbey wall, and now, perhaps testify more forcibly to the importance the place once claimed, than do the few remaining architectural features of the abbey itself.

Leaving Movilla, the party was joined by a strong contingent of members and friends from Newtownards, and the way was taken direct to the Lead mines, which are on the high ground to the north of the town. Through the kindness of Peter Echlin, Esq., the party was met at the mines by the Manager, and conducted over the works. It is right to state that though very extensive, and at one time employing over 500 hands, these works were entirely closed in 1865 and have remained so till within the past few months, when they came into the possession of the Newtownards Mining Company. A good beginning has now again been made, and it is to be sincerely hoped that ere long the busy scenes of former activity will soon be equalled, if not excelled.

A short walk brought the party to Helen's Tower, on the Clandeboye demesne, to visit which permission had kindly been granted. After a short stay, affording an opportunity to examine the various rooms, &c., and viewing the extensive and beautifully varied landscape, the return journey through bye-paths was taken to Newtownards, which was reached about five o'clock. By the kind invitation of Mr. Harbison, all adjourned to the Model School, where he entertained them to a substantial repast, highly appreciated after the invigorating day's walk over the breezy hills. Before parting, the business meeting of the club was held—Mr. H. Robinson being moved to the chair. A new member was elected, after which a vote of thanks was ably moved by Mr. Speers, Holywood, and seconded by Mr. Stevenson, Carrickfergus, to Mr. Harbison for the hospitality extended to the club on this excursion. A few members took a hasty run to

examine an ancient stone-coffer or font on the lawn of Flush Hall. This puzzling object was dug up a few years ago in Movilla burying ground, and removed here. It was remarked that a more fitting place for it would be within the walls of the Abbey in which it was found; for, although now taken care of, it is quite possible that future owners may not attach such interest to it as will secure its preservation.

WINTER SESSION.

—o—

Note.—The Authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

—o—

THE Winter Session was opened on Tuesday evening, 8th Nov., by a Conversazione, held in the Museum, College Square. For the purpose of the gathering, the whole of the building had been utilised, and some exhibition of interest occupied each one of the rooms. The curator, Mr. Darragh, had lent his assistance in the decoration of the apartments, which presented a very tasteful appearance. The President (Robt. Young, Esq., C.E.) opened the meeting by introducing to the notice of the friends and members present the various exhibits and collections brought together, after which a number of new members were elected, the remainder of the evening being occupied by an examination of the various specimens and works of art which crowded the tables and walls of the rooms, and in animated conversation respecting them. As on former occasions, the large lecture room contained the most important exhibits in connection with the club's work. A conspicuous and effective display of antlers and horns formed a good feature here. These are from the cases of the museum,

and we understand it is intended that they should remain permanently in their present position. The Natural History and Philosophical Society is certainly to be congratulated on possessing such an attractive collection as is here shown above the bird cases and on the walls. It has been usual for the club on similar occasions to select some subject for special illustration, the members generally contributing towards it. This year it was the "Ammonite and its Relations." A long table at the end of the lecture-room was devoted to this purpose, and a very large and choice series of these beautiful and varied organisms was displayed. Conspicuous among these might be seen a gigantic fossil (*Actinoceas giganteum*), from the Carboniferous Limestone of Castle-espie, County Down, which, when perfect, must have measured at least five or six feet in length. Of giant ammonities two are worthy of special notice, one of them from the Chalk of this neighbourhood and the other from the English Oolite. The latter, the property of the ex-president of the club, Mr. William Gray, M.R.I.A., was on this evening kindly presented to the museum. This subject was also well illustrated by specimens from the private collections of various members, supplemented by examples taken from the museum cases. The display showed that much attention had been given to the study of this group. The argonaut, nautilus, and cuttlefish were shown as representatives of this family in existing seas, while a host of fossil forms of many genera, from formations ranging from the Silurian up to Tertiary times, proved the importance of the ammonite and its relations in geological times. Messrs. Gray and Wright briefly explained the import of the series of specimens displayed on the table. Mr. Gray also illustrated the process of mounting for the microscope, and much interest was evinced by his audience in his simple but effective methods, and in his lucid explanations. Dr. Malcomson showed, under the microscope, living examples of *Rotifera*, displaying the wheel-like organs from which they derive their names. He also showed a number of *Foraminifera* from the Challenger dredging expeditions. Mr. W. A. Firth had on view some

choice slides, prepared with his usual skill. Mr. Joseph Wright, F.G.S., exhibited two interesting arenaceous forms of *Foraminifera* (*Astrorhiza limicola* and *Psammatodendron arborescens*) recently dredged by Mr. David Robertson, F.L.S., &c., of Glasgow, off Cumbrae, Firth of Clyde. The latter is a very remarkable branching form, more like a plant than a foraminifer, and only recently found living in British waters. A fragment of the same thing was also lately dredged off Portstewart. Rev. John Bristow kindly lent an exceedingly choice and valuable collection of British *Lepidoptera*, numbering many hundred specimens, which was greatly admired. Mr. Isaac Waugh also showed an interesting series of lepidoptera, collected by him in the vicinity of Belfast. Mr. Robert Walsh exhibited some artistic mounts of insects and dried plants, also many living insects in a fresh-water aquarium. Mr. W. H. Phillips had some very remarkable insectivorous plants, also some growing ferns, one of which was strikingly variegated. Mrs. John Jaffé exhibited some beautifully mounted Alpine plants, also some tubes containing young salmon in various stages of growth. Canon MacIlwaine sent in several good specimens of minerals and fossils. Considerable discussion was excited by an elephant's tooth said to have been found in a bog near Strabane, but regarding this more information is desirable. Professor Everett greatly added to the interest of the evening by exhibiting and working Donkin's homonograph, a beautiful machine which describes varied and intricate designs on paper. The Rev. John Andrew contributed an album of figures traced by a somewhat similar machine, the pendulograph. The exquisite beauty and delicacy of these figures were much admired during the evening. Electricity, steam's new rival, was represented by a working model of an electro-magnetic engine, the property of Mr. John Stears, of Holywood, who obligingly explained and superintended its working during the entire evening. This proved to be one of the greatest attractions of the meeting. The pictures so freely lent by members and their friends added very much to the attractive character of the rooms. In a pro-

minent position in the lecture-room was a series of water-colour sketches, the work of the President during his summer holidays, illustrating many of the finest pieces of scenery in the neighbourhood of Ballycastle and the majestic cliff scenery of County Clare. Placed conveniently to these was a set of six water-colour drawings by Dr. Moore. Five of these were of special interest, as depicting portions of "Old Belfast," if such a title may be used regarding those portions of our very modern town which have lately been demolished. The other was one of those bold pieces of mountain scenery in which Dr. Moore is so eminently successful. Mr. S. M'Cloy kindly lent the two largest paintings in the room. One was a portrait into which candlelight was ably introduced, and the other represents two children at play on a heathy bank. The grouping, subdued tone, and the finish of these paintings were very pleasing. Mr. W. Darragh contributed several elegant studies, of which we may specially note a bold piece of Antrim coast scenery. Mr. David Patterson sent two curious and remarkably fine old engravings. The Belfast Ladies' Sketching Club, through their very obliging honorary secretary, sent in about fifty drawings and sketches. These were displayed on the walls of the library and formed quite an art gallery. This large collection embraced many local subjects ; others, English and Swiss, doubtless formed pleasing reminiscences of pleasant holidays well spent. Flowers, fruit, and still life, &c., probably represent the winter work of this energetic and successful society. Mr. D. M'Kee brought in two large framed photos and a folio of rare engravings. F. W. Lockwood contributed drawings of several of our County Down castles. Mrs. Kemp kindly lent three valuable oil paintings, and Mr. T. C. Nevin two admirable scenes on the Thames. On the table were displayed a large number of photographs. Mr. Robert Graham sent a fine coloured series, illustrative of Japanese costumes and scenery. Mr. Robert Kent had a series of Indian subjects. Mr. Thomas Workman contributed a large number of South American scenes, and Mr. John Pim a set illustrating the

scenes visited during his late tour to Norway and the North Cape, the results of which he brought before the club during the previous winter session. Mr. Charles Elcock exhibited ten sketches of cromlechs, crosses, and other antiquities in North Donegal, the most curious being a remarkable cup-marked stone near Raphoe; a sculptured pillar stone at Carndonagh, which, it is believed was never before figured—it is probably of the seventh or eighth century, and contains the germ of the carved work of the Irish crosses; also a sculptured cross at the same spot, and possibly of the same date, and an extremely early holy water receptacle from Fahan. Mr. Hugh Cochrane contributed to the variety of the general display by a number of examples of Indian workmanship in silver, brass, ivory, and wood, also in inlaid metal and wire work; many of these showed great skill and design, the patterns being most varied and beautiful; they excited much interest and admiration, chiefly on account of the very fine and intricate work produced with the very rude implements used by the natives. Mr. Robert Kent also exhibited some elegant Indian metal work, and Miss Darragh some very beautiful Indian jewellery. Mr. Robert Graham showed one of those marvels of dexterity in carving, being a series of concentric balls carved out of one solid piece of ivory. Mr. Charles Langtry exhibited a collection of South Sea weapons and implements, some of which are unusually fine. Refreshments were supplied during the entire evening in the lower room by Mr. W. J. Walker, and gave entire satisfaction.

The first ordinary meeting for the present session was held in the Museum, College Square, on Tuesday, when the President, Robert Young, Esq., C.E., gave a short opening address. In commencing, he begged the indulgence of the members if he departed from what may be termed a Presidential address, such as was usually given at the opening of the winter session, and instead only occupied their attention for a short time by

bringing under their notice a subject of local geological interest. It was to place on record the first definite notice of the impression of the foot of an animal—probably reptilian—which had been found on a rippled surface of triassic sandstone of this locality. This slab had been brought under his notice by John Ward, Esq., F.G.S., who obtained it in a stone-yard in town, it having been brought from the Scrabo quarries for building purposes. Unfortunately, portions of the impression had been trimmed off by the workmen before it came into Mr. Ward's hands, but in the opinion of those who had examined the specimen, enough still remained to place the fact on record, though insufficient to identify the precise species of animal which formed it. After giving a *résumé* of the knowledge which existed on fossil footprints in the triassic formations of Britain and the continents of Europe and America, the President requested the Rev. H. W. Lett to give the communication which he had promised on "Records of a Former Level of Lough Neagh." Mr. Lett introduced his subject by referring to the dimensions and natural history of the lough, to its reputed curative and petrifying powers, and stated that ancient authorities agreed in ascribing its origin to submergence. Passing to his own observations, he stated that the water was remarkably shallow near the shore, so that a person can wade out for many yards, there being a gently shelving bank for some distance, and then a sudden precipitous drop from three or six feet to a depth of from eleven to sixteen feet. The shore population call this "the edge of the gut," and its margin can be traced through the water in summer or autumn by the fringe of Potamogetons which find on it a suitable habitat. At one place a boat can be rowed along this edge with two feet of water at one side, and nine feet at the other. The formation is the Boulder Clay. It is not possible that the undercurrents in stormy weather could do this, and the edge is too deep to have been scraped out by the ice of any recorded frost. This second margin is more or less distinct all round the south-east, south, and western shores, and is, in some instances, at a con-

siderable distance from the present shore. In the opinion of the writer, this was a former escarpment, or shore line, worn away when Lough Neagh was at least 30 feet lower than at present, and when some 20,000 acres at the south margin were dry land, covered with waving woods. The present Deryinver at the mouth of the Upper Bann, represents the Tuach Tubhear mentioned in the Book of Leccan, to which the probable overflow extended. The formation of the surface of submerged escarpment bears out this idea. It is studded in many places with large root-stumps *in situ*, and the fallen trunks of oak and fir trees, and a thick stratum of peat. In the turf bogs which border Lough Neagh, fir and oak roots of very large size are also found far below the present mean level of the lough. The submerged escarpment is an undoubted record in the Creator's handwriting of a former water level, a fact which the monkish Celtic romances but traditionally echo through the long ages.

> But like voices from afar off
> Call to us to pause and listen,
> Speak in terms so plain.

The second meeting of the session was held on Tuesday evening, 20th December—Dr. John Moore in the chair—when a paper was read by the Rev. John Andrew, entitled "Some Thoughts on the Developement Theory of Creation."

Mr Andrew opened by raising a note of warning to naturalists to distinguish in the scientific literature of the day between natural science and the worse than useless speculations that pass for science with the shallow-minded and slothful, who would rather have the universe handily put into a nutshell for them than go out and gaze on its great face, and wonder, and worship, and learn; and he gave as an instance of this idle speculation, Huxley's myth of the "*Bathybius Hæckelii*." He next proceeded to define and defend species as the real and steadfast stuff of creation, and argued that the sexes, which unite with fruitful offspring, are this abiding stuff from generation

to generation. Against Darwin and Hæckel and Vogt, and such speculators, he ranged Agassiz and Cuvier and Linnæus, and such, at the head of a host of patient observers and true workers. He then proceeded to give definitions of the evolution theory from Darwin, Mivart, and Hæckel, which, summed up in plain language and in brief, is, that instead of Nature's law being, that plants and animals having their seeds in themselves, *after their kind*, Nature's process is supposed to have been conducted in the way of causing one species of living organism to be the child of the nearest past, and the parent of the nearest future, *after another kind*, all along the "pedigree of organisms," as Hæckel calls it; so that man is the descendant of apes, and apes of something else, and so on till we reach back to the first living organism which is said to have been a little microscopic speck of living slime, just living and no more, which again was the child of dead matter—the chemical elements. The lecturer showed this evolution theory was the misguided exercise of a very excellent faculty of our nature, which was ever seeking to discern the unity of things in the midst of Nature's vast variety; and that the true exercise of the faculty is "to look through Nature up to Nature's God." Nature is the many, He is the one. The evolution theory could not but be a failure, seeing that it sought the unity only where the plurality and diversity are to be found. He proceeded to show from the writings of the evolutionists themselves that there has been entire failure at the two most important points of the evolution theory—viz., where the dead chemical elements are supposed to give birth to life, and where the apes are supposed to develop into man. At both these points the theorists themselves confess the gaps—that facts are entirely wanting to establish the theory. They have put forth this theory and they wait for the facts to come to their rescue.

The third meeting of the session was held on Tuesday evening January 24th—the president, R. Young, Esq., C.E., in the chair

—when a paper was read by Mr. Wm. A. Firth, "On Diatoms, what they are, where and how they are found." Mr. Firth, having devoted his spare time for many years to the study of this microscopic group, and being acknowledged one of the best mounters in Britain of these excessively minute organisms, naturally drew an audience, including all the members of the club interested in microscopic work. The popular manner in which the subject was brought forward greatly enhanced its value. The following is a summary :—

The reader commenced by stating that the study of diatoms has long been a favourite with the microscope, and intimately connected with its progress. The first diatom was discovered in 1773 by Professor Muller, a distinguished German, but little progress was made in the study until the earlier part of the present century. Since then great attention has been devoted to the subject, and at the present time between 5,000 and 6,000 species have been discovered on the surface of the globe. Diatoms were described as tiny aquatic plants, so minute as to be almost invisible to the naked eye, and found in fresh, brackish, and salt waters. They are classed amongst the lowest vegetable organisms, but differ from allied forms principally in the possession of a silicious shell indestructible by the ordinary agents of decomposition and heat. Descriptions of living diatoms were given, and their remarkable motions referred to. The construction of the silicious shells was also described, and it was stated that of some species forty-one millions are required to make one cubic inch, and that lines have been counted on their surface over 100,000 in an English inch. Their distribution was described as almost boundless where light and moisture are favourably combined. The brown substance found on the stems and leaves of aquatic plants, also at the bottom of ditches and pools in the milder seasons, consists almost entirely of diatoms, and wherever found is characteristic of their presence. Large deposits of their remains are found forming a portion of the earth's crust, and are widely distributed. Several exist in our own province, the most extensive being at Toomebridge, on the

banks of the Lower Bann. Remarks were made on their collection and preparation for the microscope, and it was stated that our own country is favourable for their growth, numerous interesting species having been found.

At the conclusion of the paper, several members exhibited slides of diatoms under microscopes. Photographs and drawings were also exhibited, and some plates from Schmidt's "Atlas of the Diatomaceæ." The examination of these and the animated conversation on the various points touched upon by the reader concluded a very instructive evening.

The fourth meeting for the session was held in the Museum, on Tuesday evening, February 21st—the President, Robert Young, Esq., C.E., in the chair—when two communications were brought forward.

The first was by Mr. Swanston, on "Recent Discoveries in the Lower Palæozoic Rocks." After referring to the great advance made in scientific research during the past year, and especially referring to that of geology, the reader went on to give a brief review of the history of research in the lower Palæozoic rocks, as defined by Murchison, Sedgwick, and others. A large tabulated sheet on the wall showed at a glance the opinions of the various leaders in the matter of the division of these ancient beds into groups. He then proceeded more fully to review what had recently been done in rocks of pre-Cambrian age, describing in order four great groups—the Pebidian, Dimetian, Arvonian, and Lewisian— into which they had been divided by Dr. Hicks. It was stated that one of the results of researches in these ancient strata had been to class among the sedimentary rocks extensive areas in Wales, &c., which had previously been considered igneous. The difficulty in correlating widely separated areas of these rocks was then referred to, the beds being highly metamorphosed and entirely devoid of organic remains. Under such conditions mineralogical character is mainly relied upon as a guide. The microscope also

gives much assistance by revealing, in thinly-ground slices of the rock, structure which could not otherwise be recognised. The general strike of the rocks—that is, the direction in which the exposed edges of the strata lead—have also been found to give valuable assistance in discriminating the strata in the field.

The second paper was read by Mr. F. W. Lockwood, on "The English Castles of Strangford Lough."

The club had an excursion to Strangford last summer, when they visited several castles, so that this session was a suitable time for a few minutes' talk on the subject.

The English were first invited to take part in its affairs, or in other words, invaded Ireland, in the 12th century, and before its close, John de Courcy, with twenty-two knights, fifty squires, and three hundred footmen, is recorded to have made his way into Down. Into the narrative of his struggles with the natives, and the vicissitudes which befel him and his followers, we need hardly enter. Suffice it to say that the English quickly made good their footing in the county, and never again entirely relinquished it.

In the immediate neighbourhood of Strangford Lough, it is stated that de Courcy and his followers built some twenty-seven castles, besides the two beautiful abbeys of Inch, near Downpatrick, and Greyabbey.

It is familiar to all that for a considerable period the English power in Ireland was chiefly centred within the part known as the Pale. This stretched northward without a break to near Carlingford. The English districts north of this were partially separated from the Pale by Carlingford Lough, and the wild mountain district which surrounds it. Hence the English in Down were often thrown for a time upon their own resources, forming a colony by themselves, with the sea, of which they always retained the command, for their base. We need not look in this district for any of the great structures with which the Anglo-Norman name is associated in England, or in some other parts of Ireland. The buildings we have now to notice are

the Peel-houses of the Scottish border. They present some features of interest however, for we can trace in them the application of the same ideas and principles of construction as guided the Normans in their larger works. The great castle with its strong walled enclosure, its bastion, or angle towers, its barbican, portcullis, drawbridge, and postern gate, and its massive central keep, from which some great baron and his host of retainers overawed half a county, is here replaced by a single modest tower, wherein the knight and his half dozen men at arms, found security for themselves, and maintained England's power over as many square miles. Of these twenty-seven castles, stated to have been built by de Courcy's followers, all are now more or less ruinous, and of some barely a trace remains. Indeed, as will subsequently be seen, it is doubtful whether we can point with certainty to any remaining castle, as being actually of de Courcy's age. The most perfect which the reader had seen, are those at Ardglass, Kilclief, Audley's Castle and Castle Ward, both near Strangford, and Kirkistown Castle, about the centre of the Ards. The three former, viz.—Ardglass, Kilclief, and Audley's Castle, are so much alike, that they are evidently either by the same builder, or have been built upon some recognised plan or model. Audley's Castle may be taken first, as it is rather the simplest. The plan is a square of above thirty feet, with two horns, or square projection in front, between which, high up, an arch springs, which at the first glance suggests the idea of having been intended for a portcullis. This is not so,—a portcullis is to close a gateway, and there is no gateway here, only a narrow side door in one of the projections. From the door a winding stone stair leads to the top of the building.

Amongst the resources of attack in those days, fire played an important part, and this was guarded against by the ground floor being solidly vaulted over, the great thickness of the walls resisting the thrust which the barrel or wagon-top shaped vault would necessarily produce. The ground floor would be used chiefly for storage. The next floor was occupied probably by

the men at arms or retainers, for protection the windows were narrow slits. Over this came the principal room or hall, of the knight and his family, and an attic partly in the roof, gave probably bedrooms for some of these, in addition to the small recesses off the large hall. The thick County Down slate slabs made a strong, though very heavy roof, **A** shaped, and a broad gutter of this slate, running all round behind the battlements, formed a walk from which the defenders could shoot in safety through the machicolations. We now see the reason for the arch across the front,—from behind this, which was provided with a wider platform than the other parts, missiles, melted lead &c., could be dropped just unto the front of the narrow doorway. In the case of the Ardglass Castle the same arrangement is to be seen, the door being to the right instead of the left, as at Audley's, and in addition there is a second arched projection perpendicularly over the door itself, evidently for the same purpose. There is in this castle considerable architectural elegance, and the proportions are singularly lofty and graceful. This castle can hardly be so early in date as De Courcy's time. The ogive window seen in front, and the corbelling of the arches, all look more like the work of the fourteenth century than the twelfth.

The well preserved castle of Kilclief, about the middle of the Western shore of the inlet which joins Strangford Lough to the open sea, marks the site of a very early ecclesiastic station, for the foundation of an abbey here is attributed to SS. Eugene and Neill, disciples of St. Patrick. The original castle is very like Audley's but better preserved. It was subsequently added to, and became for some time the palace of the Bishops of Down. The original door, in the same position as Audley's was probably altered when the two story addition in front was erected—over the roof of this, however, the arch is still seen, and the winding stair remains in the South Eastern projection. There are the remains in the original part of a two-light cusped and mullioned window of fourteenth century character, which regarded by itself might be deemed an insertion, but looked at

in conjuction with the corbelling, &c. of the very similar castle at Ardglass, makes it most probable that this, too, is not of De Courcy's time, but of a period at least one hundred and fifty years later. This castle is in good repair, and is still used as a farm steading.

Kirkistown Castle is also attributed by many to De Courcy. On the writer's last visit the caretaker gave a date in the twelfth century for its erection. This, however, is a mistake, and the best judges believe it was built as late as the time of James I, early in the seventeenth century.

The machicolations round the top have some of them, it is stated, merely blind openings in imitation of the earlier work. It is said to be entirely Scotch in its origin, which statement the name appears to confirm, and it is not situated in a similar position to most of the other castles. It is surrounded by a fine "Bawn" or fortified enclosure, with circular bastions or flanking towers, three of which still remain. The whole forms a rather picturesque group overlooking the sandy shores of Cloughy Bay.

Castle Ward is a simple square tower, about the size of Audley's Castle, and is kept in good repair, being used as a storehouse for corn, &c. The arrangement seems to have been quite different from the others we have noted. The original doorway is in the side, the walls—at least two of them—are very thick, and the narrow stone stair goes up along the side in the thickness of the wall. There is a projection corbelled out immediately over the door, evidently for the same defensive purpose as in the others. The work of this castle also, looks to be of a period rather later than de Courcy's time, so that one feels doubt whether any of those described are of the twelfth century after all.

In the town of Strangford itself is a small castle, which forms a very picturesque ivy clad adjunct to the little harbour. Like the others, the ground floor is vaulted, but when examined during the excursion in June 1881, there appeared no indications to denote its age. Being used as a store it has also

been much modified. In most cases a sufficient reason can be suggested for the site of the various castles referred to. Ardglass, for instance, is one of the few convenient harbours on that exposed coast. It was of some importance, and as might be expected is full of castles. Having long since lost much of its relative importance, the march of improvement has spared most of these structures. Though, as we have suggested, it is very doubtful whether Jordan's Castle is of the age of De Courcy, possibly some of the smaller ones, of which the lower walls remain, may be. Kilclief was the site of an early religious settlement, and an important castle there would be natural.

Strangford and Portaferry sprang up at the most convenient crossing place into the Ards, and castles there are naturally explained. One, now very ruinous, was built at Portaferry by the Savage family. Audley's Castle, and Castle Ward, are, one at the mouth, and the other at the head, of a small creek or estuary, forming a quiet harbour for the small craft then in vogue; they also are close to the entrance to Strangford Lough. The sites of Folly Castle, near Portaferry, and Castle Boy, of each of which only fragments now remain, are placed on small eminences, and from their summits a view could be had to the nearest stronghold in each direction.

An animated discussion ensued, and it was generally agreed that it was very questionable if any castles could now be positively attributed to De Courcy's time of the end of the twelfth century. It was stated that in the case of both Kilclief and Kirkistown, fragments of carvings, &c., had been built into the walls, which appeared to have formed part of earlier edifices.

Mr. Lockwood then called attention to a bed of sand which lies under the boulder clay in some brickfields near Agnes Street, and which may, therefore, be possibly of interglacial age, and if so, it might be worthy of careful examination by geologists.

The fifth meeting of the session was held in the Museum on Tuesday evening, 21st March—the President, R. Young, Esq., C.E., in the chair, when two communications were brought forward. The first, by Mr. Wm. Gray, M.R.I.A., was on "Wax Cells : a ready method of mounting objects for the microscope." Mr. Gray commenced by stating that it was of the greatest importance to microscopists to have a reliable, easily-made cell for mounting objects, either in the dry state or in a fluid. After briefly noting the various kinds of cell in use, Mr. Gray described, and illustrated by a variety of examples, a ready method of mounting objects in wax cells. Having referred to the method of using wax described by Mr. John Boyd before the Manchester Microscopical Society, Mr. Gray illustrated by experiment his simpler method, by which he was enabled to form cells from the sheets of wax used for making wax flowers. Cells of any size or depth may be punched from the sheet wax ; the sheet of wax so punched may be fixed to a clean slide or slip of glass by gentle heat. It may then be coloured by using any of the usual varnishes, and when the object is placed in position, the cell is covered with the usual thin covering glass ; a heated iron run round the glass cover seals it in, and cuts off the superfluous wax. The slide may be farther cleaned with benzole, then ringed and finished according to the taste of the operator.

Mr. S. A. Stewart, F.B.S., Edin., then read a short paper, entitled "Notes on Knockmore and Glangavlin." In this communication Mr. Stewart gave an account of his recent visits to the west of County Fermanagh and the north-west of Cavan, referring especially to the geology and the botany of the region. The geological structure of the country was shown to be of considerable interest, the rocks exposed at the lower elevations being the upper limestone of the Carboniferous system. On these are superimposed thin black shales and thick-bedded massive sandstones, the equivalents of the Yoredale beds, or in some instances of the coal measures. The limestone in many places appears as perpendicular cliffs that are sometimes picturesque, but are not of sufficient magnitude to become imposing.

Cuilceagh Mountain, which rises to over 2,100 feet, is capped with massive beds of sandstone, and the summit is a tolerably level ridge of rock, extending for nearly three miles, bounded by low and uneven cliffs. This mountain is called Quilca by the older writers, and was of more importance formerly. On its summit the MacGuires were usually crowned kings of Fermanagh, and its lower slopes yielded iron ore, which was smelted and made into bar iron at Swanlinbar. The forests which afforded the fuel are long since cut down, and the iron manufacture has ceased in this district. The botany of the district possesses some interesting features, though the number of rare plants is less than might have been expected. One or two are new to the Irish flora. A full list of the species met with will shortly be published by the Royal Irish Academy.

Mr. Stewart apologised for the desultory nature of his notes, and said—"My justification is to be found in the practice of the club. We are amateurs, having some acquaintance, more or less, with the methods and system of nature. We don't make profession of profound knowledge of science, nor do we wish to become martyrs in her cause ; but, while plodding on our way through life, we may make it all the more enjoyable by observing the exquisite arrangement of our surroundings ; and we may occasionally be rewarded by adding a mite, however small, to the general stock of the knowledge possessed by mankind."

A number of members made comments on Mr. Stewart's paper, after which Mr. Gray showed a specimen of waterworn sandstone, which simulates remarkably the form of the human leg and foot. This specimen was found in the boulder clay, near Dundonald, and has been referred to in the local papers, without investigation, as a wonderful human fossil. Such curious resemblances are frequently met with, and are puzzling to the inexperienced ; but it is scarcely necessary to remind the members that petrifactions such as this are not found in any geological formation, and that the specimen in question would astonish the scientific world if it were anything more than an accidental coincidence.

The sixth and concluding meeting of the session was held in the Museum, College Square, on Tuesday evening, April 18th—the president, R. Young, Esq., C.E., in the chair—when a paper was read by Mr. James J. Phillips, the subject being "The Art Metal Works of Ancient Erin." He briefly called to the remembrance of the meeting the peculiar primitive civilization of the Scoto-Celts, and of their refined decorative genius, or artistic faculty, of which there are ample evidences in the vestiges of their works in the stone monumental crosses, and in the ancient illuminated manuscripts, but particularly in the numerous heirlooms which we have of their metal works ; exquisite specimens of their handicraft in gold and in silver, in bronze and in iron, to be seen in the collections of the Royal Irish Academy in Dublin, as well as in various collections and Museums in the kingdom. The subject naturally divided itself into two departments—viz., the historical, and the descriptive or technical. The first division only was taken up in a popular form in this preliminary paper ; but the entire subject was a very extensive and intricate one, and would resolve itself into the following headings :—

Chapter I.—A brief review of such historical notices and references in the reliable annals and national MSS. and literary remains :—1st, as to the different metals of which the Scoto-Celtic works are composed, and references to the *modus operandi* in their manufacture : 2nd, ancient references to the objects, and native descriptions of them.

Chapter II.—A tabulated list and description of a few of the more remarkable objects of Scoto-Celtic metal work in various museums and collections, giving dates and names of the artists, and notes as to the materials used in their construction.

Chapter III.—The division of Scoto-Celtic art into two epochs, in which the genesis of the peculiar style may be traced. 1st. When under the influences of the pagan and earlier civilisation ; 2nd. When under the influence of early Christian re-

ligion, of which we have many vestiges of objects for devotional purposes, as well as those for secular uses.

Chapter IV.—An analysis of the details of the types and characteristics of Scoto-Celtic works, with the opinion of various competent authorities, such as Sir Samuel Ferguson, Miss Stokes, and others.

Chapter V.—An investigation as to the correlation of the art metal works with the works in stone and the ancient MSS.

Chapter VI.—The symbolism in the details of the metal works of the early Christian period in Erin.

Chapter VII.—The extinction of national art growth in Erin, a brief reference as to the motives which should govern our study of the subject, or attempts at reviving and developing the *opus Hibernicum*.

A large number of photographs and illustrations of the ancient Irish metal works were exhibited by the kindness of Canon MacIlwaine, who has latterly devoted much practical attention to this subject. It was regretted that owing to recent illness the meeting was deprived of his presence, and of the fund of information which he could contribute.

There were also exhibited a number of objects in gold and bronze from the Benn collection and from the local Museum, which illustrated the subject in a very interesting manner.

ANNUAL MEETING.

The nineteenth annual meeting of the above society was held in the Museum, College Square,—Hugh Robinson, Esq., in the chair. The chairman, after a few remarks, called upon Mr. Lockwood, one of the secretaries, to read the report of the committee for the past year, which appears in the preceding pages.

The election of officers for the ensuing year was then proceeded with.

Mr. Joseph Wright, F.G.S, in very complimentary terms, proposed that Lieut-General Smythe, R.A., F.R.S., M.R.I.A., &c., be elected president. The proposal having been seconded by Mr. Thomas C. Neven, was put to the meeting and passed unanimously.

Mr. Geo. O'Brien proposed that W. H. Patterson, Esq., M.R.I.A., be elected vice-president. The motion, having been seconded and put to the meeting, was also carried unanimously. The election of secretaries, treasurer, and committee having been concluded, a vote of thanks was ably proposed by Mr. Mann Harbinson, and seconded by Mr. Isaac Ward, to the retiring president, Robert Young Esq., C.E., for the kindness he has shown in presiding, and the lively interest he has ever taken in the work of the club. This concluding the programme of the evening, the chairman invited the members present to offer any suggestions that might tend to increase the club's usefulness or popularity. Several letters were read from absent members, recommending various districts as suitable for excursions. An animated conversation became general, after which the meeting concluded by examining the microscopic slides and the collection of fossils submitted in competition for the prizes.

RULES

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club,

and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial

Statement, shall be presented, the Committee and Officers elected, Bye-Laws made and altered; and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such proposed alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

The following Rules for the conducting of the Excursions have been arranged by the Committee.

I. The Excursions to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the majority of the members present.

V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.

BELFAST NATURALISTS' FIELD CLUB.

TWENTIETH YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31st, 1883:—

I.	Best Herbarium of Flowering Plants, representing not less than 250 Species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 Species,	...	0	10	0
III.	Best Collection of Mosses,	... ...	0	10	0
IV.	„ „ Seaweeds,	... ...	0	10	0
V.	„ „ Ferns, Equisetums, and Lycopods,	...	0	10	0
VI.	„ „ Tertiary and Post Tertiary Fossils,...	..	0	10	0
VII.	„ „ Cretaceous Fossils,	...	0	10	0
VIII.	„ „ Liassic do.	...	0	10	0
IX.	„ „ Permian do.	...	0	10	0
X.	„ „ Carboniferous do.	...	0	10	0
XI.	„ „ Older Palæozoic do.		0	10	0
XII.	„ „ Fossil Plants,	...	0	10	0
XIII.	„ „ Marine Shells, ...	...	0	10	0

XIV.	„ „ Land and Freshwater Shells, ...	£0	10 0
XV.	„ „ Lepidoptera, ...	0	10 0
XVI.	Best Set of 25 Microscopic Slides, ...	0	10 0
XVII.	Best Collection of Archæological Objects, ...	0	10 0
XVIII.	„ „ Crustacea	0	10 0
XIX.	„ „ Echinodermata, ...	0	10 0
XX.	„ „ Cheiroptera, ...	0	10 0
XXI.	„ „ Geological Specimens, illustrative of the Mineral Resources of the Province of Ulster, ...	1	0 0
XXII.	Best Collection of all or any of the above Objects, collected *at the Excursions* of the Year, ...	0	10 0
XXIII.	6 Best Field Sketches appertaining to Geology, Archæology, or Natural History, ...	0	10 0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded, if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXIV. The President offers a Prize of £1 1s for the best set of three or more original sketches to be placed in the Album of the Club. These may be executed in pen and ink, or water colour, and must illustrate one or more ancient monuments, somewhere in Ireland. In determining the relative merits of the sketches, accuracy in representing the subject and its details will have chief place.

XXV. Mr. William Swanston, F.G.S., offers a Prize of 10s 6d for the best Two Studies, illustrative of Geology, contributed to the Club's Album. The subject must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 × 9 inches.

XXVI. A Prize of 10s given by the late Mr. J. W. Murphy, for the best Collection of Recent Sponges, the conditions being the same as those for Prizes 1 to 20.

N.B.—The Sketches and Drawings to be Competitors' own work.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same Prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All Collections to be made personally during the Session, in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.

Prize 20, awarded to not less than three species, specimens to become the property of Museum.

NOTICE.

EXCHANGES OF PROCEEDINGS.

THE Committee of the Club acknowledge with thanks the receipt of the following publications, which have been received during the past year from the various Societies and Institutions :—

Belfast Natural History and Philosophical Society.
Proceedings. 1880-81.

Birmingham Philosophical Society.
Proceedings. Vol. XII., No. 3—1881.

Brighton and Sussex Natural History Society.
Annual Report—1881.

Berwickshire Naturalists' Club.
Proceedings. Vol. IX., No. 3.

Bristol Naturalists' Society.
Proceedings. Vol. III., Part 3—1881-82.

Canadian Journal of Scientific Literature and History.
New Series. Vol. 1, Part 2—1881.

Canadian Institute, Toronto,
Proceedings. Vol. 1, No. 3.

Cardiff Naturalists' Society.
Report and Transactions. Vol. XIII.—1881.

Dublin—Royal Irish Academy.
Transactions. Vol. XXVIII., Parts 6, 7, 8, 9, 10.
Proceedings. Polite Literature and Antiquities. Series II., Vol. II., No. 3.
,, Science. Series II., Vol. III., Nos. 7, 8.

Dublin—Royal Geological Society of Ireland.
Journal. Vol. VI., Part 1, New Series—1880-81.

Ealing Microscopical and Natural History Club.
Fifth Annual Report, and four detached Papers.

Edinburgh Geological Society.
Transactions. Vol. IV., Part 2—1882.

Edinburgh Botanical Society.
Transactions and Proceedings. Vol. XIV., Part 2—1882.

Epping Forest and County of Essex Naturalists' Field Club.
Transactions. Vol. II., Parts 5 and 6.

Glasgow Natural History Society.
Proceedings. Vol. V., Part 1—1880-81.

Hertfordshire Natural History and Field Club.
Transactions. Vol. I., Parts 5, 6, 7, 8, 9; Vol. II., Part 1.

Leeds Philosophical and Literary Society.
Annual Report—1881-82.

Liverpool Geological Society.
Proceedings. Vol. IV., Part 4.

Liverpool Geological Association.
Annual Report—1881. Transactions. Vol. II.—1881-82.

London—Geologists' Association.
Proceedings. Vol. XII., No. 3, 4, 5, 6, 7.

Manchester—Scientific Students' Association.
Report and Proceedings—1881.

New Brunswick Natural History Society.
Annual Report—1881.

Plymouth Institution and Devon and Cornwall Natural History Society.
Annual Report and Transactions. Vol. VIII., Part 1.

U.S.A.—Essex Institute.
Bulletin. Vol. XII., Nos. 1 to 12; Vol. XIII., Nos. 1 to 12.

„ American Association for the Advancement of Science.
Vol. XXIX., Part 1 and 2—1880; Vol. XXX.—1881.

„ American Museum of Natural History.
Bulletin. No. 1—1881.

„ Smithsonian Institution.
Annual Report—1880, and List of Foreign Correspondents.

„ Boston Society of Natural History.
Proceedings. Vol. XX., Part 4; Vol. XXI., Parts 1, 2, 3.

„ St. Louis Academy of Science.
Vol. IV., No. 2.

„ Salem—Peabody Academy of Science.
Special Publication, Primitive Industry—Charles C. Abbott.

„ Philadelphia Academy of Natural Science.
Proceedings. Parts 1, 2, and 3—1881.

Warwickshire Naturalists' and Archæologists' Field Club.
Proceedings—1881.

Warwickshire Natural History and Archæological Society.
Annual Report, No. 46—1882.

Wiltshire Archæological and Natural History Magazine.
Vol. XX., No. 59.

The following were also received from the various authors and publishers :—

Scientific Roll, conducted by Alexander Ramsey, F.G.S.
Vol. I., Part 1, Nos. 5, 7, 8; Vol. II., Parts 2 and 3, from the Author.

Some Notes on Flint, and on the Waterbearing Strata of Ealing District. by J. Allen Brown, F.R.G.S. From the Author.

Geological and Natural History Survey of Minnesota. Ninth Annual Report, from N. H. Winchell, Esq., Director.

Guide to Salem—Henry P. Ives, Publisher.

BELFAST NATURALISTS' FIELD CLUB.

—o—

TWENTIETH YEAR, 1882–83.

—o—

LIST OF OFFICERS AND MEMBERS.

President:

LIEUT.-GENERAL SMYTHE, R.A., F.R.S., M.R.I.A., &c.

Vice-President:

W. H. PATTERSON, M.R.I.A.

Treasurer:

JOSEPH WRIGHT, F.G.S.

Secretaries:

WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

WILLIAM A. FIRTH.

WILLIAM GRAY, M.R.I.A.

DR. S. M. MALCOMSON.

DR. JAMES MOORE, M.R.I.A., *Hon.* R.H.A

GEORGE O'BRIEN.

REV. CANON MacILWAINE, D.D., M.R.I.A.

DANIEL M'KEE.

HUGH ROBINSON.

S. A. STEWART, F.B.S. Edin.

THOMAS WORKMAN.

Members.

Any Changes in the Addresses of Members should be notified to the Secretaries.

Charlton B. Aickin, Murray's Ter.
Miss Alder, Kinnegar, Holywood.
W. J. C. Allen, J. P, Faunoran, Whiteabbey.
Edward Allworthy, Langford Villa.
John Anderson, J.P, F.G.S., Hillbrook, Holywood.
Robt. Anderson, Meadowlands, Balmoral.
W. C. F. Anderson, M.A., Springbank, Dunmurry.
Rev. John Andrew, Cromwell Road.
Sam. Andrews, J.P., Chlorine Place.
Mrs. Andrews, Chlorine Place.

James M. Barkley, Mountpottinger,
Robert Barklie, F.C.S., Moffatt's Terrace, Holywood.
James Barr, Sandringham.
William Batt, Ormeau Road.
J. W. Beck, M.D., Claremont Ter.
Geo. R. Begley, Wolfhill, Ligoniel.
E. H. Bell, Knockdara, Strandtown.
Geo. E. Bell, Lombard Street.
James Best, Great Victoria Street.
A. W. Blackwell, Wandsworth Villas.
W. J. Boucher, Mountpottinger.
Davys Bowman, University Street.
C. H. Brett Laurine, Antrim Road.
James Berkley Bristow, St. James's Parsonage, Antrim Road.
Col. Brooke, R.E., Mountcharles.
John Browne, J.P., Ravenhill.
John Browne, M.R.I.A. Drapersfield, Cookstown.
W. J. Browne, M.A., Longford.
W. W. Brydon, Greenisland.
Charles Bulla, Brougham Strreet.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Holywood.

J. Campbell, Rathfern, Carnmoney.
R. G. Campbell, Rathfern, Carnmoney.
Wm. Campbell, F.P.S., Ponsonby Avenue.
Miss Carruthers, Claremont Street.
William Chambers, Wellington Pl.
E. T. Church, Donegall Place.
J. C. Clarke, Dunedin.
John M. Clelland, Model School, Coleraine,
William Clibborn, Windsor Terrace.
Foster Coates, Derryvolgie, Windsor.
Sir Ed. Coey, J.P., D.L., Merville.
Miss Connery, Mountcharles.
David Corbett, Coolavin.
T. H. Corry, M.A., F.L.S., F.Z.S., M.R.I.A., Parkside, Cambridge.
W. F. C. S. Corry, Chatsworth.
Major J Sharman Crawford, J.P., D.L., Crawfordsburn.
Elisha Crawford, Fortwilliam Park.
James Creeth, Wilmont Terrace.
Wm. M. Cunningham, Sydenham.

Rt. Hon. Lord Dufferin and Clandeboye, (Hon. Mem.)
John H. Davies, Glenmore, Lisburn.
Henry Davis, Linenhall Street.
Robert Day, F.S A., M.R.I.A., Cork.
Ed. O'Rorke Dickey, Castleton Ter.
George Donaldson, Church Street,
Charles Dundee, Carnmoney.
Robert Dunn, Queen's Square.
W. A. Dunn, M.R.C.S.E., Ormeau Road.

Charles Elcock, Dunluce Street.

William Faren, Mountcharles.
Stephen Feary, Cameron Street.
W. J Fennell, Chichester Street.
J. H. Ferguson, Antrim Road.
Joseph Firth, Whiterock.
Wm. A. Firth, Whiterock.
T. M. H. Flynn, Bessbrook.
Thomas Fraser, Wellington Park.

R. M. Gilmore, Portstewart.

W. J. Gilmore, Holywood.
D. G. Gillespie, Macready Cottage, Coleraine.
D. Corse Glen, F.G.S., Annfield Place, Glasgow.
George J. Glen, Stranmillis Road.
G. T. Glover, Holywood.
Major Goldsmid, Cliftonville.
James J. Goskar, Carlisle Circus.
Jas. Gourley, Derryboy, Killyleagh.
Robert Graham, Cliftonville.
Rev. Canon Grainger, M.A., D.D., M.R.I.A., Broughshane (Cor. Mem.)
Rev. James Graves, M.R.I.A., Inisnaig, Stoneyford, Co. Kilkenny (Cor. Mem.)
Wm. Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
Miss Frances Gray, Mountcharles.
Geo. Greer, Howard Terrace, Dungannon.
Miss Greer, Tarbat Villa, Sydenham.
Miss Sara T Greer, Seville Lodge, Strandtown.
Edward Gregg, Virginia Street.
Joseph T. Gumersall, Lisburn.

Joseph Hall, Windsor Avenue.
W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Thomas Hampton, Upper Crescent.
Mann Harbison, Ravenhill Terrace.
Mrs. Harbison, Ravenhill Terrace.
Adam Harbison, Ravenhill Terrace.
John Harrison, Gardiner's Hill, Cork
W. Harte, C.E., Buncrana, (Cor. Mem.)
Rev. E. J. Hartrick, A.M., Ballynure.
Jas. Haslett, J.P., Princess Gardens
F. A. Heron, Clermont, High Holywood.
Mrs. Heron, Claremont, High Holywood.
J. Sinclair Holden, M.D., F.G.S., Sudbury, Suffolk.
Alex. Hunter, Northern Bank.
Miss Hunter, University Street.
Wm. J. Hurst, Drumaness, Lisburn.

James Imrie, Fitzroy Avenue.
Rev. Richd. Irvine, D.D., Hampton. Windsor.

John Jaffe, Cambridge Villa, Sydenham.
Mrs. Jaffe, Cambridge Villa, Sydenham.
Hugh Jamison, Duncairn Terrace.
R. M. Jennings, Cork (Cor. Mem.)
James Johnston, West Elmwood.
W. J. Johnston, J. P., Dunesk.

Robt. Kent, Dunedin, Antrim Road.
Wm. Kernahan, Antrim Road.
Rev. J. A. Kerr, LL.D., Whiteabbey.
George Kidd, Suffolk, Dunmurry.
Henry Knight, Antrim Villa, Weston Super-Mare.
W. J. Knowles, Ballymena.
Robert Kyle, Richmond.

W. W. Lamb, Divis View.
Prof. Chas. Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem.)
F. R. Lepper, Avonmore, Derryvolgie.
Professor E. A. Letts, Ph.D., D.Sc., F.R.S.E., F.C.S., Professor of Chemistry, Queen's College, Belfast, University Terrace.
Rev. H. W. Lett, M.A., T.C.D., Ardmore Glebe, Lurgan.
Joseph F. Lewis, Lothair Avenue.
Joseph Lewis, Schomberg Terrace.
Lieut. Colonel Lloyd, Barracks, Belfast.
F. W. Lockwood, Wellington Park.
W. B. Lowson, Chichester Park.
Dr. Luther, Chlorine House.

John Mackenzie, Balmoral.
Henry Magee, Eglantine Avenue.
S. J. Magowan, Granville Villas.
Rev. J. J. Major, Belvoir Hall.
Greer Malcomson, Shamrock Lodge.
Jas. Malcomson, Rosemount, Knock.
Mrs. Malcomson, Rosemount, Knock.
Samuel Murphy Malcomson, M.D., Margaretville, Strandtown.
John Marsh, Richmond.
Mrs. Marsh, Richmond.
J. C. Marsh, Castleton Tearace.
Rev. James Martin, Eglintoun.
Mrs Martin Eglintoun.
A. S. Merrick, M.D., Belfast District Asylum.

James Moore, M. D., M. R. I. A., *Hon.* H.R.H.A., Chichester St.
John Moore, M.D., Carlisle Terrace.
David Morrow, Lillis Lea, Cultra.
John Morton, Donegal Terrace.
J. R. T. Mulholland, J.P., Northumberland Street.
James Murdoch, Denmark Street.
Joseph J. Murphy, F.G.S., Old Forge, Dunmurry.
J. R. Musgrave, J.P., Drumglass.
Fras. P. M'Clean, Huntly Villas.
James M'Clenahan, Tennant Street,
Samuel M'Cloy, Cromwell Road.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London (Cor. Mem.)
Sir Thomas M'Clure, Bart., M.P., Belmont.
W. J. M'Clure, Divis Street.
James M'Connell, Caledonia Ter.
John M'Connell, North Street.
E. J. M'Ervel, Elmwood Avenue.
Rev. Canon MacIlwaine, D.D., M.R.I.A., Eisleben, Stranmillis Road.
John MacIlwaine, Sydenham.
Mrs. MacIlwaine, Sydenham.
Mrs. M'Ilwrath, Dunluce Street.
Daniel M'Kee, Adela Place.
W. S M'Kee, Fleetwood Street.
Alexander M'Laine, J.P., Queen's Elms.
Wm. M'Millen, Loy House, Cookstown.

Lucien Nepveu, Fitzwilliam Street.
Thomas C. Neven, Wellington Park.
William Nicholl, Adela Street.
Rich. Niven, Chrome Hill, Lisburn.

John D. Osborne, Carrickfergus.
Thos. Edens Osborne, Pier, Cultra.
George O'Brien, Botanic Avenue.
Joshua O'Brien, Botanic Avenue.
W. D. O'Brien, Botanic Avenue.
F. H. O'Flaherty, Fitzroy Avenue.
Mrs. O'Flaherty, Fitzroy Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
Rev. Jas. O'Laverty, P.P., M.R.I.A. Holywood.
James O'Neill, College Sq. East.
Graham L. Owens, Victoria Street.
D. C. Patterson, Holywood.
R. Lloyd Patterson, J.P., Croft House, Holywood.
W. H. Patterson, M R.I.A., Garranard, Strandtown.
George Pelan, Kinnaird Terrace.
Jas. J. Phillips, Granville Terrace.
W. H Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, Cranmlin Terrace.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
T. W. Pim, The Lodge, Strandtown.
Thomas Polley, Fitzroy Avenue,

Jos. Radley, Prospect Hill, Lisburn.
William Rankin, York Street.
John Rea, M.D., Gt. Victoria Street.
Jas. Theodore Richardson, Glenone, Lisburn.
Mrs. Ritchie, Albion Place.
Miss Emily J. Robb, King Street.
Rev. Geo. Robinson, Armagh.
R. Ross, M.D., Wellington Place.
Hugh Robinson, Donegall Street.
Mrs. Robinson, Donegall Street.
Jas. R. Robinson, St. Helen's Ter.
W. A. Robinson, J.P., Crofton, Holywood.
Mrs. Rowland, University Street.
Charles C. Russell, Campmar Villa. Newtownards.

James Shanks, Ballyfounder, Portaferry.
Capt. Simonet, The Castle, Carrickfergus.
Wm. J. Simpson, Earlsfort Terrace.
Chas. Smith, F.G.S., Barrow-in-Furness.
Edward Smith, Chichester Street.
F. W. Smith, Rugby Road.
George K. Smith, Meadow Bank, Whitehouse.
Rev. Geo. C. Smythe, M.A., Coole Glebe, Carnmoney,
Lieut-General Smythe, R A., F.R.S. Coole Glebe, Carnmoney.
Rev. J. H. Smythe, Fortwilliam.
C. Sparks, Prospect Hill, Lisburn.
Adam Speers, B.Sc., Holywood.
Sir N. A. Staples, Bart.. Lissan, Dungannon (Life Member.)
J. H. Staples, Lissan, Dungannon.

John Stears, Holywood.
James Stelfox, Park Place.
J. M'N. Stevenson, Carrickfergus.
Richard Stevenson, Ashley Avenue.
John Stevenson, Linen Hall Street.
S. A. Stewart, F.B.S.Edin, North Street.
Peter Stirling, Queen Street.
R. S. Strafford, Pottinger Terrace.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.
Samuel Symington, Jun., Ballyoran House.

Prof. Ralph Tate, F.G.S., A.L.S., University of Adelaide, South Australia (Hon. Mem.)
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
Mrs. Henry Thompson, Windsor.
George Thomson, Falls Road.
Prof. James Thomson, A.M., LL.D. F.R.S., etc., Glasgow, (Hon. Mem.)
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I, B.E., Ballymena.
William J. Trelford, Ship Street.
James G. Turtle, Cambridge Terrace.

John Vinycomb, Melrose Terrace.
J. W. Valentine, Queen's Square.

Rev. H. C. Waddell, B.A., Warrenpoint.
W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.)
Thos. R. Walkington, Laurel Lodge, Sydenham.
Isaac W. Ward, Colinview Terrace.
J. Ward, F.R.G.S., F.G.S., Lennoxvale.
John S. Ward, Lisburn.
Marcus J. Ward, Royal Ulster Works, Bedford Street.
E. H. Watson, Ardmore, Windsor.
W. J. Watt, M.D., Union Hospital.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, Clifton Park Avenue.
Robert Welsh, Lonsdale Street.
T. K. Wheeler, M.D., Clarendon Pl.
Walter L. Wheeler, Lennoxvale.
W. Whitla, M.D., Gt. Victoria St.
John C. White, Lombard Street.
James Wilson, Jun., Albion Place.
J. Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
C. Workman, M.D., Balmoral Ter.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thomas Workman, Craigdarragh.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street
Rev. J. J. Wright, Bloomfield.
S. O. Wylie, Clarendon Place.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

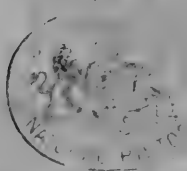
PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

1882-83.

Series II. Volume II. Part III.



PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES TO MEMBERS 1/-.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

FOR THE

Year Ending 31st March, 1883.

(TWENTIETH YEAR.)

SERIES II. VOLUME II. PART III.

Belfast:
PRINTED FOR THE CLUB
BY ALEXANDER MAYNE, CORPORATION STREET,
PRINTER TO THE QUEEN'S COLLEGE.

1884.

REPORT

OF THE

Belfast Naturalists' Field Club

FOR THE

Year ending 31st March, 1883.

YOUR Committee, in resigning the trust conferred upon them this time last year, have pleasure in stating that on this, the twentieth, anniversary of the formation of the Club, it continues to give evidence of increasing activity and vigour ; the past year having been one of quiet work, not marked by any special event. Twenty-five new members were elected, a number which will more than make up for those lost to your Society from various causes. It is with sincere regret that your Secretaries have to announce the retirement of Lieut.-General Smythe, F.R.S., M.R.I.A., &c., from the office of President, owing to his continued residence away from Belfast. The duties have in the interim been ably performed by your Vice-President, Mr. W. H. Patterson, M.R.I.A.

The Excursion Programme for the year, which was a very attractive one, had, regarding two of its items, to be departed from,—namely—the excursion to Lough Neagh and Arboe, which was found impracticable by the wished-for route, owing

to your Secretaries being unable to secure the services of a steamer to convey the party from Lurgan to Arboe Point. In lieu of it a most successful excursion was made to Lough Mourne, in the bed of which the operations of the Belfast Water Commissioners had exposed several Crannoges. The excursion to Monasterboice, Valley of the Boyne, New Grange, Tara, &c., intended to occupy two days, and which promised to be of exceeding interest, had unfortunately to be abandoned, as only three members intimated their desire to go. It was felt by the Secretaries that the expense of this excursion was above the average to which your members are accustomed,—a circumstance unavoidable where several hotel and car proprietors have to be arranged with.

The following is a list of the excursions carried out:—

1.	Slemish, and the Valley of the Braid, ..	May 13th.
2.	Collin Glen, ...	June 3rd.
3.	Lough Mourne, ...	June 24th.
4.	Glenarm, by the Hill Road from Larne, ..	August 12th.
5.	Castlereagh Hills, and Knock, ...	September 2nd.

Regarding the above excursions, your Secretaries trust that the arrangements made for them gave satisfaction. They take this opportunity, however, of giving expression to the difficulty they feel in suiting the various tastes of the members, some of whom desire by rapid movements to see as much as possible in the limited time, while some others consider the day would be more profitably spent in the investigation of a less extended area. Your Secretaries would be glad of an expression of opinion from the general body of the members on this important point.

Referring to the Crannoges discovered in Lough Mourne. Immediately on their discovery being intimated, they were visited by several of your members, who considered them of such importance that a meeting of your Committee was called to ascertain what steps should be taken regarding them; the result was that a Sub-Committee was formed to request liberty from the Water Commissioners to investigate them, and a sum

(not exceeding £10) was granted by your Committee for the purpose, Mr. S. A. Stewart very kindly consenting to take personal supervision of the work ; the results of which will be embodied in your proceedings.

The Winter Session was opened by a conversazione which was very well attended. The following papers were read at the ordinary winter meetings, the attendance at which was somewhat above the average :—

21st Nov.	I.	"Opening Address," by the Vice-President, W. H. Patterson, M.R.I.A.
,,	II.	"On rhe Recent Examination of the Crannoges, Lough Mourne," by Mr. F. W. Lockwood.
19th Dec.	III.	"On the Public Libraries' Acts, and the possible consequences of their adoption in Belfast," by Mr. Wm. Gray, M.R.I.A.
2nd Jan.	IV.	"On Sensitive Plants," by T. H. Corry, M.A., F.L.S, F.Z.S, M.R.I.A.
16th Jan.	V.	"Notes on the Stone Monuments at Carrowmore, Co. Sligo." (Battlefield of Northern Moytura), by Mr. Charles Elcock.
20th Feb.	VI.	"Notes on Rude Stone Monuments in Antrim and Down," by Mr. Wm. Gray, M.R.I.A.
,,	VII.	"A short Notice of Rare Plants recently found in Down and Antrim," by Mr. S. A. Stewart, F.B.S.Edin.
20th Mar.	VIII	"On Fungi, Mushrooms and Toadstools—Disease, Blight, and Food-producing Plants," by the Rev. H. W. Lett, M.A., T.C.D.
17th Apr.	IX.	"The Military Defences of the Ancient Donjon at Dundrum, Co. Down," by Mr. J. J. Phillips.

Your Committee, recognising the fact that the Club now enters upon the twenty-first year of its existence, suggests, that such information as may be in possession of members regarding the foundation of the Club, and such early letters and papers as may be considered of general interest, be collected and brought before the members, with a view to their publication in your proceedings. With the view of giving further *éclat* to the coming of age of your Society, your Committee have instructed your Secretaries to order a portrait album for its members, which, it is thought, when occupied by portraits of such of its *founders* as are available, as well as by the general members, will be a source of increasing interest to the Society.

Your Committee take this opportunity of thanking those who have so kindly assisted the Club during the past year in

carrying out its objects, and would especially mention the kind manner in which the Belfast Water Commissioners acceded to the request of your Sub-Committee, and in the practical way in which their contractors, through the resident engineer, facilitated our operations at Lough Mourne. The thanks of your Committee are also due and are hereby tendered to Canon Grainger, D.D., M.R.I.A., and to George Kidd, Esq., for their kindness in guiding and entertaining the excursions to their neighbourhoods.

Appended are the reports of the judges appointed by the Committee to examine the various collections and drawings submitted in competition for the prizes offered by the Club.

We have examined with very great interest the collection of Lepidoptera submitted by Mr. Isaac Waugh in competition for Prize 15. The collection is contained in five cases, and consists of 160 species, represented by a large number of specimens carefully preserved and set up. We have much pleasure in awarding Mr. Waugh the prize.

William Swanston.
S. A. Stewart.

In the way of drawings there is only one competitor, viz., Mr. William Gray, who sends in three drawings for the President's Prize, No. 24. These are of Cromlechs, and the examples selected are of more than ordinary interest, and are well represented. We consider them worthy of the prize offered.

James Moore, M.D.
John Vinycomb.

Mr. Charles Bulla submits a collection of Carboniferous Fossils in competition for Prize 10. These well represent the Palæontology of the Armagh and County Down rocks of this formation, and we have much pleasure in awarding the prize for it.

Joseph Wright.
S. A. Stewart.

Two collections have been submitted in competition for Prize 16,—the best set of 25 microscopic slides. The set by Mr. T. H. Corry is illustrative of the special department of botany to which he is at present giving his more particular attention. The set sent in by Rev. H. W. Lett, being more general in their scope, and showing more manipulative skill in preparation, we consider more worthy of the prize, and award it accordingly.

William Swanston.
W. Gray.

Prize III.—The collection of Rev. C. H. Waddell, sent in competition for Prize No. III., consists of specimens representing over 100 species of mosses. These specimens are named, mounted, and classified in a most creditable manner, and form an exceedingly good result for one year's work at such a difficult subject as the mosses. In this case the conditions have been complied with, and the collection being of abundant merit, the above mentioned prize is awarded to Mr. Waddell.

Prize 22.—The collection sent by Rev. H. W. Lett in competition for Prize No. 22, consists of a large number of specimens of mosses and Hepaticæ which were collected by him at several of the Club's Field Meetings, in 1882. The specimens are mounted and arranged as prescribed, and represent a very fair amount of critical observation and industry, and Prize 22 is accordingly adjudged to Mr. Lett.

S. A. Stewart.

Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1881-82	£43	0	2	By Expenses of Conversazione	£9	1	3
,, Subscriptions—255 at 5/-	63	15	0	,, Printing Annual Report	10	11	0
,, Gain on Excursions	0	6	3	,, Advertising, Printing, and Stationery ...	13	2	2
,, Guide Account	4	3	0	,, Exploration of Lough Mourne Crannoges ...	4	2	0
,, Proceedings	0	15	9	,, Delivery of Circulars	1	10	0
				,, Postages	4	14	7
				,, Museum Expenses	8	8	0
				,, Prizes	2	10	0
				,, Insurance on Books	0	11	6
				,, Balance on hands	57	9	8
	£112	0	2		112	0	2

Audited and found correct,

JOSEPH WRIGHT, *Treasurer.*
WILLIAM SWANSTON, *Hon. Secretary.*

SUMMER SESSION.

The following Excursions were made during the Summer Session:

On 13th May, to

SLEMISH AND THE VALLEY OF THE BRAID.

The Club, having been in existence for nineteen years, inaugurated the operations of the twentieth year by an excursion to Slemish Mountain and the Valley of the Braid, a district which contains much that is interesting in its physical aspect, with many reminiscences of the most important events in the life of St. Patrick, and the early history of Christianity in Ireland. Leaving Ballymena, with its busy streets and crowded markets, the party, numbering about twenty, were soon on the open Glenarm road, under the guidance of the Rev. Canon Grainger, D.D., M.R.I.A., of Broughshane. Near the bridge which passes over the Braid Water two forts are noted, forming part of a series, well situated for guarding the entrance to the valley from the south-east. A fine example of an esker-ridge was seen a little distance from the road, but no halt was made till reaching the picturesquely-situated church of Broughshane.

The building is a neat erection, dating from about 1820, previous to which date the parish church was the building which now forms the conspicuous ruins of Skerry. The grounds surrounding the church are neatly laid out, and it is gratifying to note the pleasing custom practised, even by the poorer people, of decorating the graves of departed friends with flowers; the simple but beautiful wild varieties being selected by those unable to procure the more fashionable species. Passing through a well-cultivated and thickly-populated district, rich with spring verdure, some miles further on another halt is made, the business this time being to ascend Slemish Mountain (1,437 feet), which runs abruptly to the left. Proceeding through bye-lanes and fields, and crossing many "stone ditches," a standing stone, possibly monumental, is visited, also the wooded knoll or rath of Rathcavan—an ancient structure—which gives name to an extensive parish lying to the south of the Braid. Soon the heathy moor round the base of the mountain is reached, and the party divides, the members attacking the slopes by whatever point seemed best to suit their climbing powers, our worthy guide leading by M'Cracken's well, a spot rendered historic by its association with the troubles of '98. Henry Joy M'Cracken, once a prominent citizen of Belfast, whose name the well bears, was one of the leaders in the "affair" at Antrim, after which he remained in hiding in the neighbourhood of Slemish, but being eventually captured, he was tried, sentenced, and executed in Belfast on 7th June, 1798. It may be interesting to note that M'Cracken's house in Belfast stood at the corner of John Street and Donegall Street, and was one of those lately removed in carrying out the town improvements. Geologists consider that Slemish forms part of the final stage of the great outburst of volcanic activity which during the Miocene or middle Tertiary period covered the County of Antrim with the sheets of lava that now form the basaltic capping of nearly all our hills and the cliffs along the coast. In the case of Slemish, and also of Carnmoney Hill, near Belfast, and possibly some others, it is by some geologists considered probable that we have the

remains of the actual volcanic necks, or, in other words, the mass of lava which once filled up the ancient craters, and which was consolidated when the subterranean fires at last died out. Of course, all the parts which are generally associated with the idea of a volcano—the thick beds and cone of ashes, the lighter and more porous streams of lava, &c.—have long since been swept away by ice, and the various denuding agencies to which the district has been exposed during its subsequent submergence, and during the so-called Glacial Period. Slemish, or Slieve Mis, is much identified with the life and acts of St. Patrick; it was the scene of his early captivity, and of much of his subsequent remarkable missionary labour. The ancient church of Skerries or Skerry, in the parish of the same name, to the north of the Braid, also one at Rathcavan, are said to have been founded by him. Again assembling at the foot of the mountain and reseated on the cars, a hurried visit is paid to a cashel or stone fort, in good preservation, about half a mile from the road. Flint implements are often found in proximity to ancient structures of this class, and in this instance a very slight search was rewarded by the finding of worked flints in the fields adjoining. On returning to the main road it was evident time would not permit the visiting of any more of the interesting objects in the neighbourhood. Passing under the rugged height upon which the old church of Skerry is situated, no farther halt is made till reaching the residence of our guide, Canon Grainger, who very kindly asked the party to partake of luncheon before parting for the return journey. Canon Grainger's residence is well known as the repository of valuable and extensive collections of objects of antiquity and natural history. Few of the party were, however, prepared for the treat in store for them, as the kind host hurriedly went from one object to another, pointing out peculiarities, beauties, or probable uses. Luncheon having been announced, all were soon engaged in the equally earnest discussion of a sumptuous repast, with an appreciation enchanced by healthy exercise, mountain air, and the attention of our kind host. After luncheon, the

business meeting of the day was held. A new member was elected, and some business letters were read. A vote of thanks was, on the motion of Mr. Mann Harbison, proposed to Canon Grainger for his courtesy and attention throughout the day, and for the very generous hospitality which they had received. The motion, having been put by the chairman (the Rev. J. H. Smythe), was carried by acclamation. The party shortly afterwards remounted the cars, and were soon on their way back to town, after a most enjoyable day.

On 3rd June, to

COLLIN GLEN.

The weather was very near perfection, and the numerous cavalcade which started from the Museum gave ample proof of the popularity of the short excursions arranged to places in the immediate vicinity of the town. Leaving the cars at the village of Hannahstown, the party crossed the fields so as to strike the Collin River at the waterfalls. The flow of water caused by the recent thunderstorms set off these to great advantage. It is to the broad sheets of basalt which spread out as uplands over most of Antrim, and form the dark capping above the white chalk upon the summits of our hills, that are due most of our local waterfalls. The alternation of harder and softer beds of this volcanic rock, and the occasional intersection of still harder dykes of the same material, give rise to numerous ledges, each marked by its own cascade. Of the Collin falls it is doubtful which to admire most, the upper and loftier fall, where, divided by a rock, the two portions of the stream fall side by side, one larger than the other—like a waterfall and its echo ; or the lower, where two streams, rising on the slopes of two separate mountains, and flowing down opposite glens, meet at last upon the same narrow ledge of rock, and, crossing as they fall, unite their waters in the deep

pool at its base. This is the spot known as the "rumbling holes," which are tokens that the stream has always been engaged cutting its way backward through the rocks. Stones are from time to time carried over a fall, these are whirled round in the eddy at the bottom, and often hollow out the rocks, leaving as the fall recedes those beautifully circular holes so often seen in such places; sometimes remaining after the fall itself has vanished, as is the case of one just above this spot. A short meeting was held here, and two new members elected. The party then divided, some in search of plants and insects, others to geologise, and a few to enjoy the general and particular beauties of scenery of this romantic spot. The flora of Collin Glen includes several plants of considerable rarity, and is therefore of much interest to the botanist. A few plants of the pretty little winter green (*Pyrola minor*) still hold their ground, in a secluded and almost inaccessible position near the head of the glen. Two or three stems only were taken on this occasion. The very rare horsetail (*Equisetum trachyodon*) is still to be found on wet rocks by the stream, and the great drooping sedge (*Carex pendula*) occurs in several places, along with the still rarer *Carex strigosa*. A special prize was offered by the Club for the best series of ferns and grasses. The prize was awarded to Mr. Edward Smith, who collected the largest number of species. A prize was also offered for the best collection of fossils. The Cretaceous and the Liassic rocks, as is well known, are seldom better displayed than in this glen, which is rendered of greater interest by being the site of one of the ancient landslips which so often occur where porous water-bearing rocks overlie the Lias shales. A great mass of the former have slid forward, and, as the stream in its downward course has cut through both the parent rock and the detached landslip, a double succession of the geological series is met with, constituting, at first sight, somewhat of a puzzle to the student who here commences his investigation of these rocks. The prize was awarded to Mr. Charles Bulla, who succeeded in collecting seventeen species, comprising double that number of individuals

—an excellent afternoon's work—though several ladies and other gentlemen ran him very close. Of the rare brachiopod (*Waldheimia hibernica*), only known as yet from specimens obtained in Collin Glen, Mr. Bulla succeeded in procuring a considerable number. Through the kindness of the proprietor, the lower glen, with its cool, mossy glades, and luxuriant masses of fern, was next visited, and here a treat unexpected to most of the party was in store. A member of the Club, Geo. Kidd, Esq., and his hospitable lady had furnished out the pic-nic house in the glen with a most welcome tea, and as many as the house could accommodate within, and the rest upon the grass outside, did ample justice to the refreshment so opportunely provided for them. Thus invigorated, and having carried by acclamation a vote of thanks to their entertainers, who assured them, in return, they could not possibly have exhausted the beauties of the glen, and must be their guests again at an early opportunity, the excursionists made the best of their way to Dunmurry Station, all agreed that Collin Glen in summer time deserved all the popularity which could be given to it.

On 24th June, to

LOUGH MOURNE.

This Excursion had been intended, according to the programme, to be to Lough Neagh and Arboe Point, but owing to the difficulty of obtaining a steamer to cross the lake in, the Committee were compelled to change their plans, and availed themselves of the opportunity to visit the Crannoges recently laid bare by the drainage operations of the Belfast Water Commissioners in Lough Mourne, above Carrickfergus. A large party started by the 12 o'clock train for that town, and from thence proceeded, mostly on foot, to the lake. Lough Mourne and its features were so fully described in the report of last year's excursions, and the Crannoges are so fully dealt with in the

report of the Committee of Excavation, that a repetition need hardly be attempted here.

Planks had been laid to bridge over the soft mud which lay between terra-firma and the Crannoges, and with one or two slight mishaps the party were soon collected upon them, turning over the boulders and loose stumps of piles of which the artificial islands were composed, speculating upon their origin, and searching for relics. Subsequently a meeting was called upon the margin of the lake under the presidency of W. H. Patterson, Esq., M.R.I.A.—when Mr. F. W. Lockwood, Hon. Sec., gave a brief address upon the characteristics of Crannoges in general and these in particular. The party then strolled round the lake, some to visit the well known Swallow Hole of Lignaca, others to botanize, or in search of insects, flint flakes, (of which several were found), and to other kindred pursuits. Besides the large Swallow Hole of Lignaca, there are several smaller ones round the lake, into which streams, however, do not now flow except under unusual circumstances.

The members of the party returned at their convenience to Carrickfergus, some of them taking advantage of the fineness of the summer evening to visit the old Parish Church, the Castle, King William's Stone, and other antiquities of that interesting town.

On 12th August, to

GLENARM, BY THE HILL ROAD FROM LARNE.

The route selected was a novelty, being inland, by the old road amongst the hills, instead of along the coast. The party, which the fine weather had augmented to nearly double the anticipated number, left town by the 9.30 train, and in due time found themselves winding slowly up the hilly roads which lead to the plateau lying behind the Sallagh Braes, and which forms the watershed between the Larne Basin and the upper part of the Glenarm valleys. From this point the prospect is a wild

one, of mountain tops rising amidst an expanse of moorland and bog, interspersed with patches of cultivation. Here a "standing stone," or "dollan," marks the site of some forgotten event, or the death of some hero of pre-historic times. The Sallagh Braes constituted the next item in the programme, but owing to the roughness of the ground, and an accident to one of the vehicles, which caused an embarrassing delay, it was only the more active of the party who were able to carry it out. These, however, pushing hastily across the intervening boggy ground, were rewarded by finding themselves on the edge of this magnificent amphitheatre of cliffs, a grand piece of scenery which too many of our coast tourists miss. This striking basaltic range constitutes a habitat for the rarer indigenous plants, and they have been long resorted to by those interested in the native flora. Nothwithstanding the limited time, some scarce plants were found. The filmy fern (*Hymenophyllum Wilsoni*) was met with, growing in moss-like patches on the shady rocks, and along with it the bladder fern (*Cystopteris fragilis*). One of the rarer hawkweeds (*Hieracium anglicum*) was seen in small quantity on the steep rocks, and *Alsine verna* was in abundance. At the same place the very rare wild vetch (*Vicia orobus*) still holds its ground, this is one of the most interesting plants of the district. It is evident that any one having time for a thorough search would be rewarded with specimens of many other botanical rarities. Whilst the botanists were thus engaged, two or three of the geological enthusiasts had bolted off to the furthermost extremity of the cliffs, where, close to the abrupt and craggy summit of Knock-dhu, are to be seen two of the most remarkable trap dykes in the province. Trap dykes are plentiful enough, for one can hardly walk a mile down a stream any where in the North-eastern counties without coming on half a dozen of them; but these of Knock-dhu are unique. They cut at right angles to a lofty cliff of the basaltic rocks, which have weathered away so as to leave a steep gully or ravine at each side of the dyke, and, in the case of the larger one especially, the dyke is to be seen towering up thirty or forty

feet in height, and running down the centre of the ravine with the regularity and straightness of a built wall. It is to be regretted that some of the senior geologists of the party were prevented by circumstances from examining these most interesting features. Soon after reaching Linford bridge the road crosses the Linford and Glenarm rivers, and, passing round the head of Lord Antrim's deer park, skirts the demesne till it reaches Glenarm, and is full of striking and picturesque views. It is on foot, however, that this valley should be studied, and to those who can obtain the privilege nothing can be more delightful than to follow the course of the Glenarm river through the park; and by the kind permission of Colonel Clerk, the present lessee, this permission was granted to the Field Club. The very rugged nature of the upper part of the glen prevented all but the more active from profiting by the opportunity; but those who were able to do so were amply rewarded for their exertions, and every step revealed some fresh beauty—every basaltic ledge over which the stream runs has its own cascade. There are hollows where the trout loves to lie, and the gnarled and twisted oaks and thorns, stretching a hundred fantastic arms aloft, offer a shade where the foot of the artist would be tempted to linger. As the valley widens it assumes a more park-like character—the stream gets quieter, the trees become more lofty, and at length the stately castle of Glenarm comes into view, with the little town nestling under the limestone cliffs. Soon the castle lodge and bridge are passed, and the party having been refreshed by a comfortable tea at the hotel, returned by the coast road, whose features—archæologic, geologic, and scenic—have been too often described to require repetition here.

On 2nd September, to

THE KNOCK, AND CASTLEREAGH HILLS.

A fine afternoon in early autumn saw a large party assembled at the Knock station, who proceeded first to the Knock graveyard, where a fragment still remains of the old church.

A few years ago the gable with a round arched window was still standing, and it is much to be regretted that such an interesting relic should have been allowed to fall. According to Mr. R. M. Young, who made some measured drawings of it a year or two previously, the date would appear to have been of the 13th century, but he states that two carved heads were built into the wall under the window, which were in all probability fragments from an earlier building. A hillock in the churchyard marks the site of a cromlech, so that sepulture in this spot dates back to prehistoric and pagan times. Several of the gravestones bear inscriptions of considerable age, one of Richard Person has on it the dates of 1647 and 1651.

The party then proceeded to the fine sepulchral mound in a field not far distant, where an admirable photographic group was taken by one of the members, the mound and its clothing of dark fir trees standing out well against the sky. Whether this Dun or mound is the true "Knock" which gives a name to the district, or whether the hill on which the graveyard is located has a better claim to the title, is a point for discussion, but they certainly both together indicate that this townland was a centre of human interest in very early times. So far as is known the interior of this mound has never been properly examined, nor have any relics of interest been found there. A tradition however is extant that some workmen commenced excavations here once for buried treasure, but a whirlwind having been aroused by the affronted genii of the place, their tools were whisked away, and the search was never resumed. A pleasant ramble through the lanes, and a climb up Castlereagh hill brought the company to the site of Conn O'Neill's Castle. The veritable stones that sheltered the famous Conn are still there, but alas! they now form the wall that encloses the bare and naked *site* alone. Who has not heard the story how the thrifty bailiff pulled down the Castle so as the more economically to build the wall with which he had been instructed to enclose the relic? The church adjoining forms a very conspicuous feature in the landscape for many miles round, and in the graveyard is a

rather quaint inscription to the memory of two brothers who "parished" in a shipwreck near Ardglass early in the century.

There are one or two interesting old houses in the village, one bears the inscription "1718 J.W.," another "R.A. 1764," and in one of them are pointed out some of the old oak beams, said to have been taken from the Castle when it was pulled down.

The village may-pole is still seen standing at the cross roads. The route homewards was taken down the Cregagh Glen, a romantic piece of scenery with several pretty cascades over the ledges of the old Silurian rocks, the escarpments of these hills forming the North-Western boundary of that formation. The landscape of this portion of the vicinity of Belfast is in marked contrast to that on the other side of the Lagan Valley, and well marks the difference of geological formation. The long slopes and broad valleys of the Antrim side, upon the very slightly inclined secondary and tertiary rocks, though of greater altitude, are much tamer, except along the line of the ancient sea cliffs, than the constant succession of narrow little valleys and deep rounded hills which cover so large a part of the County Down, and where denudation by running water has been going forward, probably, with various oscillations and submergences, ever since Carboniferous times.

At the foot of the glen a halt was called, and the collections made for the prizes offered by the Club were handed in, and, as well as the fast waning light would permit of, adjudicated upon. The prize for the best collection of flowering plants of the order Compositæ, was awarded to Miss Sara T. Greer, that for the best collection of mosses to Mr. James Creeth.

The party then separated, all of them disposed to acknowledge that the records of this, as of former excursions, would show what a remarkable amount of instruction and interest was to be found within the compass of an afternoon's walk round the outskirts of Belfast.

WINTER SESSION.

—o—

NOTE.—The Authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

—o—

THE Winter Session was opened by a conversazione in the Museum, College Square North, on the evening of Friday, the 20th of October, at which a large number of the members and their friends were present. The ordinarily sombre aspect of the Museum was enlivened by a profusion of flags, evergreens, and bouquets of flowers, kindly given or lent by the numerous well-wishers of the club and its work. Of recent years the members of the club have always selected some special subject for illustration at their conversazione. On this occasion it was silica in its various forms, and a table was filled with specimens, ranging from the gigantic flints (or paramoudras) of our local quarries to beautifully cut and polished agates, cairngorms, carnelians, and other precious stones, making altogether a very attractive and instructive display. There were, in addition, a few samples of its application in manufactures, particularly some non-conducting silicate cloth and fibre exhibited by Mr. D. Anderson, of the Lagan Felt Works.

During the previous summer the crannoges, or artificial islands, recently discovered in Lough Mourne, were examined by a sub-committee of the club, who now exhibited a carefully-prepared map of these structures. The objects of interest found in them were not numerous, the result in this respect having been somewhat disappointing, but the bow of a "dug-out" canoe obtained from them was exhibited by Mr. M'Dowell, and Mr. C. Bulla showed a very fine sepulchral urn found in the immediate vicinity, besides a crucible and other interesting relics.

The field work done by the members of the club during the season naturally forms a chief feature on these occasions, and this evening the palm of merit was decidedly due to Mr. Charles Elcock, who exhibited a splendid set of drawings executed by him of cromlechs or sepulchral monuments from the site of the famous battle of Northern Moytura, in the County Sligo, where are the remains of sixty-five stone circles and cromlechs, only seven of the latter, however, being now perfect. He also exhibited a set of drawings of cromlechs from the adjacent counties of Leitrim and Mayo. It is gratifying to have this evidence that, whatever may be the differences of opinion as to the social and political condition of these counties, the antiquarian can still pursue with such excellent result his researches amongst a class of monuments of which Ireland possesses one of the richest and most interesting collections in the world.

A very fine collection of Carboniferous fossils made during the past season was shown by Mr. Charles Bulla.

Not so showy as some objects, but of great economic interest, was a table of five hundred specimens of woods from Ceylon and Canada, belonging to the museum collection, and in connection with these Mr. W. A. Firth exhibited a variety of wood sections under the microscope, illustrating their mode and principles of growth. A very interesting collection of Zulu trophies was exhibited by Mr. E. Malcomson. A fine case of minerals by Mr. D. M'Kee, and some curious old sailing

charts about the date of 1620, were displayed on a centre table, where was also the club's album, containing a large number of drawings and photographs illustrating the geology and antiquities of the locality, in which, however, there is still space for further contributions from members of the club who possess skill in the use of their pencil.

A camera for instantaneous photography, and a number of instantaneous and other examples of that art, were exhibited by Mr. Welsh, who also had an aquarium containing some water tortoises and a salamander, which appeared at home in the water, though fable originally ascribed both its birth and habitat as being in the fire.

A new American caligraph type-writing machine, exhibited by Mr. Thomas Workman, was a centre of interest.

A number of pictures lent for the occasion adorned the walls of the lecture-room. Amongst them a fine drawing of Roslyn Castle and a study of an oak tree painted on the spot, were the handiwork of Dr. James Moore, H.R.H.A., to whom may not inappropriately be applied Byron's lines on the poet Crabbe, "Nature's sternest painter, and her best." This gentleman also lent a sketch of great value by Erskine Nichol, R.S.A. Another member of the club, Mr. S. M'Cloy, exhibited several very striking water-colour paintings, which give more than promise of future repute. Mr. Nichol lent eight sketches by his relative, Andrew Nichol, R.H.A., some of which, made nearly fifty years since, of local scenes, possess now antiquarian as well as artistic interest. Mr. H. F. Thomas lent two oil paintings, of his own, of English and Irish landscapes, and Mr. Gray some sketches of Carlingford and some Continental scenes. There were also fine drawings by Stannus and other artists, lent by various members of the club.

The library was entirely occupied by the drawings and sketches, many of them of great merit, kindly lent by the members of the School of Art Sketching Club, which, under the able direction of its president, Mr. Trobridge, gives promise of a most useful co-operation with the Naturalists' Field Club in the outdoor study of the wonders and beauty of nature.

The display of microscopes was as varied and interesting as usual. Mr. Firth exhibited wood sections, Mr. Gray fossil woods and varieties of silica ; Mr. Joseph Wright, F.G.S., exhibited a number of rare foraminifera, recently dredged by him off Dublin. Three of the former—viz., *Miliolina triangularis*, *Haplophragmium agglutinans*, *and Lagena castrensis*, were additions to the British fauna, the last of these (*Lagena castrensis*) being of especial interest, as it has hitherto been only known as a recent species from off the Australian coast.

Several members devoted their microscopes to the exhibition of miscellaneous objects.

Mr. Vinycomb showed two beautiful specimens of flower painting on terra cotta, Miss Sara T. Greer some examples of painting on china, and Mr. W. H. Patterson, M.R.I.A., a set of etchings of his own, mostly illustrating local scenes.

An extremely interesting object was shown by the Rev. H. W. Lett, M.A. This consisted of a common straw beehive, nearly full of wax cells, of which a colony of wasps had taken forcible possession, driven out the bees, and then, in the middle of the comb, built their own bag-like nest of delicate brown tissue. Whether the intruders more fitly deserved the appellation of Land Leaguers, or Emergency men, was a point which caused some amusement and discussion, and was left ultimately to be decided according to the individual tastes or politics of the members present.

In the course of the evening a meeting was held, under the presidency of W. H. Patterson, Esq., M.R.I.A., vice-president of the club, who called attention briefly to the various objects of interest exhibited. The continued popularity of the club was shown by the election of fourteen new members.

Refreshments were served during the evening by Mr. Walker, and as the company separated it was admitted on all hands that a most auspicious commencement had been made to the Belfast Naturalists' Winter Session of 1882-3, and that, having now nearly attained its majority, it would enter, it was hoped, upon a long, vigorous, and useful career.

The opening meeting of the twentieth Winter Session was held in the Museum, College Square North, on the evening of Tuesday, 21st November—William Gray, Esq., M.R.I.A., in the chair.

The first communication was a brief address prepared by the vice-president (W. H. Patterson, Esq., M.R.I.A.), who was prevented by indisposition from delivering it in person. It was therefore read by the hon. secretary (Mr. F. W. Lockwood). After briefly reviewing the excursions of the season, the vice-president pointed out that, although the club was, first and foremost, an outdoor society, yet that every member should take advantage of the winter meetings to record his observations in the field ; that there was probably not a single member who could not tell some one fact, however trifling, in natural history or archæology that had come under his own observation better than any other member ; and that if each would do this, however briefly, we might, instead of eight or ten lengthy communications, have ten times that number in the session of short ones, and the example of each would thereby encourage the others, besides placing on record many valuable and interesting facts which would otherwise be lost.

Mr. F. W. Lockwood then read a paper "On the recent examination of the crannogs at Lough Mourne, near Carrickfergus." The committee of the club having voted a sum of money for this purpose, the sanction of the Water Commissioners was sought and cordially given. The council of the Natural History Society having liberated Mr. S. A. Stewart, F.B.S.,Edin., the work was carried out under his directions with great assiduity and care, notwithstanding the very inclement weather, most unusual for the season. Sections were run through the crannogs in several directions, and a trench was attempted round the outside, but the mud was too fluid to permit much to be done. The mode of construction of them was, however, fully revealed, and was explained on a plan and sections of them made by Mr. Lockwood, which have been presented to the museum. The larger group, which con-

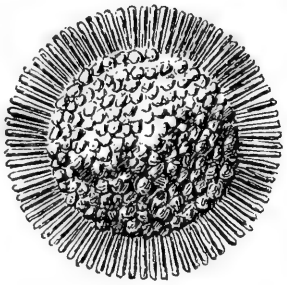
sists of four separate stone islets near the southern shore of the lake, rests upon a foundation of logs and branches of trees, mainly from three to six inches diameter, which are spread upon a layer of twigs, heather, leaves, and moss. The islets were then formed of about two feet thick of large stones loosely piled up, which formed the floor of the dwellings. Each separate structure was surrounded by rows of piles, and the whole group enclosed by more piles, numbering several hundreds. The piles were of pine, willow, ash, and, more rarely, oak ; their ends were pointed, evidently with a sharp hatchet. Rows of piles stretching in a south-west direction, and about 100 feet long, mark the line of the causeway that connected the crannog with the mainland. This does not appear to have been cross-timbered, as in many other examples, but was layered with leaves and moss, which is now in the form of imperfect peat about a foot thick. The breadth of the causeway was about 10 feet. A little to the north, and farther out in the lake, is the other crannog, which forms a single islet. Its construction is rather different and more elaborate than the former. At the bottom was a layer of large stones, whose depth could not be ascertained owing to a spring of clear water that gushed up. On these a deposit of moss had been heaped, which must originally have been very thick, as it is still, after all its compression, two feet thick. A ring of piles all round the crannog support horizontal timbers, which rest in notches on the heads of the piles, or in some cases are morticed into them. These radiate from the centre like the spokes of a wheel, and are supported on the layer of moss above described. On the timbers rests another layer of heather, moss, and leaves, upon which stones have been heaped up to form the floor. The diameter of the stone floor of this island was about forty-five feet, the piles extending about ten feet further all round it. There was no trace of any causeway, and probably none existed. In the case of many other crannogs a framework of timbers secured to the tops of the piles extended all round the outside to serve as a breakwater, but in those at Lough Mourne this could not be

observed. In the course of the excavations very few relics were brought to light, though a few were found during the summer by Mr. William M'Dowell, of Lough Mourne School, and Mr. Bulla, a member of the club, and others. Doubtless many articles lie too deeply embedded in the soft mud to be recovered except at too great expense. Subjoined is a complete list: — Charcoal and charred bones, in considerable quantity; teeth of horses, sheep, and others; horns of deer and bones, flint flakes, some of them marked by fire; a pair of whetstones, fossil sea urchins, and a perforated stone, apparently worn either as ornaments, or more probably for charms; an iron hatchet, of the early or bronze type, with a hole for attachment of thong; two small earthen crucibles, an earthenware spindle whorl, about five feet of the prow of a "dug out" oaken canoe. All the above finds, though not numerous, are of similar character to those found in crannogs elsewhere. Of the wooden huts in which the occupants lived no trace was found, but, except in one or two cases, these have invariably disappeared. Mr. Wakeman, of Enniskillen, however, found in a crannog in Ballydoolough Lake, a few years since, the foundations of an oblong frame house, of squared logs of wood, which was probably the type of these buildings.

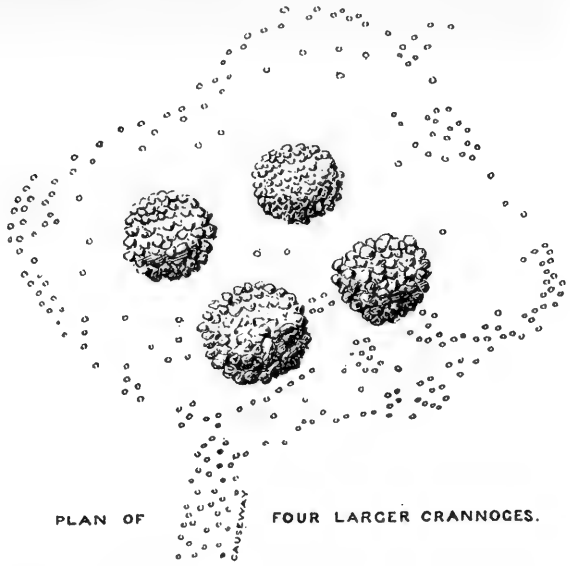
More than one hundred crannogs have now been investigated in Ireland, Mr. W. F. Wakeman having examined at least twenty in Fermanagh alone. From some of these, immense quantities of bones, pottery, iron, and bronze weapons and tools have been obtained. A great many have been found in the County Antrim, and the late Edward Benn, Esq., made a large collection from them, many of which objects are now in the museum. Particulars of most of these will be found in the Club's Guide to Belfast, the Ulster Journal of Archæology, and in the Proceedings of the Royal Historical and Archæological Society. Until recently crannogs,—*i.e.*, artificial islands—found as above described, were thought to be almost confined to Ireland; but during the last few years a great many have been discovered in Scotland. During the

CRANNOGES, LOUGH MOURNE.

EXAMINED AUGUST 1882.

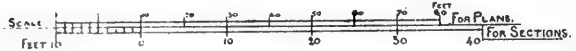


PLAN OF SMALLER SINGLE CRANNOGE.



PLAN OF FOUR LARGER CRANNOGES.

SECTION THROUGH LARGER CRANNOGES.



SECTION THROUGH SINGLE CRANNOGE.

1. LARGE STONES.
2. LAYER OF MOSS TURNED TO PEAT.
3. RADIATING TIMBERS.
4. HEATHER AND BRUSHWOOD.
5. STONES.

7 M L


BRITISH MUSEUM

present year a most valuable book has been published by Dr. Munro on Ancient Scottish Lake Dwellings. Upwards of fifty have now been recorded. Their construction is almost identical with the Irish ones, and the objects found in them are very similar. A classification of the localities in which they exist shows pretty conclusively, that crannog building was almost entirely confined to the Celtic race; and that none have been found in those parts earliest settled by the Angles, whilst the great majority being in what was the Romano-British Kingdom of Strathclyde, would point to the inference, that the North British Celts took to crannog building during the disturbed times which followed the departure of the Roman power. In Ireland, however, as the Romans were never here, their departure can have had nothing to do with crannog building. It is therefore possible that crannog building may have been adopted earlier here than in Scotland, and the elaborate structure of some of the Scottish ones would favour this view.

The mode of life of the occupants of those half-submerged islands would seem at the first glance to have been wretched in the extreme. Nevertheless, they had a considerable degree of civilization. The multitude of tools and weapons of bronze and iron, the pins, the skewers, the buckles, and the shears, all speak of an amount of clothing, and a variety of wants and purposes and domestic requirements which are far removed from a savage state; the quantity of pottery speaks of a cuisine, and its ornamentation of an artistic culture, even more decidedly civilized in its character, of which the numerous bronze medals give still further proof. That the crannog builders relied largely upon agriculture for their subsistence, is indicated by the number of querns, or handmills, which have been found; whilst the combs and brooches indicate a regard, both for personal comfort and adornment beyond what we might have expected from their other surroundings. The crucibles for the melting of bronze, silver, and gold, and many other of the articles, indicate a prolonged residence in the crannogs, and no mere temporary or casual occupation of them. In judging of the extent of their

civilization we must remember, too, that the crannog occupiers were in part, at least, contemporaneous with the men who carved the old Irish monumental crosses, and produced the priceless illuminated MSS. Life and property must, nevertheless, have been in those days very insecure, as is testified by the multitude of earthen ring forts which still remain. Notwithstanding the influence of sages and bards, and the efforts of the missionaries of the early Church, it was only by very slow and halting steps that civilization made good its advances against barbarism.

At the close of the meeting Mr. W. A. Firth exhibited specimens of the diatoms from the diatomaceous deposit at Lough Mourne, which was recorded many years ago, but its locality could not recently be found until the late drainage works.

Mr. J. Wright, F.G.S., also showed a new British foraminifer (*Rhabdogonium tricarinata*), which was found in a dredging taken by him and Mr. F. P. Balkwill, off Lambay Island, in fifty fathoms water.

The second meeting of the Winter Session was held on the 19th December, when a paper "On the Public Libraries Acts and the possible consequences of their Adoption in Belfast," was read by Mr. W. Gray, M.R.I.A. The chair was occupied by Mr. W. H. Patterson, M.R.I.A., and there was a numerous attendance.

Mr. Gray said that when he had the honour of filling the chair of president of the Belfast Naturalists' Field Club he thought it his duty to open the sessions on both occasions with addresses. On the first occasion, in the winter of 1879, he delivered an address on "The Aims and Objects of the Belfast Naturalists' Field Club," and on the second occasion he endeavoured to enlarge upon that idea by showing what material aids were necessary to accomplish the objects they had set before them. He showed that in order to fulfil their position it would be necessary to have in Belfast a

public library, an art gallery, and a museum, and he closed that address with the suggestion that the best possible means by which that could be accomplished would be to go in for the adoption of the Public Libraries Act. Since then he took part in a systematic movement for the purpose of endeavouring to secure the adoption of that Act, and so successful was that movement that the town had adopted the Act by a decisive vote of four to one. The opposition against which they had to contend had now vanished. With regard to the possible consequences of the adoption of the Act in Belfast, he should say that the public library formed under its provisions would be free, not in the sense of a public school, partaking of the nature of charity, but like a public park, because it would be maintained out of the public rates, and would be public property. It should be open to all the world, without excluding a single soul. They must at the same time have schools of science and art. It might be that a penny rate would not be sufficient to accomplish all that was desired, but they must avail themselves of the experience of other places, and devise a scheme, broad, generous, and fully equal to the possible future requirements of the town. Having described the system by which such a large free library would be established and managed, he said the scheme should not be confined to a library, but should include a museum and art gallery. The Town Council are now in possession of some splendid sites, and he hoped they would give one in a central position, with sufficient space, not only for the present, but the future requirements of the town. It was said that a site was to be provided in Royal Avenue, but if the place which had been indicated was really meant, he feared the space would not be sufficiently large. Having dwelt at length upon the educational advantages that would arise from such an institution as that of which he spoke, he remarked that if they hoped to see it fully established it would be necessary for some of the wealthy citizens of Belfast to come to its aid. If they were not prepared to do what Sir William Brown—a Ballymena man—did

for Liverpool, they might at any rate be actuated by the same spirit, and do something. The annual income from the penny rate would be about £2,300, which would be sufficient to maintain the institution, but for the provision of a suitable building, books, &c., a sum of £25,000 would be required. An effort must be made to raise by subscription the whole or greater part of the cost of the building, so as to secure a sufficient sum for maintenance. They must follow the example of other towns, and provide an institution worthy of Belfast—broad in its conception, generous in its provision, and free to all who wished to partake of its advantages ; and when the ring of the hammer and the trowel was heard along new avenues of traffic, and new centres of enterprise arose on every hand, let them also determine that provision for intellectual progress should keep pace with the increased evidence of national prosperity.

The Chairman remarked that Mr. Gray had brought the subject before them in an admirable manner. In fact, Mr. Gray might be regarded as the apostle of the movement, and it was to his indomitable energy that they were now in the pleasing position of having adopted the Free Libraries Act.

Mr. F. D. Ward, J.P., said it had afforded him very great pleasure indeed to receive the information with which they had been favoured that evening by Mr. Gray. No persons in the town, he believed, were more surprised at the result of the vote for the adoption of the Public Libraries Act than the members of the Town Council themselves. It occurred to him that in the town of Belfast they wanted another thing. They had not in Belfast, in his opinion, a Town Hall or Municipal Buildings that were at all worthy of a town of the importance of Belfast ; and, if he might be permitted to make a suggestion, he would respectfully propose that the Town Council should set about building a proper Town Hall—a building that would be a credit to the borough—and having done that, he would suggest that the present Municipal Buildings, as they stood, might with very great advantage be turned into a library, museum, and, in fact, what Mr. Gray had pointed out.

Dr. James Moore suggested that Mr. Gray's paper should be printed and circulated. It would give the public imformation as to what they might expect from the operation of the Act, and also as to what they should do.

Mr. John Vinycomb moved the following resolution:—"That this meeting would urge upon the Town Council the absolute necessity of making an art gallery and museum an integral part of the building about to be established under the Public Libraries Act."

Mr. W. J. Fennell seconded the motion, which was unanimously agreed to.

Mr. Donaldson said the Town Council never went against the adoption of the Public Libraries Act. They left the matter in the hands of the ratepayers, and he thought the Council were not to blame for the course they had taken. If there was to be a museum and art gallery, the people of the town would have to establish it themselves, for such an institution could not be established and maintained out of a penny rate. The Council had done their duty, and it was now for the people to do theirs.

Mr. Lockwood (hon. secretary) suggested that a deputation should be appointed to wait upon the Town Council on the subject. He thought it would also be well if a standing committee were formed of gentlemen interested in the question, to watch the proceedings of the Town Council.

Mr. Gray having briefly replied with reference to the various matters touched upon in the course of the discussion,

The meeting separated.

A Special meeting was held in the Museum, College Square North, on Tuesday evening, 2nd January—the Rev. Canon Grainger, M.R.I.A., in the chair—when a paper was read on "Sensitive Plants" by Mr. Thomas H. Corry, M.A., F.L.S., F.Z.S., M.R.I.A., &c., of Cambridge, of which the following is a brief *resumé*:—Among the many results of biological research none are perhaps so striking as those which have shown that

the distinctions which were held to separate plants from animals are non-existent, and that life, as manifested by protoplasm, whether animal or vegetable, is always the same. Taking the common "sensitive plant" (*Mimosa pudica*) as the most striking example of a plant possessing moveable leaves, three distinct though closely connected sets of moveable phenomena are shown. First, those due to external stimulation of touch, or mechanical, chemical, or electric forces; second, those due to the paratonic influence of light, forming the class of nyctitropic movements or night-turning; third, those that form the class of automatic or spontaneous movements, often affected by external stimuli, such as light, but not caused by them. The various mechanism by which all these are effected was described in detail, and the difference between the position assumed by the leaves under stimulation and during sleep was pointed out. The beneficial effect of sleep movements, whereby, as Darwin has shown, only one-fourth of the daylight surface of the plant is exposed to the loss of temperature by radiation at night, was discussed in detail. Some account was also given of the spontaneous movements of the telegraph plant of India, as well as of the Mimosa. This class of movements is in reality the most important, though not the most conspicuous in plant life. The action of external influences on the movements and conditions on which irritability depends were then discussed, and the rigid position and loss of movement caused by prolonged exposure to darkness, or too low or too high a temperature, or to drought, were described. The asphyxia caused by loss of oxygen, and the effects of chloroform, ether, and other anasthetics were mentioned. Turning to the morphological side, the minute anatomical structure of the pulvinus at the base of the leaf stalk was shown to be the same in all cases which had been investigated, and the possession by it of the structural peculiarities best fitted for its purposes demonstrated. A consideration of the exact changes which go on in the mechanism in the different cases, and the causes of the movements, then followed. The effects of over-stimulation of vigorous shaking (as when taken

in a carriage for instance), and the mode of propagation of the stimulus from one part of the leaf or plant to another, were then discussed. The recent researches of Walter Gardiner were noticed, showing that the protoplasm of adjacent cells is actually continuous by means of delicate filaments of protoplasm, passing from one cell to another through the minute pits which exist in the cell wall. The stimulus is, therefore, conducted directly, as well as by a disturbance of the fluid equilibrium, throughout the leaf or plant, which disturbance had been held before alone to account for it. The paper was illustrated by diagrams of the various positions assumed in consequence of movement by the more important plants described as having these qualities.

After this paper Mr. Joseph Wright, F.G.S., exhibited a foraminifer (*Pullenia quinquiloba*), a form not hitherto recorded as British. It was found in a dredging (45 fathoms), taken by him in conjunction with Mr. F. P. Balkwill, about twenty miles off Dublin. The same species has also been found by Mr. H. B. Brady, F.R.S., of Newcastle-on-Tyne, in dredgings taken at 90 fathoms and upwards off the West Coast of Ireland. The election of a new member brought the meeting to a close.

The fourth meeting of the Winter Session was held in the Museum, on Tuesday evening, the 16th January—William H. Patterson, Esq., M.R.I.A., vice-president, in the chair—when a paper was read by Mr. Charles Elcock on the stone monuments of Carrowmore, near Sligo, the site of the battle of Northern Moytura.

The practice of setting up stones as memorials was referred to, as a common one in all ages, single stones or menhirs—called in Ireland "standing stones"—probably being first used. Instances are not very common of two stones—one upright and the other flat on the top of the first—which structure is called a talyot; but a sketch of one in Minorca was shown. Trilithons, or three-stone structures, of which Stonehenge presents some fine examples, were referred to. Reference was

then made to the trilithons of the remarkable and unique remains in the deerpark at Hazlewood, near Sligo. The purpose of this structure has not yet been unravelled, but as the ground plan is rudely in the form of a man—head, body, and limbs—it was suggested it might enclose the burial-place of some family or sept. A number of cromlechs were then described, often styled "Druids' altars," but now generally recognised as having been places of sepulture. The first, or battle of Southern Moytura, on the shores of Lough Corrib and Lough Mask, was then briefly referred to. This has been elaborately described, and many of the remains identified, by Sir William Wilde, in his well-known book. The monuments on the field of Carrowmore, or Northern Moytura, are much more numerous than the former. With the help of a large map these were described. It is stated there were at one time some two hundred separate stone circles, cromlechs, and mounds within a space of three-quarters of a mile north and south, and less than half a mile east and west. Owing to the vandalism of the farmers, road contractors, and others, they are fast disappearing. Nine perfect cromlechs still exist, and the remains of perhaps forty others; stone circles, consisting of single, double, and triple concentric rings, some on mounds of considerable elevation; cists, or kistvaens; a fine cashel of somewhat irregular form, the walls built of enormous stones and earth. It is doubtful whether this is a true cashel or stone fort, being divided by two sets of parallel walls crossing it in each direction at right angles. Special attention was drawn to an immense flag level with the ground, with a row of large stones round it, which, as it appears to be hollow underneath, it was suggested might be a hitherto undescribed form of stone cist or burial chamber. It lies north of the cashel in the hollow between it and the lake or pond. The large central cairn called Listoghil, with its enclosed and long-hidden cromlech, was described. The lecturer thought he had discovered several rude circles on the inside of two of the supporting stones of the cromlech. This, if correct, may mark an early type of the

ornamentation so conspicuous at New Grange and other places.

The Caltragh, or "Pagan burial-ground," is a large earthen enclosure, said to be full of human bones, though no burial has taken place there within the memory of tradition, which nevertheless has given it this name. The people of the neighbourhood will permit none of their cattle of any sort to touch a morsel of grass within this enclosure. It was suggested that in all probability this marks the site where the common people who fell in this great battle were promiscuously interred. The circles, cromlech, and great cairn in like manner represent the monumental burial places of the chiefs and mighty warriors who fell in that eventful contest. The Irish, or Celtic, name of these monuments—"Leaba-na-Ffian"—confirms the narrative of the early MSS., its meaning being the grave, or bed, of the warriors. The opinions of Mr. Fergusson, in his work on the rude stone monuments of all ages, were quoted by the lecturer, and his conclusions were endorsed—viz., that the battle of Northern Moytura was fought about the year 30 B.C. The lecture was profusely illustrated by drawings of the cromlechs, circles, &c., made recently on the spot by the lecturer.

In the discussion which followed, Canon Grainger and others took exception to Mr. Fergusson's and the lecturer's theory that Moytura and other events recorded in the Irish MSS. were of so late a date as near the Christian era, whilst other gentlemen maintained that a cautious scepticism was the right spirit in which to deal with Irish traditions. Whatever opinion on this head may ultimately prevail, it is much to be regretted that these wonderful relics, to be matched perhaps in no other place than Carnac in Brittany, cannot be at once placed under the protection of Sir John Lubbock's Ancient Monuments Act. If this is not done their ultimate fate is only a question of a few short years.

The fifth ordinary meeting of the society was held in the Museum, College Square, on Tuesday, 20th February—

Canon Grainger, D.D., M.R.I.A., in the chair—when two communications were brought forward. The first was by Mr. William Gray, M.R.I.A., entitled "Notes on the Rude Stone Monuments of Antrim and Down." After some introductory remarks, Mr. Gray stated that he intended to refer to two classes of erections, known as cromlechs and cashels. Referring to the former, he noticed that much difference existed among writers as to the meaning of the word, as also the class of erections to which the name should be restricted, briefly stating the views of the leading archæologists. The reader agreed with the late Mr. Du Noyer, in defining a cromlech to be a large stone, supported on two or more stones, and covering a more or less defined chamber. The theories put forward to account for their erection were stated, some considering they were sacrificial altars, others that they marked the site of hidden treasure—a supposition which, doubtless, in early days, caused the destruction of many by the hands of the ruthless Dane. Recent search has, however pretty clearly proved that they must be considered sepulchral, as human remains have almost invariably been found under them when proper search was made. Having pointed out the difference between cromlechs and the erections known as kistvaens, Mr. Gray then proceeded to give a synopsis of the geographical distribution of these remarkable monuments, commencing with India. They are found scattered widely over that vast province, and extending far into China. They are also found in Northern Africa, throughout Italy and Central Europe, and as far north as Norway and Sweden. In Western Europe they occur in Spain. France, and the British Isles, and strange to relate, some writers minutely describe examples in distant lands, but overlook the fact that the North of Ireland is perhaps more closely studded with them than any other country of similar extent, Mr. Gray, referring to a large series of drawings illustrating these structures, pointed out the characteristics and peculiarities of about forty which he had sketched and measured in our two home counties. The second part of the paper referred to the

cashels. Like the former remains, there is some difficulty in restricting the name to a special class of erection. The reader described cashels as rude circular walls of local stone, built in such manner as the capabilities of the material admit. Some of these walls contain chambers throughout either the whole or part of their extent, the entrance to which is from the inner face of the wall. Many of the larger cashels have steps, affording an ascent from the enclosure to the top of the wall. In size the cashels are very variable, ranging from about fifty feet to upwards of two hundred feet in diameter; some of the larger having walls from fifteen to twenty feet thick. Many examples were described and measurements given, and it was remarked that in works treating on antiquities of the country these remarkable structures, which represent a vast amount of labour, and must have been places of great importance, are seldom touched upon.

After the reading of the paper,

The Chairman, as is the usual custom, requested the members present to express their views, or add, if possible, to the subject treated upon.

The Rev. Mr. Lett regretted very much the destruction of several cromlechs which had come under his own notice, and was of opinion that one of the strongest safeguards to the preservation of such remains was the gross superstition which the vulgar entertained that "no good" would follow their destroyer.

Several other members having referred to cromlechs, &c., which they had observed,

The Chairman expressed his high sense of the interest and value of the paper, and entertained a hope that some steps will be taken—with Mr. Gray's liberty—of embodying copies of the admirable drawings and measurements in the proceedings of the club as a contribution toward a complete catalogue of such structures in Ireland.

Mr. S. A. Stewart, in a short communication, noticed some of the rare plants recently found in this neighbourhood. He

stated that Mr. Tate's "Flora Belfastiensis," published twenty years since, was the first attempt at a list of the plants of the district, and pretty fairly represented our knowledge at that time of the local flora. Owing to the labours of several botanists, all connected with the Belfast Field Club, we have at present a more complete acquaintance with the native plants, and somewhere about 100 species must be added to Mr. Tate's enumeration. The "Flora of Ulster," published by Dr. Dickie about the same time as Mr. Tate's work, required to be increased by a somewhat similar number. The "Cybele Hibernica," which was subsequently published, gives a more complete and a much more correct representation of our local flora, but even to it there are now a large number of additions necessary. After referring to changes that are occurring in our native vegetation, owing to immigration, emigration, and extinction, Mr. Stewart proceeded to remark on a number of plants rare or new to the north, and showed many recently collected specimens. These included *Glyceria aquatica*, *Obione portulacoides*, *Rhyncospora sordida*, *Potamogeton pseudo-nitens*, *Stachys ambigua*, *Matricaria chamomilla*, and others, including several examples of Rubi and Hieracia.

The Rev. H. W. Lett remarked that it had been truly said that the district which was best searched was usually the most productive, and our own district was an example in point. Mr. Lett showed specimen of *Typha angustifolia* gathered by him in Portmore Lough. It had long been known in that locality, but not having been seen recently, there was some apprehension that it had disappeared.

In the discussion which followed, it was strongly urged that it is discreditable to Belfast, where we have gardens dignified with the title of "Royal Botanic Gardens," that there is no effort to promote the practical study of botany as a science, and no place where students can obtain or examine the specimens so necessary for their study.

The election of a new member closed a very interesting and instructive evening.

The sixth meeting was held in the Museum on Tuesday evening, 20th March—Mr. W. H. Patterson, M.R.I.A., in the chair—when a paper was read by the Rev. H. W. Lett, M.A., T.C.D., on "Fungi, Mushrooms, and Toadstools—Disease, Blight, and Food-producing Plants."

The reader commenced by saying that very few persons know anything about fungi, beyond the taste of mushrooms and the effects of blue-mould and blight. This ignorance is due to scarcity of literature on the subject, which Berkely, Badham, Cooke, and Worthington Smith have done much to remove, by publishing books of information in popular style. There is comparatively little about fungi in floras of 80 years ago. Withering could only enumerate 564 species. Since that time, owing to the improvements in microscopes and investigations, 3,000 British fungi have been described, while more than 20,000 are known to the scientific world. But still there is no Irish flora that even mentions them, and the excellent guide book of the B.N.F.C. has but one line of type referring to them. So varied are fungi that it is impossible to give an abstract definition of a fungus that would apply to every form. They may be described as cryptogamic plants, composed of minute cells. They differ from other plants in not requiring light, in not producing chlorophyll, and in absorbing oxygen and evolving carbonic acid gas. They are found everywhere and on everything. They resemble the flesh of animals in containing a large proportion of albuminous principles, and they produce nitrogen in larger quantities than any other plants. Some of them, like the lowest order of animals, have a luminous quality. One, called *Corticum cœruleum*, very common in this country, grows in bright blue patches on dead wood; it is luminous in the dark, and has originated many a tale of ghost and goblin dread. Fungi have also a remarkable power of reproducing and repairing such parts of their substance as have been injured. Although capable of universal dissemination, it is curious that in tropical forests, where we might expect to find them in the greatest

numbers and luxuriance, fungi are comparatively rare; their head-quarters seem to be in northern latitudes. Fungi are classified according to certain arrangements found in their reproductive organs. Reproduction occurs by spores, which are produced in each plant in endless millions. Spores are unlike seeds, in having no embryo. The mushroom or toadstool is the fruit-bearing portion, answering to the berry, pod, or seed-vessel, the plant itself being mostly invisible, and, if not subterranean, is parasitic and eutophytic, and of cobwebby nature, like mushroom spawn. A short sketch of each family of fungi was then given :—1. Schizomycetes, or splitting fungi, are those that produce disease, and are present in diseased blood, various putrefying liquors, and most decaying food. It is important to know that these plants, to which so much interest attaches as the producers of zymotic diseases, can resist extraordinarily high and low temperatures, without injury to their vitality. One of them produces the so-called salmon disease; another, Botrytis, caused an annual loss to silk-growèrs of £4,000,000 sterling. Such a minimisation and multiplication of their germs take place, that it is impossible to come to any other conclusion than that the germs are universally diffused throughout the atmosphere, a theory which appears to be necessary to account for putrefaction. Mention was also made of the yeast plant (*Saccharomyces*), to which we are indebted for leavened bread and alcoholic liquors. 2. Hypnomycetes, or thread-like fungi, are so designated because the thread-like plants are more conspicuous than the fruit. The dread potato disease (*Peronospora infestans*), the turnip mould, and the wheat mildew are examples too well known. The potato blight first appeared in August, 1845, in the Isle of Wight, having been previously known in Canada in 1844, and in St. Helena and Liege in 1842. These thready plants are far more common than most people are aware. They all make most beautiful objects when freshly gathered, for examination under the microscope. 3. Coniomycetes, or dust fungi, so called from their looking like pinches of snuff or dust. —This is one of the largest, most interesting, and mysterious

families. They are all epiphyllous or parasitic plants. The rust on young gooseberries is a familiar form. The smut of wheat, barley, and oats are other species. The spores of these fungi are so exceedingly minute that 49 of them would be contained within the 160,000 part of a square inch. One of this class which haunts the leaves of the wood anemone was formerly mistaken for the sori of a fern, and as such actually appears in old books under the title of the "Conjurer of Chalgrave's Fern." These fungi are the cause of the disease of the tissues on which they grow, and they are contagious. 4. Gasteromycetes.—In these the parts that bear the spores are enclosed in a peridium or case, which bursts when they are ripe. The common puff ball is a good representative. Dr. Lindley has calculated that the cells of which it is composed multiply at the extraordinary rate of 60,000,000 per minute. The large white puff balls, when quite fresh and young, are excellent to eat when fried. This class includes the only disagreeable fungi, the phalloidœa or stinkhorns, which emit a horrid stench that is quite unendurable to anyone except an enthusiastic fungologist. The curious bird's nest fungus, which is like a tiny humming bird's nest full of eggs, and the earth star, very like a star fish, are included in this division. 5. Physomycetes are marked by stalked sacs or cells, containing the spores; they are bladder shaped, and scattered upon threads. The most familiar is the blue mould on bread, known as Aspergillas, from resembling the brush used for sprinkling holy water in Roman Catholic countries. The black felty cellar fungus, so common in old wine vaults, is another species. 6. Ascomycetes, or bag-like fungi, produce their spores in the interior of groups of cells or bags. Some are altogether subterranean, such as the truffle, which is in repute among lovers of delicious food. It is found some inches below the surface of the ground; dogs and pigs are regularly trained and employed in France to find them out. The morell is another that is so highly esteemed as sometimes to reach the extravagant price of one shilling an ounce. In Germany the demand for morells was once so great that the peasants burnt

down the forests in great tracts on account of burnt soil producing large crops, until a law was passed to put an end to so ruinous a practice. 7. Hymenomycetes, or naked fungi, includes the largest-sized and most useful and numerous species. In them the spore-bearing part called the hymenium is the most prominent object. The plant in this class consists of a stem and cap. The mushroom has no root ; under the cap are gills, tubes, pores, and spines that bear the spores. One of the sub-orders, Agaricus, contains at least a thousand species, of which two hundred are edible. If the soil at base of the stem of a mushroom is carefully laid bare, a number of entangled threads like a cobweb are seen : this is the mycelium or branches of the plant. At certain points a little rounded protuberence at first appears, which as it enlarges ruptures, and the young mushroom may be seen with its cap and stem. The membrane which at first enclosed the young mushroom is termed the volva or wrapper, portions of which often remain permanently at the base of the stem ; as the cap grows, its under surface ruptures, leaving in many species a portion attached to the stem in the form of a collar ; this exposes a series of plates like gills, called lamellæ, radiating from the stem ; these gills are covered with the fructifying surface which carries the spores. Our word mushroom is derived from the French *mucheron*, or *mosseron*, given to the St. George's mushroom, which is so highly esteemed in France and Italy, that when dried it sells at 12s to 15s per lb. There is no other country that can vie with Great Britain and Ireland in the vast numbers of edible fungi that may be gathered from one end of the land to the other during all seasons. Our fields and woods literally teem with them, but they are overlooked, or suspected and avoided. Instead of the one or two species that appear in our markets, there are upwards of fifty which might be easily discriminated, the majority of which are equal, and some superior, to the common mushroom. To see, and to learn the name at the same time, as is done on such an excursion as the annual fungus foray into Epping Forest, is the only sure way to distinguish a poisonous from an edible fungus.

There is no magic method of saving the trouble of learning. However, if on tasting a fungus it burns the tongue, it is probably not good for food; but if it has a pleasant smell like fruit, spice, or new flour, it is worth a trial. A little prudence and moderation should be observed in eating fungi. Only young, fresh, and sound specimens should be gathered for the table. Instances were mentioned of persons who, by ignorance or thoughtlessness, had been injured or poisoned by unwholesome fungi, and attention was drawn to Mr. Worthington Smith's accurately drawn and coloured sheets, one giving the dangerous sorts, and the other the common edible kinds, with which as a guide it would be scarcely possible to make a mistake. In Italy, where the common mushroom is as abundant as in England, it is despised and seldom offered for sale. One little fungus is celebrated in fairy lore; it forms the peculiar circles of green grass in old pastures known as fairy rings. The legend of the two serving girls of Tavistock was related as an example of the stories connected with fungi. The shining brown toadstool (*Boletus edulis*) has the under side of the cap perforated, as if with pinholes, instead of gills; it is very common, and is excellent eating; it is sold in company with peaches at every street corner in Rome. In Lorraine it is known as the Polish mushroom, because Poles first showed it could be eaten without risk of death. The dry rots which reduce the structures upon which they establish themselves to dust, and against whose ravages no thoroughly effective remedy has yet been found, were illustrated by two species recently collected. The fairy butter, like a rich orange jelly, is common on whins and sticks in woods; it is called *Tremella intestina*, from its resemblance to the human mesentery. The purposes for which these exceedingly numerous and so universally distributed plants were created are not all known to us, but He who makes nothing in vain intends them to serve important ends in the economy of nature. We can, at least, see them reducing decaying substances to a state fitted to minister to the needs of next year's vegetation.

The reader concluded by reminding the audience that he had merely given a few hints of the large, the microscopic, the strange, and the useful and beautitul forms, with which some may desire to make a further acquaintance. Whether it be the disease, or blight, or food-producing divisions, the treasures still unopened are far richer than the uninitiated can imagine. Their observation and collection, and the study of their peculiarities, can furnish ample recreative occupation of a most fascinating nature during the whole year. There are endless elaborately-illuminated pages in God's book of nature ready to be turned by those who thirst for knowledge and think none of God's works too minute and lowly to admire and study. Frequent reference was made during the reading of the paper to a large series of coloured diagrams, specially prepared to illustrate the various orders ; representative forms of each sub-class being shown on the walls.

Some specimens of gilled, corky, leather-like, and bag fungi, together with a large series of microscopic forms, were exhibited at the close of the meeting.

Several members expressed the very great pleasure the paper had afforded them, and asked the reader several questions.

The Chairman said he considered the paper a model one, and suggested that an excursion of the club should be organised, under the guidance of Mr. Lett, for the purpose of a fungus foray to some suitable locality in the neighbourhood. Many members, he had no doubt, would be glad to learn something further of this interesting and useful groups of plants, under such able guidance.

The reader, having thanked the audience for the kind way in which they had commented on the paper, replied to the various queries, and an examination of the specimens concluded the meeting.

The seventh meeting of the Belfast Naturalists' Field Club, was held in the Museum, on Tuesday, 17th April—Mr. John Vinycomb in the chair—an interesting paper was contributed

by Mr. J. J. Phillips, on the ancient uses and military defences of the Anglo-Norman donjon at Dundrum, County Down ; also a brief reference to the Gaedhelic records of earlier structures on the site of the castle. The paper was illustrated by a large number of diagrams, showing the methods of fortifying and defending this fortress, which is unique of its kind in Ulster, and gives record of that peculiar phase of military science which is associated with the engineering genius of Richard Cœur de Lion. It is founded on the crest of a natural ridge, which in Milesian times was utilised as a rath or dun (Dundromara, in Leath Chathail), and which was the site of Bricruid's house, of which we have a description in "Leabhar-na-h-uidhre," the oldest MS. in the Royal Irish Academy. The early records comprised also the narration of the exploits of the Danes at Dundrum and its bay. The Celtic fort underwent a vast transformation early in the thirteenth century by the Anglo-Normans, who here, as well as in other instances in the Lecale, built many of these castles on the ancient raths of the Irish (as at Clough Castle and Bright Castle). This at Dundrum overlooks the plains of the Lecale from St. John's Point to Down Abbey. The donjon never underwent any such structural transformations as the rest of the Anglo-Norman castles in Ulster experienced in the 14th and 15th centuries ; to its tower was never superadded machicolations or crenelles, or any of such constructions on its corona as would guard against the advancing use of fiery missiles. An enlarged sketch was exhibited, showing conjecturally its appearance when it was first inhabited by the Knights Templars ; for we are informed John de Courci constructed it. The wooden galleries were described by which this donjon and the outer wall of *enciente* were fortified, the object being to protect from sap and mine the bases of the walls, and to render escalade more difficult. There are sufficient traces in the fabric of the donjon as well as in the walls of the court yard of the fortress to show that these exterior galleries, known as *bretèhes* or *hourds* originally were comprised in the operations of a siege. This donjon is similar in size, and in many respects corresponds with the

Tour Jeanne d'Arc in Rouen, of which drawings were exhibited. An interesting description of the original uses of the feudal donjon next followed, showing that it was an outcome of the state of the feudal system in which the Baron not merely had to protect himself against his enemy, but also to preserve himself from his treacherous friends, and from his own vassals. Typical instances were illustrated of the great French donjons, and of the English keeps, and the numerous instances of this form of castle to be found in Wales. The other departments of the fortress at Dundrum were then described, such as the large outer barbican, which masked the gateway, and its towers, whose remains we have to this day, evidencing how closely the Irish castle followed the types of the Anglo-Norman. The original fosse was traced, and there was shown the transformations which the site underwent when the Blundells, in 1636, erected on the barbican plateau their mansion, whose ruin is more ruinous than that of the old castle itself, the entire buildings forming one of the most effective groups in the county, and the most interesting. Although now deserted of their owners, and gutted out of all but the dry bones and skeletons of their archæological interest, they retain their picturesqueness and halo of antiquity, thanks to the care of the noble owner, who conserves every portion of these relics of various epochs in the history of Ireland.

The annual meeting of the club was held in the Museum, College-square, on Monday evening—the vice-president, W. H. Patterson, Esq., M.R.I.A., in the chair. The Chairman opened the meeting by a few preliminary remarks on the importance of the meeting, and asked the members to give their earnest attention to the business of the evening, by suggesting such matters as they considered would be of advantage to the working of the society. The secretaries were then called upon to read their annual report, from which it appeared that the past year had been one of quiet progress. Twenty-five new members had been elected during the year, which, after allow-

ing for those lost to the society from various causes, showed an increased membership. Sincere regret was expressed that their president, Lieutenant-General Smythe, R.A., F.R.S., M.R.I.A., had been compelled during the past year to resign office owing to his continued residence from Belfast. The five excursions of the past summer had been well attended. The club had also during the past year the rare opportunity of examining a number of crannogs in Lough Mourne, where they were exposed by the operations carried on by the Belfast Water Commissioners, and a sum of £10 had been granted by the Club to investigate them, under the personal supervision of Mr. S. A. Stewart, the result of which will be embodied in the Club's proceedings.

The winter meetings had been very successful. Nine papers were read, all of which were of much local interest. It was proposed, as the Club now enters upon the 21st year of its existence, to collect as far as possible all letters and papers connected with its early history, with a view of putting them on permanent record.

The treasurer's statement of accounts was then read, which showed a very satisfactory state of finances, notwithstanding the amount granted for investigating the crannogs.

Mr. John Vinycomb, in moving the adoption of the secretaries' and treasurer's reports, congratulated the club on the very satisfactory state of its affairs and upon its coming of age.

The election of officers was then proceeded with. William H. Patterson, Esq., M.R.I.A., was elected president for the ensuing year.

Mr. F. W. Lockwood, in moving his election to the office, referred to his (Mr. Patterson's) long and intimate connection with the club, and to the fact of his being one of the original members, and having been an honorary secretary early in the club's history.

The motion having been seconded by Dr. Luther, was passed unanimously.

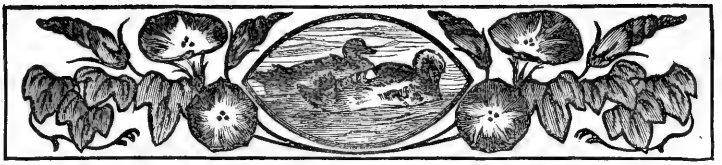
Mr. Patterson, in replying, thanked the members for the honour conferred upon him.

James Moore, M.D., M.R.I.A., Hon.R.H.A., in very kindly and fitting terms, moved that Canon Grainger, D.D., M.R.I.A., another of the earliest and most earnest members, be elected vice-president.

Mr. M'Kee having seconded the motion, it was put to the meeting and passed with applause.

The treasurer, secretaries and committee were then elected; after which the judges appointed to examine and report upon the various collections submitted in competition for the special and club's prizes were heard, the result of which was as follows:—Mr. Wm. Gray, M.R.I.A., was awarded special prize No. 24, for three water-colour drawings of archæological interest; Mr. Charles Bulla was awarded the club's prize for the best collection of carboniferous fossils; the Rev. C. Herbert Waddell, Warrenpoint, gained the prize for the best collection of mosses; Mr. Isaac Waugh was awarded that for the best collection of Lepidoptera; and the Rev. H. W. Lett, M.A., T.C.D., Ardmore, gained the prize for the best set of 25 microscopic preparations; also the prize for the best collection in any department of natural science made at the club's excursions. The subject selected by Mr. Lett was that of mosses.

The examination of the various collections which were displayed in the room, brought the meeting to a close.



METEOROLOGICAL SUMMARY FOR 1883.

—o—

THE want of easy access to tables giving a summary of the meteorological phenomena of the district has often been felt, and a wish has frequently been expressed that such could be included in the Club's Proceedings. To the kindness of Lancelot Turtle, Esq., Aghalee—who has been a careful observer for a number of years—we are indebted for the liberty of inserting the following exhaustive series of tables for the year 1883.

The observatory at which the records are made is situate at Aghalee, in the extreme southern point of the County of Antrim, at an elevation of 130 feet above sea-level. The country to the west is flat, and very little above the level of Lough Neagh, which is 2½ miles distant in that direction, and to other points the country is gently undulating and well wooded. The nearest mountains are those surrounding Belfast, distant about 12 miles east, while the Tyrone Mountains are about 25 miles west. The nearest point of sea is the upper end of Belfast Lough, while the open sea may be said to be about 20 miles east of the observatory.

REVIEW OF THE WEATHER OF 1883.

METEOROLOGICAL Observations for the year 1883, taken at Aghalee, County Antrim. Latitude, 54° 31′ 15″; longitude, 5° 16′ 0′ W.

1883.	BAROMETER 130 Feet above Sea Level. Corrected and Reduced to 32 degrees Fahrenheit and mean Sea Level.				SHADED SELF-REGISTERING THERMOMETER in a "Stevenson" Stand.										HYGROMETER at 9 a.m.	
	Max.	Min.	Mean.	Range.	Highest of the Month.	Lowest of the Month.	Mean Maximum.	Mean Minimum.	Mean Temperature of the Month.	Greatest daily Range.	Monthly Range.	Nights below 32 Deg. on the grass.	Maximum Black Bulb in vacuo, 4 feet above grass.	Mean Amount of Solar Radiation.	Mean of dry Bulb.	Mean of wet Bulb
	Inches.	Inches.	Inches.	Inches.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.					
January.....	30·402	28·770	29·689	1·632	53	24	44·84	35·93	40·38	18	29	12	89	26·22	41·5	39·9
February.....	30·724	28·852	29·831	1.872	53	29	46·07	36·28	41·17	21	24	11	97	29·53	42·7	40·4
March	30·737	29·107	29·973	1·830	52	24	44·48	31·06	37·96	25	28	23	110	42·97	39·4	36·9
April.....	30·562	29·156	29·954	1·405	64	29	55·93	38·07	47·00	32	35	9	124	48·73	47·4	43·4
May.....	30·307	29·103	29·844	1·204	69	29	59·64	41·55	50·60	32	40	5	125	49·96	52·5	47·0
June	30·390	29·546	29·967	0·744	74	41	66·43	48·23	57·33	29	33	0	136	52·03	57·4	52·4
July	30·280	29·221	29·789	1·069	74	41	57·64	49·74	57·64	32	33	0	130	61·65	58·2	53·9
August.....	30·286	29·017	29·825	1·269	75	43	65·77	51·29	58·53	25	32	0	130	47·26	59·6	55·3
September...	30·255	29·175	29·790	0·080	72	39	62·03	48·66	55·34	26	33	0	126	43·17	56·5	53·5
October.....	30·491	28·791	29·851	1·700	65	30	54·64	42·13	48·39	21	36	2	114	34·56	49·4	47·2
November...	30·264	28·654	29·757	0·610	57	20	45·67	35·17	40·42	22	37	13	98	31·40	42·3	40·8
December ...	30·636	29·494	30·124	1·142	53	26	44·42	36·13	40·24	18	27	11	81	19·74	40·8	39·4
Totals.....	365·334	348·886	358·394	14·557	761	375	647·56	494·24	575·00	301	387	86	1360	486·22	587·7	550·1
Means	30·444	29·074	29·866	1·213	63·4	31·2	53·10	41·19	48·00	25·1	32·2	7·2	113·13	40·51	49·0	45·8

1883.	Dew Point.	Comparative humidity Saturation—100—	Elastic Force of Vapour.	Mean Amount of Ozone.	WIND. Number of Days the Wind blew from the following points at 9 a.m.									Rainfall-Gauge. Diameter of Receiver, 5in.; height above the ground, 1 foot; height above sea, 105 feet.			
					N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Total depth in inches.	Greatest fall in 24 hours. Inches.	Greatest fall in 24 hours. Date.	Number of days rain.
			Inches.														
January.....	37·9	88	0·229	5·3	0	0	3	9	4	6	7	1	1	3·08	0·63	26th	21
February.....	37·6	83	0·226	6·1	1	0	0	1	6	8	10	2	0	2·75	0·41	1st	18
March	33·7	80	0·193	6·8	3	1	4	1	2	0	3	7	5	1·16	0·52	29th	11
April.....	39·0	74	0·238	8·0	5	1	5	2	6	3	3	3	2	1·34	0·45	26th	8
May.....	42·3	71	0·270	9·0	4	3	2	0	1	4	6	9	2	1·60	0·35	28th	9
June	47·9	70	0·334	9·1	5	0	7	2	5	2	2	5	2	1·42	0·25	8th	12
July...	50·0	70	0·362	8·1	4	0	1	6	4	0	2	13	1	3·88	1·34	4th	16
August.....	51·5	75	0·381	7·5	0	0	1	0	3	5	10	12	0	4·19	1·91	12th	14
September...	50·7	81	0·371	7·3	4	1	5	5	2	2	1	10	0	4·36	1·05	28th	14
October.....	44·9	85	0·299	7·0	5	0	0	1	4	5	7	6	3	3·00	0·54	24th	15
November...	39·0	82	0·238	6·6	2	0	3	2	2	4	7	8	2	3·64	0·64	15th	17
December...	37·6	89	0·226	5·7	2	0	0	4	2	4	10	7	2	1·50	0·24	10th	21
Totals.....	512·1	948	3·367	86·5	35	6	31	33	41	43	68	83	20	31·92	8·32		176
Means	42·7	79	0·280	7·2	2	0	2	5	3	0	6	2		Direction of Wind on calm days.			

Review of the Weather of 1883—*Continued.*

Comparison of Annual Temperature.

	Highest. Deg.		Lowest. Deg.		Mean Temperature. Deg.
1869	82 on the 17th	July	15 on the 28th	December	48·80
1870	86 on the 10th	Aug.	5 on the 24th	December	48·68
1871	80 on the 8th	Aug.	19 on the 15th	December	48·98
1872	77 on the 18th	July	23 on the 30th	December	49 05
1873	81 on the 22nd	July	15 on the 24th	February	48·52
1874	84 on the 18th	July	20 on the 17th	December	49·31
1875	77 on the 29th	July	22 on the 9th	December	49·43
1876	94 on the 16th	July	20 on the 20th	February	48·84
1877	79 on the 20th	June	25 on the 19th	March	48·94
1878	84 on the 22nd	July	10 on the 25th	December	48·54
1879	81 on the 11th	Aug.	14 on the 12th	January	45·51
1880	83 on the 12th	Aug.	17 on the 21st	December	48·82
1881	83 on the 31st	May	4 on the 22nd	January	47·28
1882	85 on the 10th	Aug.	11 on the 14th	December	48·67
1883	75 on the 24th	Aug.	20 on the 15th	November	48·00
Total	1231		240		727·37
Mean	82·07		16·00		48 69

Comparison of Annual Rainfall.

	Inches.	No. of days Rain.
1869	28·82	181
1870	28·86	170
1871	30·18	176
1872	47·09	222
1873	31.94	178
1874	30·03	170
1875	33·63	172
1876	38·33	174
1877	41·68	229
1878	30·02	175
1879	35·60	182
1880	30·11	150
1881	36·49	201
1882	39·59	219
1883	31·92	176
	514·29	2775
* Mean	34·28	185

Lancelot Turtle.

* Mean temperature of the year, 0·69 deg. below the average. Rainfall, 2·36 in. below the average.

RULES

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club, and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form

the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursion to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the members present.

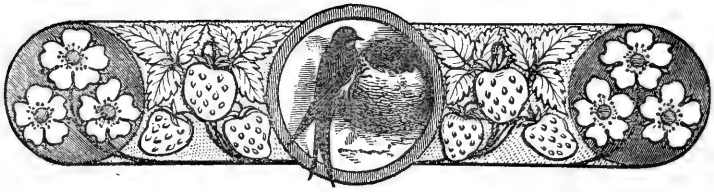
V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

TWENTY-FIRST YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31st, 1884 :—

I.	Best Herbarium of Flowering Plants, representing not less than 250 Species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 Species,	...	0	10	0
III.	Best Collection of Mosses,	... ...	0	10	0
IV.	,, ,, Seaweeds	... ...	0	10	0
V.	,, ,, Ferns, Equiseta, and Lycopods	... ...	0	10	0
VI.	,, ,, Tertiary and Post Tertiary Fossils,	... ...	0	10	0
VII.	,, ,, Cretaceous Fossils,	...	0	10	0
VIII.	,, ,, Liassic do.	...	0	10	0
IX.	,, ,, Permian do.	...	0	10	0
X.	,, ,, Carboniferous do.	...	0	10	0
XI.	,, ,, Older Palæozoic do.	...	0	10	0
XII.	,, ,, Fossil Plants,	...	0	10	0
XIII.	,, ,, Marine Shells,	... ...	0	10	0

XIV.	Best Collection of Land and Freshwater Shells, ...	£0 10	0
XV.	„ „ Lepidoptera, ...	0 10	0
XVI.	Best Set of 25 Microscopic Slides, ...	0 10	0
XVII.	Best Collection of Archæological Objects, ...	0 10	0
XVIII.	„ „ Crustacea and Echinodermata, ...	0 10	0
XIX.	„ „ Coleoptera, ...	0 10	0
XX.	„ „ Geological Specimens, illustrative of the Mineral Resources of the Province of Ulster, ...	1 0	0
XXI.	Best Collection of all or any of the above Objects, collected *at the Excursions* of the Year, ...	0 10	0
XXII.	Best Field Sketches appertaining to Geology, Archæology, or Natural History, ...	0 10	0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXIII. Mr. William Swanston, F.G.S., offers a Prize of 10s 6d for the best Two Studies, illustrative of Geology, contributed to the Club's Album. The subjects must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 × 9 inches.

XXIV. A Prize of 10s given by the late Mr. J. W. Murphy, for the best collection of Recent Sponges, the conditions being the same as those for Prizes 1 to 10.

XXV. Lieut-General Smythe, R.A., F.R.S., M.R.I.A., &c., offers a Prize of £1 1s for the best list of names of places in Counties of Antrim and Down (not hitherto published) giving their Irish meaning and derivation, on the plan of Dr. Joyce's "Irish names of Places."

XXVI. The Rev. H. W. Lett, M.A., T.C.D., Ardmore, Lurgan, offers a prize of 10s for the best collection of Fungi (Macro and Micro) representing not less than 100 species. The conditions the same as for Prizes 1 to 20, except that the names of species will not necessarily be required. Collectors may send (post paid, from time to time during the season) their specimens to Mr. Lett, who will record them to their credit.

N.B.—The Sketches and Drawings to be Competitors' own Work.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

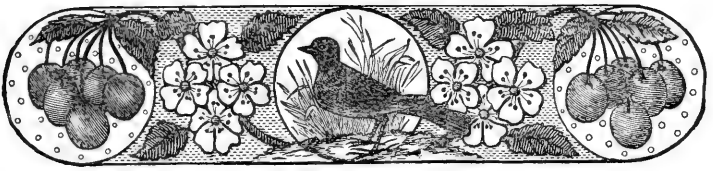
No Competitor to be awarded the same Prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All Collections to be made personally during the Session, in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and Classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitor's own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.



NOTICE.

EXCHANGES OF PROCEEDINGS.

THE Committee of the Club acknowledge with thanks the receipt of the following publications, which have been received during the past year :—

Berwickshire Naturalists' Club.
Proceedings. Vol. X., No. 1.

Canadian Institute, Toronto.
Proceedings. Vol. 1, Fasciculus, 4 and 5.

Cardiff Naturalists' Society.
Report and Transactions. Vol. XIV.

Dublin—Royal Geological Society of Ireland.
Journal. New Series. Vol. VI., Part 2.

Edinburgh Botanical Society.
Transactions and Proceedings. Vol. XIV., Part 3.

Essex Field Club.
Transactions. Vol. III., Part 7.

Glasgow—Natural History Society of.
Proceedings. Vol. V., Part 2.

Leeds Philosophical and Literary Society.
Annual Report—1882-83.

Liverpool Naturalists' Field Club.
Proceedings—1882-83.

Liverpool Geological Association.
Transactions. Vol. III., 1882-83, and Annual Report, 1883.

Liverpool Geological Society.
Proceedings. Vol. V., Part 4.

London—Geologists' Association.
Proceedings. Vol. VIII., No. 3.

Manchester Scientific Students' Association.
Report and Proceedings—1882.

New Brunswick Natural History Society.
Bulletin, No. 2.

Plymouth Institution and Devon and Cornwall Natural History Society.
Annual Report and Transactions. Vol. VIII., Part 2.

Practical Naturalist. (Ward & Riley, Bradford.)
Vol. I., Parts 1 to 7—1883.

Penzance Natural History and Antiquarian Society.
Report and Transactions—1882-83.

Scientific Roll (Alexander Ramsey, Esq., F.G.S., author).
Vol. I., No. 2—Climate.

U.S.A.—Philadelphia Academy of Natural Sciences.
Proceedings. Parts 1, 2, 3, 1882, and Part 1, 1883.

„ New York—American Museum of Natural History.
Annual Report, 1883, and Bulletin. Vol. I., Nos. 2, 3, 4.

„ Washington—Smithsonian Institution.
Annual Report—1881.

Wiltshire Archæological and Natural History Magazine.
Vol. XXI., Part 61—1883.

Carcinologiske Bidrag til Norges Fauna.
Af. G. O. Sars.

Monographi. Mysider—Christiania—1879.

Presented by the Foreign Literary Exchange of Norway.

BELFAST NATURALISTS' FIELD CLUB.

—o—

TWENTY-FIRST YEAR, 1883-84.

—o—

LIST OF OFFICERS AND MEMBERS.

President:
W. H. PATTERSON, M.R.I.A.

Vice-President:
REV. CANON GRAINGER, D.D., M.R.I.A.

Treasurer:
JOSEPH WRIGHT, F.G.S.

Secretaries:
WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

WILLIAM A. FIRTH.

WILLIAM GRAY, M.R.I.A.

REV. H. W. LETT, M.A., T.C.D.

S. M. MALCOLMSON, M.D.

DR. JAMES MOORE, M.R.I.A., *Hon.* R.H.A.

GEORGE O'BRIEN.

DANIEL M'KEE.

J. J. PHILLIPS.

HUGH ROBINSON.

S. A. STEWART, F.B.S., Edin

Members.

Any Changes in the Addresses of Members should be notified to the Secretaries.

Charlton B. Aickin, Murray's Ter.
Miss Alder, Kinnegar, Holywood.
W. J. C. Allen, J.P., Faunoran, Whiteabbey.
Edward Allworthy, Langford Villa.
John Anderson, J.P., F.G.S., Hillbrook, Holywood.
Robert Anderson, Meadowlands, Balmoral.
W. C. F. Anderson, M.A., Springbank, Dunmurry.
John J. Andrew, L.D.S., F.R.C.S., Eng., Belgravia, Lisburn Road.
Samuel Andrews, J.P., Seaview.
Mrs. Andrews, Seaview.

James M. Barkley, Mountpottinger.
Robert Barklie, F.C.S., Moffatt's Terrace, Holywood.
James Barr, Sandringham.
William Batt, Ormeau Road.
J. W. Beck, M.D., Claremont Ter.
Geo. R. Begley, Wolfhill, Ligoniel.
Miss Begley, Wolfhill, Ligoniel.
Miss Sarah J. Begley, Wolfhill, Ligoniel.
E. H. Bell, Knockdara, Strandtown.
George E. Bell, Wellington Park.
James Best, Great Victoria Street.
Edward Bingham, Twickenham St.
A. W. Blackwell, Wandsworth Villas.
W. J. Boucher, Mountpottinger.
Davys Bowman, University Street.
Charles H. Brett, Gretton Villa, South, Malone Road.
James Berkley Bristow, St. James's Parsonage, Antrim Road.
John Browne, J.P., Ravenhill.
John Browne, M.R.I.A., Drapersfield, Cookstown.
W. W. Brydon, Greenisland.
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Holywood.
William Butler, Windsor Crescent.

J. Campbell, Rathfern, Carnmoney.
R. G. Campbell, Rathfern, Carnmoney.
Wm. Campbell, F.P.S., Ponsonby Avenue.
Miss Carruthers, Claremont Street.
William Chambers, Wellington Pl.
E. T. Church, Donegall Place.
J. C. Clarke, Dunedin.
William Clibborn, Windsor Terrace.
Sir Ed. Coey, J.P., D.L., Merville.
Miss Connery, Mountcharles.
David Corbett, Coolavin.
W. F. C. S. Corry, Chatsworth.
Major J. Sharman Crawford, J.P., D.L., Crawfordsburn.
Elisha Crawford, Fortwilliam Park.
James Creeth, Riversdale Terrace, Balmoral.
Wm. M. Cunningham, Sydenham.
Francis Curley, Dunedin.
Mrs. Curley, Dunedin.

Rt. Hon. Lord Dufferin and Clandeboye (Hon. Mem.).
John H. Davies, Glenmore, Lisburn.
Henry Davis, Linenhall Street.
Robert Day, F.S.A., M.R.I.A., Cork.
Ed. O'Rorke Dickey, Castleton Ter.
George Donaldson, Church Street.
Charles Dundee, Carnmoney.
Robert Dunn, Queen's Square.
W. A. Dunn, M.R.C.S.E., Ormeau Road.

Charles Elcock, Hughenden Terrace, Cavehill Road.
Lavens M. Ewart, Glenbank, Ligoniel.

William Faren, Mountcharles.
Stephen Feary, Cameron Street.
W. J. Fennell, Chichester Street.
J. H. Ferguson, Longford Villas.
Godfrey W. Ferguson, Fisherwick Place.

Joseph Firth, Whiterock.
Wm. A. Firth, Whiterock.
Thomas Fitzpatrick, B.A., T.C.D., Adela Street.
T.M. H. Flynn, Sunnyside, Bessbrook
Thomas Fraser, Wellington Park.

D. C. Gillespie, Macleary Cottage, Coleraine.
R. M. Gilmore, Portstewart.
W. J. Gilmour, Clanchattan House, Limestone Road.
Wm. Gilmore, Diamond, Coleraine.
George Greer, Woodville, Lurgan.
Miss Sara T. Greer, Seville Lodge, Strandtown.
Edward Gregg, Wilmont Place.
John Starkie Gardner, F.G.S., M.G.S., France, Daner Terrace, Chelsea, London (Hon. Mem.).
D. Corse Glen, F.G.S, Annfield Place, Glasgow.
George J. Glenn, Stranmillis Road.
G. T. Glover, Holywood.
Major Goldsmid, Cliftonville.
James J. Goskar, Carlisle Circus.
Jas. Gourlay, Derryboy, Killyleagh.
Robert Graham, Cliftonville.
Rev. Canon Grainger, M.A., D.D., M.R.I.A., Broughshane (Cor. Mem.).
Rev. James Graves, M.R.I.A., Inisnaig, Stoneyford, Co. Kilkenny (Cor. Mem.).
Wm. Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
Miss Frances Gray, Mountcharles.
Joseph T. Gumersall, Lisburn.

W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
W. J. Hammond, Donegall Street.
Thomas Hampton, Fitzwilliam St.
John Hammond, University Street.
James S. Hull, Crumlin Place.
Mann Harbison, Ravenhill Terrace.
Adam Harbison, Ravenhill Terrace.
John Harrison, Gardiner's Hill, Cork
W. Harte, C.E., Buncrana (Cor. Mem.).
Rev. E. J. Hartrick, A.M., Ballynure.
Jas. Haslett, J.P., Princess Gardens.
F. A. Heron, Clermont, High Holywood.
Mrs. Heron, Clermont, High Holywood.
James S. Hull, Crumlin Place.
J. Sinclair Holden, M.D., F.G.S., Sudbury, Suffolk.
Alex. Hunter, Northern Bank.
Miss Hunter, University Street.
Wm. J. Hurst, Drumaness, Lisburn.

James Imrie, Fitzroy Avenue.
Rev. Richard Irvine, D.D., Hampton, Windsor.

John Jaffe, Edenvale, Strandtown.
Mrs. Jaffe, Edenvale, Strandtown.
Hugh Jamison, Duncairn Terrace.
R. M. Jennings, Cork (Cor. Mem.).
James Johnston, West Elmwood.
W. J. Johnston, J.P., Dunesk.

Robt. Kent, Dunedin, Antrim Road.
Wm. Kernahan, Antrim Terrace
George Kidd, Suffolk, Dunmurry.
Henry Knight, Antrim Villa, Weston Super-Mare.
W. J. Knowles, Ballymena.
Robert A. Kyle, Richmond.

W. W. Lamb, Divis View.
Prof. Chas. Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem).
F. R. Lepper, Avonmore, Derryvolgie.
Rev. H. W. Lett, M.A., T.C.D., Ardmore Glebe, Lurgan.
James Logan, Donegall Street.
Joseph F. Lewis, Lothair Avenue.
F. W. Lockwood, Wellington Park.
W. B. Lowson, Chichester Park.
Dr. Luther, Chlorine House.

John Mackenzie, Balmoral.
Henry Magee, Eglantine Avenue.
Rev. J. J. Major, Belvoir Hall.
Greer Malcolmson, Fitzroy Avenue.
Jas. Malcolmson, Rosemount, Knock.
Mrs. Malcolmson, Rosemount, Knock.

Samuel Murphy Malcolmson, M.D., Great Victoria Street.
John Marsh, Richmond.
Mrs. Marsh, Richmond.
J. C. Marsh, Castleton Terrace.
Rev. James Martin, Eglintoun.
Mrs. Martin, Eglintoun.
A. S. Merrick, M.D., Belfast District Asylum.
James Meneely, Calender Street.
John Moore, M.D., Carlisle Terrace.
David Morrow, Lillislea, Cultra.
John Morton, Clifton Park Avenue.
J. R. T. Mulholland, J.P., Northumberland Street.
James Murdoch, Denmark Street.
Joseph John Murphy, F.G.S., Osborne Park.
J. R. Musgrave, J.P., Drumglass.
Fras. P. M'Clean, Huntly Villas.
James M'Clenahan, Tennant Street.
Samuel M'Cloy, Cromwell Road.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London (Cor. Mem.).
Sir Thomas M'Clure, Bart., M.P., Belmont.
W. J. M'Clure, Divis Street.
James M'Connell, Caledonia Ter.
John M'Connell, Benvista
E. J. M'Ervel, Elmwood Avenue.
Rev. Canon MacIlwaine, D.D., M.R.I.A., Mountcharles.
John MacIlwaine, Sydenham.
Mrs. MacIlwaine, Sydenham.
Mrs. M'Ilrath, Dunluce Street.
Daniel M'Kee, Adela Place.
W. S. M'Kee, Fleetwood Street.
A. Mac Laine, J.P., Queen's Elms.
Wm. M'Millen, Loy House, Cookstown.
Arthur Mussen, Rubicon, Lisburn.
Mrs. Mussen, Rubicon, Lisburn.
Thos. J. M'Conkey, York Street.
Hugh M'Elwee, Annesley Street.
T. J. M'Mahon, Northcote Villa, Knock.

Lucien Nepveu, Fitzwilliam Street.
William Nicholl, Adela Street.
Rich. Niven, Chrome Hill, Lisburn.

Wm. Oke, Portstewart.
Thos. Edens Osborne, Pier, Cultra.
George O'Brien, Botanic Avenue.
Joshua O'Brien, Botanic Avenue.
W. D. O'Brien, Botanic Avenue.
F. H. O'Flaherty, Fitzroy Avenue.
Mrs. O'Flaherty, Fitzroy Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
Rev. Jas. O'Laverty, P.P., M.R.I.A., Holywood.
James O'Neill, College Sq. East.
Graham L. Owens, Victoria Street.

D. C. Patterson, Cultra.
Robert Patterson, Kilmore, Holywood.
R. Lloyd Patterson, J.P., Croft House, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Strandtown.
George Pelan, Kinnaird Terrace.
Jas. J. Phillips, Holywood.
W. H. Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, Bonavon, Antrim Road.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
T. W. Pim, The Lodge, Strandtown.
Thomas Polley, Fitzroy Avenue.
Wm. E. Lloyd Polly, Fitzroy Av.

Jos. Radley, Prospect Hill, Lisburn.
William Rankin, York Street.
John Rea, M.D., Gt. Victoria Street.
Jas. Theodore Richardson, Glenone, Lisburn.
Miss Emily J. Robb, King Street.
Rev. George Robinson, Armagh.
R. Ross, M.D., Wellington Place.
Hugh Robinson, Donegall Street
Mrs. Robinson, Donegall Street.
Jas. R. Robinson, St. Helen's Ter.
W. A. Robinson, J.P., Crofton, Holywood.
Mrs. Rowland, University Street.
Richard Riding, Hampton Terrace, Lisburn Road.
Robert Russell, Wilmont Terrace.
Charles C. Russell, Campmar Villa, Newtownards.

Thos. Shaw, Pine Lodge, Sydenham.
Mrs. Shaw, Pine Lodge, Sydenham.
James Shanks, Ballyfounder, Portaferry.

Catpain Simonet, Jersey, Channel Islands.
Wm. J. Simpson, George's Terrace.
Chas. Smith, F.G.S., Barrow-in-Furness.
Edward Smith, Chichester Terrace.
F. W. Smith, Elmwood Terrace.
George K. Smith, Meadow Bank, Whitehouse.
Wilson Smith, Virginia Street.
Rev. Geo. C. Smythe, M.A., Coole Glebe, Carnmoney.
Lieut.-Gen. Smythe, R A., F.R.S., Coole Glebe, Carnmoney.
Rev. J. H. Smythe, Fortwilliam.
Adam Speers, B.Sc., Holywood.
Sir N. A. Staples, Bart., Lissan, Dungannon (Life Member).
J. H. Staples, Lissan, Dungannon.
James Stelfox, Gas Works.
J. M'N. Stevenson, Carrickfergus.
Richard Stevenson, Ashley Avenue.
John Stevenson, Linen Hall Street.
S. A. Stewart, F.B.S.Edin., North Street.
Peter Stirling, Queen Street.
R. S. Strafford, Pottinger Terrace.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.
Samuel Symington, Jun., Ballyoran House.
Richard Glasco W. Symes, B.A., F.G.S., Ballymena.

Prof. Ralph Tate, F.G.S., A.L.S., University of Adelaide, South Australia (Hon. Mem.).
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
Mrs. Henry Thompson, Crosshill, Windsor.
George Thomson, Falls Road.
Prof. James Thomson, A.M., LL.D., F.R.S., etc., Glasgow (Hon. Mem.)
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Portrush.
William G. Trelford, Vicinage Park.
James Turner, Mountain Bush.
Jas. G. Turtle, Cambridge Terrace.

John Vinycomb, Mountcharles.
J. W. Valentine, Queen's Square.

Rev. H. C. Waddell, B.A., Warrenpoint.
W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.).
Thos. R. Walkington, Laurel Lodge, Sydenham.
Isaac W. Ward, Collinview Terrace.
J. Ward, F.R.G.S., F.G.S., Lennoxvale.
John S. Ward, Lisburn.
Marcus J. Ward, Royal Ulster Works, Bedford Street.
George Ward, Clonaver.
E. H. Watson, Ardmore, Windsor.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, Clifton Park Avenue.
Robert Walker, Robina Terrace.
Jas. Wilson, Old Forge, Dunmurry.
Louis Werner, Fleetwood Street.
W. Whitla, M.D., College Sq. North.
John Woodside, Jun., Holywood.
Robert Welsh, Lonsdale Street.
T. K. Wheeler, M.D., Clarendon Pl.
Walter L. Wheeler, Lennoxvale.
J. Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
C. Workman, M.D., Balmoral Ter.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thomas Workman, Craigdarragh.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street.
Rev. J. J. Wright, Bloomfield.
S. O. Wylie, Clarendon Place.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

1883-84.

Series II. Volume II. Part IV.

PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES TO MEMBERS 3 -.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

FOR THE

Year Ending 31st March, 1884.

(TWENTY-FIRST YEAR)

SERIES II. VOLUME II. PART IV.

Belfast:
PRINTED FOR THE CLUB
BY ALEXANDER MAYNE, CORPORATION STREET,
PRINTER TO THE QUEEN'S COLLEGE.

1884

REPORT

OF THE

Belfast Naturalists' Field Club

FOR THE

Year ending 31st March, 1884.

YOUR Committee have again the pleasing duty of laying before you their Annual Report, which on this occasion records the work of the twenty-first year of the Club's existence. Arriving at mature age, it is gratifying to be able to state that at no time was your Society more prosperous, whether we consider its increased membership, its financial position, or the value of the work going on.

The usual number of excursions were held during the past summer, at which the attendance of members was considerably above that of many past years. The suitability of the localities selected no doubt in some measure contributed to this gratifying result ; much more, however, must be attributed to the remarkably fine weather with which they were favoured, as on each of the six excursions it was in every way the most desirable. A fungus foray on the occasion of the excursion to Shane's Castle was a pleasing and, it is to be hoped, an instructive novelty in the summer programme ; it is also one which in other branches of

Natural History might be copied with success. When it is considered that upwards of 120 excursions have now been held by your Club since its commencement, most of them in the immediate neighbourhood of Belfast, it may be thought that the interest in the locality is almost exhausted ; such, however, is far from being the case ; the change of season, or slight alteration in the programme, with the influx of new members, or the giving of more prominence to some special department of research, always adds fresh interest to even familiar scenes.

The following is a list of the places visited, with the dates of each excursion :—

I.—May 12th,	...	..	Giants' Causeway.
II.—June 2nd,	...	...	Cultra and Rockport.
III.—June 23rd,	...	...	Glenavy and Ram's Island.
IV.—July 17th and 18th,		...	Killeavy, Slieve Gullion, and Carlingford.
V.—August 18th,	...	...	Carnmoney and Whiteabbey.
VI.—September 18th,	...	...	Shane's Castle, for a Fungus Foray.

The Winter Session was in every way an admirable one. It was inaugurated early in November by a social meeting, which, though a departure from the familiar conversazione, proved a success, and we trust gave satisfaction to the general members. Seven ordinary meetings were held during the winter for papers, at which nine distinct communications were brought forward. The following is a list, and summaries of them, together with notices of the excursions, will appear in your Proceedings :—

I. 13th Nov.—Social Meeting—Various Short Communications.

II. 13th Dec. { "Notes on Antiquities in Mayo, Galway, and the Arran Islands," by Mr. Charles Elcock.

III. 1, 22nd Jan { "A bit of Groundsel examined Microscopically," by Rev. H. W. Lett, M.A., T.C.D.

2, „ { "Magilligan Strand after a Storm," by Canon Grainger, D.D., M.R.I.A.

IV. 19th Feb.—"A Recent Trip to America," by Mr. John Marsh.

V. 26th Feb.— do., Second part, do.

VI. 18th Mar. { "Ants—Illustrated by Diagrams and Formicaria," by Mr. Charles Bulla.

VII. 8th April. { "The Age of the Basalts of the North-East Atlantic," by Mr. J. Starkie Gardner, F.G.S., M.G.S. France.

VIII. 1, 24th Apr { "Notes on some Objects in the Loan Museum of the Cork Exhibition," by Mr. Robert Day, F.S.A., M.R.I.A.

2, „ { "On certain Forms of Flint Implements, and their connexion with the Mammoth, in the North-east of Ireland," by Mr. Wm. Gray, M.R.I.A.

IX. 29th Apr.—Annual Meeting.

During the past year, thirty-seven new members were elected, a number which, after allowing for losses from all sources, will leave a substantial addition to your roll of membership. Among the losses which your Club has sustained during the past year, it is with sincere regret your Committee refer to the death of Dr. James Moore, M.R.I.A., Hon. R.H.A., whose active interest in promoting the Club's aims extended over a long period of its history.

Your Committee have again to express, on behalf of the Society, their thanks to all who have contributed to the success or pleasure of your excursions, and would especially mention Thomas Workman, Esq., Craigdarragh, and the Rev. George C. Smythe, Carnmoney, for their kindness and hospitality to the large parties who attended on the occasion of the excursions to their respective neighbourhoods. Your Committee would also avail itself of this opportunity of thanking Lancelot Turtle, Esq., Aghalee, for his kindness in furnishing the valuable Meteorological Summary appended to the last part of your Proceedings, an addition which, no doubt, will prove useful to the members.

Your Committee regret the delay in issuing the last part of your Proceedings, and beg to impress upon members who are responsible for abstracts of papers, or drawings intended for insertion, the necessity of furnishing same to your Secretaries as soon as possible after the Annual Meeting, in order to facilitate them in having the work carried early through the press.

The collections submitted in competition for the Club's prizes are as follow :—

I.—A series of Fossil Plants, sent in by Mr. S. A. Stewart, F.B.S. Edin., in accordance with Prize 12. Your Committee are unanimous in awarding Mr. Stewart the Prize, and are very

pleased to learn that the specimens form part of a set intended to enrich the collections of the Museum of the Natural History and Philosophical Society.

II.—The Rev. C. H. Waddell submitted a collection in accordance with the terms offered by Rev. H. W. Lett for Fungi. Mr. Lett reports that the collection consists of 158 species, and therefore is well entitled to the prize.

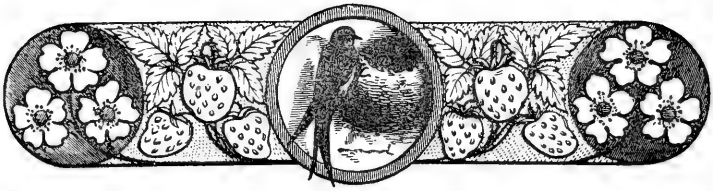
Your Committee have pleasure in acknowledging the continued receipt of the Proceedings of a number of other societies in exchange for those of the Club, and also, per W. Gray, Esq., M.R.I.A., the receipt of a series of Reports of the Board of Works, containing the reports of their architect upon the restoration and preservation of the various ancient monuments under the care of the Board ; these will form a valuable addition to the Club's Library.

Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1882-3	...	...	...	£57	9	8	By Expenses of Conversazione	£8	0	2
,, Subscriptions—253 at 5/-	...	...	...	63	5	0	,, Printing Annual Report	15	5	6
,, Rev. H. W. Lett (prize)	...	...	...	0	10	0	,, Advertising, Printing, and Stationery	13	12	8
,, Interest	...	...	...	0	8	6	,, Delivery of Circulars	1	10	0
,, Guide Account ...	...	...	...	3	5	8	,, Postages	3	18	10
							,, Loss on Excursions	0	13	3
							,, Album	5	2	6
							,, Museum Expenses	8	8	0
							,, Prizes	1	0	0
							,, Insurance on Books	0	11	6
							,, Balance on hands	66	16	5
			£124	18	10			£124	18	10

Audited and found correct,
JOHN VINYCOMB.

JOSEPH WRIGHT, *Treasurer.*



SUMMER SESSION.

The following Excursions were made during the Summer Session:

On 12th May, to

PORTRUSH AND GIANTS' CAUSEWAY.

The Twenty-first Summer Session was opened on Saturday, 12th May, by an excursion to Portrush and the Giants' Causeway. Assembling at the Northern Counties terminus, a party of upwards of twenty set off by the 9-50 train, the day promising to be one of sunshine and shower. The monotony of the railway journey was unbroken by any unusual event. Arriving at Portrush, and seated in the open carriage of the Portrush and Giants' Causeway Tramway Company, drawn by one of their neat locomotives, the party were in a few minutes on their way to the depot, turning the sharp curve at the monument with a rapidity rather startling to those unaccustomed to narrow-gauge lines. W. A. Traill, Esq., the Engineer of the line, kindly invited the company to examine the works before starting on their journey. The buildings are substantial and commodious, well designed to meet even anticipated wants, and contain all the requirements necessary to maintain the line and its rolling stock. In an enclosed portion of the building is situated the powerful dynamo and the engine set apart to work

it. The party having assembled around this new generator of force, Mr. Traill briefly and clearly explained its working; after which the steam was turned on the engine, setting the wonderfully smooth running dynamo in motion at a speed of about 600 revolutions per minute. The cable transmitting the electric current was then traced from the building, underground to the electric rail outside. To the uninitiated viewing the front of the works this rail might easily be mistaken for a simple guard to protect the tramline from trespass, as it rests upon supports about eighteen inches from the ground; its position along the roadside would, however, be rather puzzling, situated as it is between the inner rail and the bottom of the hedge bank. The connection between the cable and this rail was pointed out, and it was shown that on the dynamo being set in motion a most powerful current was established throughout its length. The electric car was ready in position for the party. Before entering, however, the method by which this electric current was transmitted as rotatory motion to its wheels was explained. Hidden below its floor, and carefully boxed in, is a second dynamo machine, similar in construction to that in the depot, but mounted to suit the altered and necessarily contracted position it occupies. In contact with this hidden dynamo are two steel arms, which project from that side of the car next the insulated electric rail; these terminate in carriage-spring-like contrivances called brushes, which rest lightly on the flat top of the electric rail, thus completing the current between the two dynamos, and setting up a sympathetic motion in the one under the car, the detail in conveying which to the carriage wheels remains simply a question of mechanics. The car itself is open and admirably suited for excursion parties, affording, as it does, an uninterrupted view. With a load of twenty-three persons the current was made, sparks were observed playing about the brushes, and off the car glides with a steady, pleasant motion—no soot flights from locomotive funnel to distract attention, nor over-worked horses to evoke sympathy from the passenger and mar his pleasure. A slight hissing,

caused by the smoothly-gliding brushes on the rail at the side, is the only sound perceptible. The journey to Dunluce was accomplished in good time, the steep incline and heavy load testing the new car thoroughly. The electric rail being only completed so far as Dunluce, the passengers are here transferred to the ordinary cars and the journey completed to Bushmills, the present terminus of the line, by steam power, the portion between Bushmills and the famed Causeway having still to be done by Irish cars.

It was regretted that time would not permit of a visit to the works on the Bushwater in connection with the electric working of the line. Powerful turbines are there being erected to utilise the water-power for working the dynamos, and it is anticipated that, by the time they are ready for work, the electric rail will also be completed throughout the entire length of the line.

Arriving at the Causeway, a hurried meeting was called—the Vice-President (Canon Grainger, D.D., M.R.I.A.) presiding. Some announcements were made by the Hon. Secretary, and a new member was elected, after which the party proceeded to examine such points of interest as the very limited time at their disposal would permit. A halt was called on the great Causeway, and a member, practically conversant with the various surrounding geological phenomena, kindly gave a brief but concise description of the different lava outflows exhibited in the cliffs, &c. The many-jointed columns of the marvellous Causeway never fail to interest the visitor, although the first view of the world-famed structure may, and frequently does, cause disappointment to the travelled stranger, who has, perhaps, pictured to himself something much more stupendous and imposing.

These irrepressible guides, with their senseless jargon of geometry, geology, and superstition, could their energies not be more profitably directed? In their dull seasons could they not be employed in making of passable pathways for the better opening up of the wonders and beauties of the place to visitors?

Few who have once attempted it would again wish to lead a party of ladies to the "organ" or guide them by the shepherd's path to the "amphitheatre"; yet these and the views from the cliffs, perhaps the most impressive scenes on the coast, are almost unapproachable with comfort for want of a few days' labour in the year. Our Scottish friends at Staffa know better. There you are surprised to find substantial stairs down the cliff face, and strong hand rails to guard one from mishap. Much is there seen with comfort, and the pleasure is thereby enhanced to the visitors, with the result of profit to those who cater for their enjoyment.

A new era is, however, apparently dawning for this really remarkable locality. The tramway will do much, but it is only a beginning. The Giants' Causeway Hotel has passed into the hands of the same company, and is being entirely remodelled—it is to be hoped in management as well as in fittings. The situation is admirably suited as a centre from which to organise excursions along the coast, and the arrangements should be such as will induce visitors to prolong their stay, and really see as well as *do* the district.

The return journey to Portrush possessed no special feature of interest, the novelty of the electric car being now in some measure overcome. The scenery claimed more attention, and many delightful peeps from the elevated car, which runs so closely to the roadside, were obtained of the deep recesses near the White Rocks. Natural arches and tunnels of chalk, the smooth, hard strand, with the clear swell breaking in white lines along it, form pictures not easily surpassed, and never before were they so easily and safely seen as now, when speeding along in the cars of the Tramway Company. The long railway journey home was, perhaps, the least attractive part of the day's work. All, however, arrived safely at York Road in due time after a very pleasant and profitable day's run.

On 2nd June, to

CULTRA AND ROCKPORT.

The second excursion for the season was to Cultra and Rockport. The 1.30 train from town landed a party of upwards of thirty members and their friends on the platform at Cultra, where they were joined by several others. Proceeding at once to the shore, geology claimed the first attention; here for almost a couple of miles the strata is very varied, and embraces representatives of five distinct geological formations, exhibiting many phenomena. A short distance west of the pier thin bands of Carboniferous Limestone are noticeable, beneath which is a grey shaley band rich in fish remains. The members who were fortunate enough to be possessed of hammers and chisels attacked this vigorously, and soon were handing round slabs showing scales and spines of *Holoptychius*, one of the ancient race of armour-plated fishes, which attained its highest period of development in the old red sandstone or Devonian seas. This limestone band seems to be the lowest carboniferous rock in the neighbourhood, and the rocks of that formation here exposed are supposed to represent the very lowest of that system. Dipping as the beds do seaward at an angle of about forty degrees, the superior zones, if still existing, are lost to view beneath the waters of the lough. It is clear, however, that they do not extend far, as we find on the Antrim side they are replaced by the new red or triassic sandstones. A few yards farther west of this outcrop of limestone the triassic beds are brought in by a fault, the line of which, like most of the fault lines here, is occupied by a basaltic dyke.

After the excitement of the search for fish remains had in some measure abated, a brief notice of the geology of the neighbourhood was read by one of the party, and before leaving the spot Dr. S. M. Malcomson showed a coloured drawing of *Placopsilina cenomana*—a species of foraminifera which he had recently discovered in shore sand gathered a short distance off.

This species is an arenaceous one, and is of comparatively large size for this group of organisms, and it is specially worthy of note, not having hitherto been known to live in British waters. It is also very gratifying to record this discovery to the credit of Dr. Malcomson, who has been most successful in this department of microscopic zoology.

Leaving the limestone bands and following the strike of the beds eastward, past the pier, several zones of the same formation were examined, which yielded additional fossils. The Boulder Clay which covers the beach here is excessively compact, and may in all truth be termed a conglomeritic rock. The geologist of the distant future will surely be delighted with the varied contents of this deposit. Pebbles and boulders of many widely separated formations may here be found imbedded side by side—basalts in vast variety, chalk and flint, fossils derived from the lias, sandstones of many different hues and textures, grits and slates, granites and quartzites, all the debris of past continents and mountain chains. Latest among the rock groups, we owe more of our wealth and prosperity to it than at first sight appears ; to it we are indebted for the softened and rounded outline of our landscape, covering as it does the rocky framework of our hills and valleys, it yields generously to the labours of the agriculturalist, and rewards his toil. The contrast in this respect cannot fail to impress itself upon the visitor to the more rugged, but comparatively barren, areas in the western counties, which have either not been blessed with this kindly covering, or from which it has subsequently been removed by some later geological change.

Crossing several more basaltic dykes, we reached a new set of rocks of a light buff colour. These are the Permian Limestones, brought in here against the Carboniferous beds, upon which they repose, by another fault. Fossils have also been recorded from these beds. They are, however, exceedingly rare, and occur only as impressions or casts. An analysis of these limestones shows about 44 per cent. of carbonate of magnesia, a fact which at one time led to its being exported to Glasgow for chemical purposes.

Many of the ancient buildings in the neighbourhood have derived part of their material from these beds, notably Holywood old church and Carrickfergus Church and Castle. Passing along the beach, the Carboniferous beds may again be seen in somewhat regular order, their outcrop parallel with the shore line. Basaltic dykes are very numerous, and their effects on the sandstones and marls through which they cut was pointed out. Boring mollusca find a suitable habitat in the soft sandstones and shales of this part of the shore. Three species of Pholas were observed, including the rather rare one, *P. crispata*. Several specimens were, after considerable labour in excavating them, secured for examination.

After a stretch of sand and shingle, we reach an entirely different character of rock formation, which must, however, be familiar to every visitor to the County Down coast; they are the slates and grits of Silurian age. It is noticeable where they are sufficiently continuous in their character that they dip at high angles, and in an entirely different direction to the carboniferous beds which recline upon them. Near Craig Owen a series of highly-contorted black shales are exposed. These are known as graptolitic shales, from the profusion in which these curious organisms occur in certain of their zones. They are not, however, here fossiliferous. The black appearance which they represent was stated by one of the members who had analysed them to be due to the large percentage of iron which they contain. While geology and zoology claimed the attention of most of the members, archæology was not neglected. The vice-president of the Club, Canon Grainger, D.D., M.R.I.A., ever on the alert in this department, was giving a good deal of attention to the surface gravels exposed along the banks, and was rewarded by many of the rude flints known as flakes and cores, for which this place is noted. A short halt is made at the sheltered little pier at Rockport, where the business meeting of the day is held—the President, Mr. W. H. Patterson, M.R.I.A., presiding—at which nine members were elected. After the conclusion of the business, the Secretary announced that Mr.

Thomas Workman, one of the earliest members of the Club, had kindly invited the party to his house at Craigdarragh before returning home. The party, therefore, entered the picturesque grounds from the shore, and were met by Mr. Workman. A short time passed rapidly here, examining many objects of interest, especially the large collection of Arachnidæ, the family to which the spiders, scorpions, and allied creatures belong. The investigation of this group has been followed with great success for some time past by Mr. Workman, and his collection, in addition to a large series of British species, contains many interesting examples from Java, Madagascar, Brazil, &c. The company was afterwards requested to adjourn to the dining-room, and invited to partake of a refreshing tea, which was most highly appreciated. The four hours' ramble along the shore having given a keen edge to appetite, ample justice was done to the good things so hospitably provided. A cordial vote of thanks on behalf of the party was moved by the Rev. J. H. Smythe, and seconded by Mr. Mann Harbison, to Mr. and Mrs. Workman for their very great kindness in entertaining the Club on this their second excursion for the year. Mr. Workman in responding, expressed the pleasure it afforded him of receiving the Club in his house, and trusted he would have other opportunities of meeting the members of the Society under similar pleasing circumstances. A walk was then taken in the beautiful grounds, and through the secluded glen. The mode of growth of the ivy here is somewhat unusual, hanging as it does in light festoons over the path and stream, from the branches of the trees, up which it has climbed. This character, together with the remarkable luxuriance of the ferns, &c., gives quite a tropical aspect to the scene. Before leaving the grounds a visit was paid to a prominent point, from which an extended view of the lough can be had. Time would not permit of a prolonged stay. Mr. Workman therefore led the party by way of the house to the railway station, and the short run to town concluded a most enjoyable and instructive programme.

On 22nd June, to

GLENAVY AND RAM'S ISLAND.

The third excursion was made on Saturday, June 23rd, to Glenavy and Ram's Island. The popularity of the route selected was well indicated by the numerous party who found themselves rattling along by the nine a.m. train for Glenavy Station. From thence they made their way, some on cars, but the majority on foot, along the pleasant country lanes which lead down to Sandy Bay, and in due time were bowling along, in the stout fishing boats, before a stiff breeze, for the island. Landed there, a meeting was held, the President of the Club, W. H. Patterson, Esq., M.R.I.A., presiding, when new members were elected, announcements made, and prizes offered for the best botanical collection made on the island.

Ram's Island, originally Inis-Garden, does not figure much in history, but is thought by Dr. Reeves to be the place, somewhere in the vicinity of Lough Neagh, which under a nearly similar name, is several times mentioned in the old MSS. There is another reference in an old document to "the church at Lenneuy (Glenavy) with the chapel." This chapel is thought by Dr. Reeves to have been possibly, or probably, on this island. The sole relic at present to be seen is the round tower ; but if we are to believe the teachings of archæology as now generally interpreted, wherever we find the round tower, there will also be found the other marks of an early ecclesiastical settlement—the small church, the accompanying graveyard, or the saints' house. Of the graveyard there is now no indication, though traces were some years ago reported still visible ; and though the church or oratory has vanished, Dr. Reeves thinks there probably was one. A few excavations might, as in so many other cases, bring to light both. It may be noted that islands have in many instances been selected for the early Christian stations. The round tower is not by any means perfect, but about forty-two feet are still standing. The

diameter is less than usual. The present entrance is by a ragged hole on the south-west side, but there are indications of a built-up opening on the east side, about six feet above the ground, with sloping jambs and a flat stone lintel, which was most likely the original door. This was very small, being only eighteen inches wide and five feet six inches high. This tower, like the one at Drumbo, appears to be of the earliest type, the arch having been nowhere used in its construction, nor are there any traces of ornament to be seen. The tower is built of the basaltic boulders which still thickly strew the beach of the island, and which present to the geologist several interesting problems.

That the high central bank of boulders and clay, with its noble crown of ancient trees—the subangular and ice-worn blocks, nearly all of them basalt, which line the more exposed western shore, the smaller fragments of representatives from every northern county, granites grey and red, porphyry, gneiss, micaschist, sandstone, and slate, which cover the eastern side of the long flat spit which forms half the island, and the bed of tenacious clay which underlies them all, and stretches also north and south along the beach of the mainland—that all these are alike relics of the "great ice age" may be taken for granted ; but the precise position to be assigned them in the history of the glacial epoch is not yet clearly defined, and still offers a task which seems specially the province of the members of the Naturalists' Field Club.

Does the clay, for instance, pass right under the island, or is there a central basaltic boss round which it lies, and against which it rests ? Again, how comes it that the blocks of basalt are mostly seen along the western side of the island, and the miscellaneous collection of smaller stones along the eastern ?

It is clearly established also that the nodules of ironstone which contain the plant remains exist *in situ* in the clay bed both on the island and the mainland ; and the lignite and fossil wood, once so plentiful on the beach, was doubtless washed out of the same deposit. Where is the parent bed from which they were originally brought to be deposited in this clay ? Can any

of the lignite beds known to exist throughout the basaltic plateau of Antrim be identified in character with these remains? It is to the patient investigation of apparently trivial details, which often characterises the local student of nature, that we must look for the solution of these and similar problems.

The botanists and entomologists of the party were not idle. "Island life" is proverbially devoid of insects, and no remarkable captures were made. Three sets of plants found in flower on the island were handed in, and that of Miss Sara T. Greer, consisting of fifty-seven species, gathered in a little over an hour, was declared the winner, the other collections being almost as numerous. The flora possesses more variety than is usally seen in an area so limited. It is especially rich in sedges. *Carex stricta*, which is accounted as one of the rarer sedges, grows on the island very luxuriantly, and several of the other carices attain a size above the average. In all, nine species of Carex were found during the two hours' stay. That curious and anomalous family of plants, the *Characeæ*, are also well represented. In the shallow water around the shores there were found *Chara fragilis* variety, *delicatula*, and *Nitella opaca*, together with another *Nitella*, which could not be at once determined. The shallow waters of the lough abound in fresh water mollusca. The shells of species of Cyclas occur in profusion, as also several univalves, notably *Planorbis marginatus*. *Limnea stagnalis* was found, but only in scanty numbers. The party returned via the Glenavy River, ascending its picturesque banks to the Glenconway Waterfall, which, however, owing to "business arrangements" at the adjacent works, was unfortunately quite dry. The party reached Belfast again about eight in the evening, after a long and most interesting day.

On 17th and 18th July, to

KILLEAVY, DUNDALK, AND CARLINGFORD.

The fourth excursion for the session was held on 17th and 18th July, the localities visited being Killeavy, Dundalk, and

Carlingford. Starting from the Great Northern Terminus at seven on Tuesday morning, a rapid run brought the party to Bessbrook, where, through the kindness of the manager of the line, the express was stopped, allowing the party to alight. Proceeding in two brakes toward the town, a halt was called at the polishing works of the Bessbrook Granite Company, where a short time was profitably spent examining the various processes necessary to produce that beautiful and enduring polish of which the Newry granites are so susceptible. Examples of granites from the various quarries of the company were shown, varying slightly in shade and texture, but all equally durable and effective. Immediately on leaving the polishing works, the extensive mills and factories of the Bessbrook Linen Company came into view, and the town, with its regular and tidy streets and handsome buildings constituting a model which other parts of Ireland might copy with advantage. On the kind invitation of Mr. Flynn, the manager of the granite works, the party breakfasted at his charming residence, Sunnyside. Again mounting the vehicles, the road was taken to the granite quarries, a short distance off. The extensive nature of these works can only be estimated by a visit. Thousands of tons are annually sent out, much of which is dressed and despatched suitably packed to all parts. The bottom of the quarry is reached by a substantial stair, and it is here that the magnitude of the work is more thoroughly realised, and the immense labour necessary to win the material estimated. The raising of the stone is mostly done by wedges, a tedious and expensive process, but the only one securing the fracture and scantling desired. Powerful cranes raise the blocks to the surface, whence they are removed to the adjoining workshops. The supply is practically inexhaustible, and any size of block desired can be quarried. The smaller pieces are manufactured into paving setts, a department which, with the others, gives employment to several hundreds of hands. Again setting out, and passing through the village of Camlough, near which other quarries belonging to the same company were seen, the road—rather

hilly—was taken for Killeavy. Passing along the eastern side of the valley, at the bottom of which lies the waters of Camlough (the crooked lake), magnificent views are obtained of mountains, woods, and lake, with distant peeps of Carlingford Bay and the open sea. Killeavy, once a place of much importance, is now only represented by the grey ruins of its ancient church, the situation of which, under the shadow of Slieve Gullion, is such that the ordinary tourist knows it not. It is, however, of much interest to the archæologist and student of Irish ecclesiastical history. In the early days of Christianity we read of how a certain saint built a religious establishment at Cill Sleibhe Cuilin—*i.e.*, the Church of Slieve Gullion—on the side of the mountain on which it was built, which was afterwards called Killslieve, afterwards softened down to Killeavy. The death of this saint is recorded in A.D. 517, and the 6th of July is her day in the calendar, which till the beginning of the present century was celebrated at Killeavy by one of those disorderly gatherings, notable for anything but religion, known as "patterns" or "patrons." The old church, situated in its ancient graveyard, now only used for interments by the Roman Catholics, consists really of the remains of two churches, the side walls of which were built on the same lines, giving great length to the structure. The original church consisted only of the western portion; the eastern chamber, which is much larger than the other, was added probably in the latter part of the twelfth century. A round tower existed here within the last century; it was attached to the south side near the south-west angle, where the stones of which it was composed form a large heap. Some of the old people in the neighbourhood have an Irish poem descriptive of its fall. The massive west doorway, formed of huge blocks of stone, and the small lancet windows are indicative of great age. Leaving the ladies of the party at the vicarage close by, the more active members made the ascent of the mountain, passing on the way the holy well of St. Moneuna. Judging from the numerous votive offerings with which the well is decorated, the patron saint seems still to

be held in much esteem, and the members were confidently informed that no one ever visited the well without receiving benefit. The ascent of the mountain is easy, as it is well covered by turf and springy heath. The bright sunshine and fresh breeze made the journey most enjoyable, and the summit was easily reached in a little over an hour. The mountain is surmounted by a cairn, or rather several cairns, of great size, which probably at one time constituted one immense monumental pile, marking the resting place of some great warrior. There is also the remnant of a cyclopean structure, which had evidently been of bee-hive form. The mountain takes its name from Cuilen, an artificer who lived here, and by whom the celebrated hero Cuchallain was fostered. Half a mile north of the cairn, and still on the ridge of the mountain, at an elevation of 1,700 feet, is the curious little lake known as Lough Calliagh Berra, regarding which several beautiful, but rather fanciful, stories are told. A native who acted as self-constituted guide regarded them with due respect, and evidently considered two rudely-hewn millstones on the shores of the lake with considerable awe. In more recent times the lonely sides of the mountain gave shelter to the notorious robber, Redmond O'Hanlon, once the terror of travellers to the North by the road which passes along its base. Owing to the comparatively isolated position of the mountain, a most extensive view is obtained from its summit, especially to the northward. The Mourne range, the open sea, and the sheltered harbour of Carlingford form a pleasing and varied picture in the opposite direction. Rejoining the ladies, the next halt was made at Faughart Old Church, which is also a foundation of very ancient date, and, like Killeavy, is attributed to St. Moneuna. No trace, however, of architectural details now remains. A few fragments of walls and scattered heaps of rubbish mark the site. These are surrounded by a graveyard in such a state of shameful neglect as should shock the most obtuse native; and this disgraceful enclosure, favoured by nature far beyond most resting places of our dead, contains the ashes of a king. Rank nettles hide the

graves, over which the visitor, for want of a single path, is obliged to stumble; brambles and dismantled tombstones trip him up at every step; thickets of sloe bushes and hemlock combine to render search for any special stone hopeless. The base of an ancient cross was supposed by the party to mark the royal grave. Another stone, a short distance off, appears to have stronger claims to the honour. In the uncertainty, members were individually left to their choice in the matter. After considerable stumbling, St. Bridget's Well, in the lower corner of the enclosure, was visited, after which the company left to examine a very fine example of fort a short distance off. This neglected spot has many historic associations. Here King Edward Bruce of Scotland, after a great victory, was crowned King of Ireland. High festivity necessarily followed so great an event, but in an evil hour the enemy, supposed to be conquered, turned the tide of war, and the coronation hill became the monarch's grave—the one which was hopelessly searched for. Centuries elapsed, and royalty again stood upon the height in the person of King William III., who, from this elevated position, got his first glimpse of James's army on its march toward the Boyne. Leaving the historic spot disappointed in their search for the place of royal sepulture, the party made inquiries of a farmer, who kindly directed to the reputed spot—neither of those whose claims were previously considered—a rude stone almost covered by the frequent interments. The position of the stone, it was said, had been handed down from father to son, but, as the place is now almost lost to sight, the next generation will most likely know nothing of it. Frequent halts were made on this road to visit remains of ancient structures—a large souterraine in a clump of firs and a cromlech in a corn field—monuments of a forgotten race, of whom even tradition is silent. At the Pillar-stone of Kilnasaggart (the Church of the Priests) the last halt on the day's route was called. This is one of the most remarkable inscribed monuments remaining in Ireland. It is a rude pillar, about eight feet in height. One face of the stone bears a cross and an inscrip-

tion, and the other ten crosses, enclosed by circles in relief. The inscription is somewhat obliterated by age. Dr. O'Donovan's rendering of it is—"Ternocus, the son of Cernaus, consecrated this place. Let him be under the patronage of Peter the Apostle." The individual to whose memory the stone was erected flourished in the beginning of the eighth century, and appears to have been a person of some importance, who dedicated himself and his possessions to the service of God. Leaving this remarkable and highly interesting monument, the party again mounted their conveyances, and passing the picturesque keep of Moyra Castle on the right, a quick drive brought them to the Imperial Hotel, Dundalk, the resting-place of the excurionists for the night. After tea, the day's programme being finished, the members visited such places as were most likely to interest them. Several, doing the lions of the place, visited the quays, the magnificent Roman Catholic cathedral, &c ; others, bent on a longer stroll, took the road for Castletown, and were favoured with a view of a most picturesque old ivy-covered tower, dating doubtless from the days of the English Pale. The timber of the grounds in which the stronghold is situated is well worthy a visit ; a magnificent cedar of Lebanon was specially noticeable, whose age most certainly rivalled that of the ancient castle.

The following morning gave promise of even a finer day than the preceding had been. All were up betimes for an early breakfast, and a start was soon made. A short time spent at Greenore, where the botanists of the party succeeded in procuring specimens of four species of spurge, viz., *Euphorbia peplus*, *exigua*, *heliscopia*, and *paralias;* the horned poppy (*Glaucium luteum*), the houndstongue (*Cynoglossum officinale*), the slender hard grass (*Lepturus filiformis*), and *Silene anglica*. Again taking train, Carlingford claimed the attention of the party for the remainder of the day. Persons visiting this historic town for the first time cannot fail to be struck with the number and importance of its ancient buildings. Convenient to the railway station is a massive square tower in good preservation ; in a

narrow street leading to the abbey is another somewhat similar in character, but with curious carvings on the stonework of its church-like windows. The Tholsel, which still stands over one of the gates of the town, was long used as a prison. Restoration was perhaps necessary here to preserve this quaint relic of byegone times, but much regret was expressed that the ancient bowed roof that had once graced it had been replaced with a new one of Welsh slates, which, with the "pointing" of its weathered stonework, has entirely destroyed its ancient appearance. The Dominican abbey or monastery, though having suffered much both from the destroyer and restorer, demands attention. It was most probably erected about the end of the fourteenth century, but has suffered much, its large window being gone as well as its entire roof and central tower. In comparatively recent times it has served, like most such buildings, as a quarry for more modern builders. At present the nave gives evidence of having been recently "restored" to fit it for a racket court. The western front is still in fair preservation, and shows some peculiarities in structure, belonging more to military than to sacred buildings. A hurried visit was paid to the extensive quarries in the Carboniferous Limestone close at hand. Little work is at present going on. The quarry is, however, a remarkable one, owing to the numerous basaltic dykes with which the limestone is traversed. Specimens can be readily obtained showing the igneous and sedimentary rocks in actual contact. The picturesque old pile known as King John's Castle was next visited. The date of the erection of this stronghold is given in ancient history as 1210. It suffered many vicissitudes in its early history, and we find it recorded that in 1501, in consequence of the town having been repeatedly burnt by the Scots and Irish, the King granted to its provost, bailiffs, and commonalty certain tolls and customs towards the enclosing of it with a stone wall. This venerable pile, after its chequered history, is much respected, and is being preserved from further decay. The botanist gathered among the ancient walls the red valerian (*Centranthus ruber*), which has become quite

naturalized here. The wild wall-flower is everywhere abundant; also the rare old salad plant (*Chenopodum*), and the sea barley (*Hordeum maritimum*), swine's cress (*Senebiera coronopus*), corn salad (*Valerianella olitoria*), and several others not considered common farther North. The day being most favourable, several of the party set out to ascend the mountain, 1,935 feet. Presently, just when bending to the work, clouds gathered over the rugged top, and a smart shower almost compelled a retreat. It cleared off, however, as rapidly as it came, and a magnificent evening was spent searching for the botanical rarities for which the place is noted. Those who toiled up were well repaid by the wide panorama afforded of the rich Newry valley, the quiet bay of Carlingford, and the distant Mourne range. The view northward is one of wild moorland and rugged rocks. The mountaineers brought down the golden rod (*Solidago virgaurea*), rose root (*Sedum rhodiola*), and the parsley fern (*Cryptogramme crispa.*) This latter is exceedingly rare. A rare moss (*Diphyscium foliosum*, a species not hitherto recorded from the North of Ireland, was also found sparingly. Leaving Carlingford, with its many castles, a short time was spent in Newry for refreshment, where the business meeting of the excursion was held. Much satisfaction was expressed by the members at the admirable programme that had been so well carried out, giving one of the most profitable and enjoyable excursions that the members had ever the opportunity of joining. Several new members were elected, and, leaving Newry at 7.15, all arrived at Belfast in due time.

On 18th August, to

CARNMONEY AND NEIGHBOURHOOD.

Availing themselves of the already popular line of the Cavehill and Whitewell Tramway Company, members and their friends, to the number of upwards of forty, crowded the car

leaving Chichester Park at 1.35 p.m., and those who had the good fortune to secure seats on top enjoyed a treat in the view of the lough and its shores, obtained from their elevated position, under the most favourable conditions of a bright afternoon. Alighting at the terminus, and under the guidance of the Rev. George C. Smythe, M.A., a visit was paid to the picturesque church and grounds of Carnmoney, situated on the southern slope of the hill. In the centre of the older portion of the burial-ground a magnificent Irish cross has recently been erected as a memorial, by Lieutenant-General Smythe, F.R.S., a late president of the Club. The cross is of Kilkenny marble, and is a very effective piece of workmanship. In keeping with the design is the inscription on the shaft, executed in relief, in Irish, the whole forming a magnificent and appropriate monument. The church, a comparatively modern erection, is a very pleasing building, with many fine examples of stained glass, and having carved stone pulpit and font. A short walk brought the party to the basaltic quarry in the hill, so well known to many members for its minerals. The officers of the Geological Survey term this rock a highly crystalline dolerite, having the augitic crystals well developed and glistering. It is also by them considered as one of the orifices through which the great beds of augitic trap have been extruded, and, in fact, to be an old volcanic neck, or perhaps crater filled with consolidated lava. A short search soon brought to light specimens of chalcedony, for which the place has long been noted. Specimens of the mineral, cut and polished, were shown by one of the members, as well as agates, jaspers, polished flints, and others of its allies. The new mineral, *Hullite*, recently discovered in this quarry, and named in compliment to Professor Hull, the director of the Irish Geological Survey, was also found, but sparingly, owing to the quarry not being at present worked. After some time spent in photographing the party by one of the members, a sharp scramble up the hill brought them to the fort on the top. Here a short time was spent, after which another quarry nearer the top of the hill was visited, the character of the rock in which

is very different from that below. Carnmoney (766 feet)—the Cairn of the Shrubbery—affords a good view of the valley through which the Great Northern Railway runs, and the rich slopes extending from the basaltic escarpment to the sea margin, with its many villas, looked exceedingly well in the evening sun. The cairn from which the hill takes its name, has, like the shrubbery, long since disappeared, having, doubtless, been found useful for fencing purposes. Descending the hill by the opposite side from that by which the ascent was made, the road was soon reached, and the party were kindly invited by the Rev. George C. Smythe to visit his residence at Coole Glebe. After partaking of the good things so liberally provided by their host, the business meeting of the day was held in front of the house —the vice-president, Canon Grainger, M.R.I.A., occupying the chair. Following the election of new members—Messrs. Gray, Harbison, Stewart, and the chairman made special reference to the recent sad death of Mr. T. H. Corry, who was for many years an active member of the Club. He attended the excursions, and contributed papers on botanical subjects. Mr. Corry was one of four members of the Club who separately received grants from the Royal Irish Academy for investigating scientific subjects, and it was while engaged in this work that he met his death. The several speakers referred to the thoroughness and practical ability of Mr. Corry as a working naturalist, his brilliant college career, and the well-founded hopes of his many friends that he would take a foremost place among the leaders of natural science. The following resolution was unanimously adopted :—"The members of the Belfast Naturalists' Field Club desire to record their sincere regret at the death of their fellow-member, Mr. T. H. Corry, M.A., &c., who was so well known as a young man of ability, culture, and zeal—qualities that won for him many distinctions, and gave a promise of a brilliant future. His fellow-members consider his death not only as a severe loss to the Club and his native town, but a loss that will be felt through much wider circles of the scientific world." A resolution was also passed delegating the Rev. George Robinson

(Armagh) to represent the Club on the approaching meeting of the British Association; or, in the event of Mr. Robinson being unable to attend that meeting, to authorise the chairman to appoint a deputy. The business being thus terminated, Dr. Beck, referring to the hospitality the party had received at Coole Glebe, moved—"That the very best thanks of the meeting be given to their host and hostess." The motion, having been supported by Mr. Mann Harbison, was passed by acclamation. Mr. Smythe briefly expressed the pleasure it gave him to see so many fellow-members at the Glebe, and was much gratified if he had added anything to the interest or pleasure of the excursion. Leaving Coole Glebe, the party took the road leading to Whiteabbey, where it was intended to visit the ruins of the old abbey from which the place takes its name. Time would not, however, permit, and the party returned to town by rail, after a most enjoyable afternoon.

On 18th September, to

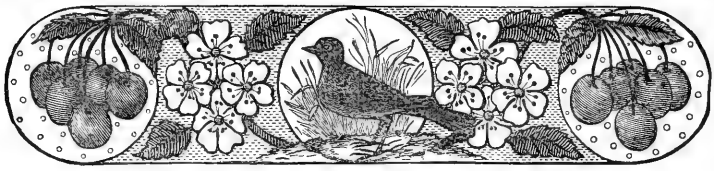
SHANE'S CASTLE FOR A FUNGUS FORAY.

This excursion had been looked forward to with more than the usual pleasant anticipations by the members. Its chief feature was suggested at one of the winter meetings, when a valuable paper was read on "Fungi, Mushrooms and Toadstools, Disease, Blight, and Food-producing Plants." In the discussion which followed the paper, it was proposed that special prominence should be given during the summer to this rather neglected but highly important department of botany. The announcement, therefore, of a Fungus Foray on the historic grounds of Shane's Castle was calculated to draw a good attendance, but the officers of the Club scarcely expected so many as sixty members and friends to respond to their call. The 9.50 a.m. train conveyed the party to Randalstown, where the extensive demesne was entered; and shortly after a halt was

called, at which the business of the day was announced, and a prize offered for the best collection of Fungi made on the excursion. Spreading to right and left of the road, a vigorous search was at once instituted, finds of large or rare specimens being frequently announced, and collecting was pushed on vigorously in brake and open. Decaying branches among the underwood, the wreck of past storms, were specially examined for such species as find on them a suitable habitat. A short examination soon proved that there was no lack of specimens, and it was at the same time evident that considerable discretion would have to be exercised in collecting. The ordinary vasculum being inadequate to the frequent demands on its containing powers, baskets were piled up, and many of the larger specimens which had at first been gathered rather freely had to be abandoned to make way for new discoveries. Some members—apparently in partnership, and possibly with a view to overawe the judge by bulk—converting their otherwise useless waterproofs into collecting bags, went gaily on with their work. A short halt was made where rustic steps lead to an ancient fort. The attractive seat round the trunk of a venerable tree in its centre, and the unmistakeable calls of the inner man, suggested luncheon. It was surprising, however, how little confidence the members had yet gained in their powers of discriminating between the edible and poisonous species in their collections, or possibly it was their anxiety to reserve their specimens in view of the prize. Be the reason what it might, Fungi formed no part of the luncheons, and even the suggestion to try "a likely one" met with scant favour. Before proceeding further a group was formed, and a photograph of the party, with a rich background of forest and fern bank, was taken. Continuing the search, and somewhat more rapidly, no further halt was made till reaching the old castle on the shores of the lake. Here some further time was spent in photography, after which the business meeting was held and a new member elected. The collections made during the day were now arranged, when it was found that eleven members had entered the contest for

the prize, a volume of "Cook's British Fungi," presented by Mr. William Gray, M.R.I.A. These, when examined by the judge, Rev. H. W. Lett, M.A., T.C.D., stood as to the number of species in the following order :—8, 10, 14, 15, 20, 21, 31, 33, 33, 40, and 56, the last being that of Mr. George Donaldson, who was declared the winner. When the quick walk, the novelty of the subject, and the restricted area (for nobody strayed far from the carriage drive) are considered, it is very creditable to bring together such a large variety, including about eighty species. One specimen of the truly beautiful fly agaricus (*Amanita muscarius*), which possesses dangerous, if not poisonous, powers of intoxication, was secured. On a decayed fallen branch was discovered a colony of the little copper green *Helotium*. The wood on which this species grows acquires the peculiar green tint so well known in the green oak used at Tunbridge for ornamental purposes. A sharp look-out was kept for the presence of the gigantic snowy puff-ball *Lycoperdon giganteum*), as it was desired to try if its flavour when well fried is as good as reported, but nothing was seen of it except the fragments of a big one, scattered by some previous passer-by. About the most abundant fungus met with was the clouded Agaric (*Agaricus nebulosus*), with its mouse-coloured cap, looking as if it had been smeared with soot, and whitening the grass about with its cloud of snowy spores. This is one of the edible sorts ; it is impossible to mistake it, and it possesses a delicious flavour. It was remarked that only half a dozen examples of the common mushroom (*Agaricus campestris*) were found during the excursion, though the old pasturage of the park seemed just the spot for them. At the foot of a massive oak was noticed the interesting oak rot (*Dædalea quercina*), which is of a corky, almost woody, consistency, the growing portion coated with a creamy velvet, on which are always great drops of moisture, as if it were weeping for the ravages it was causing in the timber. The examination of the collections being concluded, the announcement that the business of the day was over was the signal for separation, the party breaking

up into sections. Some visited the underground passages of the ruined castle, the graveyard, &c. ; others were attracted by the sedgy shore of the calm lake, over which there hung a mist completely hiding the distant shores. Time was, however, running fast, and the walk to Antrim had yet to be done. The road, however, like all those in the park, was a level one, and kept with great care. The distance was, therefore, accomplished without much fatigue. Reassembling in the historic town of Antrim, the road was taken for the railway station, and, in a quick train, the party soon returned to town, after a most enjoyable day, the weather having been all that could be desired for such an excursion.



WINTER SESSION.

NOTE.—The Authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

THE Winter Session was opened with a social evening in the Museum, College Square North, on Tuesday, 13th November. The arrangements on this occasion were somewhat varied from the conversaziones usually held, and the change may be considered in every way a success, the attendance of members and their friends being much above the average of previous years. Tea was served in the lower room between seven and eight o'clock, several of the lady members presiding at the urns. The chair was taken in the lecture-room at eight o'clock by the president of the Club, Mr. W. H. Patterson, M.R.I.A.

The President said—Ladies and gentlemen, the committee have made a change in the arrangements this year, and, instead of opening with a conversazione, have adopted a different plan, and it remains to be seen whether this different plan will be considered by the bulk of the members as more acceptable. I

must certainly congratulate the club on the large attendance here to-night. I think perhaps I have never seen so many assembled here before. It shows how vigorous the club is, and how pleased people are to come to its meetings. This particular time points to the middle of the club year ; that is, we have now accomplished the six excursions announced in the programme at the commencement of the season, and we now proceed to begin the winter session, in which the work done during the excursions will be to some extent reviewed and criticised. The excursions this year, owing to favourable weather and favourite localities, were very largely attended. Indeed, I think, probably no summer since the club started has seen such a very large turn-out of members at the excursions, taken altogether. There are a number of most interesting exhibits here to-night, and the formal proceedings will be brief, so as to allow an opportunity of examining them all ; but before you proceed to do so, some gentlemen who have taken the trouble to bring things here will say a few words about them, so as to render the exhibits themselves intelligible to you. After that, as this is an exceedingly good time to join the club, an opportunity will be given to propose new members.

Mr. Charles Bulla then showed a comprehensive series of fish remains from the Carboniferous Limestone of Armagh and other places. He also showed two specimens of formicaria, or glass cells, for the study of the daily life of ants, one on the principle adopted by Sir John Lubbock, and the other after that of the Rev. Mr. White. In both, when a light was thrown upon them, the ants could be seen busily at work, and their lively actions were the source of considerable comment and entertainment.

Mr. Chas. Elcock exhibited a number of rubbings taken by him from various ancient monuments in the Counties of Mayo and Galway. One of these is from the fragment still left at the tomb of Thibbot-na-Lung, the son of Grainia Wael, born whilst on the voyage to see Queen Elizabeth, whence he was called Thibbot of the Ship. He was the founder of the present family

of Mayo, being the first Lord Viscount. The stone at present lies very indifferently protected in Ballintubber Abbey. A second was a curious and very antique inscription from a stone in a graveyard at Teampull na Seacht na neene, County Galway. This inscription has not yet been deciphered. One rubbing from a very small slab was peculiarly interesting, the slab having been recently found lying on the shore at Omey Island, evidently washed from its place by the sea. It has an incised cross on each side, and dates probably from the 7th century. Mr. Elcock also showed a number of rubbings of very interesting crosses from Aranmor and the adjacent county of Galway, several of them of very peculiar type. In reply to a communication of his which recently appeared in several of the Irish papers, and also in the London *Times*, on the remarkable and unique monuments of the Arran Islands and their rapid destruction, he stated that he had received a letter from the Chief Inspector of Ancient Monuments, and that he would shortly proceed in a gunboat to the islands to take steps for their better preservation in the future. It is gratifying that this result should follow from the efforts of a member of the Naturalists' Field Club.

Mr. John Hamilton exhibited some live cocoons of the Atlas moth, a very fine Indian species, which he has succeeded in rearing in Belfast from imported eggs. The care needed in rearing this delicate tropical species in this climate is very great, the larvæ having required constant attention for several months.

Rev. H. W. Lett, M.A., exhibited a number of specimens of Fungi and Mosses. He gave a description of two very minute mosses, *Diphiscium foliosum*, and *Aulacomnion androgynum*. He also stated that the recent season had been marked by a great scarcity of the common mushrooom.

Mr. F. W. Lockwood showed a drawing of the ruins of the old church of Camlin, or the Crooked Water, near Crumlin, chiefly interesting for the curious arcades along the inside of the north and south walls, which the Rev. Mr. O'Laverty, M.R.I.A., suggests were probably intended for the recumbent

effigies of benefactors of the church, but suggests that the excavation might reveal something of interest here.

Dr. S. M. Malcomson explained the characteristics of some new forms of Ostracoda which he exhibited under the microscope, and Mr. Joseph Wright, F.G.S., also showed some interesting Foraminifera of the genera *Technichella*, *Haliphysema*, and *Reophax*, in which the tests are formed of sponge spiculæ alone, and said it was most remarkable how some of these simple forms of marine life were capable of selecting some special materials for the building up of their tests.

Mr. Wm. Gray, M.R.I.A., showed a curious chain, a large pin, and some armlets of fine silver, found in a fissure of rock near Garron Point, County Antrim, and also a document purporting to be a will of Dean Swift's, also lately found in this county. He showed besides a curious mineral known as Crocodilite, an indurated form of asbestos.

Mr. Robert Welsh gave an interesting description, and showed a large number of plates and prints to illustrate recent advances in photography as applied to quick printing with type in ordinary presses. He showed samples of the various photo-mechanical processes, including the new application of the calotype and photo-lithographic luxotype, and specimen sheets of nearly all the illustrated publications in which photography is used. He also showed a set of photographs taken by him at the Club excursions.

After a number of new members had been elected, the company broke up into groups to examine the various objects lent for exhibition. A new feature was the Club's portrait album, recently started. Mr. E. T. Church has offered facilities to his brother members through which it is hoped the album will shortly become a most interesting and permanent record of the membership of the Club from the commencement. Portraits of deceased members, or those who have left the vicinity, will be welcomed by the Committee whenever obtainable. The Club's sketch album has also received a number of contributions during the year, illustrating the archæology and scenery of the

district, and was a centre of much interest. On the same table was a beautiful series of botanical specimens and insects from the Holy Land, exhibited by the Rev. Robert Workman. The Rev. John Andrew showed a book of patterns, some of them very beautiful, traced by the pendulograph. An electric pump was also exhibited at work by Mr. Woodside. Dr. Luther, who has recently returned from the Luther celebrations in Germany, exhibited a photographic group (in which he figures) of the principal descendants of the great Reformer.

Some Peruvian antiquities and a curious Irish hammer were shown by Mr. Milligan.

Mr. Swanston, F.G.S., Secretary of the Club, showed a fine series of Silurian fossils and graptolites from Dumfriesshire, and a large album full of striking photographs of Irish scenery and antiquities. Amongst the members of the Club who illustrated various branches of natural history by means of their microscopes were Messrs. W. A. Firth, D. M'Kee, J. Wright, F.G.S., and Isaac W. Ward, and the latter gentleman also showed a rough pen and ink sketch of the planet Saturn and his rings, taken by him with the aid of the telescope on the previous evening.

The second meeting of the Winter Session was held in the Museum, College Square North, on 18th December—the President (Mr. W. H. Patterson, M.R.I.A.) occupying the chair. The business of the evening was a lecture on "Antiquities in Mayo, Galway, and the Arran Islands," by Mr. Charles Elcock.

Around the walls of the lecture-hall of the Museum a large number of rubbings and tracings of monumental antiquities were arranged. The lecturer commenced by stating that the journey during which he had found the various objects represented on the walls was through portions of the Counties Sligo, Mayo, and Galway. After defining the meaning which he attached to the terms "rath," "dun," "lis," "cashel," and "cahir," he said it had been found that there were 244 townlands in

Ireland named after the cahirs which were built in them. This showed how numerous they were throughout the country. Of these townlands Ulster had none ; Leinster has two—one in Longford and one in Queen's County ; Munster has 151—58 in Clare, 32 in Cork, 35 in Kerry, 17 in Limerick, 5 in Tipperary, and 4 in Waterford ; in Connaught there are 91, of which Galway possesses 67 (only six of which are east of the Shannon) : Mayo 22 (of which 15 are in the inland barony of Castlemaine), and Roscommon 2. The presence of these stone cahirs showed the necessity that existed in days gone by for having strongholds in the country, but the number of these was nothing compared with the forts or raths that still exist. There were no fewer than 1,822 of these forts to be found at the present day, although a great many of them were not marked on the ordnance map, where they ought to be. These cahirs, duns, or forts were sometimes chambered ; at other times they were a small space enclosed. A very fine example of the cahir was the "Grianan of Ailech," near Londonderry, and a good specimen of the chambered cahir is to be found at Innismurry, north of Sligo. Near Castle Connor, County Sligo, on the eastern coast of the bay going to Ballina, was a very fine example of a chambered fort, not much less than 20 feet high. In one of the walls is an opening about 2 feet square, through which a person can creep, and get into a chamber 7 or 8 feet wide, and about the same height. The arch was constructed by the stones lapping over one another, and not as at present. Earth was afterwards put on them. This fort contains no fewer than six chambers, with here and there little cupboards into which the long pointer which he held in his hand could be pushed, as if they were places in which the inhabitants could thrust their spears. Persons go in on the side of the mound, and, after going through the six chambers, emerge in the very centre of the fort. Going northwards from Ballina he passed the abbeys of Rosserk and Moyle, built about 1440 or 1450. Moyle was a much larger abbey than Rosserk, and has several peculiar features. A river runs through it, so that the monks might have plenty of water

to drink. The cloisters are perfect. The way in which the abbey is dilapidated shows the little care taken of it by the inhabitants of the district, and yet if a person were to touch it they would cry out as if they were hurt. The roof of Moyle Abbey was in existence in 1750, when a farmer in the neighbourhood, who was building a house, took off the roof of the abbey and put it on his house. Moyle Abbey has now been renovated. At Killala, where the French landed, there is a round tower, eighty-four feet high—one of the most perfect in the country. The stones of which it was built are what is called "cyclopean." A "cyclopean" structure was one in which large stones were used, and as a rule without mortar. On the Arran Islands, cyclopean walls are frequently met with. At Kilcummin, which is about 4½ miles north of Killala, there is the ruin of an ancient chapel, probably built in the fourth or fifth century. When they went back to such dates as this they must allow considerable margin for imagination. Perhaps the sixth century would be nearer the truth. "The temple," as the chapel is called, is said to have been built by a saint who died in 679; but some peculiarities about the structure have led inquirers to conclude that the building is of an earlier date than the saint. The building is of a cyclopean construction, there being stones in the wall as large as a table. Evidently when it was built the method of erecting arches was unknown, as one of the windows is surmounted by an arch cut out of a solid stone. On the outside there is a single stone with an arch cut into it, while on the inside the arch is made of two roughly-hewn stones. While sketching this window he noticed a remarkable natural phenomenon—a wonderful display of perihelion. The sun was shining over the south window, and he was surprised to observe a rainbow with the arch downwards and the "horns" pointing upwards. This he noticed for nearly two hours. At Rathfran, in addition to there being an abbey which contains several remarkable stones, there is a very large number of stone circles—commonly called "Druidical" circles. Near this place, at Mullancrusha, is one of the finest Ogham stones in the country.

It measures 8ft. 8in. high, 30 in. one way, and about a couple of feet the other. After describing Dudbrista and Downpatrick Head, the lecturer passed on to Ballycastle, three miles beyond which, at a place called Dunfeeny, is one of the most remarkable stones he had ever seen. It stands upon its end ; is about 10¼ in. thick at the bottom, by about 16 in. wide, and about twenty-three feet high. There seems to be little doubt that it is one of the old pagan worship stones of Ireland. Near the ground there are two remarkable crosses upon it, dating back to the sixth, or perhaps the fifth, century. Upon Achill Island there are few antiquities, but many curious things, including two cromlechs, one of which is in the centre of a collection of cists. There is also a stone "cahir." After referring to Slieve Mor and the Croghan, Mr. Elcock mentioned that the graphite and steatite mines recently discovered on the island did not seem to be worth much. At the foot of Croagh Patrick he came upon an old graveyard, near Louisburg, where he found a strange monument, consisting of four arms made up of segments of a circle, crossed by a straight cross with "fishtail" ends. Kinahan incorrectly describes this as consisting "entirely of segments of circles," and makes no reference whatever to a much more remarkable stone quite near to it. The lecturer also described the antiquities of Omey Island and Cong, including "Lughnaedon's Stone" at Inchaugboil, Lough Corrib, and concluded by referring to the most interesting antiquities of Galway and the Arran Islands.

The PRESIDENT said he had seldom listened to a more interesting lecture than Mr. Elcock's.

Messrs. Phillips, Lockwood, and Gray having criticised the lecture,

Mr. ELCOCK replied, and the proceedings terminated.

The third meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 22nd Jan. The President (Mr. W. H. Patterson, M.R.I.A.) presided.

Two papers were read. The first, by the Rev. H. W. Lett, M.A., was entitled, "A Bit of Groundsel, Examined Microscopically." The writer described a bit of common groundsel, from the top of the seed down to the tip of the root, and showed how much more there was in such a wayside weed to be observed beyond what is set down in most botanical works. Commencing with the seed, he described the various disclosures made by the microscope before and after fertilisation, the arrangement of the reproductive organs, and the beautiful pollen or fertilising dust. Then the different sorts of cells of which the stem and leaf are composed were explained by the help of diagrams drawn from the microscope, and also the air openings in the lower surfaces of the leaves. The rootlets, with their protecting tips, adapted for penetrating the ground, were also described, and the paper concluded with an account of two minute fungi that are parasitical to the plant.

The second paper was, by the Vice-President, the Rev. Canon Grainger, D.D., M.R.I.A., entitled "Magilligan Strand after a Storm." Canon Grainger illustrated his paper by a table-full of specimens gathered after the recent gales. Having described the geological structure of Lough Foyle and the adjacent headlands, with the Azoic rocks on the Innishowen, and the Secondary and Tertiary on the other side, and also the position of Magilligan Strand, nearly seven miles in extent, he exhibited his various specimens, giving a brief description of each. Amongst the sea-weeds cast up were the great oar-weed, *Laminaria digitata*, with the curious finger-like bases by which it is anchored to the rocks and stones; the bladder wrack, *Fucus vesiculosus*, whose abundant air vessels are so often taken by the careless sea-side visitor for pods of seed; the very common *Plocamium coccineum*, which is such a universal favourite with young ladies who make up bouquets of dried sea-weed for bazaars, &c. The dulse, or *Delesseria*, was shown growing in dense clusters on a stem of oar-weed. Some varieties of another red alga, *Ceramium*, and the *Porphyra*, or sloke; also, the lovely emerald green *Conferva conglomerata*, which is found

alike in sea and fresh water. In describing the various shells, Dr. Grainger stated that there did not now seem to be nearly such a variety of species as when he first used to collect on the shore, thirty years ago. He also said that, of the millions of shells with which the sands were strewn, the vast majority were the representatives of three or four species only. In exhibiting some of the shells with holes bored in them, he described the habits of the various boring mollusca, some of which, like the *Teredo* and *Pholas*, bore into wood or stone, whilst others bore into various other shells for the purpose of preying upon their inmates. An animated discussion followed, in which the members of the Club were strongly urged to bring forward communications of a similar nature to the two just read, and a hope was also expressed that the Club might, during one of its excursions, soon have an opportunity of visiting Magilligan Strand.

On the 19th and 26th February—Mr. JOHN MARSH read an account of an excursion over a large extent of the Continent of North America. The places visited by the lecturer included the White Mountains in the State of Maine, Niagara, the Canadian Pacific Railway, as far as it was then formed, to the foot of the Rocky Mountains, the Red River and Saskatchewan, St. Paul's on the Mississippi, Kansas, Denvir, Utah, Salt Lake City, and the Mormon Settlements, California, San Francisco, the Yosemite Valley, &c. The return journey was made by the frontiers of Mexico, and along the Gulf to New Orleans—thence to Mobile and back to New York by Atlanta, Knoxville, and Washington.

The papers were illustrated by numerous photographs, specimens of Indian work, samples of ores, &c., and contained many acute criticisms upon the present state, and suggestions as to the future prospects of the vast regions visited during the excursion.

The sixth meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 18th March—the President, W. H. Patterson, Esq., M.R.I.A., in the chair—when a paper was read by Mr. Charles Bulla upon "Ants."

After describing the structure of these remarkable insects and quoting various passages from Sir J. Lubbock, Mr. White, and others regarding their habits, the reader gave some of his own experiences in the study of ants in "formicaria," or portable ants' nests, of the type of those used by Lubbock, White, and other observers. He described his sensations when opening out his first batch of ants, received from a country friend through the medium of the parcels post, and the manner in which his guests by degrees made themselves at home in their new domicile. These formicaria, of which he has two, of different construction, both chiefly of glass, were exhibited, and in them could be seen the ants engaged in their avocations, repairing and improving the various passages, tending the young, fighting—for, alas, a few days ago part of a new tribe had been introduced into one of them, and war had been the result. Finally, the battle over, some could be seen removing the dead to a cemetery set apart in one corner of the domain. The reader strongly advised the audience to take to ant study for themselves, as being both easy, inexpensive, and without risk, as most of the local species are stingless. Nothing is required but a glass jar or box and a little slightly moist earth. An interesting discussion followed the reading of the paper, in which Messrs. J. J. Murphy, Greer, Stewart, Wright, Marsh, and Lockwood took part.

The seventh meeting was held in the Museum, College Square—the President, W. H. Patterson, Esq., M.R.I.A., in the chair—when a valuable paper was read on "The Age of the Basalts of the North-east Altantic," by J. Starkie Gardner, Esq., F.L.S., F.G.S., M.G.S. France.

Possessing a limited acquaintance with this district, I feel great diffidence in speaking about it to those whose knowledge is so intimate. I cannot but feel that I have far more to learn from you than to impart, and had I not been so cordially pressed by my friend Mr. Swanston, who, in his kindness, chooses to believe that I must have something new to say about it, I would have waited until enough information about the fossil floras had accumulated to have justified me in giving an account of them. As it is, I can only bring general considerations under your notice, postponing the discoveries which make the investigation of fossil plants so fascinating, and the problems of past distribution and migrations of existing plants, subjects of increasing wonder.

When many years ago I commenced to collect the Eocene plants of the South of England, I little thought they would become invested with the interest they now possess. From them my attention wandered to those of Mull, and thence, attracted by Mr. Baily's papers, to those of Antrim, and hence the pleasure of being here this evening. Still later I found it necessary to study those of Iceland and Greenland, and, finally, I formed the ambitious project of describing the whole of the British Tertiary floras, and fixing through them the real ages of those of the Arctic Circle and America. The first part of the task is making progress, but the possibility of attaining the second seems to recede, for while a few years since we all felt positive that our Antrim fossil plants were of Miocene age, I can now show that we really know nothing for certain about them, except that they are newer than the chalk on which they in places rest. I shall further endeavour to show that the determination of the basalts as Miocene, though hitherto unquestioned, is not founded on any direct or satisfactory evidence. After that we may examine such as we actually possess towards the determination of the question of their age.

In the first place, two most erroneous, but deeply rooted, assumptions have to be eradicated. The one, that all floras comprising modern and temperate looking genera, such as the

plane, the willow, the beech, the alder, the hazel, poplar, elm, pine, the American Liquidambar, sassafras, redwood, and swamp cypress must be Miocene ; and the other that such floras as those of Sheppey and Alum Bay, consisting of palms, Proteaceae, figs, Aralias, aroids, Podocarps, Araucarias, and other tropical and sub-tropical families are alone distinctive of the Eocene. This fundamental error has, owing to the influence of the late Professor Heer, led to the incorporation in the Miocene of all the Tertiary deposits with plants, with insignificant exceptions, of Greece, Italy, Austria, Germany, Switzerland, France, the West of England, Scotland, Ireland, and of all the numerous Tertiary floras round the Arctic Circle, and even of Madeira, Sumatra, and such distant lands. Though the Eocene is in every other respect the more important formation, no floras except such as were actually preserved *in situ* beneath or between typical Eocene marine formations, have been referred to it. The whole of the American floras with Dicotyledons would also have been absorbed into the Miocene had not stratigraphical evidence come to the rescue. A parcel of plants from Nebraska was sent to Heer to determine, and they were pronounced by him to be Miocene, but since they had been obtained from beneath a massive formation containing Ammonites, Belemnites, and Baculites, with a skeleton of Mososaurus rolled among the leaves, the determination for once was questioned, and, after a long controversy, Heer admitted them to be Cretaceous. Thence-forward he classified such floras containing dicotyledons as he had to describe either as Cretaceous or Miocene, hardly taking into account the Eocene, or the great gap between that and the Chalk.

The Eocene floras have been discovered of late to be far more varied than had been supposed. Fossil plants are found beneath the mottled plastic clays of Reading. The London clay, with its characteristic sea-shells, actually rests upon them, and they in turn rest upon a bed of sand with layers of oysters, characteristic of the lowest member of our Eocene ; so that there can be no doubt as to the true age of the plants. The

prevailing species are plane, and apparently poplar and willow ; the flora as a whole resembling the Cretaceous Dakota flora of America, and the Miocene (?) flora of Greenland. They would, I think, upon plant evidence be regarded as Cretaceous, but if not, then decidedly Miocene. Elsewhere at about the same, as well as a slightly higher horizon, but still below the London clay, a somewhat different flora is to be found, whose affinities are also rather with the American Cretaceous than otherwise. At Bournemouth I have found a very extensive flora whose affinities are with the American Eocene deposits and the Oligocene or Miocene plant beds of the South of France, Austria, Greece, and Italy. At Hordle, I found, when with Mr. Keeping, a few plants resembling those of Reading and the Greenland Miocene, (?) but in the still newer Gurnet Bay beds there seems a reversion to Bournemouth or southern types. Heer would have described the whole of these, as he did the flora of Bovey Tracey, which is on about the same horizon, as Miocene, though stratigraphically, their Eocene age is beyond dispute. At Aix-la-Chapelle, there is a flora which we only believe to be Cretaceous, for it has some characteristics of the Eocene, because it underlies chalk with flints containing Cretaceous fossils. The same thing occurs in America, where thoroughly Eocene or Miocene looking floras underlie thoroughly Cretaceous faunas. Within the last few days Professor Noetling, of Königsberg, has written to me to say that the marine deposits intercalated among those most Miocene looking plant beds, the amber beds of Prussia, show these latter to be of Eocene age and about contemporaneous with our London clay.

Much more to the same effect might be added, but there is sufficient to show that attempts to fix the ages of deposits by aid of dicotyledonous plants must for the present fail. We have not yet commenced to appreciate the delicate progressive gradations among the newer fossil floras, and until they are studied in a new and different spirit, all attempts to define the relative ages of formations through them are premature. Their study is all the more difficult as no considerable collections of

Cretaceous Dicotyledons exist in our Museums, and those preserved on the Continent are not too accessible, while our own unrivalled series of Eocene plants is not yet available to the public. Yet one of the most unaccountable incidents in the development of the science of geology seems to me to be the absolutely unquestioning way in which all our great leaders have accepted the determinations of age which some palaeophytologists, as they are sometimes called, have had the effrontery to evolve out of ridiculously inadequate material. The study has for thirty years been weighted with an influence, which, paralysing all advance, has reduced it to a state difficult to describe, but which can, perhaps, be realised by supposing it to be half-a-century more backward than any kindred science.

I must thus ask you to entirely divest your minds of any preconceived ideas as to the age of the Basalts, derived from the presence in them of fossil plants. Had any single geologist who has written about them and assumed them to be Miocene, troubled to look into the evidence, their age would never have been spoken of as definitely ascertained.

A glance at the so-called plant evidence will render this apparent. It has been assumed, I do not know who is originally responsible for the assumption, that the Antrim plants were on the same horizon with the Mull plants, and that since the latter were Miocene, the former must necessarily also be of that age. Neither of these premises are established, and being so far incorrect, the inference drawn from them falls to the ground.

The Mull plants were described by Edward Forbes in 1851.* They occur, like those of Antrim, between columnar basalt. No more could be said about them than that they might belong to *Taxites? Filicites? Rhamnites? Platanites? Alnites?* and that "the general assemblage of leaves, when judged by the present state of our knowledge of the vegetation of ancient epochs, is decidedly tertiary, and most probably of that stage of tertiary called Miocene." Of these plants, Heer was only able to claim one, the Taxites (*Sequoia langsdorfii*), or at most two,

* Journ. Geol. Soc. for 1851, p. 103.

as Miocene forms. The *Filicites* was shown by Dr. J. S. Newberry to be a living fern, *Onoclea sensibilis* of North America, and also of the Greenland Tertiaries. The *Platanites* is apparently the *Platanus Heerii* of the Cretaceous Dakota beds; another leaf seems to be the *Tilia* or Lime of the Greenland beds; another the *Corylus* of Greenland, and so on.* The chief affinities of the Mull flora are with certain of the Greenland Tertiary floras, and not with any European flora of known Miocene age; but as the Greenland floras were not known when the Mull flora was pronounced to be Miocene, this affinity could not have influenced the determination. *The only plant I find common to the Mull beds and the Antrim beds, so far, is one first found by Mr. Koch, at Mull, not more than three or four years ago, and as no description has been published of it,*† it cannot have formed the basis of any comparison. It is quite certain that *none of the characteristic plants of Ballypalady or Glenarm* are yet known from Mull, with the one possible exception alluded to; equally, also, that the *Onoclea sensibilis* and *Platanites*, which are the prevailing fossils of Mull, have not been found at Ballypalady or Glenarm. The only definite notice I can find of any actual comparison having been attempted is where Mr. Baily, in one of his reports, says, "So far as can be judged from a preliminary examination such as this, these plant-remains from between the Basalts of Antrim appear to differ as a group from those obtained in the corresponding beds at the Isle of Mull."

It thus appears that if the Mull beds were proved to be Miocene, it would not necessarily follow, from the evidence of the plants, that the Antrim beds were even approximately of the same age, since their floras are entirely different. But these floras, however, so resemble certain floras of the Arctic Circle said to be Miocene, as to render it necessary to investigate the grounds on which the age of these latter have been fixed.

* A more recent examination of the Mull beds leads me to believe that the number of species in them is more restricted than I here suppose.

† The species will be published with other Coniferae in the volume of the Palaeontographical Society for 1884.

We may take those of Greenland, which are the best known and most extensive, as the type, for I believe that all that applies to them, applies no less to the fossil floras of other Arctic lands.

Heer, we have seen, has determined all the known fossil dicotyledonous floras from all lands within at least 200 geographical miles of the Pole to be either Cretaceous or Miocene. The determination of the age of the Miocene plants of Greenland (lat. 70°) rests upon the supposed identity of some 25 per cent. of them with other supposed Miocene plants occurring in latitudes 23 or 24 degrees to the south (lat. 46° and 47°). Supposing that the age of the more southern plant beds were accurately known, and that the identifications were correct, neither of which points could for one moment be conceded, even this would not prove them to be of the same age ; but rather the contrary, for it would be impossible for floras so much alike and so similar in habit to those of the present day, to grow simultaneously at, or not far removed from the same level, in such widely different latitudes. We must recollect that these plants are many of them specifically identical with, and nearly all of them closely related to living plants, so that we are bound to infer similarity of habit. The hypothesis, that because floras from widely different latitudes are similarly composed they must have been contemporaneous, would demand, if applied to the existing plant-world, a nearly identical flora growing simultaneously in Lombardy and Iceland, or Florida and Newfoundland. The living representatives of the fossils, for the most part leafy forest trees, could never have had such a range of latitude, unless stationed on very high land in the south ; but this has never been suggested in the case of the central European Miocene, and is opposed to the conditions under which they were imbedded. The fallacy of this argument is, I trust, apparent.

We have next the extreme improbability that the plants of the Eocene, a far more important formation than the Miocene, would have been alone overlooked in a series of deposits of immense extent and thickness, abounding in plants, and continuously forming from the Cretaceous to the Upper Miocene.

There is no stratigraphical break, but there is a break all round the Arctic Circle in the continuity of the floras, for unfossiliferous sedimentary beds 1,000 feet thick often intervene between the highest of the so-called Cretaceous and the lowest of the so-called Miocene plant beds, and these unfossiliferous beds represent, according to Heer, the Eocene. Now no reason has ever been advanced why the Eocenes should alone be unfossiliferous in high latitudes. It is universally admitted that continuous land existed in the north between Europe and America from early Eocene times, as proved by the palæontological records of both continents, as well as by many other facts.

The discovery of a flora at the base of our Eocene formation, implying a climate as temperate as that we now enjoy, accounts for the unfossiliferous zone in the deposits of the far north, for under such conditions, no forests of leafy trees would be able to flourish in Greenland and Spitzbergen, and to this age it may safely be referred; but the increase of heat that took place towards the middle Eocene, when the temperature in the latitude of London became almost tropical, would certainly drive vegetation very far northward; indeed, it is only common sense to suppose that the hottest period of the Tertiary would be the one most likely to produce a luxuriant vegetation round the Arctic Circle. I assume, from all the data I have collected, that the mean temperature of the South of England, (lat. 50°,) was some 70° Fahr., and if the temperature decreased in going north at approximately the same ratio as it does to day, 10° Fahr. for every 10° latitude, we should have a mean temperature of 5°F. in Greenland under latitude 70°, which is exactly the Miocene temperature (90°C.) assigned to it by Heer. The decrease from Greenland to Grinnell-land is in about the same ratio, and Heer admitted that the fossil Tertiary plants show a corresponding decrease as far north as Spitzbergen, though he disputed, against the evidence I think, that it was maintained to Grinnel-land. With our Middle Eocene temperature sub-tropical in lat. 50°, we need feel no surprise at the presence of such floras in high latitudes. England and Greenland of the past were relatively

as Madeira and England are to each other now, being at the same relative distances, and with the same relative temperatures, and exhibiting similar differences in their floras. There is thus every physical ground for believing that the Greenland Tertiary plants are more likely to be Eocene than Miocene.

Now, what is the evidence of the plants themselves? There is a total absence, in the first place, of any characters among them which would preclude their being referred to the Eocene. The fact that a proportion of them had been identified by Heer with those of the Swiss Miocenes, may be set against the considerable number which are equally identified with plants of the undoubted Eocene Lower Lignitic series of America, and a number of forms in the latter again with those of the Miocene of Switzerland. The truth is, that at present any formation containing Dicotyledons may be with almost equal plausibility referred to any age an author pleases, for besides the similarity always existing between the ordinary forms of ovate and lanceolate leaves, many species, no doubt, actually had a great range in time, and occur with slight modifications from the Cretaceous to the Miocene inclusive. The existing confusion originated in a very simple manner. The flora of Oeningen must be accepted as a very typical Miocene flora, containing possibly, scarcely any Eocene forms. It contains, however, many plants common to somewhat older floras, which do contain a percentage of Eocene forms. The only series from undoubted Eocenes formerly available for comparison were peculiar, and therefore misleading; I allude to the floras of Alum Bay and Sheppey. In the absence of stratigraphical evidence the known Miocene types decided the question of age, and the unknown Eocene types became incorporated into and in their turn typical constituents of Miocene floras, and were used to identify yet older beds, with still more Eocene affinities, as Miocene, so that at last every bed containing a dicotyledon was pronounced by Heer to be Miocene, until as I have said, even a parcel of plants from the American Cretaceous was returned with the positive assurance that they were Miocene. Heer did not possess the data requi-

site to separate stages of the Eocene from the Miocene, and none of his work bears investigation. The authors of the works on the floras of Sotzka, Häring, Monte Promina, etc., considered they were describing Eocene floras, but Heer differed with them ; and even described the Eocene Bovey flora as Miocene. Shall his unsupported dictum any longer outweigh all other evidence and probability ? Professors Dawson, Newberry, Marcou, Saporta, and many others who have studied the question think not ; but the mass of even leading geologists in our country continue to speak of the Miocene floras of Mull, Antrim, and Greenland, as if no doubts regarding their ages could possibly exist.

Having disposed, I trust, of preconceived ideas regarding the value of the plants, I now propose to examine the stratigraphical evidence, with a view to further testing the Miocene hypothesis.

The extent and thickness of the Basalts of Antrim and the adjoining counties are so well known to you that they need not be referred to. They are but a small fragment, however, the mere southern limit of a series of stupendous outputs of lava that once extended in an unbroken mass northward through Scotland and the Faröes to Iceland. Nor does this represent their extreme limits, for, as Professor Geikie has pointed out, innumerable dykes diverge from them, and traverse England and Scotland even to the shores of the North Sea. Vast as the area covered by them is, it is not wholly without parallel elsewhere. A region in the Deccan, 200,000 square miles in extent, has been converted into a plateau of horizontal sheets of basalt, whose aggregate thickness is 6000 feet. These flows are of a Cretaceous age, and therefore preceded ours ; but in Oregon another enormous area, estimated to equal that of the whole of England and France united, has been overwhelmed at a subsequent date, and became an undulating plain of basalt, so recently in fact, that the latest flows may have taken place in the human period. All these are believed to have welled up from great fissures, for no conceivable number of cones or craters would

be adequate to produce such vast level and continuous sheets. They are termed "massive eruptions," and have been held by many "to represent the grand fundamental character of vulcanism, modern volcanic cones being regarded as merely parasitic excrescences on the subterranean lava reservoirs, very much in the relation of minor cinder cones to their parent volcanoes."* A distinguishing feature of lavas erupted in this way is their horizontal bedding and the rarity of the dykes which intersect them, relatively to local outbursts such as have formed the Islands of Madeira or Teneriffe. These contrast strongly with them, being riddled in every direction by veins and dykes, while in Iceland I rode for a long day down a valley between walls of basalt some 2000 feet in height, and saw only one dyke. In Antrim, which is away from the centre, the dykes are apparently more numerous. Again, while Professor Hull and others in Ireland, and Professors Geikie and Judd in Scotland, mention the occurrence of volcanic necks, or true craters, Dr. James Geikie met no trace of such in the Faröes, nor did I among the Tertiary basalts of Iceland. I often saw knolls or bosses projecting above the general level of the basalts, but these always proved to be the last remaining fragments of layers that had otherwise been entirely denuded, and it struck me that if overgrown, these would have been mistaken for necks.

These formations were not erupted at once. In Ireland, they have been grouped by Professor Hull into three classes, the oldest of which includes highly silicated felspathic trachytes, porphyry, pearlstone, and pitchstone. The second comprises basic beds of amygdaloid with bands of bole, volcanic ash, etc. The third is formed of massive sheets of columnar basalt. A very long interval, marked by the changed characters of the lavas, is supposed to have intervened between each stage, and lesser intervals are marked by the layers of bole, which so frequently intervene between the lavas. Each layer marks, however, a period sufficiently long for a considerable depth of the solid basalt to have decomposed into vegetable mould, and

* Geikie, Text Book of Geology, 1882, p. 256.

remained, perhaps, for ages a soil on which a luxurious vegetation flourished; or the slow accumulation of sediment in the clear waters of a volcanic lake. The lignites mark even longer pauses, and Dr. Jas. Geikie has shown that the important lignites and true coals of the Faröes* are on one horizon, and must mark a very vast interval indeed. True coals and lignites are also met with in Iceland, probably on the same horizon, and Professor Geikie mentions local beds of "black cherry-coal" in Mull. But this is not all. A higher series of glassy trachytic lavas is preserved in the northern districts of Iceland, which have no representatives in Ireland, though underlying yellow tuffs with plants show them to belong to the same Tertiary age. To this series probably belongs the pitchstone of the Scùr of Eigg so well described by Professor Geikie,† and which he considers to belong to a period of volcanic activity widely separated from that of the basalts. "Their successive beds, widely and deeply eroded by atmospheric waste, were here hollowed into a valley traversed by a river, which carried southward the drainage of the wooded northern hills. Into this valley, slowly scooped out of the older volcanic series, the pitchstone and porphyry *coulées* of the Scùr flowed. Vast, therefore, as the period must be which is chronicled in the huge piles of volcanic beds forming our basalt-plateaux, we must add to it the time needed for the excavation of parts of those plateaux into river valleys, and the concluding period of volcanic activity during which the rocks of the Scùr of Eigg were poured out." The eruptions which produced a massive formation, extending, probably without a break, for a thousand miles in a direct line, must thus have occupied an immense time, which may not unreasonably be supposed to represent an entire geological period.

But since the close of this period of volcanic energy,—for the present localized manifestations in Iceland are as utterly disconnected from the basaltic outflows, as an outburst in

* The beds of coal and accompanying shale are 6 to 7 ft. thick, and extend over quite 5000 acres. Stokes, Q.J.G.S. Vol. xxxvi., p. 625.

† Quart. Journ. Geol. Soc., vol. xxvii., p. 310.

Ireland to-morrow would be, it would appear as if an even greater interval had elapsed. Originally spread out in vast continuous sheets, their present contours are not due to dislocations or upheavals which have thrown them into mountainous shapes, but their mountains have been carved out of the solid, inch by inch, by the slow process of weathering, which has cut down through them to a depth of 2000 feet. In this country the basaltic region still presents a plateau-like aspect, but in Iceland, the plateaux, where not concealed by ice or recent volcanic products, are cut up into long rolling hills 1000 to 2000 feet in height, separated by wide, nearly parallel valleys, the flanks of the hills, where still exposed, being slowly disintegrated, or buried under their own *debris*. The denudation is colossal, and solitary pinnacles or protuberances everywhere attest, like monuments, the former presence of sheets of basalt of which no other trace remains. The Faröes are even more eloquent of waste. This little group of some 20 islands and islets, presents the ruins of a once continuous plateau 2000 or more feet in height. The hills, as in Iceland, are usually flat-topped like Sleamish, but the cliffs, frequently 1000, and sometimes 2000 feet in height, are almost vertical, and fretted, especially on their Western faces, into weird and fantastic forms. The sub-aërial waste is here supplemented by the attacks of the waves, and the sea-bed for miles around is shallowed by the re-deposited silt. In Scotland only disconnected fragments of the erupted matter remain. "Some of the noblest hills of the Inner Hebrides are but solitary outliers left standing amid the ruins of the great sheets of solid rock of which they once formed a part. Ben More, in Mull, though more than 3000 feet high, is only a magnificent fragment of the larger pile of volcanic material which formerly swept over what are now the deep glens and fjords of Mull. The long lines of imposing cliff with which the basalt plateaux front the Atlantic all through these islands, from the Fair Head of Antrim to the far headlands of Skye, tell everywhere the same tale of vast and continuous denudation."* "But most striking of all is this fact of enormous

* Geikie, Quart. Journ. Geol. Soc., vol. xxvii., p. 285.

denudation of the Scottish Highlands during very recent geological periods, demonstrated by the occurrence of numerous post-Miocene faults, having downthrows of various amount, up to nearly 2000 feet, the effect of which upon the surface has been entirely masked by post-Miocene denudation."* Even all this it is obvious may be insignificant to the denudation effected over tracts which are now sea, or to that which has acted over land surfaces which no longer present any shreds of the basalts except the dykes through which they welled up. Is it inconsistent, I would ask, in face of such stupendous results, to stretch back the time during which the causes may have operated to the remotest possible limits?

We thus have next to inquire what these utmost possible limits may be, and how far back in geological time we may place the first convulsive throes of eruptions of such appalling magnitude.

The basalts in Ireland rest upon the upper chalk, and are, therefore, not so old as this part of the Cretaceous series. They must, indeed, be considerably younger, for on the north the surface of the chalk on which they rest is bared and denuded, and probably sub-marine, while to the south and east the thick capping of loam and flints and the piped surface that intervene, denote a long-continued terrestrial exposure prior to the arrival of the lava. In Scotland, moreover, according to Judd, the upper chalk, or zone of *Belemnitella mucronata*, is covered by intervening estuarine and coal-bearing strata, which, though but 20 feet thick, suffice to negative the idea that the basalts were in any way contemporaneous with any part of the true Cretaceous series of Britain; though it is quite possible that volcanic activity may have been developing towards its close.

Between the newest Chalk of England, however, and the oldest Eocene, there is an enormous interval. The magnitude of the break has led to the Chalk being classed as a Secondary, and the Eocene as a Tertiary rock. In the interval, formations were accumulating in America and New Zealand, of immense

* Judd, Quart. Journ. Geol. Soc., vol. xxxiv., p. 699.

thickness, and also in Northern Europe to a less extent. It would be no exaggeration to say that these Cretaceo-Eocene formations may have reached 10,000 feet in thickness. Geologists have not sufficiently realised the importance of the gap, and when beds are discovered unmistakably belonging to this middle age, the question as to whether they are Cretaceous or Eocene is hotly disputed. This is especially the case when their fossils include plant remains. In England, the Chalk is a purely oceanic deposit, containing no indications of the proximity of land, while the Eocenes are fluviatile or delta deposits. How the Chalk area became converted from ocean to land, and for how long a time it had been land before the deposition of the Eocenes commenced, are questions that can only be solved by a study of the rocks of remote countries. Its denudation had proceeded for ages, and on a colossal scale, before the deposition of the Eocenes commenced, since even their lowest beds consist of extensive tracts of flint ground into pebbles and sand. But the vastness of the interval is chiefly to be inferred from the striking and complete changes that took place in the fauna or floras of our area in it. Throughout the whole of the Eocenes, the progressive change is trifling, and differences seen in the forms of life are chiefly due to migration through changes of temperature. Throughout the Cretaceous period too, the changes in the types of fauna are so slight as to be little more in value than are commonly recognised as specific. Each period, notwithstanding the breaks that occur, has its continuous and characteristic faunas and floras. The Cretaceous and Eocene faunas, on the contrary, seem to possess nothing in common, and present, perhaps, the most remarkable gap in the geological record. How or when the Cretaceous fauna disappeared, we cannot trace in our area, yet we know its extinction must have been gradual, for Cretaceous types lived on elsewhere, mingled with mollusca of a strikingly Eocene facies. A large number of localities in Europe, North America, and New Zealand have yielded floras of completely Eocene aspect, interstratified with beds containing groups of mollusca, some of which, at least in

England, are characteristic of the Cretaceous period. This conflicting evidence has uniformly been decided in favour of the better known mollusca, and that of the little known plants has been justly set aside. In all the cases into which I have examined, the supposed purely Cretaceous fauna contains a large number of types which are quite unknown in our true Cretaceous rocks, and which seem to me to denote a marked approach to those of the Tertiary. These faunas require very cautious and critical examination, for even the humblest groups of mollusca have steadily progressed from primæval to modern forms, and the recognition of the precise stages they had reached on the journey, when summed up, should afford a tolerably safe indication of the relative age of the rocks in which they occur. It is unworthy of science to suppose that all the types characteristic of the Cretaceous were extinguished at once, for a great many still exist, and the presence of a Belemnite, Baculite, Ammonite, or Inoceramus, should no more be received as conclusive evidence of the synchronism of a bed with our Chalk, than the presence of a Nautilus, Cidaris, Salenia, Terebratula, Trigonia, Pleurotomaria, or any other of the scores of Cretaceous genera that are still existant. Numerous plants have been obtained from our Neocomian, Gault, and even grey Chalk, without any trace of the presence of dicotyledons, yet beds abounding in dicotyledons of still existing genera are correlated with them on the strength of the Cretaceous aspect of a percentage of their mollusca. I can only say that if these floras are truly contemporaneous with our Chalk, there is nothing to prevent our assigning a Cretaceous age to the floras of Mull and of Antrim.

Besides the Cretaceo-Eocene period, to which at least the earlier outpours might be assignable, we have the entire Eocene formation, a fragmentary record in England of only some 2000 feet thick, but attaining in the nummulitic formations of the East to prodigious thicknesses. The actual, direct, palæontological evidence, connecting the plants of the Basaltic formation with those of the Eocene period, I must postpone until a future time. I can only now say that if asked to pick out the flora

most resembling that of Ballypalady, setting those of Greenland on one side, I would select that of Monte Promina, which is undoubtedly Eocene.

Equally unprofitable would it be at present to dwell upon the absolute insufficiency, or rather total absence, of evidence connecting the basalt floras with the Miocene. Further research, if encouraged, will develop these questions, and render it possible to obtain something like definite grounds for forming an opinion. Though disinclined, for the present, to lay any stress on plant evidence, I cannot help pointing out what may, or may not, be a significant fact, that the Mull type of *Platanus* or *Platanites*, together with others of the plants, recall so-called Cretaceous rather than Eocene types, resembling, in fact, the *Protophylla* and *Platanus* of the Dakota beds. A still living fern is associated with them, it is true, but it is of an archaic genus, only one species of which now lingers, and similar cases are frequent throughout the Eocene, such as *Osmunda Javanica*, *Chrysodium vulgare*, etc. I should imagine, from its aspect, that the Mull flora would be older than those of Antrim.

Only one geologist, Thomas Smith, (Trans. Edin. Geol. Soc., vol. 1, April, 1867,) has ventured to suppose that the basalts of Antrim, embracing those of the Giants' Causeway, might be Cretaceous. Such writers as Professors Hull, Geikie, and Judd, have based all their inductions regarding the basalts on the assumption that all above, and including the plant beds, are Miocene. A most superficial study would have convinced them of the weakness of the evidence, yet they bring it forward as incontrovertible, without examination, and build theories upon it as to the surprising rate of post-Miocene denudation. A most elaborate paper is based on two fallacies ; one that the basaltic formation is Miocene in age, and another that it was all erupted from craters. The floras may be Miocene, but the evidence is all against it: and there may have been craters in Scotland which erupted basalt, but that the Irish or Faröese basalts were erupted from them is physically impossible. Hull

assigns the lowest division of the basalts to the "latter part of the Eocene." "At any rate such is its contrast to the overlying sheets of basalt and amygdaloid of *known* Miocene age, that I am constrained to infer a considerable lapse of time between their respective eruptions."* All other writers speak in an equally definite way of its age. No British professional geologist seems to know or care anything about plants newer than the Carboniferous, yet everything our foreign contemporaries have said about them has been accepted without question.

I fear I have wandered rather far afield, and spent so much time in pointing out what we do not know, that little space is left for what we do know. Before returning to the County Antrim, it may be useful to recapitulate the chief points we have noticed.

We have first seen that the evidence of fossil plants in determining the ages of late Cretaceous or Tertiary rocks is almost valueless. Next, that our plants differ from those of Mull completely, and that while the former find their nearest allies as a flora in the Eocene of Monte Promina, the latter are of late Cretaceous or lower Eocene aspect. Both, however, are very similar to Greenland fossil floras, said to be Miocene; but an examination of the question shows that the evidence and balance of probability is against their being of Miocene, and in favour of their Eocene age. We next reviewed the evidence supporting the enormous length of time occupied by the formation of the Basalts and their subsequent denudation, and on these grounds claim the utmost possible antiquity for them, consistent with stratigraphical and palæontological evidence. We turned aside to notice their extent and that of other similar "fissure" eruptions, as opposed to "crater" eruptions, and then, in order that our ideas as to the geological periods during which it was possible for them to have been erupted might not be cramped, we briefly reviewed the enormous Cretaceo-Eocene deposits which in other countries fill up the almost inconceivable

* Hull, Phys. Geol. and Geogr., Ireland, 1878, cap. iii., p. 79.

gap between the newest chalk and the oldest Eocene of our area.

Of the Lower series of Basalts, nothing need be said, for they are practically unfossiliferous.

We, therefore, come at once to the middle series of the Basalts, which, being in places fossiliferous, may eventually present us with definite evidence as to age. The amygdaloids, of which this is largely composed, are closely similar to those of the Faröes and Iceland, and are probably of the same age. The plant-remains are already known to occur in sandy-clay, in Lignite, in Clay Iron-ore, as silicified wood ; and it is not improbable that remains may be found in still other qualities of sediment, for they have been met with in yellow and red tuffs in Iceland, brown tuffs in Madeira, dark shales in Mull and elsewhere. In fact, wherever volcanic ejectamenta have been re-arranged by water, or sedimentary deposit taken place, there may plant impressions be looked for. It is generally supposed, and may be accepted, that all the plant bearing beds are on or about the same horizon.

Irish Bauxite is, as you are well aware, a nearly white aluminous earth (hydrate of alumina) which adheres to the tongue when dry, and never becomes plastic when wet. It is quarried near Glenarm, and certain beds a little in rear of that town were formerly worked, which abounded in handsomely preserved plant remains, whose dark colour rendered them conspicuous against the nearly pure white matrix. It is unfortunate, however, that during the whole time that quarrying operations were going forward, no one, not even the officers of the Geological Survey, who were then on the spot, thought it worth while to collect, and thus only a few stray specimens seem to have been preserved. Mr. Swanston kindly accompanied me to these pits, which are underground, and now completely inaccessible, owing to the depth of water which has collected in them ; but by digging in an old spoil bank, now a crumbled heap of talus, we unearthed a few fragments of large leaves, and I have great hopes, through the courtesy of the owners, and the

interest taken in the subject by Mr. Jamieson, that this flora may again become accessible. It seems to be by far the most beautiful and best preserved of any included in the basalts, either in Greenland or elsewhere, and to be identical with the Ballypalady flora, except that it is far richer in leafy trees.*

The principal Lignites are above the Bauxites and rest upon them. The thickest beds vary from 2 to 5 feet in depth, and occur at Ballintoy on the coast, considerably to the west of Glenarm. They are very compact, but split readily into laminæ, on the surface of which the leaves, fragmentary and much macerated before being imbedded, are faintly defined by their more glistening surfaces. The greater part belong to a peculiar triple nerved leaf, named *M'Clintockia Lyelli* by Heer, and abundant in some of the Greenland shales. The lignite is full of compressed wood, with well defined structure, and belonging in some cases to trunks of considerable girth. Portlock mentions the occurrence of amber in lignites in the face of Craignastroke, in Ballynascreen parish. Lignites and bituminous woods imbedded in a loamy earth are met with at very many other places in the basaltic area ; but our member Mr. Gray has treated this subject so exhaustively in our Tenth Annual Report, 1873, (p. 28), that it is superfluous to add anything further here.

The Iron ores have been described on various occasions, particularly by Messrs. Tate and Holden, (Quart. Journ. Geol. Soc., vol. xxvi., p. 151, 1869), and they are doubtless very familiar to most of the members of this Club. They are met with over a very large tract of the basaltic area, from the north coast to at least Belfast Lough. Our member Mr. Gray observes a regular sequence in the ores :—

1 lithomarge,	3 bole,
2 ochre,	4 pisolitic iron.

Ochres or boles are very irregularly distributed among the columnar basalts, and are in very many instances old soils or vegetable mould produced by the decomposition of basalt sur-

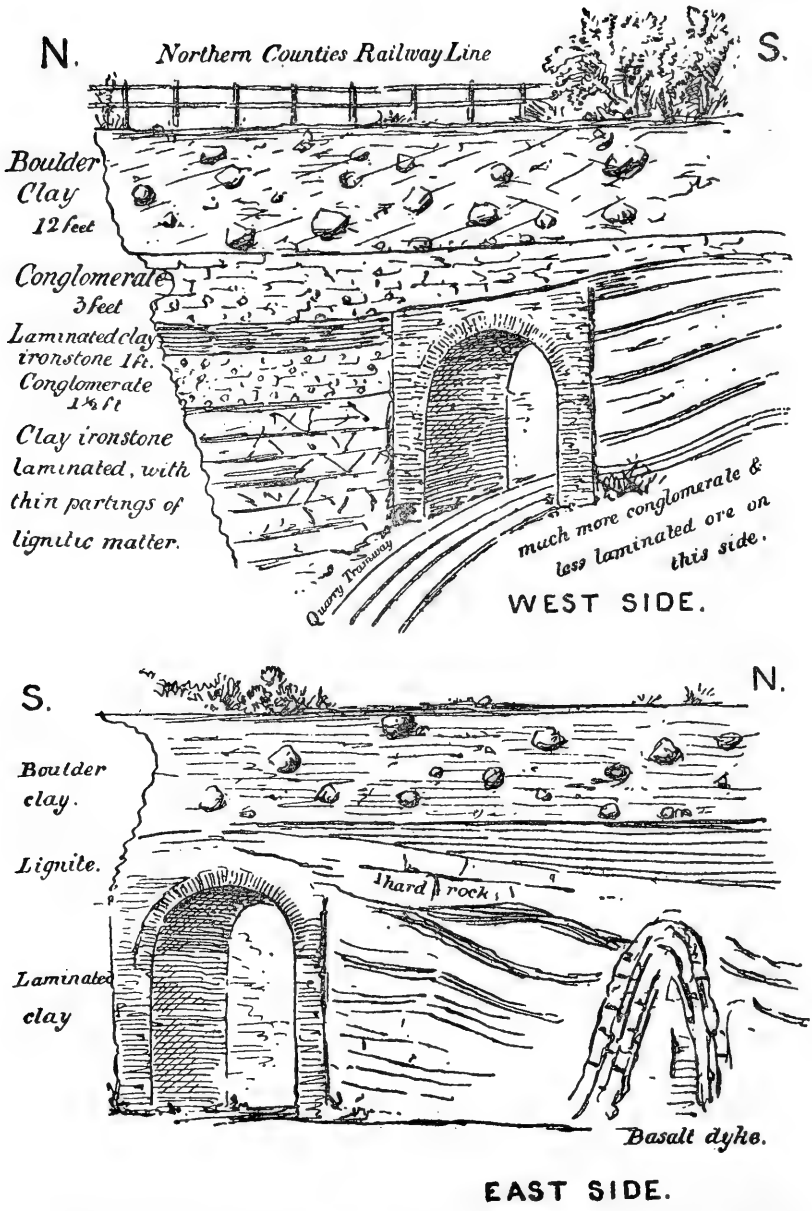
* These hopes have since been realised, and if permitted to do so, I shall have pleasure in presenting the Club with an account of the results of the exploration.

faces in periods of quiescence, burnt red by the succeeding flows. Five of these can be seen at different levels at the Pleaskin, and such abound in Madeira, Iceland, and Vesuvius, and probably in most volcanic countries. The pisolitic ores are more peculiar, and I am not aware of their accompanying volcanic lavas elsewhere ; they are apparently confined here to the middle zone. Messrs. Tate and Holden contended that they were the direct products of metamorphic action, but this view has not passed unchallenged, and the pisolitic ore is more generally thought to have been formed by confervoid algæ in shallow lakes, and in the same manner that similiar ore is forming in Sweden at the present day. Much of the lithomarge passes insensibly into basalt, and has been directly formed from it without any re-arrangement by water, and by ordinary atmospheric action. All boles or ochres that were once surface soils are naturally unfossiliferous, and for the same reason that the iron conglomerates are destitute of plant remains, namely, the coarseness of the matrix being unsuited to retain delicate impressions, and the looseness of the material permitting decay to continue after plants were imbedded. The only fossiliferous iron-ores with which I am acquainted, are those of Ballypalady, and all are agreed that these decomposed basalts or ashes were re-arranged by water. Several sections have been published, and they are supposed to be on a not greatly different horizon to the Lignites and Bauxites of the north-east coast, and to the pisolitic iron ores. Duffin places them at about 600 feet from the base of the basalts, and 400 feet below the nearest outflow. This must be of course where the full thicknesses are present. Portlock believes the materials to have been blown into the air, and afterwards deposited in the quiet waters of a series of shallow lakes, the iron being derived from basaltic uplands. Professor Hull coincides in this opinion, and adds that the lakes were formed in a depression of the basaltic area, due to the sinking of the surface at the close of the second period of volcanic activity. The iron was brought down by streams from the decomposing basalts, and was dissolved as carbonate, and precipitated as oxide.

There seems practically to have been no dissent from this explanation of their origin.

I think myself, however, that the use of the term lake is a little misleading, and that the deposits were not formed in any larger sheets of water than would be called tarns among our mountains. Their deposition is too irregular, and the water must have been too impregnated by iron for them to have been truly lacustrine, and I have noticed that little sediment is formed in actual lakes in basaltic areas. The association together of heavy closed pine-cones and fruits, with objects so easily floated away as well preserved dead leaves and pine-needles, would appear to show that the water must have been almost stagnant, for in true river deposits such associations would not be likely to occur. The irregular and almost twisted nature of the bedding, and the presence of breccias or conglomerates, and the generally coarse nature of the matrix, is on the other hand, entirely opposed to their having been formed in stagnant water, and the transverse section especially, at Ballypalady, has every appearance of having been due to rapid and shifting water, of very varying volume.

Detailed sections published in the works of Portlock, Tate and Holden, Bailey, and Kinahan, differ slightly. The quarries have greatly changed in form, and the variability of the beds renders it difficult to reconcile the older sections with what is actually existing. The plant bed on the west side of the railway appears to be from 10 to 15 feet thick, the greater part of this mass being conglomerate, or at least a gritty ore, and the fossils confined to thin and laminated seams of finer texture. This laminated matrix preponderates towards the base. On the west side of the line, the beds are only overlaid by boulder clay, but on the north-east face, they are partly covered by basalt ; and a dyke penetrates them diagonally from east to west. The quarry on this side extends for about 100 yards, and the ores become much more compact, and are quarried in larger blocks.



Sketch Sections, in the quarry at Ballypalady, showing character of bedding transversely to the direction of deposition; as seen in 1884.

On the north face, the laminated beds with plants occupy quite two-thirds to one-third conglomerate. In a cutting on the railway just above, there is a seam of lignite above a layer of basalt, and three or four feet of plant bearing beds unrepresented in the quarry. The total thickness of the deposit would seem, therefore, to exceed 25 feet, though it is not even then apparent that the base is exposed.*

It is generally assumed that the Lignites and Iron-ores mark a prolonged period of volcanic repose ; but it does not appear that this was altogether the case, for though the iron-ores are mainly decomposed basalt, rearranged by water, they certainly contain fragments of ash that must have been ejected and fallen directly into them. For a long period there were no lava flows over this district, but the volcanic forces, doubtless, remained active in other respects, and their presence was probably continuously manifest through fumaroles, etc. In the railway cutting a little south of Ballypalady, the evidence of fire is startlingly fresh. A slight hill is cut through, composed of ash or mud which has undoubtedly been subjected for a very long time to a fierce heat. It must have been a burning plain, and presented a scene as desolate as those in the Myvátn district of Iceland, which continuously exhale steam and gas and boiling mud. The colours of the calcined earth shade from bright cherry-red to crimson, with complimentary facets of blueish purple. The mud and ash has assumed, under the prolonged heat, a concentric structure, and presents sections in form of ⊔ shaped retorts. These signs intensify towards a core of basalt which forms the centre of the hill. About a mile and a half south, a hill of amygdaloidal basalts, with very rich colouring, is cut through.

These are approximately on the level of the Ballypalady beds. Some of the latter are very vesicular, especially towards the base of the quarry. There is a total absence of aquatic life;

* It is quite possible that the beds in the cutting, being separated by a thick dyke from those in the quarry, may be only the same beds brought to a higher level by an upthrow.

and Mr. Swanston and I discovered a number of the cavities to be due to some fruit which seems to have been lobed and echinated, very variable in size, and shed in vast profusion. Their decay seems to have generated or set free much gas, which has formed deep cavities.

I must next refer to the silicified wood and the lignites of Lough Neagh. These have been known for a very long period, and petrified trunks seem to have existed a century and a half ago, that could not be moved by a team of oxen, and from which branches were broken as thick as a man's leg. Very little is now left on the shores, the larger specimens having been removed to adorn rockeries. It is greatly to be hoped that a fine specimen may be secured for the Natural History Museum at South Kensington, to correspond with the splendid silicified trunk from New Zealand, which forms the most conspicuous object in the gallery of fossil plants. Any member of this Club would hand down a name to posterity, and render science a service by arranging the presentation of such a specimen to our great National Museum. It has long been a moot point, whether the wood is derived from the supposed Pliocene deposits of the Lough, or from Basalts through the Boulder Clay. The evidence in favour of the former is, so far as I gather from publications, not absolutely conclusive, though members of this Club, particularly our esteemed Secretary, Mr. Swanston,* seem to have embraced this view. Mr. Gray considers that the wood is found both in the lignites of the Lough and in the Basalts, considering these deposits to be of the same age. The opinions of such trained observers, familiar as they are with the ground, deserves every respect, supposing that they have undergone no change, yet there seem two or three points deserving further consideration. The leaves that are found in concretionary iron at low water on the shore appear to differ greatly from those of the Ballypalady deposit. Some appear to be nearer to leaves of existing trees, such as beech, willow, and alder; and it is quite conceivable that the supposed Sequoia might really be a fir or juniper, for I have

* Proc. B.N.F.C., vol. i., p. 350. *Ibid*, 10th Report, 1879, p. 40.

seen precisely similar iron concretions covered with impressions of fir, which would certainly have been described as Sequoia. The foliage of the yew would also be taken for Sequoia, and it has long been the fashion to refer all such impressions to that genus. I do not, however, yet know enough about them to say that they cannot be Eocene, or even older. These concretions seem to have nothing volcanic in their composition, and are indistinguishable from the concretions met with at Bacton, on the Norfolk coast, at certain states of the tide. The variations of the matrix are similar, and the main mass of the deposit in both places is a closely similar blue clay, with lignite and lignitic matter. On the other hand, very similar or identical nodules from Greeenland, which may belong to the same horizon, contain plants that are certainly not Pliocene, and are as old as those of the basalts. A search at Lough Neagh, where the nodules are, I am convinced, *in situ*, though possibly derived, would probably lead to the discovery of plenty of fruits and seeds in the lignites, which would thoroughly establish their age. Silicified wood is not uncommonly associated with basalts or volcanic deposits, and I have found beautifully silicified pieces *in situ* in Madeira. Moreover, the wood has been determined to belong to the Cupressineæ, and while members of this family positively abound in the inter-basaltic beds of Ballypalady, no representatives of it are known in British Pliocenes.* Thus, if the wood occurs *in situ* in it, the beds cannot well be Pliocene, except it be derived. Against the theory that the deposits are in any part contemporaneous with the basalts, I would set the absence of any layers of tuffs or ashes† in them, and it would seem impossible for any considerable sediments to have formed in the immediate vicinity of such intensely active volcanic displays, without abundant traces of such being enclosed. Relatively very mild eruptions, we know, cover areas of hundreds

* Since this was read, I have been able to collect further specimens from Lough Neagh, including a very Eocene type of *Cinnamon*, and a *Platanus* indistinguishable from the English Lower Eocene species.

† I am unacquainted with Messrs. Tate and Holden's "Ash-bed," with Platanites and Sequoia.

and thousands of square miles with thick deposits of ash. This argument may not, however, have any value when applied to fissure eruptions, about which so little is known.

Finally, the silicified wood, I am informed, has frequently been met with by Mr. Gray *in situ* among the basalts to the north-east of the Lough, and an accurate list of the localities should be recorded.*

There is little space remaining to devote to the plants themselves. Mr. Baily published the first account of those found at Ballypalady, in 1869, and ascribes their discovery to Mr. Du Noyer ; but Messrs. Tate and Holden state that Mr. Rowland Smeeth knew of their presence in 1862, and that Dr. J. Bryce had long previously discovered plants on the shores of Lough Neagh. Towards their investigation, the British Association contributed in 1873, and between 1879 and 1881, a sum of £75, and received in return three or more reports. This contrasts favourably with the £225 spent by them on Greenland plants, and £260 on the Alum Bay leaf bed, for no great results followed the expenditure in these cases.

The flora of Ballypalady is chiefly coniferous, and evidently, when living, occupied an elevated region. Dicotyledons are relatively rare, and the matrix, moreover, is unfavourable to their preservation. Among the Coniferæ, the prevailing species are a Cypress, a Cryptomeria, and a Pine. The Cypress is adequately represented by 2 or 3 exceptionally fine specimens of foliage, and innumerable smaller branchlets and cones. The foliage of the various living Cypresses is very similar, but ours agrees in its minuter characters with the type seen in *C. torulosa*, *C. funebris*, etc., and if we had but foliage it would not be possible to make any closer determination. But all these species have fruits which differ considerably from each other, and the presence of cones enables me to say that the Antrim species was, if not absolutely identical with *C. torulosa*, so near it that it could not be separated specifically, or even made a

* Ferruginous wood from the Giants' Causeway proved to be Abietineous, and not Cupressineous like all that from Lough Neagh.

variety, so far as fruit and foliage go. The identity of both these principal organs with those in a living form, make it pretty well a matter of certainty that the other organs were identical, and that the fossil formed a no less majestic tree than the living. When a palæontologist finds the bones and teeth precisely agreeing with those of a horse or a crocodile, the muscles, hoofs, claws, mane, and tail are assumed, and he no more doubts that the horse possessed all these, and browsed and galloped, than he does that the crocodile lurked and basked as he does now. If such inductions were not permissible there would be an end to palæontology. We may therefore consider that our fossil Cypress was a tree; stately and erect, towering as straight as an arrow to perhaps a height of 150 feet, and with a girth of a dozen or even a score of feet. We may picture a conical outline such as these trees now possess in their Himalayan habitats, with branches slightly drooping, the branchlets ferny and feathery, and of a beautiful greyish green. The Cupressineous wood of Lough Neagh doubtless belonged to this tree, and huge logs of it were formerly found. The wood before petrifaction must have been as deliciously fragrant as that of *C. torulosa*, held sacred by some tribes through its perfume. This does not prevent the clumps or larger masses which clothe the hills from 4000 to 8000 feet from suffering the fate of the Deodar, where water transit is available and large quantities of its timber annually reach the Indian markets. A peculiarity about the Irish distribution of this particular conifer is that it seems confined to Ballypalady, and is absent in both the Bauxites and Lignites, telling eloquently that the former was formed nearest the mountain habitats it loved. Its preponderance shows how largely the old Alpine forests of Antrim were composed of it. A few fragments from the Arctic floras, figured by Heer under various names, may belong to it.

Next, and scarcely less important, is the *Cryptomeria*, whose presence in such abundance is truly remarkable. This is a genus now completely confined to Japan and China, and possessing but one species. I at first assigned the remains definitely

to Cryptomeria, then I doubted, hesitated, but after a prolonged investigation, I am perfectly certain that they belong to Cryptomeria and no other genus. In dealing with fossil plants, first impressions from superficial resemblance are very often correct, but until every possible comparison has been made, and the issue narrowed down to one or two by a process of natural rejection, the determination will possess no scientific value. In this case, the existing genus, being Japanese, has been cultivated for ages with a view to produce sports or varieties which are held in religious esteem. The Cryptomeria of our gardens is one of these, introduced by Mr. Fortune from seed gathered in the north of China and the Isle of Chusan, and has leaves nearly twice as long and more closely pressed to the branches than the true stock of Japan. Plants transplanted to hills in Java, under similar conditions and temperature, have rapidly degenerated, and approach the fossil type of foliage. The cones also are excessively bracteated, and the scales deeply fringed so as to mask their structure, but fruiting specimens identical with the fossil are not uncommon, and as devoid of bracts. Whether bracteated and fimbriated or not, we have only to imbed them in plaster to represent the conditions of the fossil, and then cut through them, to make certain that the fossil cones are Cryptomeria and nothing else. There can be no doubt that our Conifer is the wild stock of the existing Cryptomeria, which still loves a basaltic and humid soil, and under such conditions forms vast forests ; at least a tenth part of those which clothe the three principal isles of Japan from 500 to 1200 feet above the sea being formed of this tree. Its fine pyramidal crests and deep green contrasts with the laurels and bamboos, and gives a peculiar and characteristic aspect to forests of Eastern and Southern Japan. It occasionally rivals its companion Cypress in bulk and height, and is a majestic tree, strongly recalling *Araucaria Cunninghami*. This plant, unlike the Cypress, abounds at Glenarm, as we might expect on the supposition that those beds contain the spoils of lower land ; for it ranges within 500 feet of the sea-level, while the Cypress is a more purely Alpine tree.

It, or something like it, has also been found in Mull, and seems everywhere present among the Arctic floras described by Heer, though referred to the genus Sequoia.

There are at least two species of pines, both apparently belonging to the section distinguished by its arrangement of needles in pairs. There are several European and two Japanese species to which the fossils are allied. There are also, a pine of the Strobus section, a Tsuga or Abies, and probably a Larix and a Taxus. The whole assemblage forms one of the most important groups of fossil Coniferæ ever obtained, and is second only to that so ably described by Professor Goeppert from the Amber Beds of Prussia. The group, unlike those of the English Eocenes, appears to have been transported bodily to Japan and Eastern Asia.

Of the remainder of the Flora I can as yet say little. There is only one fern, and that apparently a Gleichenia of an Arctic fossil species. The only striking fruit is one referred to Magnolia by Heer, but which I think may not improbably be but a peculiar condition of fossilisation of a Gymnospermous cone with thin scales and ripe seeds. The largest leaf is that of a water-lily. Another fine and deeply notched leaf is assigned to Quercus, and we have fruit and leaves of an arctic fossil Alnus. Messrs. Tate and Holden record the occurrence of leaves from Ballypalady referable to Eucalyptus, Hakea, Celastrus, and Daphnogene. Mr Baily in his reports apparently ignores these genera, and records Salix, Populus, Fagus, Andromeda, Viburnum, Magnolia, M'Clintockia, Rhamnus, and Juglans in their place. The whole are the merest guesses, and as such we may leave them.

I am sorry so little information can be given about the plants, but where nothing definite can be stated, it would be no service to science to add further lists of guesses.

In conclusion, Mr. Gardner said—I think we may assume that the old land on which this flora grew formed a part of the Continent of Europasia as it existed in Eocene times, and further that it formed or was not distant from its western coast line.

I, in common with an increasing number of geologists, am a firm believer in the theory that there exists somewhere between the earth's crust, which has become solid from loss of heat, and the interior, which is solid through density and pressure, a plastic zone. Many rocks are metamorphosed or melted through heat, and this heat has been generated through pressure, for metamorphosed rocks occur chiefly in mountain areas where they have been squeezed in the process of elevation. On the other hand, the interior of the earth has over and over again been proved to be rigid. There is no escape from the inference that it is kept solid at a temperature above its melting point through excess of pressure. This nucleus cannot pass into a crust whose solidity is due to its low temperature without passing through that intermediate stage of temperature and pressure at which rocks are molten, and a continuous layer of molten matter must therefore underlie the solid outer crust and follow to a great extent the earth's contour.

Seismologists have demonstrated the extreme sensitiveness of this crust, and its perpetual state of unrest, so that we now know that there is nothing more unstable than solid ground. Geologists have called attention to the fact, reiterated in every formation and in every country, how invariably the great sedimentary strata have formed in areas in which subsidence has kept pace with their accumulation, so that no matter what their thickness, they always remained at or about the sea-level. I discussed these facts in "Nature" only last August, with a view to uphold the conclusion that the earth's crust was sensitive under the increase of weight on any given area, and sufficiently flexible to yield under it and cause subsidence. Passing over all lesser examples of areas in which weight might be added, I endeavoured to show that the great depths of the oceans must ever be the areas over which the greatest and a constantly increasing pressure is exerted.

If ocean basins are permanent, sediment must have been slowly accumulating in them since Eozooic times, and attained an aggregate vertical thickness that must be colossal. The pressure of water alone will equal in a depth of 400 fathoms

6195½ tons to the square yard, and this, on the supposition of a continuous molten layer, would continually tend to squeeze matter from regions of greatest pressure towards the edges where the pressure decreased. The displaced matter would find relief under areas of least resistance, and these would coincide most frequently with sea margins, because they would be the nearest lines free from accumulating sediments. For a long time the expansion would only show itself in upheaval, and the character of the basaltic floras certainly shows that their plateaux must have been of considerable elevation, and then, as the strain became more severe, in eruption. But when the strain was lessened through such vast and repeated outbursts, and the tension withdrawn, the enormous weights of the erupted matter would in turn make themselves felt, and slowly submerge and drown the land. The steady rise of land in Eocene times would shut out the ice-laden waters of the Arctic Ocean by uniting England and America, and its submergence, by gradually opening wide the channels, would re-admit ice-bergs in vaster quantity, and prepare the way for a glacial epoch. These causes may not have been independent of astronomical changes, but the help of such changes in the distribution of land and water in our Northern Hemisphere would alone render such extremes of climate possible.

Such probably may have been the causes which led to the elevation and drowning of a vast stretch of land which enabled the Mammalia and plants of Europasia to invade and to a large extent replace the indigenous and less developed flora and fauna of North America. The basalts of Antrim are but a fragment of it, but as such they are of surpassing interest.

At the conclusion of the paper, several members spoke of the great importance of such a communication, and the desire was expressed that it would be a valuable addition to the Club's Proceedings if published in extenso. Mr. Gardner having kindly handed his manuscript to the Secretaries, it was unanimonsly resolved that the entire paper be embodied in the Club's Proceedings.

The eighth and last meeting of the Session was held in the Museum, on 24th April, when two communications were brought forward. The first was by Mr. Robert Day, F.S.A., M.R.I.A., of Cork, "Upon some of the objects in the Loan Collection of the Cork Exhibition of 1883." Mr. Day illustrated his subject with examples from the Exhibition, which had been lent by the owners. Among these was a collection of silver spoons, comprising a trefoil-top spoon, with the London Hall mark 1565; an Apostle spoon, with the London date letter for 1637, the handle of this surmounted with a figure of St. Philip holding in one hand a cross, and in the other a basket of fish; a remarkable silver ladle, with an octagonal hollow handle, and the mark W. C., for William Clarke, the maker, who was Master of the Guild of Goldsmiths in Cork, anno 1714; a seal-top spoon, with the London Hall mark 1647; a Danish spoon, anno 1701, with engraved bowl and open work handle; a Persian spoon of boxwood, in a case with silver chain; &c. He referred to the "Maidenhead spoons," so called from having a figure of the Virgin upon the handle; to the Cavalier spoons, which bore an effigy of King Charles; and to the many historical allusions to the Apostle spoons—*e.g.*, in the play of King Henry VIII., where the King twits Cranmer as wishing to spare his spoons by excusing himself from being godfather to the young Princess Elizabeth, for the spoons were sponsorial gifts, and are mentioned more than once in the diaries of Pepys, Evelyn, &c. His next reference was to the pomander or scent box, a beautiful example of which, in pierced silver work, was shown. The pomander is mentioned in an inventory so far back as 1321, and again among the valuables of King Henry V., anno 1423. Cardinal Wolsey is described by Cavendish as holding one in his hand when passing among crowds, as a prevention against pestilent airs, the plague and infection. He then referred to the matrices of mediæval and other seals, and showed a beautiful vesica-shaped, brass-gilt matrix of "S. Priorisse Monasterei sce Caterine D. Senis" of 14th century work. While dwelling

upon mediæval antiquities, the stone and bronze periods of Ireland were not forgotten, and some of the stone objects were illustrated by those of a similar form from New Caledonia, New Guinea, Australia, New Zealand, North and South America, Africa, &c., &c. Among the gold ornaments exhibited were a fillet of gold, from the County Cork ; a fibula, with wineglass-shaped ends ; a twisted torc, from Donegal ; a silver arm-and-neck torc, from Kerry ; &c., &c.

The second communication was by Mr. William Gray, M.R.I.A. The reader directed attention to erroneous statements, published under the auspices of the Royal Irish Academy and other learned societies, with reference to the mammoth and the ancient flint implements of Antrim. Mr. Gray read from the reports of the Belfast meeting of the British Association that the Rev. Canon Grainger, D.D., of Broughshane, included a mammoth's tooth in a list of fossils from the glacial gravels of Ballyrudder, on the Antrim coast road. In the Transactions of the Royal Irish Academy and the "Journal" of the Royal Geological Society of Ireland, the late Professor Leith Adams describes this tooth as having been found by Dr. Grainger "sticking in a marine deposit." Thus, the fact of finding the tooth in a particular bed was apparently settled upon the authority of so reliable a scientist as the Rev. Canon Grainger. Mr. Gray, however, demonstrated that the tooth was not found by Dr Grainger, but was first found by a farm labourer several years before Dr. Grainger saw it. The original tooth was broken into several pieces, and the pieces were distributed among the cottages in the neighbourhood, until the scientific eye of Dr. Grainger detected the large piece at the residence of the late Joseph Dale, of Ballyrudder ; so that beyond the fact of the tooth being found, the evidence it affords is of no scientific value. Dr. Grainger states that he picked up a small fragment of the tooth near where it was first found. This fact confirms the labourer's account of the transaction, but does not determine either the exact position, or the geological formation from which the fossil originally came. Yet this tooth

has been referred to at the British Association, and Royal Irish Academy, in papers dealing with our Antrim worked flints, leaving a vague impression that the workers of the flints and the mammoth were contemporary. Mr. Gray said that these loose, careless statements were very reprehensible in any communication intended for the use of the members of the Royal Irish Academy, or even for a provincial society. As another example, Mr. Gray referred to Mr. Knowles, of Ballymena, who had contributed largely to many of our leading scientific societies. In a recent paper on the Flint Implements of the raised beaches, published in the Transactions of the Royal Irish Academy, Mr. Knowles says—"As far as I am aware, all the objects which have been hitherto found in the raised beaches and described as implements were in reality only flakes." In making this loose statement, Mr. Knowles overlooked the fact that so far back as 1869, years before Mr. Knowles commenced writing for the scientific world, Mr. J. H. Staples read a paper before the Belfast Naturalists' Field Club on the Flaked, Chipped, and Worked Flints to be found in the gravels in the neighbourhood of Holywood, County Down. In this communication Mr. Staples described "rudely-chipped celts, spear heads, and certain oval-shaped weapons" "of the same type as those from the Somme Valley in France, and different English gravels." In addition, Mr. Gray read a paper at the Belfast meeting of the Royal Historical and Archæological Society of Ireland in 1879, which has been published in the Society's Journal, and this paper describes and figures "roughly-chipped unpolished flint celts, having all the characters of extreme age," and "implements that approach nearest the Palæolithic forms of England and the Continent," all of which were from the raised beach gravels. Mr. Gray's published papers, moreover, contain a tabulated statement showing the distribution of the implements at eight raised beach stations; the rough flint celts of Palæolithic type were found at five stations. Again, Mr. Knowles, in describing the geological character of the raised beach gravels at Larne and other parts of the North-East

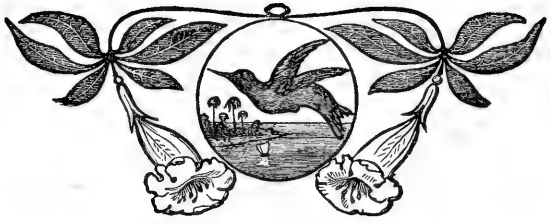
of Ireland, says the worked flints are mixed through the gravel to the "lowest layer." He describes the gravels as being "heaped together in a most irregular manner, and notices a general absence of stratified arrangement." He therefore concludes—"The whole formation appears to me not to be a raised beach in the ordinary sense of the term, but rather something of the nature of an esker which has received glacial matter on its surface at the time of submergence." "If I am correct," continues Mr. Knowles, "the term Palæolithic might be too modest an application for these implements. They would probably be the oldest implements not only in Ireland, but in the British Isles." A bold surmise. Mr. Gray contended that the above description of the gravels was inaccurate, and the conjectures founded thereon untenable. The gravels are not heaped together irregularly; they are manifestly a well-defined, stratified marine deposit; they have no relation to "glacial matter;" they are deposited upon a thick bed of estuarine clay, and are thus of a comparatively recent date.* Moreover, the worked flints are not mixed through the gravel, but occur only on the surface of the undisturbed gravels, and therefore the men who worked the flints lived subsequent to the formation of the raised beach.

The election of several new members and the examination of the valuable and highly interesting collection brought by Mr. Day to illustrate his paper terminated the meeting.

The Annual Meeting was held on Tuesday evening, 29th April, in the Museum, College Square. The President, W. H. Patterson, Esq., M.R.I.A., having taken the chair, called upon the Honorary Secretaries and Treasurer for their reports

* The term Estuarine Clay is intended to signify those deposits, mostly of clay, which have been accumulated in our existing bays and estuaries since the close of the Glacial Period. They are the latest of a long series of Geological deposits, and resting, as they most commonly do, on the Boulder Clay, they unite the present to the past. See "A list of the Fossils of the Estuarine Clays of the Counties of Down and Antrim." By Samuel H. Stewart. Eighth Annual Report—Belfast Naturalists' Field Club. Appendix II., 1871.

which will be found in their proper place, at page 219. The President having announced that, as the formal business of the evening was over, he would be glad if the members present would assist the Committee by suggestions in any department, with a view of increasing the usefulness, improving the working, or in any other way advancing the Club's aims, the conversation became general, and it was soon observable that the excursion programme claimed a first place, many localities being named as suitable for visiting. The prize-list also came in for a fair share of attention. These were all duly noted by the secretaries, and will, no doubt, receive proper consideration by the Committee of the new year.

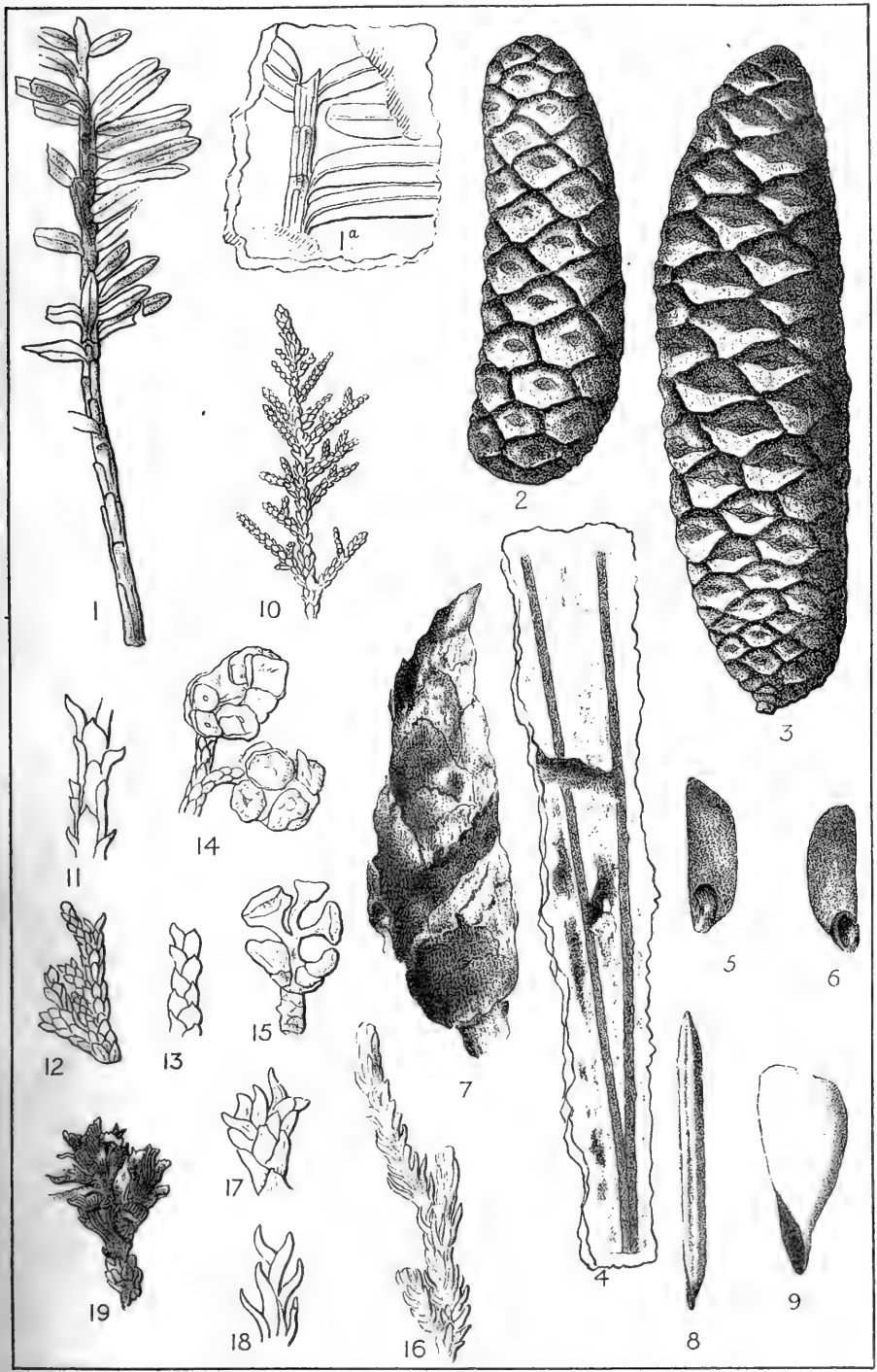


EXPLANATION OF PLATE,

Illustrating all the Coniferæ of the Ballypalady beds referred to in Mr. Gardner's Paper on the Basalts of the North-East Atlantic.

---

1. *Taxus Swanstoni*, Gard. 1*a* enlarged.
2. *Pinus Bailyi*, Gard.
3. *Pinus Plutonis*, Baily. cone.
4. „ „ leaves.
5, 6. „ „ seeds.
7. *Tsuga Heerii*, Gard. cone.
8. „ „ leaf.
9. Seed of *Tsuga* or *Abies*.
10. *Cupressus Pritchardi*, Gœppert, foliage.
11-13. Enlargements of same.
14-15. Cones of same.
16. *Cryptomeria Sternbergi*, Gœppert, foliage.
17-18. Enlargements of same.
19. Cone of same.



Marcus Ward & Co Ltd

· CONIFERÆ · FROM · BALLYPALLADY ·


NATURAL HISTORY

METEOROLOGICAL SUMMARY FOR 1884.

To the kindness of LANCELOT TURTLE, Esq., J.P., Aghalee, we are again indebted for the liberty of inserting the following exhaustive series of tables for the ten months ending October, 1884.

The observatory at which the records are made is situate at Aghalee, in the extreme southern point of the County of Antrim, at an elevation of 130 feet above sea-level. The country to the west is flat, and very little above the level of Lough Neagh, which is $2\frac{1}{2}$ miles distant in that direction, and to other points the country is gently undulating and well wooded. The nearest mountains are those surrounding Belfast, distant about 12 miles east, while the Tyrone Mountains are about 25 miles west. The nearest point of sea is the upper end of Belfast Lough, while the open sea may be said to be about 20 miles east of the observatory.

REVIEW OF THE WEATHER.

METEOROLOGICAL Observations of Ten Months ending 31st October, 1884, taken at Aghalee, Co. Antrim. Latitude, 54° 31′ 15″; Longitude, 5° 16′ 0″ W.

1884.	BAROMETER 130 Feet above Sea Level. Corrected and Reduced to 32 degrees Fahrenheit and mean Sea Level.				SELF-REGISTERING THERMOMETER in a "Stevenson" Stand.							Nights below 32 Deg. on the grass.	Maximum Black Bulb in vacuo, 4 feet above grass.	Mean Amount of Solar Radiation.	HYGROMETER at 9 a.m.	
	Max.	Min.	Mean.	Range.	Highest of the Month.	Lowest of the Month.	Mean Maximum.	Mean Minimum.	Mean Temperature of the Month.	Greatest daily Range.	Monthly Range.				Mean of dry Bulb.	Mean of wet Bulb
	Inches.	Inches.	Inches.	Inches.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.					
January.....	30·600	27·678	29·867	2·922	53	27	45·48	39·00	42·24	21	26	7	88	19·26	43·4	41·9
February.....	30·336	28·211	29·680	2.125	53	27	44·69	36·07	40·38	17	26	7	97	25·58	42·2	40·8
March	30·251	29·141	29·784	1·110	63	27	49·87	37·84	43·85	23	35	5	113	41·24	43·6	41·6
April.....	30·309	28·971	29·822	1·338	64	30	56·06	37·10	46·58	32	34	8	121	50·47	46·3	43·7
May.....	30·347	29·099	29·878	1·248	75	34	60·52	42·96	51·74	36	41	1	125	48·93	52·2	48·2
June	30·443	29·447	29·950	0·996	84	38	67·30	48·53	57·90	34	46	0	138	51·33	56·9	53·1
July	30·191	29·151	29·711	1·040	81	43	69·48	52·13	60·81	26	38	0	148	48·13	61·3	57·0
August.....	30·200	29·551	29·930	0·649	80	41	68·94	52·74	60·84	30	39	0	131	43·28	59·8	56·2
September...	30·426	29·504	29·907	0·922	76	38	64·66	48·26	56·46	26	38	0	125	42·04	56·0	53·3
October.....	30·352	29·320	29·971	1·032	64	36	53·74	43·26	48·50	21	28	0	115	33·26	49·1	46·3
Totals.....	303·455	290·073	298·429	13·382	693	341	580·74	437·89	509·30	266	351	28	1201	403·52	510·8	482·1
Means	30·345	29·007	29·843	1·338	69·3	34·1	58·07	43·7	50·93	26·6	35·1	2·8	120·1	40·35	51·08	48·21

REVIEW OF THE WEATHER.—*Continued.*

1884.	Dew Point.	Comparative humidity Saturation—100—	Elastic Force of Vapour.	Mean Amount of Ozone.	WIND. Number of Days on which the Wind blew from the following points at 9 a.m.									RAINFALL. Gauge—Diameter of Receiver, 5in.; height above the ground, 1 foot; height above sea, 105 feet.			
					N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Total depth in inches.	Greatest fall in 24 hours. Inches.	Greatest fall in 24 hours. Date.	Number of days rain.
			Inches.														
January.....	40·1	88	0·240	5·0	0	0	4	1	2	4	18	2	0	4·94	0·57	9th	25
February.....	39·2	89	0·239	5·4	0	0	4	8	1	7	6	2	1	2·89	0·65	20th	20
March.....	39·0	80	0·239	5·7	0	0	2	7	7	3	8	3	1	2·78	0·49	30th	21
April.....	40·2	79	0·250	9·0	6	2	6	8	1	0	2	2	3	1·70	0·51	3rd	12
May.....	46·1	80	0·312	9·5	2	0	8	8	1	1	3	5	3	2·22	0·47	8th	13
June	49·6	82	0·356	8·9	3	1	2	1	1	3	4	9	6	1·26	0·55	4th	5
July.....	53·2	75	0·406	8·2	3	0	1	4	8	4	7	1	3	2·90	0·42	28th	21
August.....	53·0	80	0·403	7·8	0	1	1	4	4	6	6	4	5	2·57	0·70	27th	16
September...	50·8	83	0·373	7·6	0	0	4	3	4	5	10	2	2	2·85	0·85	6th	13
October.....	43·3	80	0·281	7·2	4	0	0	0	4	5	10	5	3	2·55	0·55	31st	18
Totals.....	454·5	816	3·099	74·3	18	4	32	44	33	38	74	35	27	26·66			164
Means.....	45·45	81·6	·344	7·43	2	0	3	3	3	4	9	3		Direction of Wind on calm days.			

Review of the Weather—*Continued.*

Comparison of Annual Temperatures.

	Highest Degrees.		Lowest Degrees.		Mean Temperature Degrees.
1869	82 on the 17th July		15 on the 28th Dec.		48·80
1870	86 „	10th Aug.	5 „	24th Dec.	48·68
1871	80 „	8th Aug.	19 „	15th Dec.	48·98
1872	77 „	18th July	23 „	30th Dec.	49·05
1873	81 „	22nd July	15 „	24th Feb.	48·52
1874	84 „	18th July	20 „	17th Dec.	49·31
1875	77 „	29th July	22 „	9th Dec.	49·43
1876	94 „	16th July	20 „	20th Feb.	48·84
1877	79 „	20th June	25 „	19th Mar.	48·94
1878	84 „	22nd July	10 „	25th Dec.	48·54
1879	81 „	11th Aug.	14 „	12th Jan.	45·51
1880	83 „	12th Aug.	17 „	21st Dec.	48·82
1881	83 „	31st May	4 „	22nd Jan.	47·28
1882	85 „	10th Aug.	11 „	14th Dec.	48·67
1883	75 „	24th Aug.	20 „	15th Nov.	48·00
1884*	84 „	28th June	26 „	26th Feb.	50·93
	1315		267		778·30
Mean	82·19		16·69		48·64

Comparison of Annual Rainfall.

	Inches.	No. of Days Rain.		Inches.	No. of Days Rain.
1869	28·82	181	1879	35·60	182
1870	28·86	170	1880	30·11	150
1871	30·18	176	1881	36·49	201
1872	47·09	222	1882	39·59	219
1873	31·94	178	1883	31·92	176
1874	30·03	170	1884*	26·60	164
1875	33·63	172		540·89	2939
1876	38·33	174	Mean	33·80	183
1877	41·68	229			
1878	30·02	175			

LANCELOT TURTLE.

* For ten months of the year.

NOTE—The Minimum Barometer for 26th January is the lowest atmospheric pressure there is any record of in this country.

RULES

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB"

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club, and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be

eligible for re-election who has not attended at least one-fourth of the Committee Meetings dnring his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursion to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the members present.

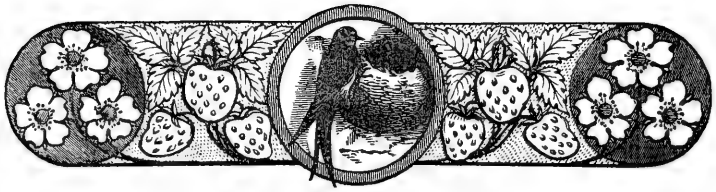
V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

TWENTY-SECOND YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31st, 1885 :—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species,	...	0	10	0
III.	Best Collection of Mosses, ...	...	0	10	0
IV.	,, ,, Seaweeds, ...	...	0	10	0
V.	,, ,, Ferns Equiseta, and Lycopods, ...	...	0	10	0
VI.	,, ,, Tertiary and Post Tertiary Fossils,	...	0	10	0
VII.	,, ,, Cretaceous Fossils,	...	0	10	0
VIII.	,, ,, Liassic do.,	...	0	10	0
IX.	,, ,, Permian do.,	...	0	10	0
X.	,, ,, Carboniferous do.,	...	0	10	0
XI.	,, ,, Older Palæozoic do.,	...	0	10	0
XII.	,, ,, Fossil Plants, ..	...	0	10	0
XIII.	,, ,, Marine Shells, ...	...	0	10	0

XIV.	Best Collection of Land and Freshwater Shells, ...	£0 10 0
XV.	„ „ Lepidoptera, ...	0 10 0
XVI.	Best set of 25 Microscopic Slides, ...	0 10 0
XVII.	Best Collection of Archæological Objects, ...	0 10 0
XVIII.	„ „ Crustacea and Echinodermata, ...	0 10 0
XIX.	„ „ Coleoptera, ...	0 10 0
XX.	„ „ Geological Specimens, illustrative of the Mineral Resources of the Province of Ulster, ...	1 0 0
XXI.	Best Collection of all or any of the above Objects, collected *at the Excursions* of the Year, ...	0 10 0
XXII.	6 Best Field Sketches appertaining to Geology, Archæology, or Natural History, ...	0 10 0
XXIII.	Best Collection of Fungi (Macro or Micro) representing not less than 100 species, names of species not necessary. Collectors may send (post-paid, from time to time during the season) their specimens to Rev. H. W. Lett, M.A., T.C.D., Ardmore, Lurgan, who will record them to their credit, ...	0 10 0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXIV. Mr. William Swanston, F.G.S., offers a Prize of 10s 6d. for the best Two Studies, illustrative of Geology, contributed to the Club's Album. The subjects must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 × 9 inches,

XXV. A Prize of 10s., given by the late Mr. J. W. Murphy, for the best collection of Recent Sponges, the conditions being the same as those for Prizes 1 to 21.

XXVI. Lieut.-General Smythe, R.A., F.R.S., M.R.I.A., &c., offers a Prize of £1 1s. for the best list of names of places in the Counties of Antrim and Down (not hitherto published) giving their Irish meaning and derivation, on the plan of Dr. Joyce's "Irish Names of Places."

XXVII. Dr. J. W. Beck offers a Prize of £1 for the best Herbarium of Flowering Plants collected during the season at the various Excursions of the Club, the competition of this Prize to be limited to members or visitors at the Excursions under the age of 21.

N.B.—The Sketches and Drawings to be Competitors' own Work.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All Collections to be made personally during the Session, in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.

NOTICE.

EXCHANGES OF PROCEEDINGS.

THE Committee of the Club acknowledges with thanks the receipt of the following publications, which have been received during the past year from the various societies and institutions :—

Belfast Natural History and Philosophical Society.
Proceedings, 1883-84.

Berwickshire Naturalists' Club.
Proceedings. Vol. X., No. II.

Bath Natural History and Antiquarian Field Club.
Proceedings. Vol. V., No. 3.

Brighton and Sussex Natural History Society.
Annual Report, 1884.

Bristol Naturalists' Society.
Proceedings. Vol. IV., Part 2.

Cardiff Naturalists' Society.
Report and Transactions. Vol. XV., 1883.

Dublin Royal Irish Academy.
Proceedings—Science. Series II., Vol. IV., Nos. 1 and 2.
,, Polite Literature and Antiquities, Series II., No. 5.
Transactions—Science. Vol. XXVIII., Nos. 14, 15, 16.

Dublin Commissioners of Public Works, Ireland.
Reports. Nos. 44, 45, 46, 47, 48, 49, 50, and 51.

Edinburgh—Botanical Society of.
Transactions and Proceedings. Vol. XV., Part 1.

Essex Field Club.
Transactions. Vol. III., Part 8, and Appendix I.

Hertfordshire Natural History Society and Field Club.
Transactions. Vol. III., Parts 1 and 2.

Huddersfield Naturalists' Society.
Transactions. Part 1.

Leeds Philosophical and Literary Society.
Annual Report—1883-84.

Liverpool Literary and Philosophical Society.
Proceedings. Vols. XXXV., XXXVI., XXXVII.

Liverpool Geological Society.
Proceedings. Vol. IV., Part 4.

Liverpool Naturalists' Field Club.
Proceedings—1883-84.

London—Geologists' Association.
Proceedings. Vol. VIII., Nos. 5 and 6.

London—The Postal Microscopical Society.
Journal. Vol. III., Part 9. Rules, &c.

Manchester Field Naturalists' and Archaeologists' Society.
Report and Proceedings—1883.

Manchester Scientific Students' Association.
Report and Proceedings—1883.

Norfolk and Norwich Naturalists' Society.
Transactions. Vol. III., Parts IV. and V.

Penzance Natural History and Antiquarian Society.
Report and Transactions—1883-84.

Plymouth Institution and Devon and Cornwall Natural History Society.
Report and Transactions. Vol. VIII., Part 3.

Toronto—Natural History Society of.
Label list of Insects of the Dominion of Canada.

Toronto—Canadian Institute.
Proceedings. Vol. II., Fasciculus, No. 1, No. 2, and No. 3.

U.S.A.—Philadelphia Academy of Natural Sciences.
Parts 2 and 3, 1883, Part 1, 1884.

" New York—American Museum of Natural History.
Bulletin. Vol. I., No. 5., and Fifteenth Annual Report.

" Essex Institute, Salem, Mass.
The North Shore of Massachusetts Bay. 6th edition.
Do. Bulletin of Vol. 14., Nos. 1 to 12.
Do. Guide to Plummer Hall: its Libraries and Collections.
Do. Pocket Guide to Salem, Mass.

" Smithsonian Institution.
Report, 1882.

" St. Louis Academy of Science.
Transactions. Vol. IV., No. 3.

" Geological Survey. J. W. Powell, Director.
Second Annual Report—1880-81.

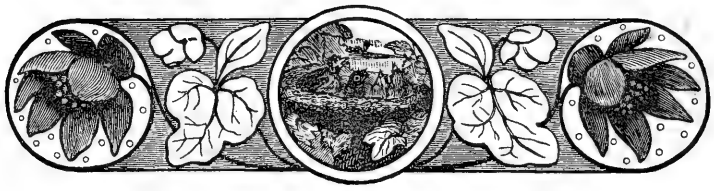
" American Association for the advancement of Science.
Proceedings. Vol. XXXI., 1882, Parts 1 and 2.

" Boston Society of Natural Science.
Proceedings. Vol. XXI., part 4, and Vol. XXII., Part 1.

The following were also received from the Authors:

Rev. George Wilson, Corresponding Member, S. A., Scot.
Notice of a Collection of Implements and Antiquities from Wigtonshire.
Notes on Implements and Ornaments from Glenluce, Wigtonshire. Two papers.
Notice of Sculptured Stones, Wigtonshire.
Notes on Crannogs and Lake Dwellings, Wigtonshire.
Notes on Lake Dwellings, Wigtonshire.

T. Rupert Jones, Esq., F.R.S., F.G.S., &c.
On some Palæozoic Phyllopoda.
On some Carboniferous Entomostraca from Nova Scotia.
Demonstrations on the Marbles and other Monumental Stones.
On the Implementiferous Gravels near London.



BELFAST NATURALISTS' FIELD CLUB.

TWENTY-SECOND YEAR, 1884-85.

LIST OF OFFICERS AND MEMBERS.

President:
W. H. PATTERSON,

Vice-President:
REV. CANON GRAINGER, D.D., M.R.I.A.

Treasurer:
JOSEPH WRIGHT, F.G.S.

Secretaries:
WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

CHARLES BULLA.	GEORGE O'BRIEN.
WILLIAM A. FIRTH.	DANIEL M'KEE.
WILLIAM GRAY, M.R.I.A.	HUGH ROBINSON.
REV. H. W. LETT, M.A., T.C.D.	S. A. STEWART, F.B.S., Edin.
DR. S. M. MALCOMSON.	JOHN VINYCOMB.

Members.

Any Changes in the Addresses of Members should be notified to the Secretaries.

Charlton B. Aickin, Murray's Ter.
Miss Alder, Kinnegar, Holywood.
Edward Allworthy, Langford Villas.
John Anderson, J.P., F.G.S., Hillbrook, Holywood.
Robert Anderson, Meadowlands, Balmoral.
John J. Andrew, L.D.S., F.R.C.S., Eng., Belgravia, Lisburn Road.
Samuel Andrews, J.P., Seaview.
Mrs. Andrews, Seaview.

James M. Barkley, Mountpottinger.
Robert Barklie, F.C.S., Moffatt's Terrace, Holywood.
James Barr, Sandringham.
William Batt, Ormeau Road.
J. W. Beck, M.D., Claremont Ter.
Miss Emma Beck, Claremont Ter.
Geo. R. Begley, Wolfhill, Ligoniel.
Miss Begley, Wolfhill, Ligoniel.
Miss Sarah J. Begley, Wolfhill, Ligoniel.
E. H. Bell, Knockdara, Strandtown.
George E. Bell, Wellington Park.
James Best, Great Victoria Street.
Edward Bingham, Ponsonby Av.
W. J. Boucher, Mountpottinger.
Davys Bowman, University Street.
Hugh B. Brandon, Oceanic Avenue.
Chas. H. Brett, Gretton Villa South, Malone Road.
James Berkley Bristow, St. James's Parsonage, Antrim Road.
John Browne, J.P., Ravenhill.
John Browne, M.R.I.A., Drapersfield, Cookstown.
Thomas Brown, Rosemary Street.
W. W. Brydon, Silverstream House, Greenisland.
Rev. G. Raphael Buick, Cullybackey
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Martello House, Holywood.
William Butler, Windsor Crescent.

J. Campbell, Rathfern, Carnmoney.
R. G. Campbell, Rathfern, Carnmoney.
W. Campbell, F.P.S., Ponsonby Av.
Miss Carruthers, Claremont Street.
E. T. Church, Donegall Place.
J. C. Clarke, Dunedin.
William Clibborn, Windsor Terrace.
Sir Ed. Coey, J.P., D.L., Merville.
David Corbett, Hope House, College Park, East.
W. F. C. S. Corry, Chatsworth.
Samuel Courtney, Castlereagh Place.
Elisha Crawford, Cliftonville Avenue
James Creeth, Riversdale Terrace, Balmoral.
Robert Culbert, Distillery Street.
Wm. M. Cunningham, Sydenham.
Francis Curley, Dunedin.
Mrs. Curley, Dunedin.

Rt. Hon. Lord Dufferin and Clandeboye (Hon. Mem.).
John H. Davies, Glenmore, Lisburn.
Henry Davis, Percy Street.
Robert Day, F.S.A., M.R.I.A., Cork.
Ed. O'Rorke Dickey, Castleton Ter.
George Donaldson, Church Street.
John Donaldson, Eglinton Street.
Charles Dundee, Carnmoney.

Charles Elcock, Hughenden Terrace, Cavehill Road.
Lavens M. Ewart, Glenbank, Ligoniel.

William Faren Mountcharles.
Stephen Feary, Cameron Street.
W. J. Fennell, Chichester Street.
Godfrey W. Ferguson, Fisherwick Place.
J. H. Ferguson, Langford Villas.
Joseph Firth, Whiterock.
Wm. A. Firth, Whiterock.
Thomas Fitzpatrick, B.A., T.C.D., Adela Street.
T. M. H. Flynn, Sunnyside, Bessbrook
Thomas Fraser, Wellington Park.

John Starkie Gardner, F.G.S., F.L.S., M.G.S., France, Damer Terrace, Chelsea, London (Hon. Mem.).
D. C. Gillespie, Macleary Cottage, Coleraine.
R. M. Gilmore, Portstewart.
W. J. Gilmore, Clanchattan House, Limestone Road.
Wm. Gilmour, Diamond, Coleraine.
D. Corse Glen, F.G.S., Annfield Place, Glasgow.
George J. Glenn, Stranmillis Road.
James J. Goskar, Carlisle Circus.
Jas. Gourlay, Derryboy, Killyleagh.
Robert Graham, Cliftonville.
Rev. Canon Grainger, M.A., D.D., M.R.I.A., Broughshane (Cor. Mem.).
Rev. James Graves, M.R.I.A., Inisnaig, Stoneyford, Co. Kilkenny (Cor. Mem.).
Wm. Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
George Greer, Woodville, Lurgan.
Miss Sara T. Greer, Seville Lodge, Strandtown.
Edward Gregg, Claremont Street.
Joseph T. Gumersall, Lisburn.

W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Rev. T. Hamilton, M.A., Brookvale House, Cliftonville Avenue.
W. J. Hammond, Donegall Street.
Thomas Hampton, Fitzwilliam St.
John Hammond, University Street.
Mann Harbison, Ravenhill Terrace.
W. Harte, C.E., Buncrana (Cor. Mem.)
Rev. Canon Hartrick, A.M., Ballynure.
Jas. Haslett, J.P., Princess Gardens.
F. A. Heron, Clermont, High Holywood.
Mrs. Heron, Clermont, High Holywood.
J. W. Hicks, Scotsmount Terrace, Lisburn Road.
J. Sinclair Holden, M.D., F.G.S., Sudbury, Suffolk.
John Hungerford, Melrose Terrace.
Alex. Hunter, Northern Bank.
Miss Hunter, University Street.
Wm. J. Hurst, J.P., Drumaness, Lisburn.

James Imrie, Fitzroy Avenue.
Rev. Richard Irvine, D.D., Hampton, Windsor.

John Jaffe, Edenvale, Strandtown.
Mrs. Jaffe, Edenvale, Strandtown.
Hugh Jamison, Duncairn Terrace.
John Jellie, J.P., Farmhill House, Carrickfergus.
James Johnston, West Elmwood.
W. J. Johnston, J.P., Dunesk.

Robt. Kent, Dunedin, Antrim Road.
Wm. Kernahan, Antrim Terrace.
George Kidd, Suffolk, Dunmurry.
Henry Knight, Antrim Villa, Weston Super-Mare.
W. J. Knowles, Ballymena.
Robert A. Kyle, Richmond.

W. W. Lamb, Chichester Avenue.
Prof. Chas. Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem.).
F. R. Lepper, Avonmore, Derryvolgie.
Rev. H. W. Lett, M.A., T.C.D., Ardmore Glebe, Lurgan.
Joseph F. Lewis, Lothair Avenue.
F. W. Lockwood, Wellington Park.
James Logan, Donegall Street.
W. B. Lowson, Chichester Park.
Dr. Luther, Chlorine House.

John Mackenzie, Balmoral.
Henry Magee, Eglantine Avenue.
Rev. J, J. Major, Belvoir Hall.
Greer Malcolmson, Fitzroy Avenue.
Jas. Malcolmson, Rosemount, Knock.
Mrs. Malcolmson, Rosemount, Knock.
Samuel Murphy Malcolmson, M.D., Great Victoria Street.
John Marsh, Richmond.
Mrs. Marsh, Richmond.
J. C. Marsh, Castleton Terrace.
Rev. James Martin, Eglintoun.
Mrs. Martin, Eglintoun.
James Meneely, Donegall Pass.
A. S. Merrick, M.D., Belfast District Asylum.
Seaton F. Milligan, Royal Terrace.
William Milliken, Wilmont Terrace.
J. Mohen, Brookhill Ter., Strandtown
John Moore, M.D., Carlisle Terrace.
Thomas Morrison, Donegall Street.
David Morrow, Lillislea, Cultra.

John Morton, Landscape Terrace.
J. R. T. Mulholland, J.P., Northumberland Street.
James Murdoch, Denmark Street.
Joseph John Murphy, F.G.S., Osborne Park.
J. R. Musgrave, J.P., Drumglass.
Arthur Mussen, Rubicon, Lisburn.
Mrs. Mussen, Rubicon, Lisburn.
John M'Alister, Fitzwilliam Street.
J. M'Chesney, Holywood.
Fras. P. M'Clean, Huntly Villas.
James M'Clenahan, Tennant Street.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London (Cor. Mem.).
Sir Thomas M'Clure, Bart., M.P., Belmont.
W. J. M'Clure, Divis Street.
Thos. J. M'Conkey, York Street.
James M'Connell, St. Helen's.
Hugh M'Elwee, Ponsonby Avenue.
E. J. M'Ervel, Rugby Road.
Mary M'Gaw, Thornville, Jordanstown.
Rev. Canon MacIlwaine, D.D., M.R.I.A., Mountcharles.
John MacIlwaine. Sydenham.
Mrs. MacIlwaine, Sydenham.
Mrs. M'Ilwrath, Dunluce Street.
Daniel M'Kee, Adela Place.
W. S. M'Kee, Fleetwood Street.
A. MacLaine, J.P., Queen's Elms.
Wm. Macmillan, Loy House, Cookstown.
T. J. M'Mahon, Northcote Villa, Knock.
John M'Stay, L.D.S., R.C.S.Eng., King Street.

William Nicholl, Adela Street.
Rich. Niven, Chrome Hill, Lisburn.

Wm. Oke, Portstewart.
George O'Brien, Botanic Avenue.
Joshua O'Brien, Botanic Avenue.
W. D. O'Brien, Botanic Avenue.
F. H. O'Flaherty, Fitzroy Avenue.
Mrs. O'Flaherty, Fitzroy Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
G. M. Ogilvie, Antrim Terrace.
Rev. Jas. O'Laverty, P.P., M.R.I.A., Holywood.
James O'Neill, College Sq. East.
Graham L. Owens, Victoria Street.

D. C. Patterson, Cultra.
Robert Patterson, Kilmore, Holywood.
R. Lloyd Patterson, J.P., F.L.S., Croft House, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Strandtown.
George Pelan, Upper Crescent.
Jas. J. Phillips, Holywood.
W. H. Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, Bonavon, Antrim Road.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
T. W. Pim, The Lodge, Strandtown.
Thomas Polly, Fitzroy Avenue.
W. E. Lloyd Polly, Fitzroy Avenue
Robert Lloyd Praegar, The Croft, Holywood.

Jos. Radley, Prospect Hill, Lisburn.
William Rankin, York Street.
George Raphael, Galgorm, Ballymena
John Rea, M.D., Great Victoria St.
D. Redmond, Antrim.
Daniel Reid, Portstewart.
Jas. Theodore Richardson, J.P., Glenone, Lisburn.
Richard Riding, Hampton Terrace, Lisburn Road.
Miss Emily J. Robb, Lisnabreeny.
Joseph W. Robb, Crown Terrace.
Rev. George Robinson, Beech Hill House, Armagh.
James Robinson, Richmond Place.
Hugh Robinson, Clive Villas.
Mrs. Robinson, Clive Villas.
Jas. R. Robinson, St. Helen's Ter.
W. A. Robinson, J.P., Culloden House, Cultra.
R. Ross, M.D., Wellington Place.
Mrs. Rowland, University Street.
Robert Russell, Wilmont Terrace.
Charles C. Russell, Campmar Villa, Newtownards.

Thos. Shaw, J.P., Pine Lodge, Sydendam.
Mrs. Shaw, Pine Lodge, Sydenham.

James Shanks, Ballyfounder, Portaferry.
Captain Simonet, Jersey, Channel Islands.
Wm. J. Simpson, George's Terrace.
Chas. Smith, F.G.S., Barrow-in-Furness.
Edward Smith, Chichester Terrace.
F. W. Smith, Elmwood Terrace.
George K. Smith, Meadow Bank, Whitehouse
Wilson Smith, Virginia Street.
Rev. Geo C. Smythe, M.A., Coole Glebe, Carnmoney.
Rev. J. H. Smythe, Fortwilliam.
Lieut-Gen. Smythe, R.A., F.R.S., Coole Glebe, Carnmoney.
Walter Smyth, Holywood.
Adam Speers, B.Sc., Holywood.
Sir. N. A. Staples, Bart., Lissan, Dungannon (Life Member).
J. H. Staples, High Street.
James Stelfox, Oakleigh.
J. M'N. Stevenson, Carrickfergus.
John Stevenson, Linenhall Street.
Richard Stevenson, Ashley Avenue.
S. A. Stewart, F.B.S.Edin., North Street.
Peter Stirling, Queen Street.
R. S. Strafford, Pottinger Terrace.
Alexander Sutherland, Larne.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.
Samuel Symington, Ballyoran House.
Richard Glascott W. Symes, B.A., F.G.S., Portrush.

Prof. Ralph Tate, F.G.S., F.L.S., University of Adelaide, South Australia (Hon. Mem.).
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
Mrs. Henry Thompson, Crosshill, Windsor.
George Thomson, Falls Road.
Prof. James Thomson, A.M., LL.D., F.R.S., etc., Glasgow (Hon.Mem.)
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Portrush.
William G. Trelford, Vicinage Park.
James Turner, Mountain Bush.
Robert Turner, Mountain Bush.
Jas. G. Turtle, Cambridge Terrace.

J. W. Valentine, Cromwell Terrace.
John Vinycomb, Mountcharles.

W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.).
Robert Walker, Atlantic Avenue.
Thos. R. Walkington, Laurel Lodge, Sydenham.
George Ward, Clonaver.
Isaac W. Ward, Collinview Terrace.
J. Ward, F.R.G.S., F.G.S, Lennoxvale.
John S. Ward, Lisburn.
Marcus J. Ward, Royal Ulster Works, Bedford Street.
E. H. Watson, Ardmore, Windsor.
Isaac Waugh, Clifton Park Avenue.
Mrs Waugh, Clifton Park Avenue.
Robert J. Welch, Lonsdale Street.
Louis Werner, Fleetwood Street.
T. K. Wheeler, M.D., Clarendon Pl.
Walter L. Wheeler, Lennoxvale.
Robert Whitfield, Kenbella Avenue.
W. Whitla, M.D., College Sq. North.
Jas. Wilson, Old Forge, Dunmurry.
J. Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
John Woodside, Jun., Holywood.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thomas Workman, Craigdarragh.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street.
S. O. Wylie, Clarendon Place.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club,

1884-85.

Series II. Volume II. Part V.

CONTENTS:

APPENDIX IX.

PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES TO MEMBERS 3/-.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club,

FOR THE

Year ending 31st March, 1885,

(TWENTY-SECOND YEAR.)

SERIES II. VOLUME II. PART V.

Belfast:

PRINTED FOR THE CLUB,

BY ALEXANDER MAYNE & BOYD, CORPORATION STREET,

PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1885.

REPORT

OF THE

BELFAST NATURALISTS' FIELD CLUB,

FOR THE

Year ending 31st March, 1885.

YOUR Committee, in presenting their twenty-second Annual Report, have pleasure in recording the continued prosperity of the Society, and the steady co-operation of the members generally in furthering its aims and objects. The year which now closes has been one of quiet progress, unmarked by any feature calling for special notice from us.

Ten excursions were held during the summer. Four of these, being additional to the ordinary programme, were organised with a view to the examination of special features within easy reach of the town, and were conducted by members of Committee specially qualified for the duty. One of these short excursions was to the Botanic Gardens, where a resolution was passed to the effect, that the Club regretted the want of a classified botanical collection of growing plants in Belfast, and the hope was expressed that such a collection would soon be made, either at the Botanic Gardens or Ormeau Park.

The attendance and the interest evinced in the excursions were well sustained, and your Committee recommend a similar arrangement to their successors.

The following is a list of the places visited :—

1. The Gobbins and Southern end of Islandmagee ... May 17th.
2. Dunadry, Muckamore Glen, and Antrim ... June 14th.
3. Ballycastle, Fair Head, and Antrim Coast Road ... July 8th, 9th & 10th
4. Donaghadee ... ... August 7th.
5. Sallagh Braes ... ... August 30th.
6. Killymoon and Cookstown for a Fungus Foray ... September 30th.

The special short excursions were as follow :—

7. Cave Hill Quarries ... ... (Whit Monday) June 2nd.
8. Botanic Gardens ... ... June 23rd.
9. Drumbridge and Lagan ... ... July 19th.
10. Whitehead ... ... August 23rd.

Your Committee having learned that a very fine canoe had been discovered in Lough Mourne during the progress of the works being carried out there by the Belfast Water Commissioners, and, taking into consideration the fact that the Club had granted the sum of £10 on a past occasion to investigate the crannoges that had there been exposed, it was thought desirable to ask the Water Commissioners to hand over the canoe to your Committee, with the view of having it placed in the Museum of the Natural History and Philosophical Society, to be there preserved with the other remains found during that investigation. The Commissioners having graciously acceded to the request, the canoe was removed to the Museum, and now forms an important feature among the local antiquities.

A social meeting was held in the Museum on 28th October, to which the members were admitted free, and were granted the privilege of introducing a friend. The attendance was good, and much interest was taken in the various exhibits. Seven additional meetings were held, at which eight distinct communications were brought forward. An entire evening was also devoted to the exhibition of microscopic objects, and the practical demonstration of various methods of mounting

such. Unusual interest was shown in this evening's proceedings, and the hope was expressed by many of those present that a similar meeting would be repeated in following years.

Your Committee avail themselves of this opportunity of thanking all those who assisted during the past year in carrying out the aims of the Club, and would especially name the York St. Flax Spinning Co. for permission to visit Muckamore Glen, the Turnley family for liberty to enter the grounds of Drumnasole, and C. F. Moutray, Esq., for the privilege of holding a fungus foray in the grounds of Killymoon. The Committee also express their best thanks to William M'Millen, Esq., Loy House, Cookstown, for his great kindness on the occasion of the excursion to his neighbourhood.

The Annual Report and Proceedings for the past year are now in the hands of the members, and it will be found to be one of the most valuable ever issued by the Club, the appendix containing a list of local Coleoptera, and an important contribution to our knowledge of the Archæology of Ulster.

The following is a list of the papers read during the session, abstracts of which, together with notices of the excursions, will be embodied in your proceedings :—

18th Nov.	I.	"Opening Address," by the President, W. H. Patterson, M.R.I.A.
16th Dec.	II.	"On the Origin and History of the Silicified Wood of Lough Neagh," by Wm. Swanston, F.G.S.
„	III.	"Notes on an Ancient Helmet in the Belfast Museum," by J. Starkie Gardner, F.G.S., F.L.S., &c.
20th Jan.	IV.	"Notes on the Gilled Fungi collected in the North of Ireland," by Rev. H. W. Lett, M.A., T.C.D.
17th Feb.	V.	"On the Scale-Mosses and Liverworts of the County Down," by Rev. H. C. Waddell.
„	VI.	"Notes on some hitherto unobserved Foraminifera from the Chalk Powder of Keady Hill," by Jos. Wright, F.G.S.
17th Mar.	VII.	Exhibition of Microscopic Objects and Mounting of Specimens by a number of ourselves.

The Committee also take this opportunity of thanking the ladies who so graciously assisted at the tea tables on the evening of the social meeting, opening of the Winter Session.

As on former years, your Committee have exchanged proceedings with kindred societies. A large number of publications have thus been added to your book-case during the past year, a list of which will be appended.

The following collections were submitted in competition for the Club's prizes :—

Mr. R. L. Praeger, a collection of ferns, &c., in competition for Prize 5.

S. M. Malcomson, M.D., and Mr. D. M'Kee, each a set of 25 microscopic slides, in competition for Prize 16.

S. M. Malcomson, M.D., and Rev. H. W. Lett, each a collection of mosses, in competition for Prize 23.

Mr. Charles Bulla, a collection of fossil plants, in competition for Prize 12.

Mr. J. J. Andrew competed for Prize 23—the best collection of fungi—in accordance with the conditions imposed in summer programme.

The following are the awards of the judges appointed to examine the various collections exhibited :—

Prize V.—Mr. R. L. Praeger has sent in a collection of ferns and their allies in competition for this prize. The specimens represent nearly all the native ferns and horsetails of the North of Ireland, in their typical forms, further illustrated by many examples of the more interesting varieties which occur. The plants, which are elegantly prepared, and mounted on 69 folio sheets, form an exceedingly good collection, and we have great pleasure in deciding that the Prize No. 5 be awarded to Mr. Praeger.

Museum, 29th April, 1885.

S. A. Stewart.
W. Gray.

Prize XVI.—We have carefully examined the collections of microscopic preparations submitted in competition for this prize, and, estimating their respective merits as to variety, scientific or educational value, and method of mounting, we

recommend the prize to be awarded Dr. S. M. Malcomson, whose preparations are excellent in every respect, and are models of neatness and manipulative skill. The collection of rock sections submitted by Mr. M'Kee display the patience and research characteristic of a true Naturalist, and are highly commendable.

Museum, 29th April, 1885.

W. Gray.
S. A. Stewart.

Prize III.—For this prize there are two competitors. Dr. Malcomson has sent in a set of exceedingly well mounted mosses numbering about 90 species, and Rev. H. W. Lett sends in a series which represents about 120 species. Both collections are highly creditable, but the latter being the more numerous, and including some very rare species, the prize is accordingly awarded to Mr. Lett.

Museum, 29th April, 1885.

S. A. Stewart.
W. Gray.

Prize XII.—This prize is awarded to Mr. Charles Bulla for a set of fossils from the Ballypallady leaf beds. Mr. Bulla's collection includes a fern, some leaves of dicotyledons, and a large number of specimens of coniferæ, representing foliage, fruit, and stems. We regard the collection as fairly well illustrating this locally difficult branch of Palæontology, and we award the prize accordingly.

Museum, 29th April, 1885.

W. Gray.
S. A. Stewart.

Prize XXIII.—In competition for this prize Mr. J. J. Andrew has sent to me, from time to time, a total of 178 distinct species of fungi, and the collection is well entitled to the prize.

Museum, 28th April, 1885. H. W. Lett.

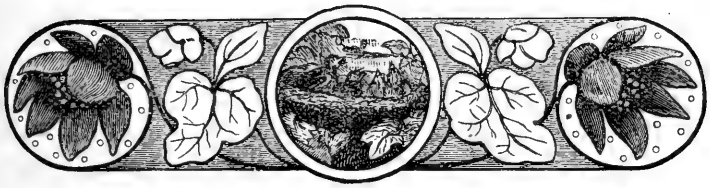
Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1883-4	...	...	...	£66	16	5		
,, Subscriptions—251 at 5/-	...	...	...	62	15	0		
,, Guide and Proceedings Account	...	...		5	0	0		
				£134	11	5		

By Expenses of Social Meeting	...	...	...	£3	11	9		
,, Printing Annual Report	...	...	...	46	18	0		
,, Advertising, Printing, and Stationery	...	...	...	11	15	4		
,, Delivery of Circulars	...	...	...	1	10	0		
,, Postages	...	...	...	...	...	1	15	11
,, Loss on Excursions	...	...	...	...	...	0	13	3
,, Museum Expenses	...	...	...	...	...	8	8	0
,, Prizes	...	...	...	...	...	2	10	0
,, Insurance on Books	...	...	...	...	...	0	11	6
,, Balance on hands	...	...	...	...	...	56	17	8
						£134	11	5

Audited and found correct,

JOSEPH WRIGHT, *Treasurer.*
S. A. STEWART.



SUMMER SESSION.

The following Excursions were made during the Summer Session

On 17th May, to

THE GOBBINS—SOUTHERN END.

The first excursion of the season was made, on Saturday, 17th May, to the Gobbins and southern end of Islandmagee. Despite the unpromising weather of the preceding day and of the early morning, a fair number of members started by the 9.30 train for Ballycarry ; and, as the event proved, those whose want of faith in "field club weather" kept them at home, had good cause to regret their loss of a most exhilarating and breezy day among the rocks and cliffs of that romantic coast. From Ballycarry station the route was taken through the lanes, delicious in their spring greenness, to the brow which looks down upon the southern end of the Gobbins. From this spot a wide view is to be had. Looking backwards the eye ranges along the well-wooded western slopes of Larne Lough, to rest upon the higher ground beyond, first Shane's Hill and Agnew's Hill, as yet partly shrouded in mist, then the grand horseshoe

sweep of the Sallagh Braes, Knock Dhu and Scawt Hill; with the bold headland of Ballygalley, round which runs the coast road, looking dwarfed beneath them; and farther on the Carnlough Mountains and Garron Point, possibly even Cushendun beyond, but the rain clouds still held possession in that quarter, so the eye turned seaward, and there, below and beyond the Gobbins, lay the broad channel, with the long swell breaking everywhere into foam as the freshening breeze met and contended with the flood tide, now at its strongest. Descending the slope, the party were soon at the foot of the fantastic cliffs with which the Gobbins terminate, and here the Club held their meeting, the Rev. George Robinson being called to the chair, and, as well as the roar of the surf and a "skiff" of rain would permit, the business was transacted, several new members elected, and the conditions announced of the prizes to be competed for. The party then broke into groups, some busy with hammers amongst the Chalk, Greensand and Lias rocks, which in somewhat puzzling confusion stretch along the beach, others turning over seaweed to find the somewhat scanty relics of marine life which the high tide and waves would allow to be discovered, and others with sketch-book or camera to preserve some permanent record of scenes which have ever been favourites with our local artists. Undoubtedly the most interesting feature of this bit of the coast is its geological formation. It is not like the shore on the southern side of the Belfast Lough, for instance, where a number of the secondary and palæozoic formations have, by successive volcanic convulsions at different epochs, been thrown up and down, till the various small patches, which are all that are left after ages of denudation, are at length found within a few yards of each other, upon the same level, along the beach at Cultra, and nowhere else within a circuit of many miles. In this other case we have the same order of rocks that stretch all round the Antrim coast to Portrush—the Triassic at the bottom, then the Lias clays and shales, the Greensand, and the Chalk, with the great basaltic outflows everywhere over all; but yet here, all is in confusion;

sometimes the Chalk is uppermost, and sometimes it lies at the bottom, and basaltic rocks apparently *in situ* seem to be cropping out amongst the Lias shales. In fact it is these Lias shales which are responsible for the chaos, though it is quite possible that the earthquake upthrows and downthrows, which accompany all periods of volcanic activity, may have helped the work ; but the main effect is certainly due, as at Garron Point, Glenarm, and other places, to the sliding of huge masses of superincumbent formations over the Lias shales and mud, till, in some cases, the position of the rocks has become almost topsy-turvey. Wherever this has occurred, we always get the most picturesque bits of our Antrim coast, black, white, and grey masses standing out into the waves, and contrasting with each other, and with the bright green water, in the most striking manner. In passing along the shore, the "Black Cave" was examined. It has apparently been hollowed by the waves, (during the period the fifty-feet terrace was being formed) out of a softer bed which lies between two harder layers of basalt. On reaching Blackhead the party turned inland, and made their way back to Ballycarry. Here the various wallets were turned out, and the collections made during the day in competition for the prizes offered by the Club were adjudicated upon. The prize for the best collection of Cretaceous and Liassic fossils was awarded to Mr. D. M'Kee, his being chiefly Liassic ; that for the best collection of marine zoology, to Mr. G. Donaldson. In both cases several other competitors ran the winners very close, and, although nothing calling for special record was handed in, the industry shown by the collectors was very creditable.

On 14th June, to

MUCKAMORE GLEN.

The second excursion of the season was made on Saturday, 14th June, to Dunadry, Muckamore, and Antrim. The fine

weather and the liberal terms always offered by the Northern Counties Railway brought out a large party, which proceeded by the tweve o'clock train to Dunadry station. The first object visited was the fine stone circle at Kilmakee, about half a mile distant. This circle is formed of over forty stones, most of them of large size, and is still almost complete, about sixty-six feet in diameter. The group of fine trees standing in the circle gives it a very striking and impressive appearance. At Dunadry there used to be a very fine example of the funereal mound, from which the village, no doubt, derived its name. This fell a victim, about fifty years since, to the cupidity of a farmer, who desired the mould of which it was composed to spread on his field. It was built on a solid foundation of three rings of stones, and its sides were faced with stones to a considerable height. In removing it a skeleton and several valuable relics were found, which are now in the Museum of the Royal Irish Academy. The next place visited was Rathmore, the great earthen fort at which place, known as Rathmore Trench, was the seat of the kings of Dalariada during the sixth and succeeding centuries. Not far distant is another fort—Rathbeg, which there was not time to visit; the scene of the treacherous murder of the last King of Ireland who reigned at Tara. By adding one or two slight inferences to the ancient record, we may draw a very fair picture of the transactions of that lawless time, when Christianity was slowly and with uncertain steps making its way into the hearts, and taming the manners, of a barbarous people. Diarmid MacCearbhall, King of Ireland, and the pious founder of Clonmacnoise, on his passage through Ulster had reached Rathbeg. Many years before, he had slain the King of Dalariada, but in penitence for the deed had reared his son, Aodh the Black, who now reigned at Rathmore. The blood feud was deferred, not forgotten, however; and Aodh, not wishing, it may be, to sully his conscience by such a gross breach of the laws of hospitality as the murder of his foster-father and suzerain would have been, under his own roof, compounded with his conscience by setting fire to Rathbeg whilst

the King was staying there. When Diarmid rushed out to escape the flames, he was stabbed by the Northern chieftain, and staggering for refuge into the moat or stream which surrounded the fort, was struck by the falling timbers, and crushed or drowned. His head was carried to Clonmacnoise, and his body interred at Connor.

The early English settlers seem to have built a castle at Rathmore, which was destroyed by Edward Bruce, brother of King Robert, when he invaded Ulster, and raged like a firebrand through the country in 1315. Under the fort is a large souterrain or cave, of four chambers nearly 100 feet long, interesting as being, what is unusual, hollowed out of the solid rock. The entrance is now so blocked up with fallen fragments, that the more adventurous members of the club who made the attempt, were only able to penetrate about 18 feet. Whilst at the fort a meeting was held—J. J. Murphy, Esq., presiding—when several members were elected, and the hon. secretary and other gentlemen made a few remarks on the fort and other antiquities of the district. Not far distant is Donegore Hill, with its fine sepulchral mound. To this hill the rebels of '98, after their repulse at Antrim, retired, and soon finding their cause a hopeless one, seem to have slipped away by twos and threes, leaving behind their field pieces and their baggage—if they had any.

Growing in profusion about the fort was the dwarf elder (*Sambucus ebulus*), known by the country people as the "Dane's blood," from its being frequently found in the neighbourhood of such structures, which are popularly, though erroneously, ascribed to the Danes. Though there is no evidence to connect the Danes with Rathmore, yet the name of this spot is one of the first associated with the Saxon in Ireland; for in 684 Ægfrid, King of Northumbria, sent Berct, his general, into Ireland, who, after wasting much of the country, was defeated at Rathmore. In this, the "first blood" between the nations, it would seem the honours, such as they were, rested with the Irish. The whole population of this district

would seem now to be of English and Scotch descent, and during the various wars, the Irish of Tyrone and the West rarely made any footing here. Besides the earthen fort, with its long-vanished wooden structures, and the subterranean rock-cut chambers, and the English castle, of which the name only survives, in the "castle field," the site of the "Church of Rathmore," is still marked by one or two ancient fragments of wall in one of the farm enclosures. Bones, and silver coins have also been found here in some quantity.

Muckamore, the next spot visited, is the site of a priory founded by the King Diarmid, whose murder is recorded above. Of the priory ruins, once of great extent, nothing can now be seen but a fragment, in the garden wall of the present seat of Muckamore Abbey.

The botanists of the party had not been idle. The course of the Sixmilewater has long been known to local botanists as yielding many scarce plants. Amongst these is the very rare water crowfoot (*Ranunculus fluitans*), which has not been met with elsewhere in Ireland. It formerly occurred in some plenty in the river near Doagh and Templepatrick, but was destroyed in that locality some years since, and it was feared that it was extinct now in this country. It still survives, however, and was found by the Field Club on this occasion growing plentifully in the stream near Dunadry and Muckamore. At Rathmore was found the penny cress (*Thlaspi arvense*). Another plant found there is rather puzzling; it is evidently a close ally of the horseshoe vetch of England (*Hippocrepis comosa*), but differs both in flowers and foliage from that species. Whence it came, and how it happens to be located at Antrim, are questions easily asked, but not so easy to answer. There is one of the helleborine groups of orchids which has been stated more than fifty years ago to occur in several places in County Antrim. None of the botanists of the present generation have met with the plant in this county, and as its time of flowering is June, and Muckamore one of its reputed haunts, an attempt was made on the present occasion to

ascertain whether it still exists. The plant is named *Cephalanthera ensifolia*. A specimen brought from Killarney was shown to assist those unacquainted with its appearance, and a special prize offered for its discovery stimulated several to engage in an active search. This proved fruitless, and the question of its present existence remains unsettled, with the balance of probability strongly in the negative.

Antrim, and the round tower, which is now kept in perfect order and preservation by the care of G. J. Clarke, Esq., J.P., concluded the day's programme. This tower is interesting as having the Irish cross inscribed on a stone over the lintel of the doorway, Donaghmore, near Navan, being the only other tower possessing a similar emblem. Through the kindness of Mr. Clarke, the Club were invited to examine a curious ecclesiastical relic—viz., one of the "knee stones," a large basaltic block, with two hollows sunk in its surface, presumably to receive water from the holy well not far distant, for the use of pilgrims seeking a cure for their infirmities.

The party returned by rail from Antrim, well satisfied with their day's work in one of the most interesting localities about Belfast.

On 8th, 9th and 10th July, to

FAIR HEAD, &c.

The third excursion for the present session was on the 8th, 9th, and 10th July, to Ballycastle, Fair Head, Cushendall, and the coast road. At 9.30 those intending to join assembled at the Northern Counties Terminus, and left by the 9.50 train, and in due time arrived in Ballycastle. The railway platform of this usually quiet town was in extraordinary bustle, and vast quantities of luggage were piled about. This, it was soon ascertained, was from the Dominion line s.s. Sarnia, which had grounded on the south point of Rathlin Island the previous

morning. The passengers and their luggage were being transferred as rapidly as possible to Belfast en route to their various destinations.

While disposing of luncheon at the Antrim Arms, the party discussed the important question of how best to employ the remainder of the day, which, according to the programme, was "free to the members to spend as they wish," several interesting places being named for their selection. A small party was soon organised for Carrick-a-Rede, and the only conveyance in town not engaged in bringing the passengers of the unfortunate Sarnia, and their luggage, from the shore to the railway station, was hired for the ladies of the party to visit that well-known island, and its swinging bridge. Kinbane Head and Castle attracted a second section, while a third, found genial employment in examining and sketching Bunnamargie Abbey, and the ancient tombstones in its surrounding graveyard. The evening was admirably suited for out-door work. The rains of the past few days had freshened the vegetation and gladdened the hearts of the farmers, who were with some reason beginning to fear for their crops under such a long continuance of dry and hot weather as had prevailed during the past month. The walk along the headlands was most enjoyable ; the heat was tempered by a refreshing breeze, which ruffled the sea, causing it to sparkle in the bright sunshine. From some of the higher points the views are very fine ; the coast of Cantire appeared close at hand ; Islay and the Paps of Jura were distinctly visible to the north, while Rathlin Island lay like a map below. Many of the bold and inaccessible headlands along this part of the coast were formerly used as places of retreat and safety, against incursions from unfriendly neighbours ; and powerful leaders, who had, perhaps, most to fear and risk, frequently went to great labour in further fortifying their natural strongholds against the enemy. The Castle of Kinbane, or Kinbaun (the White Head), is one of those defences. The headland is a huge chalk rock, which rises abruptly to a height of above 100 feet, and projects beyond, and in striking contrast

to, the dark basaltic cliffs and points with which it is associated. This was the residence of Colla Macdonnell, a chieftain who took an active part in the stirring events for which this locality is known in Irish history. His castle was partially destroyed by Sir James Croft, who in 1551 commanded an English expedition to Ulster, to strike a blow at the Macdonnells, and also to seize the rich spoils which it was confidently believed were stored on Rathlin, and to carry them off at one swoop from the island. This expedition seems not to have been very successful, the attack on Rathlin having been repulsed with considerable loss to the invaders, and we soon after find that Colla, who had withdrawn his forces to Rathlin, returned to Kinbaun, where he died in 1558. Many interesting geological phenomena are noticeable along the shore. In one place a basaltic dyke, which had cut through the chalk, has yielded to the influence of the waves, while its more solid bounding walls have resisted their action, and now the chasm, filled with deep blue water, greatly resembles an artificial dock. Great beds of volcanic ash, unexpected exposures of columnar basalt, and varied outflows of trap, give evidence of violent igneous action.

The botanists were busy, and found *Habenaria albida* and *Listera ovata* abundant on the tops of the cliffs near Kinbaun, where also was found that curious plant, *Orobanche rubra*, parasitical on wild thyme.

"In riding from Portrush to Ballycastle I went a short way off the beaten road to see a whimsical little fishing rock, connected to the mainland by a very extraordinary flying bridge; it is called Carrick-a-Rede (or the rock in the road), and lies somewhat eastward from Ballintoy, on a most romantic shore." So wrote the Rev. William Hamilton in 1786 in his "Letters concerning the Northern Coast of Antrim." The whimsical little fishing rock still continues to attract the curious, and thither most of the party went, and, doing the honours of the swinging bridge, returned to Ballycastle, highly pleased with the evening's ramble.

After an early breakfast next morning, and while waiting

for the conveyances, the party had the pleasure of an invitation to examine a collection of fossils and antiquities made during the past year, by a young gentleman who bids fair to have soon a very representative series, illustrative of these inviting departments of research. Many good Lias and Carboniferous fossils were noticeable in the collection, and it was most interesting to find a portion of a boulder of Middle Lias, which was found when excavating for the railway. This would tend to confirm the opinion, that that zone is only represented by fragments scattered through the surface deposits, and that it does not occur *in situ* in the neighbourhood. Among the antiquities were several very fine arrow heads, of the various types; also axes or celts. One of the latter was a peculiar form, about 1¼in. broad, with parallel sides, and was of flint, neatly chipped, and resembling the Danish weapons. The hurried inspection was brought to a close by the announcement that the vehicles were in waiting, and soon all were on their way to Fair Head, delighted with the prospects of another favourable day. Ballycastle may be said to consist of two parts—the town proper clustering round the church, and the portion adjoining the quay. Near the latter is gathered a goodly village looking out towards Rathlin. This was once the seat of considerable industries—breweries, tanyards, salt and glass works being once in full operation; while the collieries, a short distance off, yielded from 10,000 to 15,000 tons annually, causing considerable shipping trade. Lewis says that "the harbour was spacious, in which seventy-four gunships could anchor with safety in any weather, and upon the improvement of which £130,000 had been expended; also a pier and quay, the construction of which had cost £30,000." What a change has passed over this scene! The breweries, &c., are now no more, and the remains of the glassworks were recently removed as an eyesore. The pier and harbour, for which the Irish Government granted so liberally, is now a hopeless ruin, endangering any craft that would attempt an entrance; a few fishing boats are its only occupants. This entire commercial development seems to have been due

to the energy of Hugh Boyd, Esq., who in 1736 received grants of the minerals in the neighbourhood, and after whose death the success seems to have declined. Passing over a considerable stream formed by the junction of the Carey and Glenshesk Rivers, the ruins of the Abbey of Bunnamargie are seen a short distance from the road, surrounded by its ancient graveyard. The abbey was founded in 1509 by Charles Macdonnell, for Franciscan friars of the third order, and is one of the latest monastic edifices erected in Ireland. It is now roofless, and little architectural details remain. Like the headlands along the coast, the Antrim glens have witnessed many sanguinary conflicts, and the plain of Bunnamargie was the scene of perhaps one of the fiercest. It took place in 1569, and was between the forces of Macquillin and those of Sorley Boy Macdonnell. This battle, by which the Macdonnells obtained possession of the castles and estates of the Macquillins, is described as having continued throughout the whole of Glenshesk, of which every yard was fiercely contested, and nearly the entire surface strewn with the slain. Bunnamargie has long been the burying-place of the Macdonnells, and the unsightly building to the south side of the ruined abbey is at present used as a tomb. Some distance further on, a halt is made to examine a rude cross near the roadside. Shortly after, the main road is left, and a bye one, not so suitable for vehicles, is taken, and eventually near a farmhouse the road ceases, the way lying over the rocky moorland. Here a few of the party diverge to visit Lough-na-Cranagh. As its name indicates, this mountain tarn, due to glacial action, has one or more of those artificial islands known as crannoges. The most conspicuous in the present low state of the water can be seen to be an erection of stones. It is greatly to be regretted that there is no means of access available by which these islands could be reached and thoroughly examined in dry seasons. The shores of this so-called lough are rich in mosses and aquatic plants, and the rare quillwort, *Isoetes palustris*, was collected. Benmore—the Great Peak—perhaps better known as Fair Head,

was considered the central feature in this day's programme, and certainly this great peak is well worthy of its appellation, for in height and imposing grandeur it far surpasses any of the headlands along the coast, and the view from it is most impressive. Here the ordinary business meeting of the excursion was held, the President occupying an easy position on the heather. A new member was elected and other business transacted. Rue Point, the nearest extremity of Rathlin, was but a short distance off, and the critical position of the s.s. Sarnia aground on it was admirably seen from this elevated vantage ground, and the vigorous efforts then being made by the tugs in attendance, to remove the splendid ship from her perilous position were watched for some time with great interest. The Rathlin coast seems to have been this year most unfortunate for seamen, as at Bull Point, the opposite extremity of the island, lay a fine iron ship, which ran on in daylight a few weeks ago, and is likely to become a wreck. Leaving Fair Head and its attractive view, the party proceeded along the top of the cliffs towards Murloch Bay. On the way a halt is made at the Grey Man's Path, a deep chasm in the face of the cliff, across which one of the huge basaltic columns of which the headland is composed has fallen. A small section of the party elect to go down the giddy path, and reach Murloch by that route, while the main body continued the walk along the cliffs, the view from which as they turn southward changes greatly in character. The rugged talus at the base of the perpendicular cliffs here is hidden by wild but luxuriant vegetation ; while further on advantage is taken of the rich soil derived from the crumbled rocks, and a few farmsteads are scattered along the slopes, deeply hidden among the trees that flourish in these sheltered nooks. Those who took the route by the base of the cliffs had perhaps the advantage botanically, and several rarities were picked up. The roseroot (*Sedum rhodiola*) and the Welsh poppy (*Meconopsis Cambrica*) were found in crevices on the descent of the Grey Man's Path ; the sea spleenwort (*Asplenium marinum*) was noticed, but temptingly out of reach. After

rather a difficult piece of path, or rather scramble for want of a path, the old workings of the collieries are reached, and several traces of fossil plants are found in the *debris*. Near here was also found the willow herb (*Epilobium angustifolium*), a locality long since recorded by Templeton for the plant. The party eventually again combining, and the vehicles being at hand, the road is taken for Cushendall—not that dreary stretch over the high moorland known to the regular tourist, but the old Cushleake road, along which, we are told by the natives, a four-wheeled machine has not travelled for the last twenty years. Truly these old roads have the advantage in variety and scenery; they are, however, better suited to the pedestrian, and great was the surprise and alarm of the driver of the waggonette, when brought face to face with the abrupt hills and windings of this, to him, new route to Cushendall. Ample time had been allowed for this part of the journey, and it was all required.

Growing profusely in some spots along the hedge banks was found the hay-scented fern (*Lastrea oreopteris*), and near Colraney the dwarf elder was seen filling the corner of a field. With patience and some help the last hill, which had been frequently announced, was really descended, and the better and leveller line of road reached. It was regretted that so much time was occupied on the way, as it was intended to visit the ancient stone cashel near Cushendun. This, however, was only accomplished by an advanced party. It consists of a circular wall of about ten feet high, by almost as many thick, regularly built of local stones. There is but one entrance to the erection, and a semblance of rude steps remain, leading from the enclosure to the top of the wall. There appears also to have been a chamber built in the thickness of the wall, having access from inside the circle. Adjoining the cashel a large number of the common blue iris was found in what appeared to be a natural unbroken meadow. It is curious how such an "escape" could get so firmly established in this unlikely place. Arriving at length at Cushendall, and dinner being in readi-

ness, it was soon the sole object of attention, the long day and the healthy exercise having stimulated appetite, a result which Mrs. Miller, the hostess of the Glens of Antrim Hotel, seems to have anticipated, judging from the amply-provided table. The remainder of the evening was principally devoted to the examination of the specimens collected during the day, and in deciding on the merits of the collections of mosses and lichens submitted for the prize, as stated in the programme. There were three competitors, and the collection made by Rev. H. W. Lett, numbering 103 species, was declared the successful one. Mr. Praeger, a member who joined on the route, was fortunate enough to find on one of his extended walks on the high ground above Carnlough specimens of a rare saxifrage (*S. hirculus*). This plant is noted in "Dickie's Flora of Ulster" as found in one locality in County Antrim. "Mackay" says of it:—"It is singular that this plant, which Dr. Hooker found in Iceland, should not be found in the North of Ireland."

Next morning opened wet and dull. The summit of Lurigethen, which overlooks the village, was hidden in mist. The delightful weather which had prevailed during the two past days had, however, so gratified the party that all felt satisfied and in good spirits as the start was made after breakfast on the homeward journey, by the well-known coast road. Passing along under Redbay Castle, and by Glenariffe and Garron Point, no halt is made till reaching the entrance to Drumnasole—the Ridge of the Lights—supposed to be so named from a custom which once prevailed here of communicating by beacon fires with the Scots across the Channel. Here, through the kindness of Miss Turnley, the party was permitted to pass through the beautiful grounds. Following the high bank of a stream course, deficient of water, and penetrating a dark chasm in the chalk, a sudden turn of the path brings to view a magnificent cascade, falling over a basaltic cliff. The amount of water which here finds its way was a surprise to all present, as, judging by the dry bed of the stream lower down, the remarks that were indulged in on the way up were some-

what justifiable, that the party would see the place where the water ought to fall. It appears that the stream, except when very large, gets hidden among the boulders and debris that fill its course, and that it finds its way to the sea by secret passages. Retracing our steps and resuming the journey, Glenarm is reached a little before the appointed time, and a walk through the park is indulged in, the day having to this point been dry, though too heavy for distant views. After luncheon, the remaining section of the road is accomplished in rain. Larne is reached in time for the 5.45 train, and the company eventually part on the platform in Belfast, well pleased with the "long excursion" of the year.

On 7th August, to

DONAGHADEE.

The fourth excursion of the season was on 7th August, to Donaghadee. Leaving the County Down Terminus at 1.15 p.m., the party, on its arrival at Donaghadee, was at once conducted to Coal-pit Bay, about a mile south of the harbour, where there is exposed a series of black slates and shales, known to geologists as a Graptolitic band. As announced by circular, the principal feature of this excursion was to examine this series. The locality is well known to many of the members as by far the richest in our neighbourhood in these remarkable fossil remains. The conductor announced that a prize would be awarded to the member who, at the close of the day's work, could show the greatest number of species. The leading geological features of the spot were then pointed out. The black shales and slates, almost vertical, appear in one of the many anticlinal foldings of the Greywacke or Silurian rocks, the axis of which seems to be a large dyke. Subsequent movements of the strata have, however, greatly complicated the beds, rendering it difficult to follow any particular zone. With pinch-bar, picks and hammers, the party was soon busy raising

slabs of slate, and endeavouring to split them on lines parallel to their bedding plane—a work requiring some skill—as it is on such planes that the specimens are best shown. Under the leadership of one of the secretaries, the party was led to zone after zone, and it was observed that each had its own almost peculiar set of forms. Later in the evening the older beds, lying nearer the axis of the anticlinal, were visited, but not with such good results as regards the bagging of specimens, as the containing shales are more altered and shattered than the later deposits. After an exhaustive evening's work, a meeting is called, at which several new members are elected. A hasty examination of the specimens collected resulted in the prize—a botanist's lens—being awarded to Mr. S. O. Wylie, whose labours were rewarded by 19 species.* The return journey was by train, due in Belfast at 8.20 p.m.

On 30th August, to

SALLAGH BRAES.

The fifth regular excursion of the season was made on Saturday, 30th August, to Cairncastle and the Sallagh Braes. Starting by the 9.30 train from the Northern Counties Station, the party proceeded in waggonettes from Larne along the coast road, on whose beauties it is needless here to dwell. Giving a moment's glance at the basaltic columns of Ballygally Head, and the fragment of castle once known as "O'Halloran's" on an outlying rock, a halt was called at Ballygally Castle, and the talented occupier, himself no mean antiquarian, showed the party over this interesting relic of the Shaws, one of whom built it in 1625; and over the lintel of the original doorway is inscribed the date of 1625, and the motto, "God's providence is my inheritans." Besides the castle, there were extensive farm buildings and walled enclosures, some of which still survive in various stages of picturesque decay. Leaving the coast, the vehicles wound slowly along the hilly slopes until the

* For full list and figures of the fossils from these beds, see Proc., series II., vol. I., part IV., app. IV.

village of Cairncastle, with its church and quaint slated spire, was reached. Here a few minutes in the graveyard well repaid the visitors. The ancient church of "Karkasteli" (now Cairncastle) has still a fragment of wall remaining, deliciously clothed with fuchsias in luxuriant bloom. It is recorded in the Terrier of Pope Nicholas IV. of the thirteenth century, but the church itself may be much older. There are many old and curious headstones in the churchyard. One to Hugh Ross dates from 1656, another about as old is sacred to Jean Boyd, and at the top, surrounded by an elaborate scroll, is a round face much like that cut by rustic boys out of a turnip, which it is doubtful whether is intended for a representation of the Jean Boyd aforesaid or of a cherubim. To Patrick Lorimer and his wife Helen Bell, date 1728, and to his brother and wife, is a stone with a very elaborate quartering of arms. Of this and other stones sketches and rubbings were taken. Leaving here, and climbing still more slowly, the cavalcade wound up the new road close by the summit of Knock Dhu, getting more and more striking views of Scotland, of Ailsa Craig, and of the Isle of Arran, as they ascended. Exactly at the summit of the pass are some earthworks—two circular, and one square—but not rising very high above the general level. A couple of hundred yards off is a cairn of stones, known as the "Headless Cross." Whether the cairn was once surmounted by a wooden cross, long since decayed, or what other origin there may be for the title, is not now clear. Half a mile beyond, the party, under the guidance of the Rev. Canon Grainger, M.R.I.A., was led to a really valuable relic. This is a block of stone about 3ft. square, upon which are inscribed two fine crosses. This is known as "The Priests' Grave." Close by are the remains of another structure, commonly termed a giant's grave, more generally known to antiquarians as a kistvaen, an oblong sepulchral chamber, formed of upright stones covered with slabs. From this place a start was made on foot for the summit of Knock Dhu, or the Black Mountain, whose precipitous head is so conspicuous from the

shore side. In its side is a magnificent trap dyke, intersecting, or, more correctly, bisecting a gully, and which stands up to a perpendicular height in some places of near 50ft., as clean and regular as a built wall. The softer amygdaloid trap on each side has been weathered and washed away, and the harder basalt of the dyke left standing out by itself. There is another fine specimen in an adjacent gully. From this point the noble cliff escarpment known as the Sallagh Braes stretches in a magnificent semicircle. In the cliff gullies, and in the boggy moorland behind, several mountain plants were found, such as the filmy fern, *Hymenophyllum unilaterale*, and the two insectivorous plants, *Drosera rotundifolia* and *Pinguicula vulgaris*. On some of the leaves half-digested tiny flies or midges were found, but the meals of the plants in this neighbourhood or season do not seem to have been so luxurious as the writer has seen on Cave Hill in a former year, when nearly fifty flies, in various stages of dissolution, were counted on a single plant of pinguicula. Regaining the cars, after a run to a fine standing stone, the best speed which the steepness of the mountain roads would permit was made for Larne, and the party were soon enjoying a comfortable tea in Mr. M'Neill's extensive establishment. Almost the whole of the route traversed during this excursion lies quite beyond the ordinary track of tourists or holiday excursions, and the value of the Field Club is shown by the facilities it affords for searching out and arranging for visits to such out-of the-way, but interesting, localities as that selected for the present excursion.

On 13th September, to

KILLYMOON AND COOKSTOWN.

The sixth and last excursion of the season was held on Saturday, 13th September, to Killymoon and Cookstown. The members assembling at the Great Northern in time for the 7 a.m. train, found a special carriage obligingly placed at their

disposal for the journey, and, after a quick run, arrived at Cookstown at 9 a.m. Without entering the town, the road is at once taken for Killymoon Demesne, admission to which had been kindly granted by C. F. Moutray, Esq. On the way the attention of members is attracted by the local building stone, which is carboniferous, or mountain limestone. The rock is seen *in situ* in the railway cutting, and is of a pale grey colour, resembling the Armagh limestone. This spot is worthy of notice, as from it were obtained specimens of the exceedingly rare fossil brachiopod, *Camaraphoria isorhynchus*. Before entering the richly-wooded grounds a halt is called, and the Rev. George Robinson, of Armagh, is unanimously appointed chairman for the day, in the absence of the president. The secretary then, referring to the circular announcing the excursion, reminded the members that the main object of the programme was botany, the special department being the collecting and study of fungi, for the best collection of which made during the day a prize was offered. Under the guidance of Rev. H. W. Lett, who also acted as judge at a later period of the day, a vigorous start is at once made, and soon the members spread themselves, and set to work in real earnest. The storm of last winter has left sad traces of its destructive force in all directions here. Uprooted trees are everywhere to be met with, some of them of immense size. Now, in the calm of the finest of autumn days, when there is scarce a rustle among the leaves overhead, and the stillness is only broken by the collectors as they announce some new find, or exceptionally fine specimen, it is hard to conceive what a din and noise there must have been here when the fallen trunks, under or over which the members scramble, were laid low by its force. Pursuing the search with much ardour till past midday, the party reassemble near the castle, which is an imposing pile close to the Derry side of the Ballinderry or Kildress River—a beautiful stream, which winds through the grounds. The castle is a comparatively modern building, and was erected at a cost of about £80,000, from designs by the once celebrated English

architect, Mr. Nash. Crossing the stream by a handsome bridge, a visit is made to a magnificent avenue, upwards of half a mile in length, the trees of which are well grown and very regular, entirely meeting overhead. It is sad to see the irreparable damage caused here by the storm, several gaps having been made in the northern side, to some extent spoiling the fine effect. Archæology was not expected to be a feature in the day's programme, but, under the guidance of a resident member, well versed in such matters, a hurried visit is paid to a densely-wooded mound, where, hidden from view, is one of those ancient rude stone chambers known as kistvaens, the possible uses of which to their ancient builders, is still an unsettled point with archæologists ; locally, they are often known as giants' graves. It is probable that this particular example had at one time been covered with earth, as it seems to occupy the site of what is designated Drummond's Fort on the Survey maps. The day wearing on, the return journey is commenced, the fungus foray still being vigorously maintained till a halt is called before leaving the grounds, to allow of a display and examination of the spoil. Five competitors had kept at the work, and the results when spread out, had certainly a remarkable effect. The result of the judge's scrutiny proved that the Rev. Herbert C. Waddell had gained the highest number, and had collected as many as 99 distinct species. His competitors, however, had closely followed by collections numbering respectively 96, 84, 79, and 72—all truly marvellous results in the few hours devoted to the search. Many of the species were new to the members, and doubtless the club will hear further of them during the winter session. Passing from the grounds, a short walk brought the party into Cookstown—one of the best markets for flax and general farm produce in Ireland. It being market day, though late, its fine broad street still thronged with farmers was a surprise to those who had not before visited it.

By the kind invitation of William Mac Millan, Esq., the party adjourned to his residence, Loy House, to partake of dinner

before leaving. The club has frequently on its excursions been agreeably surprised by the hospitality of its members when visiting their districts. Never, however, has this hospitality been more fully shown, and seldom has it been more appreciated, than on the present excursion. With the early start from town, and the active day's work, it is needless to say that full justice was done to the ample repast. Before leaving the table, the ordinary business meeting of the day was held. Some announcements were made and a new member elected, after which the Rev. H. W. Lett, rising, moved on behalf of the Club, that the best thanks of the meeting be given to Mr. Mac Millan for his generous hospitality on this, the first occasion of the Club's visit to the neighbourhood of Cookstown. The motion being seconded by Dr. Beck, Mr. S. A. Stewart begged, before the chairman put it to the meeting, to state that it was a very pleasing coincidence that the Club should be assembled on the last excursion of the twenty-first year of its history, in the residence of one of its founders, Mr. Mac Millan being one of the four, through whose correspondence in the Belfast newspapers in 1863 the Club originated. The chairman, in a few happy words, then put the vote of thanks to the meeting, by whom it was passed by acclamation. Mr. Mac Millan, in briefly replying, thanked the party for their presence, and stated that perhaps nothing that he had ever done had given him more pleasure than the part he had taken in the early life of the Club, and now in its vigorous manhood he was delighted to have an opportunity for the first time of meeting the members in his house. It being almost train time, after a hurried leave-taking and a quick run home, the company parted again at the Great Northern terminus, having had a most enjoyable day, and concluded an admirable excursion season.

WINTER SESSION.

—o—

NOTE.—The authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

—o—

THE Winter Session of the Club was inaugurated on Tuesday evening. October 28, by a social meeting in the Museum, College Square North, to which the members and their friends were invited. Tea and coffee were served, under the management of the lady members, from seven o'clock till eight, after which the company assembled in the lecture-room, where the chair was taken by the president—W. H. Patterson, Esq., M.R.I.A. In opening the proceedings reference was made, in the first place, to the forthcoming Flora of the North of Ireland, which the Club have taken steps to publish in conjunction with Robert Corry, Esq., father of the late Thomas H. Corry, F.L.S., &c., &c. This work was projected by him, in partnership with Mr. S. A. Stewart, F.B.S.Edin., and was in part completed before Mr. Corry's lamented death by drowning in Lough Gill upon a botanical excursion. It will now be brought out under the editorship of Mr. Stewart, and it will be the most complete work on our local botany which has yet appeared.

The President then briefly directed attention to some of the objects lent for exhibition, and called upon the various exhibitors to give a short description of the objects shown.

Mr. John Hamilton called attention to a specimen of the Atlas moth, from India, reared by him in Belfast. Owing to the continuous warmth and other conditions required, the rearing of these tropical insects is attended with considerable uncertainty, and demands very close attention to ensure success.

Mr. Charles Bulla described a set of carboniferous fish remains, chiefly teeth and bony gums, spines, &c., the majority from the limestone of Armagh, and also showed several illustrated books on the subject. He showed in addition a history of Ireland during the reign of Henry VIII., printed in black letter towards the end of the sixteenth century.

Mr. Joseph Lewis exhibited and described a number of photographs, and processes illustrating photo-lithography.

The Hon. Secretary (Mr. F. W. Lockwood) then briefly called attention to the canoe found during the past summer in Lough Mourne, and kindly presented to the Club by the chairman and members of the Belfast Water Board. This canoe, which was placed on a side-table, is 12 feet 8 inches long, 2 feet 6 inches wide, and 9 inches deep in the inside. It is hollowed out of a single trunk of oak, and is of the same width throughout, flat-bottomed, and square both at stem and stern, being exactly the shape of the fishing punts so common in the Thames at the present day. At even distances along the centre of the bottom are six round holes, very clearly bored, about $\frac{3}{4}$in. in diameter. The canoe appears to have been shaped chiefly by the axe. Various suggestions have been made, both as to the use of these holes and as to the age to which the canoe belongs. One theory would bring it down to the time of Queen Elizabeth ; another would make it perhaps double that age.

Mr. Wm. Gray, M.R.I.A., &c., next called attention to the set of drawings made by him for the forthcoming annual report

of the Club's proceedings, and to the prints from them by Marcus Ward & Co. These represent a fairly complete series of the cromlechs of Antrim and Down, as a commencement towards a catalogue of the rude monuments of the North of Ireland. In conjunction with these is a set of similar drawings, by Mr. Charles Elcock, of the cromlechs and other monuments at Carrowmore, Sligo, the site of the battle of Northern Moytura. These are also for the Club's proceedings.

Mr. R. Welch exhibited a set of photographs taken at the Club's excursions, chiefly of antiquities, as well as a set recently taken upon Cave Hill. Mr. E. T. Church showed some striking portraits and other photographs, and Mr. W. Gray showed an album of nearly one hundred photographs, mostly of antiquities, taken during the past summer. It is to be hoped this example of photographing our Irish antiquities will be followed by other members of the Club.

A fine case of minerals was exhibited, which forms part of a set just presented to the Natural History and Philosophical Society by the British Museum. Mr. Vinycomb exhibited a very fine silver inlaid pipe bowl, from Persia; some very spirited sketches by Mr. Thompson, late of Ward & Co.'s, now upon the staff of the *English Illustrated Magazine*; and also a portfolio of compositions, decorative and allegorical, by the great masters. A Chinese fiddle and sandals were exhibited by James Wilson, Esq. Mr. W. Swanston, F.G.S., honorary secretary, lent a number of books of Irish antiquities. The Club's portrait album, arranged and mounted by E. T. Church, Esq., and the Club's sketch-book, occupied a prominent place on a centre table; and, amongst other valuable books in the possession of the Club, were exhibited a set of the Board of Works Reports upon the ancient monuments under care of the Board, kindly procured for the Club by William Gray, Esq., M.R.I.A., &c. The reports are illustrated by a number of excellent sketches and measured drawings. A fine cinerary urn and a quantity of cremated bones, found near Comber, were exhibited by Mr.

Robt. M'Kee. Four worked flint flakes were found near the urn, and two other urns were also discovered close by. A number of members, as usual, kindly attended with their microscopes, diatoms being shown by Mr. W. A. Firth; specimens of microscopic drawings by Dr. Malcomson. Mr. J. J. Andrew, L.D.S., R.C.S., England, showed samples of comparative dental anatomy, and also a valuable recent work, "Studies in Microscopical Science," edited by Arthur C. Cole, F.R.M.S. Mr. Joseph Wright, F.G.S., showed foramenifera, &c. Thanks are due to several friends who kindly sent flowers for the decoration of the room.

On the evening of the 18th November, The President—Mr. William H. Patterson, M.R.I.A., delivered the opening address. He said—Our Field Club, as you know, concerns itself not only with the natural history of this part of Ireland and with natural history generally, but, besides this, its other chief branch of investigation includes the antiquities and archæology of Ireland, particularly of this province. It seemed to me that I might occupy your attention for a short time this evening by briefly referring to some of the early sources of information we have, as to the ancient topography of Ireland, the history of events, and the customs and modes of thought of the early inhabitants. Owing to the studious habits and literary tastes of the Irish in olden times, and to their strong desire to recover and preserve all the facts connected with their national and family history, Irish scribes seem to have been continually occupied in compiling annals, in which they narrated such matters as had been handed down to their time, either by oral tradition or by the labours of earlier scribes. Even before a single page of written history existed in Ireland, the bards and sennachies, who were professional historians, had committed to memory long histories of events. It has been conjectured that these histories were in rhyme for their more easy committal to memory. The earliest scribes, no doubt, wrote down as much as existed in their time of this early bardic history. Whether

or not the art of writing was known in Ireland much before St. Patrick's time is uncertain, but there are good grounds for believing that during Patrick's lifetime the great code of Irish law, called the Brehon Law, which is embodied in a large work entitled the "Senchas Mor," was written in the form in which it now exists, although it is not alleged that any actual manuscript of that early time has come down to us. This great law compilation was made, according to the Annals of Ulster, in the year 439, under the direction of nine eminent persons, consisting of three kings, three bishops, and three poets. The three principal personages engaged in this great work were Leaghairè, the monarch of Erinn; Patrick, the apostle of Erinn; and Ros, the chief Filé or bardic poet of Erinn. A large portion, if not the whole, of this work has come down to us by successive transcriptions, dating from the close of the thirteenth or beginning of the fourteenth to the latter part of the sixteenth century. "In the account of this work, generally prefixed to it, and which is in itself of great antiquity, we are told that it was Ros the poet that placed before St. Patrick the arranged body of the previously existing laws of Erinn; that the saint expunged from them all that was especially anti-Christian or otherwise objectionable, and proposed such alterations as would make them harmonise with the new system of religion and morals which he had brought into the country; that these alterations were approved of, adopted, and embodied in the ancient code; and that code, thus amended, was established as the national law throughout the land" (O'Curry). The "Senchas Mor" has lately been printed by the Government, so that any one can study this ancient code of Irish law; and I may say that any one who does so will be amazed at the vast amount of detail, at the number of distinct offences which are named, and at the curious nature of the punishments, or compensations, for a system of compensation seemed to underlie the Irish penal code. Three bulky volumes of this work have now been published under the authority of the Brehon Law Commission, and, just to give you

an idea of the amount of detail contained, I may tell you that the whole of one volume is filled with causes or reasons for what lawyers call "stay of execution" in specified cases. This means that when a person had by law forfeited something, usually a certain number of cattle, as a recompense to some one he had wronged, he could in a great number of cases claim an extension of the time within which the fine should be paid, for the purpose of having the case retried, or for some other reason. There are still preserved many ancient Irish manuscripts dealing with our early history, and throwing much light on our early topography, and on the manners and customs, ways of living, and modes of thought of the people of this country in old times. Some of these have been translated by such scholars as O'Donovan, O'Curry, Dr. Todd, Dr. Reeves, and others, and these translations have been published by the Irish Archæological and Celtic Society, and in other ways. By far the most important of these translated works is that known as the "Annals of the Four Masters." This wonderful compilation contains a mass of historical information, arranged year by year, with a fullness that gives to us Irish a history older and more complete than that possessed by any other nation in Europe. O'Curry, in speaking of this work, says—"In whatever point of view we regard these Annals, they must awaken feelings of deep interest and respect, not only as the largest collection of national, civil, military, and family history ever brought together in this, or perhaps any other country, but also as the final winding-up of the affairs of a people, who had preserved their nationality and independence for a space of over two thousand years, till their complete overthrow about the time at which this work was compiled. It is no easy matter for an Irishman to suppress feelings of deep emotion when speaking of the compilers of this great work, and especially when he considers the circumstances under which, and the objects for which, it was undertaken. It was no mercenary or ignoble sentiment that prompted one of the last of Erinn's native princes, while the utter destruction of his property, the

persecution and oppression of his creed and race, and even the general ruin of his country, were not only staring him in the face, but actually upon him. Those were not, I say, any mean or mercenary motives that induced this noble man to determine, that, although himself and his country might sink for ever under the impending tempest, the history of that country, at least, should not be altogether lost." The Four Masters who compiled from all available sources the book of Annals which now bears their name, were Michael O'Clery, Conary O'Clery, Cucory O'Clery, and Ferfeasa O'Mulconry. The place where they performed their work was the Abbey of Donegal, and the Irish gentleman who encouraged them in this undertaking, and who bore all the expenses of it, was Ferral O'Gara, lord of Coolavin and Moy Gara, in the County of Sligo. The O'Clerys were Donegal men ; Michael, the chief of the Four Masters, and his brother Conary were born near Ballyshannon ; the remains of their hereditary castle on a rock overhanging the sea at Kilbarron are still to be seen. Cucory O'Clery came of a family settled in the North-West of Donegal. Of the fourth master, Ferfeasa O'Mulconry, nothing is known but that he was a native of the County of Roscommon, and a hereditary antiquary. Michael O'Clery dedicated this great work to his patron, Ferral O'Gara, and the following is a literal translation by Dr. John O'Donovan of this dedication :—"I beseech God to bestow every happiness that may redound to the happiness of his body and soul, upon Fearghal O'Gadhra, Lord of Magh Ui Ghadhra and Cuil Obh Finn, one of the two knights of Parliament who were elected [and sent] from the County of Sligeach (Sligo) to Ath-cliath (Dublin) this year of the age of Christ, 1634. It is a thing general and plain throughout the whole world, in every place where nobility or honour has prevailed in each successive period, that nothing is more glorious, more respectable, or more honourable (for many reasons) than to bring to light the knowledge of the antiquity of ancient authors, and a knowledge of the chieftains and nobles that existed in preceding times, in order that each successive gene-

ration might possess knowledge and information as to how their ancestors spent their time and life, how long they were successively in the lordship of their countries, in dignity or in honour, and what sort of death they met. I, Michael O'Clerigh, a poor brother of the Order of St. Francis (after having been for ten years transcribing every old material which I found concerning the saints of Ireland, observing obedience to each provincial that was in Ireland successively), have come before you, O noble Farrell O'Gara. I have calculated on your honour that it seemed to you a cause of pity and regret, grief and sorrow (for the glory of God, and the honour of Ireland). How much the race of Gaedhael, the son of Niul, have gone under a cloud and darkness without a knowledge of the death or obit of saint or virgin, archbishop, abbot, or other noble dignitary of the Church, of king or prince, lord or chieftain [and] of the synchronism or connection of the one with the other. I explained to you that I thought I could get the assistance of the chroniclers for whom I had most esteem, for writing a book of annals, in which the aforesaid matters might be put on record ; and that should the writing of them be neglected at present, they would not again be found to be put on record, or commemorated to the end and termination of the world. There were collected by me all the best and most copious books of annals that I could find throughout all Ireland (though it was difficult for me to collect them to one place) to write this book in your name, and to your honour, for it was you that gave the reward of their labour to the chroniclers by whom it was written ; and it was the friars of the convent of Donegal that supplied them with food and attendance in like manner. For every good that will result from this book in giving light to all in general, it is to you that thanks should be given, and there should exist no wonder or surprise, jealousy or envy at [any] good that you do, for you are of the race of Heber Mac Mileadh, from whom descended thirty of the Kings of Ireland and sixty-one saints ; and to Tadhg mac Cein mac Oilella Oluim, from whom eighteen of these saints are sprung, you can

be traced generation by generation. * * * On the 22nd day of the month of January, A.D. 1632, this book was commenced in the convent of Dun na ngall, and it was finished in the same convent on the 10th day of August, 1636, the eleventh year of the reign of our King Charles over England, France, Alba, and over Eire.—Your affectionate friend, Brother MICHAEL O'CLERY." O'Clery having thus collected his materials, and having found a patron willing both to identify himself with the undertaking and to defray its expenses, he betook himself to the quiet solitude of the monastery of Donegal, then presided over by his brother, Father Bernardine O'Clery, where he arranged his collections of ancient books, and gathered about him such assistants as he had known by experience to be well qualified to carry out his intentions in the selection and treatment of his vast materials. In the copy of the work presented to Ferral O'Gara, the chiefs of the abbey of Donegal inserted a *testimonium* as to the labours of the four scribes. The part of this which is specially of value to us is that in which they enumerate the ancient books (manuscripts) brought together by the Four Masters, and from which they compiled their great work, and they testify to having seen these in the hands of the Four Masters while the work was in progress. The *testimonium* goes on to say—"The old books (manuscripts) which they collected were the 'Annals of Clonmacnoise,' an abbey founded by Holy Kieran, son of the carpenter; 'The Annals of the Island of Saints on Lough Rive' (Ree); 'The Annals of Senat MacMagnus on Lough Erne' (now called 'The Annals of Ulster'); 'The Annals of the O'Maolconarys'; 'The Annals of Kilronan,' compiled by the O'Duigenans; and 'The Annals of Lacan,' compiled by the MacFirbisses," as well as other books of less account. Most of these books are now unknown, and are probably no longer in existence, and had Michael O'Clery and his companions not undertaken their work at the time they did, many of the facts they record would have been lost for ever; for their labours were hardly concluded when the great rebellion of 1641 broke out, and the country

was swept with fire and sword from one end to the other. Regarding this Dr. Petrie writes :—"How prophetic were the just apprehensions of that chief compiler 'that, if the work were then neglected, or consigned to a future time, a risk might be run that the materials for it should never again be brought together.' Such, indeed, would have been the sad result. Those fearful predictions were made on the very eve of that awful rebellion which caused a revolution of property and an extent of human affliction such, perhaps, as no other country ever experienced. In that unhappy period nearly all the original materials of this compilation probably perished, for one or two of them only have survived to our times. Even this careful transcript was supposed to have shared the same fate, and its recent discovery may be considered as the result of a chance almost miraculous. What a solemn lesson, then, is here given us of the necessity of giving durability, while yet in our power, to the surviving historical remains of our country, and thereby placing them beyond the reach of a fate otherwise almost inevitable! To me it appears a sacred duty on cultivated minds to do so. Had this compilation been neglected, or had it, as was supposed, shared the fate of its predecessors, what a large portion of our history would have been lost to the world for ever!" As to the period of time covered by the Annals of the Four Masters, we find that they commence with the year of the world 2242, and continue to the year of the world 5194—that is, the seventh year before the Christian era—this portion thus covering a period of 2,952 years. The Annals then go on with the year 1 of the Christian era, and terminate with A.D. 1616. The whole period covered is about 4,500 years. There are not entries for every year; in the earlier portions especially there are long gaps. The translation of the Annals by O'Donovan is printed, including index, in seven large quarto volumes, containing 4,215 pages of closely-printed matter. The Irish text and the translation are printed in opposite pages. This gives to Irish scholars the power of verifying O'Donovan's translation, which in the main, how-

ever, is an admirable one; but what adds great value to this work is the number of explanatory notes which the translator has added. He has given us the benefit of his wonderful knowledge of the topography of Ireland, and has drawn at every point on his rich stores of historical lore. There is hardly a district or spot in Ireland respecting which we cannot get information either in the Annals or in O'Donovan's notes. As regards the doings of people, here we may learn about the deaths of eminent people, the battles, and the accidents of all kinds that happen in countries, the dress and weapons and ornaments of the people, their diseases, superstitions, and ways of thought, along with an infinite number of other matters. As regards what we may call the records of scientific facts, we find mention of eclipses of the sun and moon, of comets and meteors, of severe frosts and snow, of storms, of persons killed by lightning, of the eruptions of lakes and of rivers (this is a very curious matter), of great plagues, and also of seasons of great fertility or seasons of scarcity. The erection is recorded of many ancient forts. We find notices also in the Annals of the introduction of certain arts and artistic productions into Ireland. For instance, in the year of the world 3656, that is, more than 1,500 years before the Christian era, it is recorded that it was Tighearnmas, the King of Ireland, who first had gold smelted in Ireland. The artificer was Uchadan, of the Feara-Cualann. "It was by him that goblets and brooches were first covered with gold and silver in Ireland; it was by him that clothes were dyed purple, blue, and green;" and in Macgeoghegan's translation of the Annals of Clonmacnoise it is further stated concerning this same monarch—"It was he who first caused standing cups to be made, the refining of gold and silver, and procured his goldsmith (named Ugden), who dwelt near the Liffey, to make gold and silver pins to put in men's and women's garments about their necks, and he was the first that invented the dyeing of parti-coloured clothes in Ireland." Keating says that Tighearnmas was the first Irish king who established the custom of distinguishing the rank of his sub-

jects by the different colours in their dress, as one colour in the garment of a slave, two colours in the garment of a peasant, three in that of a soldier, four in that of a brughaidh, five in that of the chieftain of a territory, and six in that of an ollav [ollam], chief professor, and in those of kings and queens. This introduction of parti-coloured clothes, or tartans, as a mark of social rank, is by the Four Masters attributed to King Eochaidh, who commenced to reign eight years after the death of the King just named. Again, in the year of the world 3817 we are told that silver shields were made by Enna Airgtheach, at Airget Ros—that is, the silver wood. It is situated on the River Nore, in the County of Kilkenny, "and he gave them to the men of Ireland, as well as chariots and horses." In 3882 gold rings were first worn upon the hands of chieftains in Ireland. Fiacho, who died in A.M. 3991, was the king in whose reign wells for water were first dug in the earth. In 4176, Roitheachtaigh, who had reigned for seven years, was killed by lightning at Dunseverick. It was by him that chariots of four horses were first used in Ireland. Under the date of A.D. 9, the death is recorded of Crimhthan in the sixteenth year of his sovereignty, at Dun Crimhthan, at Edair (Howth), after returning from the famous expedition on which he had gone. The Annals relate that it was from this expedition he brought with him the wonderful jewels, among which were a golden chariot, and a golden chessboard inlaid with a hundred transparent gems, and the cedach-crimhthainn, which was a beautiful cloak embroidered with gold. He brought a conquering sword, with many serpents of fine massy gold inlaid in it; a shield, with bosses of bright silver; a spear, from the wound inflicted by which no one recovered; a sling, from which no erring shot was discharged; and two greyhounds, with a silver chain between them, which chain was worth three hundred cumbals; with many other precious articles. It is needless to quote further; every page of the Annals contains what is matter of interest for us. I may conclude this very imperfect notice by a reference to King Cormac, the son of Art, and grandson of

Conn of the Hundred Battles. He died A.D. 266, after reigning forty years. The Four Masters tell us that it was he who composed Teagusc-na-Righ, to preserve manners, morals, and government in the kingdom. He was a famous author in laws, synchronisms, and history, for it was he that established law, rule, and direction for each science, and for each covenant, according to propriety, and it is his laws that governed all that adhered to them to the present time. It was this Cormac, son of Art, also, that collected the chroniclers of Ireland to Teamhair (Tara), and ordered them to write the chronicles of Ireland in one book, which was named "The Psalter of Teamhair." In that book were entered the coeval exploits and synchronisms of the kings of Ireland, with the kings and emperors of the world, and of the provinces, with the monarchs of Ireland. In it was also written what the monarchs of Ireland were entitled to receive from the provincial kings, and the rents and dues of the provincial kings from their subjects, from the noble to the subaltern. In it also were described the boundaries and meares of Ireland from shore to shore, from the province to the cantred, from the cantred to the townland, and from the townland to the traigth of land. This monarch was one of our earliest historians, and the book of the Teagusc-na-Righ, or kingly advice, is a remarkable production for so early a period. It is in the form of a conversation between King Cormac and his son Calistré, and it seems to have been composed for the purpose of giving this son such advice as would fit him for the high station he was to occupy.

Several very interesting extracts from this most important book were given, after which

Mr. Swanston read brief notes on some rare mosses communicated by Rev. H. W. Lett (Ardmore), of which the following is the substance :—I have now the pleasure of laying before the Club notice of my having collected, whilst moss-hunting in the Mourne Mountains, two mosses not hitherto observed in Ireland. The first of these is *Thuidium recognitum* (Hed.), a striking species, and easily distinguished from the common form.

Its leaves are most beautiful objects under the microscope, owing to their being densely papillose on the back. The other is *Grimmia Donniana*, of which I got fine specimens with abundant fruit, in all stages, growing in cracks or crevices in schist stones near Newcastle. The first plants of this that I found were on the top of a high wall that I had to get over, and whilst meditating on the easiest way of descending, I saw this little beauty, and, though I took a good gathering, I did not by any means exterminate it. *Oligotrichum hercynicum* occurs in plenty on the Mourne range. I have found it abundant on the granitic and sandy *debris* all round Slieve Comedagh, and in two instances in fruit. I have it also from Bencrom and Slieve Donard. Another rare moss that I found on Slieve Comedagh is *Anœctangium compactum*. It grows at 1,800 feet on steep wet rocks. On the icehouse above Donard Lodge I found *Eucalypta streptocarpa* in fine condition. This also occurs on a bridge over the Spinkwee River in Tollymore Park. *Fontinalis squamosa* appears to have been quite overlooked in the North-East. I have found it in Rostrevor River and elsewhere among the Mourne Mountains ; it is easily distinguished by the leaves being not keeled. I may mention that my specimens have all been submitted for identification to the searching judgment of Mr. Holt, of Manchester.

Mounted specimens were handed round for the examination of the audience, after which

Mr. F. W. Lockwood read some notes on several archæological remains visited by the Club in the course of the past summer's excursions, and especially mentioned Rathmore Trench, near Muckamore, and the cairn of stones near the Sallagh Braes, known as the Headless Cross. The discussion which followed, in which the vice-president (Canon Grainger, D.D., M.R.I.A.), J. J. Murphy, Esq., and others took part, elicited some valuable information, and the election of a new member closed the evening's business.

The second meeting of the Session was held on 16th December—Rev. H. W. Lett, M.A., T.C.D., presiding. Two communications were brought forward. The first was on "The origin and history of the Lignites and Silicified Wood of Lough Neagh, by Mr. William Swanston, F.G.S. The reader, in introducing the subject, stated that much attention had recently been directed to these remnants of an ancient vegetation found scattered through the drift and gravels. Conjecture pointed to their being linked with the plant remains of the iron ores and bauxites of County Antrim, but no conclusive evidence could be adduced. Their abundance along the south-western shore of Lough Neagh, in the neighbourhood of an extensive deposit of clays, to which various ages had been assigned, pointed strongly to those beds as the probable source. These beds had indeed by early writers been pointed out, and the records of investigations in them left no room to doubt that the silicified woods are derived from them ; but recent writers have treated the evidence and records as antiquated, and, while substituting no further information, have left the question again an open one. Mr. J. Starkie Gardiner, F.L.S., F.G.S., in a valuable paper read before the Club,* pointed out the desirability of solving this important question, and with that view Lough Neagh was frequently visited. The reader then gave a brief summary of the literature of the subject. Referring to the locality, he pointed out that an extensive area, tinted grey on the Geological Map of Ireland, compiled by the late Professor Jukes, indicated, as per margin, Pleistocene clays. A visitor to the district would perhaps fail at first sight to recognise these clay beds, as they are but slightly exposed to view, being covered with the usual boulder drift and soil, with which you must all be familiar. In summer, however, when the water is low, white and greyish clays may in places be seen, resembling pipeclays, which, when stirred up, give to the water an appear-

* The Age of the Basalts of North-East Atlantic. Proc. B.N.F.C., Sec. II., Vol. II., Part IV., Page 254.

ance as if whitewash had been poured into it. These clays, varying somewhat in their character, have been found to extend from Arboe Point on the west shore, inland, to near Dungannon, where they are utilised for pottery and tile-making. They present a broad fringe along the southern end of the Lough, and reach as far up the eastern shore as Langford Lodge; covering, in all, an area estimated at 180 square miles. In various places they have been pierced to a depth of between two and three hundred feet, without reaching their base. It will therefore be seen, that, geologically speaking, the deposit is an important one, and as scarce two authors assign these clays to the same formation, it becomes a matter of deep interest to geological students to examine every point of evidence tending to throw light on the question.

Fragments of Silicified Wood occur over this area in the drift and soil. It has even been found as far north as Coleraine, and as far south as the Maze racecourse, where it occurred in drift gravels.* Associated with these fragments are certain nodules of ironstone, to which I have already referred, many of which contain impressions of leaves and plants, and it is important to note this connection between these two classes of fossil.

The Lough is well known to you all, and perhaps equally so is the tradition of the petrifying powers attributed to its waters, whereby wood is said to be turned into stone.

By early writers on Ireland, whenever Lough Neagh is referred to, this property is ascribed to its waters as one of the greatest of wonders, and so the statement became almost universally known, and in those days—when science teachers were not abroad—unhesitatingly believed in, and much of the early notoriety of the lough is due to its supposed possession of this remarkable virtue. As early as the ninth century a writer speaks of it as follows :—"There is another lough that hardens wood into stone. Men cleave the wood, and when they have

* J. S. Gardiner on the Lower Eocene Plant Beds of the Basaltic Formation of Ulster, Q.J.G.S, February, 1885.

fashioned it they cast it into the lough, where it lies to the beginning of the year, and at the beginning of the year it is found to be stone, and the lough is called Lough Echach." I need hardly say that if this petrifying process was so rapid and simple, an estate on the lough shore would be a valuable property indeed.

In a famous but somewhat rare book (Ireland's Natural History, by Arnold Boate, dated about 1650), there is a section of a chapter devoted to this subject. In section 7, chapter 9, he writes :—"Before we make an end of this Chapter we must say something of the wonderful property which generally is ascribed to Lough Neaugh, of turning Wood into Stone ; whereunto some do add, to double the wonder, that the Wood is turned not only into Stone, but into Iron ; and that a branch or pole being stuck into the ground, somewhere by the side where it is not too deep, after a certain space of time one shall find that piece of stick which stuck in the ground turned into Iron, and the middle, so far as it was in the water, into Stone, the upper end which remained above the water keeping its former nature. But this part of the History I beleeve to be a Fable ; For my Brother, who hath been several times in places not far distant from that lough, and who, of the English thereabouts inhabiting, hath inquired this business with singular diligence, doth assure me that he could never learn of any such thing, but that the turning of Wood into Stone was by everyone beleeved for certain, as having been tryed divers times by severale persons ; saying, moreover, to have understood of them that the water hath this virtue onely at the sides, and that not everywhere, but onely in some few places, especially at that part where the River Blackwater dischargeth itself into the lough. He could never come to speak with any persons who had themselves tryed this matter, but with several who affirmed that to their knowledge it had certainly been done by others of their acquaintance."

Harris, in his description of the County Down (1744), goes very fully into this matter. After treating of the healing qua-

lities of its waters, he writes :—" The second property ascribed to this Lake—viz., of petrifying and converting Wood into Stone, challenges some Attention ; and the more so, as Antiquity and universal Consent have conspired to give it this Quality. But Fable has been fruitful in adding a remarkable Particular to this Property ascribed to the Lough—viz., That the Wood is turned partly into Stone and partly into Iron."

Harris does not seem to have been convinced of this virtue said to be possessed by the water or soil of the lough, and in an ingenious manner tries to set it aside. After enumerating the arguments given in support of the belief, he thus reviews them :—" To the First We answer, 'It is now a determined point among Naturalists, *that Stones Vegetate as well as Plants* ; it seems not impossible that these may be peculiar Stones, which, though in the manner of their Growth they may resemble Wood, and especially Holly, yet are not from that Resemblance necessarily to be admitted such, any more than those Representations of the Shells of Cockles, Oysters, and Escalops, some forming and some formed, frequently observed in Lime-stone in the Peak of Derbyshire, are to be supposed ever to have been real Shells, or those exact Representations of a Lion couchant, of a human Corps laid out ; nay, of several artificial Things, as Chairs, a Set of Organs, and innumerable other Sportings of Nature, in the vegetating Lime-stone, are to be imagined to have ever been the real things they resemble.'"

Many other such quaint quotations might be given, but no solid ground of investigation is touched till the publication, in 1751, of Dr. Barton's famous lecture to the Royal Society on *The Petrifications, Gems, Crystals, and Sanative Qualities of Lough Neagh.* The learned, but very wordy, Doctor quotes all that had been previously written on the subject ; but his strong point is original research, and the collection of an extraordinary series of specimens which he describes in his work most minutely. You will kindly excuse my inflicting a few of his paragraphs upon you.

Turning to his third lecture on metamorphoses, he describes a specimen on which he had a Latin inscription cut—"This wonderful saxo-ligneous mass is extremely hard on the outside, emitting fire, on collision with steel, in great plenty. Yet has it wood, which is very soft, internally. . . . The weight of the specimen, before a small fragment was separated, was seven hundred pounds, being weighed at the public crane in a market town. . . . The true external colour is white, like that of a firm kind of chalk ; but the matter which affords this colour is very thin, not exceeding that of an English silver penny, and capable of being altered by rain, for when it is wet the stone in some parts appears of a blue colour. It was found about two miles from the lake, on the side of the River Camlin (Crumlin River), above the surface of the water, which at the time was very low." Specimen No. 2—"A mass of wood and stone continuous, is as much as two able men can lift in a frame, whose joints are strengthened with iron. . . It being the reverse of the former specimen—wood on the outside and stone within—it was necessary to frame it, that it might be fixed in so steady a manner as not to loose by friction the tender part of its substance which lay on the outside." Specimen No. 7—"This stone is nearly twenty inches long and five broad ; one side is ground to a flat surface, is a firm black stone, and gives a knife a good edge ; the other side is wood, and may be cut by that knife in several places without spoiling the edge. N.B.—There was a great quantity of wood which was broken off in the polishing." And so on I might quote from his descriptions of two hundred and seventy-one specimens. The point I wish you specially to note in those I have quoted is, that they are part wood and part stone.

Lecture IV. is devoted to a history of the phenomena of Lough Neagh, and in it he describes the two sorts of wood to which his enquiry relates. I may give them to you. "I.—Those which appear to the eye to be now wood, although they are really stone, and are generally white in colour, porous, and comparatively lighter than other stones, cleaving easily length-

wise, grinding to a smooth surface, so as to be fit to whet knives, and never yet found with any wood continuous to them, and commonly found in small pieces." This description of Barton's applies to the smaller rolled pieces found scattered through the soil or gravel, which have been rounded by attrition, and bleached by exposure. "II.—Those that are large, harder, and more weighty, black internally and externally, found lately in many instances with much wood on the surface, and also with a good deal of wood intermixt with the inward parts of the stone."

I shall finish my quotations from the learned Doctor's work by his description of the locality where the petrifactions were found in greatest abundance. "Whereas former inquirers have left upon record, that the mouth of the Blackwater and neighbouring shores were particularly remarkable for productions of these petrifactions, it was proper to examine those places accurately, which was done, yet nothing curious found. And to come directly to the purpose, the entire encompassing shore of the lake was carefully searched, without success, from the former point (Ardmore Point) to a point called Ahaness, in the County Antrim."

"This place seeming to be the forge where these materials receive part of their form, deserves a particular and accurate description; because future reasoning concerning these productions must in a great measure depend upon it."

"Ahaness is half a mile south of the River Glenevy, and the shore between them is sandy; it is three miles north of Portmore Park, and the shore between them is for the most part rough, except in one place for five hundred paces it is sandy and pretty deep. The part immediately adjoining upon Ahaness is a surface of yellow clay, covered roughly with stones." "At Ahaness there has been raised, from time to time, above two ton weight of stones, with wood continuous in them, one of which, weighing 150 lb., is deposited in Trinity College, Dublin; and several fragments of extraordinary rarity, got by breaking the large stones, are deposited in the University of Cambridge, with the Woodwardian professor of the knowledge of fossils. The bank at Ahaness is twelve feet high, between

the bottom of which and the lowest water mark in summer, there is a space of about ninety feet, which space in winter is sometimes covered with water. Upon digging a pit in this place (of which there are several made), the upper stratum of matter is red clay, three feet deep ; the second stratum is stiff blue clay, four feet deep ; the third stratum is a black wood lying in flakes, four feet deep ; the next stratum is clay, &c." Speaking of the stratum of black wood, he says—"It has no intermixture of the neighbouring strata with it, nor has it any void spaces, as should be found amongst timber thrown in a heap, unless some incumbent weight should so press the mass as to reduce the round form of the trees to a flat, and thereby so exactly fit them together that they may appear one solid uniform mass, or so press the small boughs with the leaves into the interstices as to give the appearance of one homogene mass. In many places of this mass, the leaves of trees seem principally to be pressed together, so as to form matter of the visible appearance of what the workers in leather call jump, being thin parings so united by pressure as to become sufficiently firm for heels of shoes. Such a kind of appearance this stratum of wood has ; it is one uniform mass capable of being cut any way with a spade, tho' more easily with the grain."

I have been unable to identify this place named Ahaness on any map, and it is not known to the residents now, but the locality is so precisely described that there can be no uncertainty about it.

In 1837, Dr. Scouler, of Dublin, was commissioned to examine these deposits of clay and lignite, and did so most systematically, engaging men to bore and otherwise excavate for examples. The results of this survey is given in the journal of The Geological Society of Ireland, and the beds were, in his opinion, stated to be of Tertiary age,* and he further adds that "to Barton therefore is due the merit of being first to ascertain the relation of the Silicified Wood to the Lignites."

Griffith wrote fully on these clays and lignites, and pointed

* Dublin Geological Journal, vol. 1., part 3.

out the probability of the Silicified Wood found in the Drift as having been derived from these beds.*

Portlock, in 1843, states—"In respect to the connection of the Basalts and Silicified Wood more evidence is necessary"†

Two early members of the Belfast Naturalists' Field Club, in 1869, read a valuable joint paper before the Geological Society of London, on the Iron Ores associated with the Basalts of the North-east of Ireland. The iron nodules with plant remains, found on the Lough shores, are referred to, and considered identical in age with the then only known leaf beds of Ballypallady, and all are grouped as of miocene age.‡

Dr. Macloskie, in 1873, gave an elaborate paper to the Belfast Natural History and Philosophical Society on the Silicified Wood, and expressed his opinion that the specimens found in the Drift were derived from beds of miocene age, and gave a fancy picture of a vast river flowing southward over a continent, of which the Hebrides and Western Islands of Scotland form but a remnant, and this river brought the partially Silicified Wood and scattered it along its course.§

In the same year, 1873, the Coal question was the all-absorbing topic, and Mr. Wm. Gray, M.R.I.A., then Senior Honorary Secretary of the Belfast Naturalists' Field Club, gave a valuable paper on *The Lignites of Antrim and their relation to true Coal.* The subject was thoroughly gone into, and many new facts were brought forward; perhaps one of the most important was the discovery of Silicified Wood in the Basalt at Laurencetown, where he states "there is a bed of lignite in the Basalt, about 30 feet from the surface, and in this lignite there are layers of wood charged with siliceous matter, and resembling the wood erroneously supposed to be petrified by the waters of Lough Neagh. This fact supplies the evidence Captain Portlock admitted was wanting."‖ After summing up all the evidence which Mr. Gray puts into a concise form, he comes to the con-

* Griffith—2nd Report of Railway Commission, p. 22.

† Report of the Geology of Londonderry, 1843, p. 76.

‡ Tate and Holden, Q.J.G.S.

§ Proceedings Belfast Natural History and Philosophical Society, 1873.

‖ Proceedings Belfast Naturalists' Field Club, 10th Annual Report, 1873.

clusion that we cannot escape the deduction that the beds of Ballypallady, Isle of Mull, those near Shane's Castle, and at Laurencetown, together with the Silicified Wood, and their associated lignites of Lough Neagh, are of the same age, namely miocene, as supposed by various writers.

Taking the literature of the subject in its order, the next reference we have to these Lough Neagh beds is that made by the officers of the Geological Survey, and as their opinions are of great weight, it is necessary to examine them carefully. Sheet 47, and its explanatory memoir, describing the neighbourhood of Armagh, was issued in 1873. Sheet 35 and its explanation descriptive of the Tyrone Coalfields, and the South-West corner of Lough Neagh, appeared in 1877 ; these clay beds are there described fully, under the head of *Pliocene Clays*, their thickness being estimated at over 500 feet. The results of many borings and sections obtained in pits are given. Nearly all of these have records of Lignites and Ironstone nodules, the latter in one place containing reed-like plants. The writers are careful, however, to note that "in no instance has any specimens of the Silicified Wood of Lough Neagh been found in them, although a good opportunity for its discovery has thus been afforded over an extensive area."

The memoirs and sheet 27 appeared in 1881, and there is again another chapter on the Pliocene clays continued into the area which they represent. The author says—"That the fossil wood is more or less directly connected with the lignite seems to be generally admitted, but there has existed diversity of opinion as to the nature of this relation ;" and he then proceeds to give one of Dr. Barton's definite statements, and quotes the paragraph describing his digging into the lignite deposit where some of his largest specimens were found, and concludes with the following paragraph :—"Mr. Hardman, one of the surveyors, supposes that the silicified pieces of wood had their *locus* in the basalt, and that the silicification is due to the percolation of water through the porous and easily decomposable rock. That this process does take place, at least to some extent, appears from a note to Dr. Macloskie's paper, referring

to a specimen of partially silicified lignite found intercalated between beds of trap at Knocknagor, near Banbridge; and specimens are said to have been found in the heart of silicified blocks at Lough Neagh, resembling the lignite of Knocknagor and the Giants' Causeway." Thus to a great extent all the definite statements based on the observations and research of previous writers, that the Silicified Wood has its source in these clays are to a great extent ignored.

In company with Mr Starkie Gardiner, I visited the Lough shores frequently last summer, while the waters were low, and, while admitting the possibility of Silicified Wood being found in the basalts, we were quite satisfied from what we saw, that the Lough Neagh examples and the numerous specimens scattered about that area are associated with the ironstone nodules, and are derived from the lignite-bearing clays in question, but no positive proof could be gained, and the older writers stood unsupported. In December last, however, Mr S. A. Stewart and myself again visited the ground, and found a pit had been sunk on the margin, as near as possible to the spot so precisely indicated by Dr. Barton—that is to say, Ahaness, half a mile south of Glenavy River. The pit had been sunk to obtain lignite for trial in some manufacturing process. We found the hole full of water, but after no small labour we cleared it; it was about three feet deep. Under a foot of surface gravels and some of the white tenacious clay which characterises these beds, was a solid stratum of lignite. With a good deal of difficulty it could be dug, as so accurately described by Dr. Barton. We did not work long at the digging, as the water could not be kept out, but after throwing out a quantity, had to abandon the work. On asking the very intelligent farmer who assisted us if he could tell us where the silicified wood came from, he at once said it came from the lignite, and could prove it. He said he had carted several loads of the lignite to his house for fuel, and on burning a large piece he found the heart of it was stone. The calcined remains of this important specimen he gave me, and pointed out the heap he had carted up, and in it we found a piece, part wood and part stone, that had

not reached the domestic hearth. Resident for a long time on the spot, he said there could be no doubt but the specimens found along the Lough side had originally come from the lignite beds. Several pieces on his garden wall showed part, still wood, although they had been there exposed for years.

All this is, after all, only corroborating what has already been seen and said by others, and this is all we ask to claim, our wish being to place it again on record, believing it to be the proof necessary to show the relation between the fossil wood and the lignites, as required by the writer of explanatory memoirs to sheet 27 of the Geological Survey.

The second communication was the substance of a paper read in London to a club of artists and dilettanti, which goes by the strange title of "The Kenoozers' Club," the word being an old rendering of the French "connaisseur." At its last meeting, on the 2nd inst., in the house of Mr. Seymour Lucas, the well-known artist, an account of one of the rarest antiquities in Ireland, and preserved in our own Museum, formed the subject for the evening. The paper was read by Mr. J. Starkie Gardiner, F.L.S., F.G.S., &c., and was as follows :—"The helmet to which I desire to call attention is preserved in the Belfast Museum, and its existence is probably unknown to members of the Club. It is made of sheet iron, now much corroded, is of conical form, 12 inches high, and 26 inches at its largest circumference. It has been partially described and figured in the Ulster Journal of Archæology. The description concludes with the expressed opinion that it is a bascinet of the time of Richard II., founded on a fancied resemblance in its form to a bascinet in the Tower, and on the fact that MacMurragh, a King of Ireland, is represented in a contemporary MS. with a conical head-piece. If, however, it be, as I suspect, a unique example, its true age has to be inferred from analogy, and in that case I think the following considerations will enable an approximate estimate to be come to. The first point about it is its general form, for, though conical, the apex is not central, but the front recedes, throwing it well to the back, so that the back and front curves seen in profile are different, but

both of some beauty. The second point is that a very pronounced ridge or crest commences at the nose piece, and, if I remember rightly, only terminates at the back base of the helmet. We have next to note the shape of the eyelets, which are large, rounded at the side furthest from the nose, and curved upwards very slightly. The nose piece projects at a slight angle, is shaped a little round the eyelet, is again shaped lower down, and terminates in a point with something of the profile of a blunt lance head. The basal margin is strengthened with rivets. So far the groundwork is of iron; but it is embellished with another metal. Two delicate ridge-shaped fillets of bronze follow the contour of the eyelets, swelled in three places to permit a rivet to pass through and fasten them, and there is also a very curious bronze ornament fastened to the front between and a little below the eyelets. This piece is broad at the base where it is attached, but thins down to a blunt point, which is recurved, and slants well away from the nose piece, the whole appearance being roughly describable as something like an elephant's head and trunk. It is obviously there to strengthen the weakest and most vulnerable spot. This is a rough, but I think tolerably complete, description of the helmet as it stands. None of the characteristics I have mentioned, so far as I know, are to be met with in any mediæval bascinets, and they have nothing in common with it except the conical form, which gives them a superficial resemblance. In this case I think 'like is an ill mark.' The setting back of the apex, the continuous ridge, and the shape of the eye holes are essentially classic, and though I have not seen any classic helmet in which all these characters are combined in a precisely general form, yet there are many of less conical shape in which they are all present. The way the sides fold round, lapping over and protecting the cheek, is a very classic feature, and the front view is almost identical, even in the height of the cone-shaped top, with the helmet on a bronze statuette of Mars in the British Museum. In this case, however, the sides are slit and cut round the ears, while ours is bulged to enclose them. On another helmet there is a projecting stud, a rude

head, I think—in the same position as the bronze stud on the Irish example. The bronze stud is there probably as a defence, but it is just possible that it may have been a survival (because it was found practically useful) of some merely ornamental appendage—something to which a badge or distinguishing mark may have been fixed. The upturned end would have been very inconvenient if the wearer were liable to receive downward blows, and its form almost suggests a mode of fighting confined to missiles or thrusts. Its presence renders the theory, to my mind, that it is a bascinet with a vizor removed, an impossible one, though the author of it in the *Ulster Journal* gives it an apparently modern date by describing the bronze additions as ornaments in polished brass. The helmet was found in a crannoge. Some present may never have seen one, so that I will just mention that it is an artificial island, of common occurrence in small Irish lakes, enclosed by a stockade of oak driven into the bottom of the lake. Peat, bramble, heath, and all other available materials were used to raise it above the water level, until a platform appeared, 30 to 100 feet in diameter, on which one or several rude dwellings were constructed. These were sometimes connected with the land by a causeway, but sometimes a fleet of dug-outs have been found on the banks. The crannoges have yielded a rich supply of ancient Irish implements, and tools of stone, bronze, and iron. Now, there is nothing in the fact of its having been found in this position that would preclude its being of late date, even Elizabethan, for Irish chiefs often refuged in them, and Sir Phelim O'Neill was captured in one as late as the year 1642. The fair inference, however, from its being found in this situation would be that it was of an exceedingly early age, for, while early Celtic antiquities are found in them by thousands, I am not aware of anything much later, being of common occurrence in them. In the old Celtic days they were the habitations, while later they were at most only a temporary refuge, such as a cave might be. Its association with flints and bronzes goes far to paove its antiquity. The bronze work upon it seems to be of the same composition, has the same beautiful finish, and

is brought up to a characteristic ridge, as in the old Celtic bronze work with which we are familiar. The introduction of iron, however it was brought about in Ireland, led to the disuse of bronze for certain purposes, especially for sword and lance heads, and its greater powers of resistance, we may assume, would before long have led to its use in defensive armour. The early workers in iron, however, may have been quite unable to forge the delicate fillets, and hence all the difficult parts were fashioned in the metal they had been for ages skilled in manipulating. If this theory were correct, we should be able to fix the age of our helmet as early in the iron age, and it would consequently be the very earliest iron helmet known from this country. Actually, of course, there is no such thing as an historical stone, bronze, and iron age, for the use of iron dates back far beyond the oldest records, while it is still the stone age with some races of men. In estimating the antiquity of an object, the country in which it is found has to be taken into account. In Iceland, for example, all the native art products look as old as William the Conqueror, ornamentation contemporary in appearance with the Bayeux tapestry is dated of the 17th and 18th centuries. We should be quite prepared to find primitive weapons clung to in Ireland long after they had been discarded in England, and it is probable that, while their chiefs and noted warriors fought with iron and bronze, the tribesmen used stone lance and arrow heads. Beautifully wrought arrow heads are immensely abundant, quite on the surface of the ground in many spots, while in England flints are nothing like so skilfully worked, and are always, unless unearthed by accident, buried at some depth. It is hardly probable that at any date prior to the Norman invasion helmets formed part of a warrior's costume in Ireland. Making every allowance for the perishable nature of an object made of sheet iron, the bronze ornaments would resist alike the axes and other implements which are found so commonly, yet I have never seen anything like the eyelet rims or the nose piece ornaments in collections, and it seems likely that only a chieftain could have possessed it. We know, at all events, that many

moderately civilised tribes went to battle without any metal headgear. As for fixing the date of the helmet more exactly than this from any intrinsic evidence, I find it hopeless, and can only hope some expert may take the matter in hand. Ulster has had a stormy history. Before the arrival of the Milesians, about A.M. 3500, there had been many invasions chronicled. It has since then been held by the Picts, invaded by the Northumbrians, and scourged by the Norsemen. The Anglo-Normans, under De Courcey, subjugated it A.D. 1177, and the Scots repeatedly encroached, and often maintained their footing. Whether the helmet was worn by invader or invaded, and whether the chieftain retired wounded to breathe his last in his islet fortress, died in his armour, or the helmet was merely carried there as a trophy, is a secret that has been locked in the peaty crannoge for hundreds, perhaps even thousands, of years."

The third meeting was held on Tuesday evening, January 20th, in the Museum—the President (W. H. Patterson, Esq., M.R.I.A.) in the chair—when a paper, entitled "Notes on Gilled Fungi," collected in the North of Ireland, was read by the Rev. H. W. Lett, M.A., of which the following is an abstract :—

Fungi, or Funguses, are thought by most persons to be unimportant vegetables, the humble mushrooms and toadstools making up the class, according to their ideas, whereas the most numerous and important fungus plants are either microscopic or else so small as to attract little attention. About them much can be learned from Dr. M. C. Cooke's book on Microscopic Fungi, and Mr. Worthington G. Smith has just brought out a little well-illustrated work, called "Diseases of Field and Garden Crops," chiefly such as are caused by fungi, which ought to be in the hands of everyone who grows or studies plants and flowers. The number of fungi is enormous. The two volumes of Cooke's "British Fungi," published fourteen years ago,

described 2,809 species, and each year has since added to the list. Not much has been done to investigate them in Ireland. Wade, in 1803, in his "Rarer Plants found in Ireland," gave a list of 50 species; and in 1878 Mr. Greenwood Pim compiled a list of the fungi of Counties Dublin and Wicklow for the guide-book issued on the occasion of the visit of the British Association to Dublin, which brought up the list of fungi found in Ireland to 470 species, and since then Mr. Pim has recorded some 60 additional species. In the North of Ireland, the Belfast Naturalists' Field Club has been doing something in the same line. A suggestion of the lecturer's in a former communication to the Club, on fungi, brought about two most agreeable fungus forays, the only excursions of the kind ever held in Ireland—the first in 1883 to Shane's Castle Demesne, and again in last September to Killymoon, near Cookstown. These forays were far from unsuccessful, though it is generally a bad opportunity for searching a spot under pressure of the secretary's whistle, reminding members that they must catch a certain train; and the botanist always feels the day should be twice as long, and plant-case and basket four times as capacious as they are. However, eighty species were identified among the collections at Shane's Castle, and ninety from Killymoon. All these are to be duly recorded in a list the writer has for some time been engaged in preparing for publication in the Club's report. With the aid of a series of coloured diagrams, a description was then given of the method of classifying fungi,—by the way in which the fruit or spores are borne,—by the colours of these spores or seeds, which are white, pink, brown, purple, or black, and by their forms, which are in endless variety and beauty. Fungi, which have upon the under side of the cap numerous vertical plates or gills, radiating like the spokes of a wheel, are called agarics; they are all shaped much like the common mushroom, and abound in Ireland. The lecturer then referred to a large number of drawings of such as have come under his own observation, which were exhibited on the walls. In all, the list of agarics satisfactorily determined as being natives of Ulster is 135, a very small proportion of the entire number

known to fungologists. The popular error which regards all fungi, except mushrooms, as intended for seats for frogs, was humourously explained by a sketch of two huge toads or frogs on toadstools, or, as called in County Antrim, paddock stools. Their esculent properties were varied, and the reader gave his personal experience as a toadstool eater, the only guide to becoming an expert in that department being knowledge and practice. There is no royal road or short cut by which to know wholesome from poisonous species ; but the former are the most numerous and common. With common sense and Mr. W. G. Smith's coloured charts and guide to poisonous and edible fungi, and Mr. M. C. Cooke's little handbook, which were laid upon the table, there need be no fear of putting death into the pot while preparing savoury dishes out of what is now allowed to rot unheeded in our fields, and woods, and lanes. But the mere study of these plants, in order to get a few more dishes of savoury meat, is a rather unworthy motive, and the study should be taken up for the sake of the knowledge itself and the insight into the works of the great Creator, bringing us a few more steps nearer to the beginning of life, and therefore to that Being of whom, through whom, and in whom are all things. A collection of dried fungi was shown. This is not a satisfactory method of keeping the specimens, which in their desiccated state are mere mummies ; hence the best and surest plan is to make a careful portrait from a fresh specimen, and make full notes of its place and time of growth, its size, colour, and smell, the shape of the cap and gills and stem, and the hue of the spores. The lecturer hoped that more of the members of the Club would engage in this hitherto neglected department of the Irish Flora, and mentioned how Mr. Pim had already found five species new to science as the reward of the attention he had been able to devote to the subject.

After the reading of the paper, several members spoke of the importance of the subject, and of the able manner in which it was brought forward by the reader.

The President spoke of the extreme interest Mr. Lett had given to this lowly class of plants ; and hoped in the future

fungus forays of the Club, that the honorary secretaries or conductors would arrange for a locality affording sufficient time to test in a practical way, by cooking, &c., some of the species found and pronounced to be so delicious.

Mr. Wm, Gray, by his remarks, elicited some useful information about preparing and mounting the minute forms, and portions of the larger ones, for microscopic examination.

Several other members having asked questions, which were replied to by the reader, an examination of the large series of specimens on the table, and the drawings of the more perishable species, concluded the meeting.

The fourth meeting was held in the Museum, College Square North, on Tuesday evening, 17th February—Mr. W. H. Patterson, M.R.I.A., in the chair—when a paper, entitled "Notes on the Scale Mosses and Liverworts of County Down," written by the Rev. C. Herbert Waddell, B.A., was read by the Rev. H. W. Lett, Ardmore. The writer stated that the study of the Hepaticae or scale mosses has hitherto been much neglected in the North of Ireland. They come lower down in the scale of life than the true mosses, from which they are distinguished in the following particulars :—Their leaves are constructed upon a different plan, being more like bracts or scales than true leaves; hence the name scale mosses. The fruit is different in shape, and contains elaters, curious little bodies which help to scatter the spores. These plants have also a peculiar bilateral habit of growth, with an upper side turned towards the light, and an under side next the ground, of a different shape. There are in Europe 314 species of Hepaticae in all, and of this number 137 species have been found growing in Ireland—that is to say, nearly half of the European Flora. A number of species grow at Killarney that either do not grow elsewhere, or only in the Pyrenees and West Indies. Dr. Spruce says—"When gathering mosses and Hepaticae on the slopes of the Andes he was reminded of the Kerry mountains, whose cryptogamic vegetation is the nearest approach in Europe to that of tropical

mountains." Of the 137 Irish species, about 58 seem to have been found by the late Dr David Moore, of Glasnevin, in the north and East of Ireland, chiefly in the glens of Antrim. 40 species have been found by the writer in County Down, but no doubt a more extended search would bring to light many more species. Of these the most interesting are:—*Gymnomitrium obtusum*, *Radula aquilegia*, *Lejeunia*, *Mackaii*, and *ovata*. A description was then given of the most interesting genera and species, and their life history and structure explained by the aid of some coloured diagrams, which had been prepared to illustrate the paper. The frondose section, containing the liverworts and crystalworts, have no distinct stem and leaves, but a frond or thallus, like the lichens. The crystalworts mostly grow on fallow ground and damp clay banks, and are lovely little objects, not more than a quarter of an inch across, especially the common *Riccia glauca*, when the sun is shining on it, and it glitters like a miniature ice plant. One or two of them are to be found floating like the duckweeds on still ditches and ponds. Everyone must be well acquainted with the common liverwort, *Marchantia polymorpha*, which may be found creeping over the pots in greenhouses, on damp banks, garden walks, and courtyards. It holds firmly the doctrine of "fixity of tenure," and, moreover, believes that it has a "natural right" to creep over and occupy every damp pot in the greenhouse, with or without the leave of the present occupier. The fruit is borne on the top of stalked receptacles, which may be seen springing up out of the fronds in the month of July. But neither hepaticae nor mosses are dependent upon any single means for the increase of their species. They usually grow in tufts or colonies, containing many individuals, and cover over a large extent of ground in a short time. Provision has been made in several ways to supply this constant demand for new individuals. The old stem or frond may die in the centre, and the outside branches become new plants. Sometimes cells simply break off from the margins of the leaves of the mother plant, and found new colonies. Sometimes a whole leaf or set of leaves will do the same. Sometimes, when the plant has

been withered and killed by the scorching heat of summer, the root hairs still retain their vitality, and with the return of autumn moisture begin to develop new plants, just as if nothing extraordinary had happened. But in Marchantia, besides the spores, there is yet another mode of increase. Tiny, green-fringed baskets are developed on the surface of the fronds. In these leaf-hairs spring up, and gradually develop into round flat gemmæ or buds, which are packed in rows in the baskets like bakers' cakes ; when ripe they fall out and give rise to new plants. An account was then given of the foliose section, containing most of the scale mosses, so called because they have no true leaves, but only scales or bracts. The loveliest of all these, *Pleurozia cochleariforme*, of a brilliant rosy purple, grows near Hilltown, and was illustrated by a coloured diagram. Another diagram illustrated the structure of the flowers, which are minute bud-like bodies at the ends of the stem or branches, and would escape the notice of a casual observer. The sporangium, or vessel which contains the spores, is extremely interesting. This may be seen by placing one under the microscope and applying a drop of water. Immediately it bursts with violence, and the spores are expelled in a brown cloud ; and this is effected by the aid of a number of little coiled-up springs, which have been lying hidden in the vessel biding their time. It then presents a wonderful sight, and is all in motion, like a basket of eels. The same mechanical principle of the watch-spring has been employed by the Great Machinist to protect the little vorticellas from danger—a beautiful family of infusoria which may be found in any fresh-water pond. Have we not in these "elaters" a striking instance of design ? We have traced their gradual development, and seen how the tiny spirals were formed by the gradual thickening of portions of the inner walls of the cells ; but we cannot believe that they developed themselves. Although some scientists are beginning to talk of the sagacity and morality of little bits of protoplasm, we cannot believe that the complicated plan of this wonderful fruit vessel was formed in the brain of that little cell. Nay, there must have been a mind behind it. It could not have first laid down

and then carried out that complex plan. The most sagacious of the lower animals have never been able to lay down and work out the plan of a watch, much less could a tiny cell of protoplasm. Surely there must have been a watchmaker who planned and developed these little springs, and timed them to commence to go just at the proper moment to carry out the purpose of their existence and scatter the spores far and wide to the winds. And we prefer to call this Artificer, this Mind, that is hidden behind the organism, God, rather than "nature" or "life," or the "laws of nature," because it is more in accordance with true science so to do, for these terms represent mere abstractions of the mind that men use to cloak their ignorance.

The paper was illustrated by a series of dried specimens and by drawings. An interesting discussion took place on the subject treated of in the paper.

Mr. Joseph Wright, F.G.S., exhibited some specimens of Cretaceous Foraminifera from Keady Hill, County Derry, a locality exceedingly rich in these forms. These species were additional to those already published as occurring in the chalk of Ireland, and are of great interest. The following is a list of the names of those already identified :—*Thuramмina papillata*, *Lagena globosa*, *Glaudulina lævigata*, *Rhabdogonium tricarinatum*, *Polymorphina cylindrica*, *P. gibba*, *Orbulina universa*, *Pullenia sphæroides*, and *Gaudryina*, new species. This latter is a very beautiful form, in appearance somewhat resembling *Textularia crispata* figured in the Challenger Report on Foraminifera.

The paper was discussed at some length, after which Mr. Wright briefly replied. The Secretary announced that the business of the next meeting would be studies under the microscope. The meeting then concluded.

The fifth meeting for the Session was held in the Museum, College Square North, on Tuesday evening, 17th March—Mr. Mann Harbison in the chair. The business of the evening was an entire departure from the ordinary routine of papers and

lectures, being devoted to the exhibition of microscopic objects, and the methods of preparing such. The members possessing instruments mustered in considerable force. Twelve microscopes, including several of the most perfect and powerful made, with their elaborate appliances, lamps, &c., were during the evening kept in full operation, and the rarity and interest of the objects exhibited were above anything of a similar nature perhaps ever before brought forward at any meeting in Belfast. The general attendance of members was good, and the Society's efforts seemed to be highly appreciated. The following is a summary of the principal exhibits :—

The Rev. H. W. Lett, M.A., T.C.D., illustrated the fructification of mosses, a department of Botany to which he has given special attention.

Mr. Wm. Gray, M.R.I.A., exhibited a variety of microscopic preparations illustrating the fructification of ferns, stoneworts, Equisetaceæ, or horsetails, and marine algae, or seaweeds. He also exhibited some glass models of sponge spiculæ. The latter were made by Messrs. Wood, Castle Place, and were remarkably effective and instructive representations of these varied forms.

Dr. S. M. Malcomson gave a demonstration on cutting, staining, and mounting sections of animal and vegetable tissues. The following is the process applied to the first specimen taken up :—Having selected a piece of the kidney of a sheep, the blood vessels of which had previously been filled with coloured gelatine to show their distribution, he placed it in gum mucilage on the freezing plate of a Cathcart's microtome, the ether spray of which being then brought into action, the whole was completely frozen in a few minutes, and was then easily cut into excessively thin slices by means of a very sharp knife. These sections, after being floated in water, were immersed in a staining fluid, so as to differentiate the elements of the tissue, and, after being passed through alcohol and oil of cloves, were placed in a drop of Canada balsam on a glass slip, covered with a thin glass circle, and finished in the usual manner by running a ring of cement round the cover. He then went through a somewhat similar process with a vegetable structure.

Mr. Andrew, L.D.S.Eng., demonstrated the preparing and mounting of hard substances, such as teeth, bones, and rocks. Taking a human tooth, he cut it into slices about one-sixteenth of an inch thick by means of a fine spring saw. These he further reduced by rubbing on a fine hone, kept wet with plenty of water, until they were sufficiently thin, examining them frequently by means of the microscope towards the end of the process, to avoid grinding them too much. A piece of bone was treated in a similar manner. Thin chips of Carboniferous limestone and some fossil teeth (*Psammodus porosus*) were used to illustrate the preparation of geological specimens. These were first ground flat on one side, and polished on a very fine hone. The flat surface was then cemented to a glass slip with gum shellac, after which the other side of the piece was rubbed down until the section became thin enough to show the structure. The slip with the section on it was then placed in alcohol, which dissolved the shellac and allowed the section to float off. They were then mounted in Canada balsam in the same way as the soft structures before described. The entire processes of both operators were closely watched by as many as could conveniently get within view, and the admirably-finished slides testified to their ability and manipulative skill.

Mr. Charles Elcock exhibited specimens of several new and undescribed Foraminifera obtained by him from various "Challenger" dredgings. He also exhibited specimens of *Technitella legumen*, which he found in abundance in a gathering from the Irish Sea. A very interesting series of specimens of three species of *Carpenteria*, and a large and beautiful *Frondicularia* (not described in the "Challenger" Report), also several very fine recent *Polycystinæ*, were among the rarities exhibited. Some fossil Foraminifera new to the chalk at Magheramorne, as *Thurammina*, *Hormesina*, *Orbulina*, *Globigerina æquilateralis*, &c., were also shown.

Mr. Joseph Wright, F.G.S., exhibited some fossil Foraminifera, which had been found in chalk powder (in flint) at Keady Hill, County Derry. These were to illustrate a communication given by him at the last meeting of the Club, on Foraminifera

from this locality, which were new to the Irish cretaceous rocks. He also exhibited some others which had been since found by him, and which are also new to Ireland—viz., *Cristellaria crepidula*, *Verneuilina spinulosa*, and *Globigerina æquilateralis*. This last form was also found by Mr. Elcock in material from other Irish localities. A curious dimorphous form of *Textularia globulosa* was also shown, in which the later chambers became wild growing and spreading.

Mr. D. M'Kee exhibited twenty-five slides illustrative of micro-geology ; also a number of agates, &c., in the rough and polished state.

Mr. W. A. Firth showed some Diatomaceæ from West Indian dredgings, also examples from Barbadoes chalks. These included some of the rarest species of this beautiful and interesting class of objects.

Dr. Whitla contributed preparations of several disease germs, among which were the cholera microbe and bacilli of typhoid fever. It need scarcely be said that these dangerous spores or germs were dead, and safely sealed up on the slides. They were shown by Mr. Isaac Ward, under $\frac{1}{8}$ and $\frac{1}{10}$ objectives, and still appeared very minute, although magnified to almost 1,000 diameters.

Mr. Charles Bulla exhibited an extensive series of fossil teeth, principally from the Armagh limestone, and their structure was shown under the microscope by a magnificent set of sectional slices prepared by Mr. Andrew in the manner before described.

The Belfast Water Commissioners kindly lent their powerful microscope, and Mr. M'Chesney showed on it a general collection in various departments of natural history. The Club's albums were on the table during the meeting, and were well examined.

Mr. Richard Niven, of Lisburn, contributed a valuable series of above forty Indian ink drawings of ancient buildings and antiquities in the North of Ireland, which he generously presented to the Club as an addition to the sketch album.

At nine o'clock a new member was elected, and several announcements were made ; but it was almost ten o'clock

before the audience seemed to be satisfied with their examination of the apparently inexhaustible stock of the specimens in the room.

The twenty-second Annual Meeting of the Society was held in the Museum, on Tuesday, 29th April—Mr. Wm. Gray, M.R.I.A., in the chair. The formal business of the evening, as announced by programme, was to hear the reports of the Secretaries and Treasurer for the past year; but, as on several similar occasions, a short communication of scientific interest that had come under recent notice was brought forward by a member. This evening it was a note by Rev. H. W. Lett, M.A., T.C.D., on a remarkable and interesting discovery of antlers of red deer found during excavations at Mr. Waddell's lime quarries near Maralin. The workmen were stripping some of the chalk rock, and while removing the overlying clay they came upon a deep and extensive bed or layer of broken and gravelly chalk, in which, at a depth of six or seven feet from the surface, were found half a cart-load of deer's horns. They were lying confusedly, and not far from each other. It was observed that none were discovered in the fine boulder clay. The horns are greatly decayed, and when taken out were quite soft and fragile; some of the tines were perfect, and measured ten inches in length; most of them were of full-grown animals, while a few were of a smaller size. Fully a third of them had a portion of the skull attached, indicating that they had not been shed in the ordinary way, but that their owners had been killed by primeval man for food, or by some other animals, close upon, if not previous to, the great ice-age.

The labourers noticed that no teeth or other bones were found. The escarpment shows that the deposit which contains these sub-fossil remains is stratified, indicating its having been laid down by water, and that it is undisturbed; while the position is far from any stream, or where there could have been a river or lake, being on the side of a hill more than a hundred feet above the bed of the Lagan. The exact spot is close to, and

between the pre-historic cemetery, where many funereal urns have been found in position, and a large rath or fort that was levelled within the present century. It is believed that further explorations will bring to light additional traces that would be valuable to the archæologist and naturalist. The specimens exhibited were afterwards presented to the museum of the Natural History and Philosophical Society by the reader, on behalf of Mr. Waddell.

Several members spoke of the great importance of the discovery, and the Chairman stated that he had a short time since discovered somewhat similar remains near Ballyrudder—the locality where the mammoth's tooth, in the possession of Canon Grainger, is said to have been found.

The Secretaries were next called upon, and read their Report for the past year, which—though reviewing the work of a year of quiet progress, unmarked by any feature calling for special notice—was a very satisfactory one.*

The election of officers for the ensuing year was next proceeded with. The Rev. Canon Grainger, D.D., M.R.I.A., &c., was elected president, and Mr. Hugh Robinson vice-president, amid applause. It is specially worthy of note that both these gentlemen have been long and intimately connected with the Club, Dr. Grainger having been the first chairman of committee in its infancy, before it felt strength sufficient to aspire to a president; and Mr. Hugh Robinson was one of the few founders of the Club, and subsequently, for upwards of ten years, one of its active secretaries, and to his untiring exertions during that period is due much of the healthy vigour which the Club now enjoys. After the re-election of the treasurer and secretaries, the committee, with some necessary change, was elected; and the meeting resolved itself into one of general discussion on suggestions calculated to advance its prosperity, the summer programme forming a prominent part. A strong wish was revived by some of the members that the new committee should organise a dredging excursion down the Lough, engag-

* This report appears *in extenso* in its proper order in the beginning of this part of the proceedings.

ing a steamer or other suitable craft for the purpose. Those experienced in such methods of investigation saw many difficulties in carrying out such an expedition, but it was thought not beyond the powers of a committee to overcome them, and thus add new and attractive fields to the area of research.

In consideration of the almost unanimous desire of the meeting being in favour of an attempt to organise a dredging excursion, Mr. J. J. Andrew, L.D.S., proposed that the sum of £5 be granted from the funds of the Club towards meeting the expenses of such. The motion was seconded and passed.

A circular issued by the British Association for the Advancement of Science, directing attention to advantages gained by affiliation with that Society as a Corresponding Society, having been read, a resolution proposed by Rev. H. W. Lett, M.A., T.C.D., was seconded and passed, to the effect that the Club request to be placed on the list of such Corresponding Societies of the Association.

METEOROLOGICAL SUMMARY FOR 1885.

To the kindness of LANCELOT TURTLE, Esq., J.P., Aghalee, we are again indebted for the following exhaustive tables, giving a summary of meteorological phenomena for the months of November and December, 1884, omitted from last year's Proceedings, and for the full summary for 1885, and accompanying monthly notes.

The observatory at which the records are made is situate at Aghalee, in the extreme southern point of the County of Antrim, at an elevation of 130 feet above sea-level. The country to the west is flat, and very little above the level of Lough Neagh, which is $2\frac{1}{2}$ miles distant in that direction, and to other points the country is gently undulating and well wooded. The nearest mountains are those surrounding Belfast, distant about 12 miles east, while the Tyrone Mountains are about 25 miles west. The nearest point of sea is the upper end of Belfast Lough, while the open sea may be said to be about 20 miles east of the observatory.

REVIEW OF THE WEATHER.

METEOROLOGICAL Observations for the year 1885, taken at Aghalee, County Antrim.
Latitude, 54° 31′ 15″ N.; Longitude, 5° 16′ 0″ W.

1885.	BAROMETER 130 Feet above Sea Level. Corrected and Reduced to 32 degrees Fahrenheit and mean Sea Level.				SELF-REGISTERING THERMOMETERS in a "Stevenson" Stand.							Nights below 32 Deg. on the grass.	Maximum Black Bulb in vacuo, 4 feet above grass.	Mean Amount of Solar Radiation.	HYGROMETER at 9 a.m.	
	Max.	Min.	Mean.	Range.	Highest of the Month.	Lowest of the Month.	Mean Maximum.	Mean Minimum.	Mean Temperature of the Month.	Greatest daily Range.	Monthly Range.				Mean of dry Bulb.	Mean of wet Bulb
	Inches.	Inches.	Inches.	Inches.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.	Degree.					
January.....	30·347	28·402	29·823	1·945	54	24	43·00	35·00	39·06	18	30	12	85	18·26	40·2	37·8
February.....	30·155	28·745	29·509	1.410	57	23	46·36	34·82	40·60	17	34	13	100	30·54	41·8	39·8
March	30·593	29·253	30·052	1·340	55	24	47·61	32·29	39·95	28	32	18	108	41·40	41·0	38·6
April.....	30·291	29·855	29·742	0·436	66	29	54·45	38·76	46·60	29	37	7	120	49·38	42·7	44·4
May.....	30·172	29·206	29·502	0·966	66	30	57·06	39·00	48·03	27	36	4	124	57·34	49·2	46·0
June	30·362	29·556	30·035	0·806	82	35	66·53	46·46	56·50	35	47	1	136	52·73	56·1	52·2
July	30·382	29·676	30·124	0·706	82	40	70·58	51·00	60·77	34	42	0	135	50·82	60·0	56·0
August.....	30·270	29·256	30·261	1·014	81	39	65·29	49·58	57·43	32	42	0	130	39·74	57·5	53·7
September...	30·191	29·110	29·771	1·081	67	30	59·90	45·83	52·86	25	37	2	125	46·23	53·3	50·2
October.....	30·316	29·033	29·852	1·283	56	31	51·16	39·06	45·11	18	25	3	110	37·44	46·0	43·4
November....	30·323	28·744	29·810	1·579	59	23	48·23	38·03	43·13	20	36	5	90	19·93	44·0	41·8
December...	30·625	29·019	30·133	1·606	61	19	44·39	35·32	39·86	19	42	11	90	16·67	40·0	39·0
Totals.....	364·027	349·855	358·614	14·172	786	347	654·56	485·25	569·90	302	440	76	1353	460·48	571·8	542·9
Means	30·335	29·154	29·884	1·181	65·5	28·9	54·54	40·43	47·49	25·2	36·6	6·3	112·75	38·3	47·6	45·2
1884.																
November...	30·680	29·271	30.090	1·409	55	26	46·23	36·90	41·56	20	29	9	95	25·63	42·4	40·3
December...	30·474	28·917	29·725	1·557	54	22	41·87	33·77	37·82	17	32	13	76	18·11	39·8	34·2

1885.	Dew Point.	Comparative humidity Saturation—100—	Elastic Force of Vapour.	Mean Amount of Ozone.	WIND. Number of Days on which the Wind blew from the following points at 9 a.m.									RAINFALL. Gauge—Diameter of Receiver, 5in.; height above the ground, 1 foot; height above sea, 105 feet.			
					N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Total depth in inches.	Greatest fall in 24 hours. Inches.	Greatest fall in 24 hours. Date.	Number of days rain.
			Inches.														
January.....	34·7	85	0·200	5·7	2	2	5	5	5	2	5	0	5	1·75	0·52	31st	15
February.....	37·4	100	0·224	6·3	0	0	0	2	6	5	10	2	3	4·17	0·80	21st	18
March.....	35·6	81	0·208	7·0	9	0	2	3	4	3	3	5	2	1·78	0·54	28th	12
April.....	41·3	81	0·260	8·5	3	3	5	2	8	3	2	2	2	2·17	0·58	24th	13
May.....	42·6	77	0·273	9·0	4	2	1	1	5	2	5	7	4	1·96	0·28	1st	19
June.....	48·5	76	0·345	8·6	6	1	2	1	2	3	3	8	4	0·55	0·16	23rd	6
July.....	52·5	76	0·395	8·2	2	0	1	3	2	3	10	3	7	2·29	0·46	17th	13
August.....	50·2	76	0·364	8·1	4	0	7	2	3	1	3	4	7	1·64	0·55	5th	11
September...	47·1	80	0·323	7·8	2	0	1	2	5	7	9	2	2	4·93	0·75	24th	22
October.....	40·3	83	0·250	7·3	9	2	2	0	2	2	4	8	2	2·22	0·33	25th	18
November...	39·2	83	0·240	7·0	1	0	5	9	5	1	6	1	2	1·85	0·54	26th	15
December....	36·7	85	0·217	7·0	2	1	2	0	4	2	9	2	9	1·00	0·27	3rd	10
Totals.....	506·1	983	3·299	90·5	44	11	33	30	51	34	69	44	49	26·31			172
Means.....	42·2	82	0·275	7·5	{9	1	6	7	1	2	14	9		Direction of Wind on calm days.			
1884.																	
November...	37·7	84	0·227	7·0	5	0	0	2	4	2	8	5	4	2·48	0·50	12th	14
December....	27·0	60	0·147	6·2	1	3	2	2	2	4	9	4	4	3·37	0·58	12th	17

Review of the Weather—*Continued.*

Comparison of Annual Temperatures.

	Highest Degrees.		Lowest Degrees.		Mean Temperature Degrees.
1869	82 on the	17th July	15 on the	28th Dec.	48·80
1870	86 „	10th Aug.	5 „	24th Dec.	48·68
1871	80 „	8th Aug.	19 „	15th Dec.	48·98
1872	77 „	18th July	23 „	30th Dec.	49·05
1873	81 „	22nd July	15 „	24th Feb.	48·52
1874	84 „	18th July	20 „	17th Dec.	49·31
1875	77 „	29th July	22 „	9th Dec.	49·43
1876	94 „	16th July	20 „	20th Feb.	48·84
1877	79 „	20th June	25 „	19th Mar.	48·94
1878	84 „	22nd July	10 „	25th Dec.	48·54
1879	81 „	11th Aug.	14 „	12th Jan.	45·51
1880	83 „	12th Aug.	17 „	21st Dec.	48·82
1881	83 „	31st May	4 „	22nd Jan.	47·28
1882	85 „	10th Aug.	11 „	14th Dec.	48·67
1883	75 „	24th Aug.	20 „	15th Nov.	48·00
1884	84 „	28th June	22 „	20th Dec.	49·06
1885	82 „	30th July	19 „	11th Dec.	47·49
	1397		281		823·92
Mean	82·18		16·53		48·48

Comparison of Annual Rainfall.

	Inches.	No. of Days Rain.		Inches.	No. of Days Rain.
1869	28·82	181	1880	30·11	150
1870	28·86	170	1881	36·49	201
1871	30·18	176	1882	39·59	219
1872	47·09	222	1883	31·92	176
1873	31·94	178	1884	32·51	195
1874	30·03	170	1885	26·31	172
1875	33·63	172			
1876	38·83	174		573·11	3142
1877	41·68	229			
1878	30·02	175	Mean	33·71	185
1879	35·60	182			

Lancelot Turtle.

MONTHLY NOTES.

JANUARY was slightly above the average for warmth. Frosts were short-lived, and never severe; the prevailing winds easterly and southerly; a sunless month, with rainfall and force of wind below the average.

FEBRUARY.—Frosts were frequent, but of short duration. Rainfall 1·72 inch above the 16 years' average, and mean temperature 0·5 degrees below the average of 16 years. A severe equatorial gale on the 21st and morning of the 22nd doing a considerable amount of damage.

MARCH was a cold dry month, with but little spring weather in it, yet a good seed-time. Rainfall and temperature below the average; prevailing winds N. and N.W.; aurora on the 6th and 15th.

APRIL.—There were ten days of spring warmth extending from the 17th to the 26th. At other times cold E. and N. winds prevailed; mean temperature 0·72 deg. below the average; and rainfall 0·21 in. above the average. Hawthorn bursting into leaf on the 14th, chestnut on the 19th, and beech on the 23rd. This was 8 to 10 days later than the previous year. Swallows here on the 19th, landrail heard on the 23rd, and the cuckoo on the 26th.

MAY.—Lower temperature prevailed from the 6th to the 10th, with frost at night, injuring the abundant fruit blossom of the cherry and damson. On the 24th, there was an increase of temperature which continued during the remaining 7 days. The month on the whole was 3·60 degrees below the average, and minus its mean more than any month of the year. Cold, dry, and ungenial.

JUNE copied some of the ungenial features of May, but with more sunshine. It was 1·02 degree below the average warmth of the month. When sunshine came, it was dry and scorching, and serious injury was done to the turnip crop. A month of drought, yet cold for June, with the springs considerably lower than is usual at this time of the year. Cuckoo last heard on the 27th.

JULY was the only summer month of which 1885 could boast—warm, bright, and beautiful, yet the mean was very little above the average warmth. The gauge of rainfall was again less than the mean, and was distributed by very moderate falls over a period of 13 days.

AUGUST.—Polar currents continued from the 2nd to the 15th, almost without intermission, reducing the temperature considerably below the standard; but the remainder of the month, alternating with the equatorial element, brought more heat. Excepting the August of 1881, this August had the lowest mean temperature of any for at least 17 years.

September was wet and cold. At the close of the month, there came two days of sharp frost, cutting off dahlias, and other late annuals. Prevailing winds S.W. and W.; average force 1, or 10 miles per hour velocity; mean temperature 2·25 deg. below the average; and rainfall 1½ inch in excess of the mean. The wettest month in the whole year.

October.—Temperature again below the average; rainfall less than the mean; cold N. and N.W. winds, frequent, but very little frost.

November was above the average temperature, cloudy, and little sunshine. The frosts were few, and of short continuance. There were three periods of unseasonable warmth; once the thermometer rose to 59, which was 10 degrees above the mean for that day; and rainfall 1·20 inch below the average. Swallows last seen on the 7th. Very remarkable and almost unforetold meteoric showers on the 27th.

December.—Temperature above the average 2·61 degrees; eleven nights frost; rainfall 2 inches below the mean. On the 16th, the shaded thermometer rose to 61, a degree of warmth never before recorded for December in Aghalee, and was 14 degrees above the mean for that particular day; monthly range of temperature 42 deg.

Mean temperature of the whole year 1·59 deg. lower than 1884, and 1·04 deg. minus the average mean of 16 years; rainfall 6·20 inches, or 626 tons to the statute acre less than 1884, with 23 less wet days, and 7·91 inches, or about 800 tons to the acre minus the mean; and rainy days 14 below the average.

Lancelot Turtle.

RULES

OF THE

Belfast Naturalists' Field Club.

That the Society be called "The Belfast Naturalists' Field Club."

II.

That the objects of the Society be the practical study of Natural Science and Archaeology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club, and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and, on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the Votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading Papers; such Papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April, inclusive.

VIII.

That the Committee shall, if they think it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on Geological or Archæological researches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-Laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursions to be open to all Members, each to have the privilege of introducing two friends.

II. In the absence of the President and the Vice-President, a Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the members present.

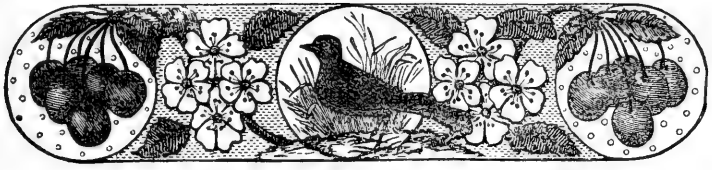
V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

TWENTY-THIRD YEAR.

The Committee offer the following Prizes to be competed for during the Session ending March 31st, 1886 :—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species,	...	0	10	0
III.	Best Collection of Mosses,	... ...	0	10	0
IV.	,, ,,	Lichens, ...	0	10	0
V.	,, ,,	Seaweeds, ...	0	10	0
VI.	,, ,,	Ferns, Equiseta, and Lycopods,	0	10	0
VII.	,, ,,	Tertiary and Post Tertiary Fossils, ...	0	10	0
VIII.	,, ,,	Cretaceous Fossils, ...	0	10	0
IX.	,, ,,	Liassic Fossils, ...	0	10	0
X.	,, ,,	Permian and Carboniferous Fossils, ...	0	10	0
XI.	,, ,,	Older Palæozoic Fossils, ...	0	10	0
XII.	,, ,,	Marine Shells, ...	0	10	0
XIII.	,, ,,	Land and Freshwater Shells,	0	10	0
XIV.	,, ,,	Lepidoptera, ...	0	10	0
XV.	,, ,,	Hymenoptera, ...	0	10	0

XVI. Best Collection of Coleoptera, ... £0 10 0
XVII. ,, ,, Crustacea and Echinodermata, 0 10 0
XVIII. Best set of 25 Microscopic Slides 0 10 0
XIX. 6 Best Field Sketches appertaining to Geology, Archæology, or Zoology 0 10 0
XX. Best Collection of Fungi; names of species not necessary. Collectors may send (post-paid, from time to time during the season) their specimens to Rev. H. W. Lett, M.A., T.C.D., Aghaderg Glebe, Loughbrickland, who will record them to their credit, ... 0 10 0
XXI. Best Collection of Fossil Sponges, ... 0 10 0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXII. The President offers a Prize of £1 1s. for the best set of three or more original sketches, to be placed in the album of the Club. These may be executed in pen and ink, or water colour, and must illustrate one or more ancient monuments somewhere in Ireland. In determining the relative merits of the sketches accuracy in representing the subjects and their details will have chief place.

XXIII. Mr. William Swanston, F.G.S., offers a Prize of 10s. 6d. for the best Two Studies, illustrative of Geology, contributed to the Club's Album. The subjects must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 × 9 inches.

XXIV. A Prize of 10s., given by the late Mr. J. W. Murphy, for the best collection of Recent Sponges, the conditions being the same as those for Prizes 1 to 21.

XXV. Lieut.-General Smythe, R.A., F.R.S., M.R.I.A., &c., offers a Prize of £1 1s. for the best list of names of places in the Counties of Antrim and Down (not hitherto published) giving their Irish meaning and derivation, on the plan of Dr. Joyce's "Irish Names of Places."

XXVI. Dr. J. W. Beck offers a Prize of £1 for the best Herbarium of Flowering Plants collected during the season at the various Excursions of the Club, the competition of this Prize to be limited to members or visitors at the Excursions under the age of 21.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

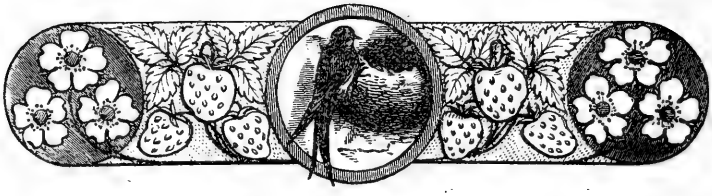
No Competitor to be awarded the same prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All collections to be made personally during the Session in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.



NOTICE.

EXCHANGES OF PROCEEDINGS.

The Committee of the Club acknowledges with thanks the receipt of the following publications, which have been received during the past year from the various societies and institutions :—

Bath Natural History and Antiquarian Field Club.
Proceedings. Vol. V., No. 4.

Belfast Natural History and Philosophical Society.
Proceedings, 1884-85.

Berwickshire Naturalists' Club.
Proceedings. Vol. X., No. 3.

Bristol—Naturalists' Society of.
Proceedings. Vol. IV., Part 3.

Cardiff Naturalists' Society.
Report and Transactions. Vol. VI., 1884.

Dublin—Royal Irish Academy.
Transactions—Science. Vol. XXVIII., Parts 17, 18, 19, and 20.
Proceedings—Science. Series II., Vol. IV., Part 3.
,, Polite Literature and Antiquities. Series II., Vol. II., Pt. 6

Dublin—Royal Geological Society of Ireland.
Journal. Vol. VI., Part 3, new series.

Dulwich College Science Society.
Annual Report 1884-85.

Eastbourne Natural History Society.
Transactions, new series. Vol. I., Parts 4, 5, 6, 7, and 8.

Ealing Microscopical and Natural History Society.
Annual Report, 1885.

Edinburgh—Geological Society of.
Transactions. Vol. IV., Part 3.

Edinburgh Botanical Society.
Transactions and Proceedings. Vol. XVI., Parts 1 and 2.

Glasgow—Natural History Society of.
Proceedings and Transactions. Vol. V., Part 3; and N.S., Vol. I., Part 1.

Hertfordshire Natural History Society and Field Club.
Transactions. Vol. III., Parts 3, 4, 5, and 6.

Huddersfield Naturalists' Society.
Transactions. Vol. II.

Leeds Philosophical and Literary Society.
Annual Report, 1884-85.

Liverpool Naturalists' Field Club.
Proceedings, 1884-85.

Liverpool Geological Society.
Proceedings. Vol. V., Part 1.

Liverpool Geological Association.
Transactions. Vol. IV.

Liverpool Literary and Philosophical Society.
Proceedings. Vol. XXXVIII.

Liverpool Science Students' Association.
Annual Report, 1883-84 and 1884-85.

London Geologists' Association.
Proceedings. Vol. VIII., Nos. 7 and 8, and Vol. IX., Nos. 1, 2, and 3.

London Postal Microscopical Society.
Quarterly Journal. Vol. IV., Part 13. Rules, &c.

Manchester Scientific Students' Association.
Report and Proceedings, 1884.

Penzance Natural History and Antiquarian Society.
Report and Transactions, 1884-85.

Plymouth Institution and Devon and Cornwall Nat. Hist. Soc.
Transactions and Annual Report. Vol. IX., Part 1.

St. John's, N.B.—Natural History Society.
Bulletin. No. 4.

Toronto—Canadian Institute.
Proceedings. Vol. VIII., Fasciculus, Nos. 1 and 3; third series.

U.S.A.—Boston Society of Natural History.
Proceedings. Vol. XXII., Parts 2 and 3. Vol. XXIII., Part 1.

,, Essex Institute. Salem, Mass.
Bulletin. Vols. XV. and XVI.

,, New York Microscopical Society.
Journal. Vol. I., Parts 2, 3, 4, 5, 6, and 7.

,, New York—American Museum of Natural History.
Annual Report, &c., 1884-85; and Bulletin, Vol. I., No. 6.

,, Minnesota—Natural History and Geological Survey of.
Annual Reports, 1st, 4th, 10th, 11th, and 12th.

,, Philadelphia Academy of Natural Sciences.
Proceedings. Parts 1, 2, 3, and 1885, Part 2.

,, Salem—Peabody Academy of Science.
Report of Trustees, 1874 to 1884.

,, American Association for the Advancement of Science.
Proceedings of Thirty-second Meeting, 1883.

,, Washington—United States Geological Survey. J. W. Powell, Director.
Third Annual Report, 1881-82.

Wiltshire Archæological and Natural History Magazine.
Vol. XXII., No. 65.

Warwickshire Naturalists' and Archæologists' Field Club.
Proceedings, 1884.

The following were received from the Authors:—

By Wm. Topley, Esq., F.G.S.
The National Geological Surveys of Europe.

By A. Ramsey, Esq., F.G.S.
The Garner: A Science Recorder's Journal. Vol. I., No. 1.

By Joseph Ewart, M.D., F.R.C.P., Brighton.
Forestry in India, and three other Papers.

BELFAST NATURALISTS' FIELD CLUB.

TWENTY-THIRD YEAR, 1885-86.

LIST OF OFFICERS AND MEMBERS.

President:

REV. CANON GRAINGER, D.D., M.R.I.A., F.G.S.I.

Vice-President:

HUGH ROBINSON.

Treasurer:

JOSEPH WRIGHT, F.G.S.

Secretaries:

WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

CHARLES BULLA.
W. A. FIRTH.
WILLIAM GRAY, M.R.I.A.
REV. H. W. LETT, M.A., T.C.D.
S. M. MALCOMSON, M.D.
GEORGE O'BRIEN.
DANIEL M'KEE.
WM. H. PATTERSON, M.R.I.A.
S. A. STEWART, F.B.S.Edin.
JOHN VINYCOMB.

Members.

Any changes in the Addresses of Members should be notified to the Secretaries.

Miss Alder, Kinnegar, Holywood.
Edward Allworthy, Langford Villas.
John Anderson, J.P., F.G.S., Hillbrook, Holywood.
Robert Anderson, Meadowlands, Balmoral.
Rev. John Andrew, Belgravia.
J. J. Andrew, L.D.S., R C.S.Eng., Belgravia, Lisburn Road.
Samuel Andrews, J.P., Seaview.
Mrs. Andrews, Seaview.

Rev. G. W. Bannister, The Manse, Moneyrea.
James M. Barkley, Mountpottinger.
Robert Barklie, F.C.S., Moffatt's Terrace, Holywood.
James Barr, Sandringham.
William Batt, Ormeau Road.
J. W. Beck, M.D., Claremont Ter.
Miss Emma Beck, Claremont Ter.
Geo. R. Begley, Wolfhill, Ligoniel.
E. H. Bell, Knockdara, Strandtown.
George E. Bell, Wellington Park.
James Best, Great Victoria Street.
Francis Joseph Bigger, Ardville.
Edward Bingham, Ponsonby Av.
W. J. Boucher, Mountpottinger.
Davys Bowman, University Street.
Hugh B. Brandon, Oceanic Avenue.
Chas. H. Brett, Gretton Villa South, Malone Road.
James Berkley Bristow, St. James's Parsonage, Antrim Road.
W. T. Brand, Florida, Killinchy.
John Browne, J P., Ravenhill.
John Browne, M.R.I.A., Drapersfield, Cookstown.
Thomas Brown, Rosemary Street.
W. W. Brydon, Silverstream House, Greenisland.
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Martello House, Holywood.
W. Campbell, F.P.S., Denmark St.
John Carey, Claremont Street.
Joseph W. Carey, Claremont Street.
Miss Carruthers, Claremont Street.
John Carson, Church Lane.
E. T. Church, Donegall Place.
William Clibborn, Windsor Terrace.
Sir Ed. Coey, J.P., D.L., Merville.
David Corbett, J.P., Hope House, College Park, East.
W. F. C. S. Corry, Chatsworth.
Rev. W. Cotter, D.D., Riversdale Ter.
Alex. Crawford, Sandybank, Malone.
Elisha Crawford, University Road.
James Creeth, Riversdale Terrace, Balmoral.
Robert Culbert, Distillery Street.
Samuel Cunningham, Glencairn.
Francis Curley, Dunedin.
Mrs. Curley, Dunedin.

Rt. Hon. Lord Dufferin and Clandeboye (Hon. Mem.).
John H. Davies, Glenmore, Lisburn.
Henry Davis, Percy Street.
Robert Day, F.S.A., M.R.I.A., Cork.
Ed. O'Rorke Dickey, Castleton Ter.
Rev. John Dickson, Ballycarry.
Wakefield H. Dixon, Dunowen.
George Donaldson, Church Street.
John Donaldson, Eglinton Street.

David Elliott, Albert Bridge Road.
Lavens M. Ewart, Glenbank, Ligoniel

William Faren, Mountcharles.
Stephen Feary, Cameron Street.
W. J. Fennell, Chichester Street.
Godfrey W. Ferguson, Fisherwick Place.
J. H. Ferguson, Langford Villas.
Joseph Firth, Whiterock.
Wm. A. Firth, Springfield Terrace.
Thos J. G. Fleming, Limavady.
T. M. H. Flynn, Sunnyside, Bessbrook
Thomas Fraser, Wellington Park.
John Starkie Gardner, F.G.S., F.L.S, M.G.S., France, Damer Terrace, Chelsea, London (Hon. Mem.).
D. C. Gillespie, Macleary Cottage, Coleraine.

R. M. Gilmore, Coleraine.
W. J. Gilmore, Clanchattan House, Limestone Road.
Wm. Gilmour, Diamond, Coleraine.
D. Corse Glen, F.G.S., Annfield Place, Glasgow.
George J. Glen, Stranmillis Road.
James J. Goskar, Carlisle Circus.
Jas. Gourlay, Derryboy, Killyleagh.
Robert Graham, Ciftonville.
Rev. Canon Grainger, M.A., D.D., M.R.I.A., Broughshane (Cor. Mem.).
Rev. James Graves, M.R.I.A., Inisnaig, Stoneyford, Co. Kilkenny (Cor. Mem.).
Wm. Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
George Greer, Woodville, Lurgan.
Miss Sara T. Greer, Seville Lodge, Strandtown.
Edward Gregg, Claremont Street.
Joseph T. Gumersall, Lisburn.

Rev. S. J. Hackett, M.A., Holywood
W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Rev. T. Hamilton, M.A., Brookvale House, Cliftonville Avenue.
W. J. Hammond, Donegall Street.
Thomas Hampton, Fitzwilliam St.
Ernest Hanford, India Street.
Mann Harbison, Ravenhill Terrace.
W. Harte, C E., Buncrana (Cor. Mem.)
Rev. Canon Hartrick, A.M., Ballynure.
James H. Haslett, J.P., M.P., Princess Gardens.
W. D. Hazleton, Cliftonville.
F. A. Heron, Clermont, Holywood.
Mrs. Heron, Clermont, Holywood.
James Hogg, Woodland Avenue.
J. Sinclair Holden, M.D., F.G.S., Sudbury, Suffolk (Cor. Mem.).
Alex. Hunter, Northern Bank.
Wm. J. Hurst, J.P., Drumaness, Lisburn.

James Imrie, Fitzroy Avenue.
Rev. Richard Irvine, D D., Hampton, Windsor.
W. J. Jackson, Osborne Park.
Hugh Jamison, Duncairn Terrace.
John Jellie, J.P., Farmhill House, Carrickfergus.
James Johnston, West Elmwood.
W. J. Johnston, J.P , Dunesk.

Wm. Kernahan, Antrim Terrace.
George Kidd, Suffolk, Dunmurry.
W. J. Knowles, Ballymena.
Robert A. Kyle, Richmond.

W. W. Lamb, Chichester Avenue.
Prof. Charles Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem.).
F. R. Lepper, Avonmore, Derryvolgie.
Rev. H. W. Lett, M.A., T.C.D., Ahaderg Glebe, Loughbrickland.
F. W. Lockwood, Wellington Park.
James Logan, Donegall Street.
W. B. Lowson, Chichester Park.
Dr. Luther, Chlorine House.

John Mackenzie, Balmoral.
Henry Magee, Eglantine Avenue.
Rev. J. J. Major, Belvoir Hall.
Greer Malcomson, Fitzroy Avenue.
Jas. Malcomson, Rosemount, Knock
Mrs. Malcomson, Rosemount, Knock.
Samuel Murphy Malcomson, M.D., Great Victoria Street.
John Marsh, Glenlyon, Holywood.
Mrs. Marsh, Glenlyon, Holywood.
J. C. Marsh, Castleton Terrace.
Rev. James Martin, Eglintoun.
Mrs. Martin, Eglintoun.
John G. Mathewson, Londonderry.
James Meneely, Donegall Pass.
A. S. Merrick, M.D., Belfast District Asylum.
Seaton F. Milligan, Royal Terrace.
William Milliken, Wilmont Terrace.
John Moore, M.D., Carlisle Terrace.
Thomas Morrison, Donegall Street.
D. Morrow, Church Hill, Holywood.
John Morton, Landscape Terrace.
J. R. T. Mulholland, J.P., Northumberland Street.
James Murdoch, Denmark Street.
Joseph John Murphy, F.G.S., Osborne Park.
Geo. Erskine Murray, Botanic Av.
J. R. Musgrave, J.P., Drumglass.
Arthur Mussen, Rubicon, Lisburn.
Mrs. Mussen, Rubicon, Lisburn.

John M'Alister, Fitzwilliam Street.
J. M'Chesney, Holywood.
Fras. P. M'Clean, Huntly Villas.
H. M'Cleery, Royal Avenue.
James M'Clenahan, Tennant Street.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London, (Cor. Mem.).
Sir Thomas M'Clure, Bart., V.L., Belmont.
W. J. M'Clure, Divis Street.
Thos. J. M'Conkey, York Street.
James M'Connell, St. Helen's.
Hugh M'Elwee, Ponsonby Avenue.
Miss M'Gaw, Thornville, Whiteabbey.
John MacIlwaine, Sydenham.
Mrs. MacIlwaine, Sydenham.
Mrs. M'Ilwrath, Dunluce Street.
Daniel M'Kee, Adela Place.
W. S. M'Kee, Fleetwood Street.
A. MacLaine, J.P., Queen's Elms.
Wm. Macmillan, Parkbrook.
T. J. M'Mahon, Northcote Villa, Knock.
John M'Stay, L.D.S., R.C.S.Eng., King Street.

William Nicholl, Adela Street.
H. Nicholson, Ardsallagh, Windsor.
W. Courtney Nesbitt, Kinnaird Ter.
Rich. Niven, Chrome Hill, Lisburn.

George O'Brien, Botanic Avenue.
Joshua O'Brien, Botanic Avenue.
W. D. O'Brien, Botanic Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
G. M. Ogilvie, Antrim Terrace.
Rev. Jas. O'Laverty, P.P., M.R.I.A., Holywood.
H. O'Neill, M.D., College Sq. East.
James O'Neill, College Sq. East.
Graham L. Owens, Victoria Street.

D. C. Patterson, Cultra.
Robert Patterson, Kilmore, Holywood.
R. Lloyd Patterson, J.P., F.L.S, Croft House, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Strandtown.
George Pelan, Upper Crescent.
W. H. Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, Bonavon, Antrim Road.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
T. W. Pim, The Lodge, Strandtown.
Thomas Polly, Fitzroy Avenue.
W. E. Lloyd Polly, Fitzroy Avenue.
Robert Lloyd Praeger, B.A., The Croft, Holywood.

Jos. Radley, Prospect Hill, Lisburn.
Geo. Raphael, Galgorm, Ballymena.
John Rea, M.D., Great Victoria St.
D. Redmond, Antrim.
Daniel Reid, Portstewart.
Jas. Theodore Richardson, J.P., Glenone, Lisburn.
Richard Riding, Hampton Terrace, Lisburn Road.
Miss Emily J. Robb, Lisnabreeny.
Joseph W. Robb, Crown Terrace.
Rev. George Robinson, Beech Hill House, Armagh.
James Robinson, Richmond Place.
Hugh Robinson, Clive Villas.
Jas. R. Robinson, St. Helen's Ter.
W. A. Robinson, J.P., Culloden House, Cultra.
R. Ross, M.D., Wellington Place.
Mrs. Rowland, University Street.
Robert Russell, Wilmont Terrace.

Thomas Shaw, J.P., Pine Lodge, Sydenham.
Mrs. Shaw, Pine Lodge, Sydenham.
J. Shanks, Ballyfounder, Portaferry
Wm. J. Simpson, George's Terrace.
Edward Smith, Chichester Terrace.
George K. Smith, Meadow Bank, Whitehouse
Wilson Smith, Virginia Street.
Rev. W. S. Smith, The Manse, Antrim.
Rev. George C. Smythe, M.A., Coole Glebe, Carnmoney.
Rev. J. H. Smythe, Fortwilliam.
Lieut.-Gen. Smythe, R.A, F.R.S., Coole Glebe, Carnmoney.
Walter Smyth, Holywood.
Adam Speers, B.Sc., Holywood.
Mrs. White Spunner, Armagh.
Sir N. A. Staples, Bart., Lissan, Dungannon (Life Member).
James Stelfox, Oakleigh, Ormeau Park.
J. M'N. Stevenson, Carrickfergus.

John Stevenson, Linenhall Street.
Richard Stevenson, Ashley Avenue.
S. A. Stewart, F.B.S.Edin., North Street.
Peter Stirling, Queen Street.
R. S. Strafford, Pottinger Terrace.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.
J. H. H. Swiney, C.E., Kenbella Avenue.
Samuel Symington, Ballyoran House.
Richard Glascott W. Symes, B.A., F.G.S., Portrush.

Prof. Ralph Tate, F.G.S., F.L.S., University of Adelaide, South Australia (Hon. Mem.).
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
S. G. Thomas, Limestone Road.
Mrs. Henry Thompson, Crosshill, Windsor.
George Thomson, Falls Road.
Prof. James Thomson, A.M., LL.D., F.R.S., etc., Glasgow (Hon. Mem).
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Portrush.
William J. Trelford, Vicinage Park.
James Turner, Mountain Bush.
Jas. G. Turtle, Cambridge Terrace.

J. W. Valentine, Cromwell Terrace.

John Vinycomb, Mountcharles.

W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.).
Robert Walker, Atlantic Avenue.
Thomas R. Walkington, Laurel Lodge, Sydenham.
George T. Ward, Clonaver.
Isaac W. Ward, Collinview Terrace.
Marcus J. Ward, Royal Ulster Works, Bedford Street.
E. H. Watson, Ardmore, Windsor.
Thomas Watson, Londonderry.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, Clifton Park Avenue.
Robert J. Welch, Lonsdale Street.
Louis Werner, Thorndale Terrace.
T. K. Wheeler, M.D., Clarendon Pl.
Walter L. Wheeler, Lennoxvale.
Robert Whitfield, Kenbella Avenue.
W. Whitla, M.D., College Sq. North.
Jas. Wilson, Old Forge, Dunmurry.
J. Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
John Woodside, Jun., Holywood.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thomas Workman, Craigdarragh.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street.
S. O. Wylie, Clarendon Place.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club,

1885-86.

Series II. Volume II. Part IV.

CONTENTS:

PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES FOR MEMBERS 2/-.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club,

FOR THE

Year ending 31st March, 1886.

(TWENTY-THIRD YEAR.)

SERIES II. VOLUME II. PART VI.

Belfast:
PRINTED FOR THE CLUB,
BY ALEXANDER MAYNE & BOYD, CORPORATION STREET,
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1886.

REPORT

OF THE

BELFAST NATURALISTS' FIELD CLUB,

FOR THE

Year ending 31st March, 1886.

YOUR Committee on again meeting you at the close of another year have the pleasure of reporting a continuance of the prosperity which has marked the Club's history from its commencement.

The Summer Session may be considered to have been a successful one, the usual number of excursions having been held, and the localities selected proved suitable for furthering the Club's aims and objects. It is to be regretted that the unfavourable weather on the occasion of the "long excursion" to the Mourne Mountains prevented the full programme from being carried out, much good work, however, was done on the occasion, as may be seen from the report of the conductor.

The following is the list of excursions for the session.

1. Woodburn ... ... May 16th.
2. Toomebridge ... ... June 13th.
3. Mourne Mountains ... ... July 7th and 8th.

4. Collin Glen ... ... August 8th.
5. Greyabbey ... ... „ 29th.
6. Crossgar, for a fungus foray ... ... September 19th.

The additional excursions announced in summer programme were prevented from taking place.

A Sub-Committee having been appointed at the last Annual Meeting to make arrangements, if found practicable, for carrying out a dredging excursion in the Lough, that excursion took place on June 23rd, and proved a success, 54 members and friends joining; it is very satisfactory to state that only a few shillings of the £5 guaranteed from the funds of the Club were required.

A full report of this, as well as the other excursions, appeared in the local papers, and will be embodied in the Report and Proceedings for the year. Advantage has been taken of the delay in issuing the Proceedings for 1884–5 to include in it a list of the Foraminifera of that cruise, prepared by Mr. Joseph Wright, F.G.S., and also a list of the Ostracoda then obtained by Dr. S. M. Malcomson; both these lists are illustrated with plates, and form valuable contributions to our local natural history.

The Winter Session was opened by a Social Meeting; and in addition, five ordinary meetings were held, at which seven distinct communications were brought forward. The Secretaries also at one of those meetings brought under the notice of the members the fact that an effort was being made to have the old North Gate of Carrickfergus removed. The unanimous feeling of the meeting was that the Club would much regret the removal of such an interesting archæological relic, and the Secretaries were instructed to convey to the Grand Jury of the Town and County of Carrickfergus the sense of the meeting as expressed in the resolution. This was done, and it is gratifying to know that the Gate is for the present safe, but the question of its removal may at any time be revived.

Your Secretaries having learned that the old Cross at Dromore, County Down, which has for a long time remained

in a neglected state, was likely to be removed from its site, on the re-building of the Market House, brought the matter before the same meeting, on which they were instructed to write to the Dromore Town Commissioners expressing a hope that the opportunity would be taken advantage of to have the Cross restored, and erected on a suitable site. Your Secretaries learned in reply that such were the intentions of the Commissioners, and that the question of a proper site was under consideration.

The following is a list of the several communications brought forward during the Winter Session, summaries of which will be embodied in your proceedings :—

27th Oct.	I.	—Social Meeting. Various short communications.
10th Nov.	II.	Presidential Address. Subject, "Extinct Wild Life," by the President, Rev. Canon Grainger, D.D., M.R.I.A. "Notes on Ballywillan Church, Portrush," by Mr. F. W. Lockwood.
15th Dec.	III.	On "Mythical and Fictitious Creatures in Symbolic Art," by Mr. John Vinycomb.
19th Jan.	IV.	"Notes from Lough Sheelin, Co. Cavan," by Mr. R. Ll. Praeger, B.A.
16th Feb.	V.	On "The British Bee," by the Rev. John Andrew. On "The Honey Bee," by Rev. H. W. Lett, M.A., T.C.D.
23rd Mar.	VI.	"A Survey of the Lower Organic World, on a frond of Laminaria," by Mr. W. Gray, M.R.I.A.

The number of members on the roll shows a slight falling off from the previous year, the new members elected scarcely balancing the loss by death and removal, and the non-payment of annual subscription.

Among those removed by death, your Committee have to record with regret the loss which the Club has sustained in the death of the Rev. Canon MacIlwaine, D.D., M.R.I.A., a gentleman who ever took a deep interest in the Club's pursuits, and who was always ready to assist and encourage the younger members in their studies and researches. A resolution was brought forward at one of your meetings expressing the feelings of the Club, copies of which were forwarded to the members of Canon MacIlwaine's family.

Your Committee also regret to have to record the loss the

Club has sustained by the death of Rev. Canon Graves, D.D., M.R.I.A., who was for many years an Honorary Associate of your Club, and whose labours in Early Irish History, and Archæology are so well known and appreciated. Your Committee have also to lament the death of Mr. Henry Knight, who was early connected with your Club, and who, though for several years previous to his death resident in England, never lost his interest in your work.

Your Committee avail themselves of this opportunity of expressing the thanks of the Club to all who in any way contributed to the success or pleasure of the excursions during the past year, and would especially name John Jellie, Esq., J.P., for his kindness and hospitality on the excursion to Woodburn ; and to George Kidd, Esq., on the occasion of the visit to Collin Glen ; to Hugh Montgomery, Esq., D.L., for liberty to visit the grounds and interesting ruins of Grey Abbey, and to Wm. Davison, Esq., J.P., for permission to hold a fungus foray in the wooded grounds of Rademon.

Your Committee would also again express the thanks of the Club to Lancelot Turtle, Esq., J.P., for the very comprehensive summary of meteorological observations and monthly weather notes which form part of your proceedings, and which they are confident will prove useful and interesting to the members.

Your Committee have to apologise for a considerable delay in the issue of the Report and Proceedings for 1884-5, but take this opportunity of pointing out to the members that it includes, in addition to the ordinary contents, a voluminous appendix on four distinct subjects, two of which, as before stated, arise out of the dredging cruise of the Protector—these are by Messrs. Wright and Malcomson ; Mr. Wright also contributes a valuable addition to the list of Cretaceous Microzoa of the North East of Ireland. Mr. S. A. Stewart edits a list of Coleoptera made in Ulster by the late Robert Patterson, Esq., F.R.S., and the Rev. H. W. Lett furnishes a list of Fungi of Antrim and Down. This latter is the most complete list yet made from any Irish locality. It will therefore be evident that this appendix

forms a most important addition to the volume in progress, upon the Fauna and Flora of Ulster.

Your Committee have also to report that they have purchased three photographic albums, which they intend should be devoted to the reception of photographs respectively to illustrate the Natural History, Archæology, and general scenery of Ireland. They have been indebted to several members in past years for contributions of photographs on these subjects, which have hitherto been placed in the general sketch album; these are being transferred to their proper places in the new books, and now that so many members of the Club are engaged in the pursuit of outdoor photography, the Committee earnestly appeal to all the members to assist in making the Club's collection of photographs as complete as any that can be found in the country.

Your Committee takes this opportunity of thanking such kindred societies and public bodies as have continued to exchange Proceedings with your Club; by this means a large addition of valuable literature has during the past year been received.

The following collections were submitted in competition for the Club and special prizes :—

Mr. R. Ll. Praeger, B.A., flowering plants, in competition for Prize 1.

Mr. D. Redmond do. do. do.

Mrs. White Spunner do. do. do.

Mr. J. J. Andrew, L.D.S., R.C.S., Eng., mosses in competition for Prize 3.

Mr. D. M'Kee, carboniferous fossils, in competition for Prize 10.

S. M. Malcomson, M.D., fungi, in competition for Prize 20.

Mr. J. J. Andrew, L.D.S., R.C.S.,Eng., sponges, in competition, for Prize 21.

Mr. Charles Bulla, land and freshwater shells, in competition for Prize 13.

Mr. George J. Glen, microscopic slides, in competition for Prize 18.

Mr. D. M'Kee, microscopic slides, in competition for Prize 18.

Mr. Robert Ll. Praeger, B.A., plants in competition for Special Prize 26.

The following are the awards of the judges appointed to examine the various collections submitted.

We have examined the various sets of botanical specimens, and awarded Prize 1 to Mr. Robert Lloyd Praeger. Mr. Praeger's collection is one of the best ever submitted to the Club; the number of species represented being 475; the specimens beautifully preserved, and well mounted. This series includes many of the rarer plants—one of which, *Epilobium tetragonum*, has only yet been found in two or three places in Ireland. We consider this collection very creditable, and have much pleasure in making the award.

We award Prize No. 2 to Mr. D. Redmond, whose collection represents 257 species, well preserved and excellently mounted. Mr. Redmond deserves great credit for his botanical work of the past season.

A very large collection of flowering plants sent in by Mrs. White Spunner were excluded from the competition, owing to the failure of the collector to conform to the conditions. It is required that all specimens should have been collected during the past year of the Club. We regret that Mrs. Spunner overlooked the rule, as her set of plants is an exceedingly fine one, elegantly preserved, and most attractively mounted.

To Mr. John Andrew we awarded Prize 3. Mr. Andrew has sent in an excellent series of mosses. There are several hundred specimens, representing over 100 species; including several which are esteemed as rare. The plants are displayed in the best manner, and well illustrate this difficult branch of botanical science.

Prize 10 is awarded to D. M'Kee for a fine set of carboniferous fossils. Mr. M'Kee's specimens represented about fifty species, mainly fish remains, from Armagh. There is considerable variety in these specimens, and those who understand the difficulty of getting fossil fish remains will agree that this is a collection of much merit.

Mr. Charles Bulla has sent in a collection of land and fresh-water shells in competition for Prize 13. These specimens are numerous, and include a large number of species. They have not been mounted or displayed to advantage; but, taking it as it stands, we consider it of sufficient merit; and, therefore, award Prize 13 to Mr. Bulla.

Two sets of micro slides were sent in; one each by Mr. Geo. J. Glen and Mr. D. M'Kee, in competition for Prize 18. They both exhibit great persevering skill in the preparation of siliceous rock sections. Strictly speaking, neither of the sets comply with the conditions; but we recommend that the prize be awarded to Mr. Glen, and to record our commendation of Mr. M'Kee's objects.

In competition for Prize 24, Mr. J. J. Andrew sent in a collection of sponges collected on the Club's recent dredging trip. These form an interesting series, but are precluded from receiving the prize, owing to the specimens being unnamed.

Special Prize, offered by Dr. John Beck, for the best herbarium of plants collected at the field meetings of the Club—open only to members or visitors under twenty-one years of age. The judges report as follows:—Mr. R. Lloyd Praeger has sent in a collection of plants which we adjudge to have fulfilled the conditions, and to be in all respects worthy of the prize offered. Mr. Praeger's specimens amount to 250; each one representing a distinct species. These plants were collected on or near the Mourne Mountains, in the two days of the Club's visit in last July. They demonstrate what may be accomplished in a short time by energy and acute observation.

William Gray.
S. A. Stewart.
S. M. Malcolson.

For Prize 20, for the best collection of Fungi, only one competitor sent in specimens. These numbered but 101 species. However, as several of them were rather uncommon, I recommend that the prize be awarded to Dr. S. M. Malcomson.

H. W. Lett.

Dr. Belfast Naturalists' Field Club in Account with Treasurer. Cr.

To Balance from 1884-85	..	..	..	£56	17	8	By Expenses of Social Meeting	£4	17	8
,, Subscriptions—249 at 5/-	..	..	..	62	5	0	,, Printing Annual Report	48	11	2
,, Balance from Dredging Excursion	..	..		4	0	4	,, Advertising, Printing, and Stationery	11	12	7
,, Guide Account ..	..	..	..	0	10	0	,, Loss on Excursions	0	9	9
							,, Delivery of Circulars	1	10	0
							,, Postages	4	5	4
							,, Museum Expenses	8	8	0
							,, Grant for Dredging Excursion	5	0	0
							,, Insurance on Books	0	11	6
							,, Prizes	4	0	0
							,, Balance on hands	37	7	0
			£123	13	0			£123	13	0

Audited and found correct.

JOSEPH WRIGHT, *Treasurer.*
WILLIAM SWANSTON, *Hon. Secretary.*

SUMMER SESSION.

The following Excursions were made during the Summer Session.

On 16th May, to

WOODBURN.

The first excursion of the season took place on Saturday, 16th May, to the Woodburn Glens. This interesting and popular locality would doubtless have drawn a much larger gathering if it had not been for the inclemency of the morning. The small party, however, who had the courage to venture, were rewarded by a brilliant and most enjoyable afternoon. On leaving Trooper's Lane Station they were met by a member of the Club, Mr. John Jellie, J.P., and a few minutes were spent in his residence, Farm Hill, partaking of the generous hospitality of host and hostess. A meeting was then held, the President of the Club, Canon Grainger, D.D., M.R.I.A., in the chair, and several new members elected. A start was then made up the western glen, every facility having been given by the Belfast Water Commissioners, whose property it now is. This romantic and picturesque gorge is now easy of access by the path which the Commissioners have made, and the bridge and step ladders which they have put up. Some members, however, were disposed to regret its pristine wildness of twenty years ago, when access could only be had to the falls by wading

up the stream, closely shut in by the rocky sides and over-arching bushes. The lower fall, in volume of water, is still as fine as ever; but, alas! the upper and loftier fall, the finest in the district, has for the present, if not for ever, ceased, owing to the diversion of the stream by the Water Commissioners. These falls, like all the others in the country, are due to the step-like character of the alternations of the harder and softer beds of the great basaltic plateau, from whence these rocks have derived the designation of "trap," from trappa, a stair. In many cases dykes penetrating the softer beds have given their character to our local falls, and also produce the sudden turns and windings to which the streams owe their picturesqueness. There is scarcely a stream leaves the basaltic uplands without passing over one or more of these falls, some of which are scarcely known to the generality of tourists—those on the upper waters of the Glenarm River for instance. Having reached the top of the glen, whilst a few of the more enthusiastic botanists were engaged in searching every cranny and recess for mosses and other lowly forms of vegetable life, the rest of the party struck across to visit the ruins of Killyann Church, or "the church at the river." Of this, one of the relics of the times before Carrickfergus became an Anglo-Norman county, only a fragment of the west gable now stands, but the foundation can still be traced, having the dimensions inside of about 41 feet long by 16 feet wide. This church was also known as Duncrue Church, from the burial mound or tumulus which still stands close beside it. Near the mound, on the edge of the ravine in which flows the eastern branch of the Woodburn River, is a third relic, of later date probably than either church or mound. This is the site of a castle whose foundations formed a square about 34 feet by 26 feet, and which was surrounded by an earthen rampart, traces of which still exist, forming a rectangular enclosure about 300 feet long by 150 feet wide, having outside it a fosse or moat of considerable width and depth. Tradition reports that this structure was occupied by a family of the name of Russell. Descending to the stream, the party proceeded for some distance up the bed of the eastern

river, where the best exposures of the Liassic and Cretaceous rocks are now to be found, and where hammer and chisel were freely called into use. The search produced, however, nothing new; though some very fine and complete specimens of the commoner fossils became the prize of the collectors. One narrow strip in particular in the chloritic sand was noted as being almost entirely formed of nearly perfect shells of Exogyra. Indeed it is frequently seen that characteristic fossils are chiefly to be found arranged in certain layers, and not generally distributed through the mass.

After leaving the Woodburn streams, such of the party as did not require to catch the earlier trains spent a pleasant hour or two in Mr. Jellie's residence at Farm Hill, and his genial hospitality formed an agreeable close to the day's proceedings.

On 13th June, to

TOOME.

The second excursion for the season took place on Saturday, 13th June, to Toome and neighbourhood. The day being in every respect favourable, a party of about thirty members and friends assembled at the Northern Counties Terminus, and proceeded by the 9-30 train. At Antrim the party was further augmented by the President and several additional members joining. Arriving at Toome and crossing the bridge, a meeting was called, at which the programme was read, and a prize offered for the best collection of flowering plants in flower gathered on the excursion. Three new members were elected, after which the party proceeded up the west bank of the Bann in search of the flint flakes, &c., for which the place is so noted. Meanwhile boats are being got in readiness for a visit to Church Island in Lough Beg—an expansion of the Bann River. The accommodation of so large a number on so short notice was a matter of some difficulty, but soon a flotilla of four well-manned boats was gliding quietly on its way down the stream, the banks of

which in places were fringed with aquatic plants, among which the common water Ranunculus, with its pretty white flowers, was in great luxuriance. The water, owing to the long-continued dry weather, was low, and a good idea of the structure of the flat country on either side could be easily learned. The lowest beds seen on the route were the boulder clays, resting on which is a considerable thickness of peat, with immense numbers of tree trunks imbedded in it. From the passing look these appeared to be all oak. Over the peat is a deposit from two to six feet thick of a light-coloured earthy clay. This is the diatomaceous earth, so well known to microscopists. Diatoms are the silicious tests of most minute plants which flourished and multiplied here in quiet waters, and their imperishable remains, now cut through by a running stream, testify to changes of level in the country, as well as to the great lapse of time which must have intervened since the oaks in the peat below formed a waving forest.

Church Island lies near the western shore of Lough Beg. Though termed an island, it can be reached by land in dry seasons. The first impression on visiting its ruined church and silent graveyard is one of solitude, and it was this that probably led to its selection as the site for a monastery at a very early period. Subsequently, the parish church was erected on the same spot, the ivy-clad walls of which now form a picturesque ruin. The tower and spire are apparently of more recent date than even the church. The island is covered with venerable thorns, the extraordinary profusion of bloom on which perfumed the air. Near the old shore line of the island, half-hidden by the thorns, is a large stone, with a hollow, apparently artificial, on its upper surface. Its origin is unknown. Possibly it may have been associated with long-forgotten Pagan rites. Tradition has, however, endowed the water which collects in this cup-like cavity with marvellous healing powers; and, judging by the well-beaten path leading to it, and by the many offerings in the form of rags affixed to the over-hanging branches, it is still much resorted to by afflicted believers.

Regaining the boats, the return journey is made with a little

more toil against the stream, and a landing is effected on the east bank, along which another search is made for flints, and with some success, several good examples having been found Sharp eyes also detected several fragments of the silicified wood for which Lough Neagh is famous, and several members were surprised at the great number of ironstone nodules, some of which, containing plant impressions, were brought away. It is to be regretted that the eel fisheries were not at work, as a view of this valuable source of revenue would have been highly appreciated. Some estimate of their value may be formed from the fact that their annual rental at this place alone amounts to close upon £2,000, and that it is found necessary for the suppression of illegal fishing to employ a staff of men and a steamer on the water, for which, it is to be regretted, there is ample employment in this direction. On the way home a scrutiny of the collections in competition for the prize offered in the early part of the day was made, and Mr. James Forsythe Wilson was declared successful with fifty-one species. No record of special note was made during the day, and the lateness of flowering in many plants was particularly noticeable.

On 7th and 8th July, to

THE MOURNE MOUNTAINS.

The Club had their annual long excursion on the 7th and 8th July, the place selected this year being the Mourne Mountains. A party of ladies and gentlemen, well provided with hammers and plant cases, braved the threatening rain of Tuesday, the 7th, and assembled at the Belfast terminus of the County Down Railway, in time to leave by the 7-30 a.m. train for Newcastle. Notwithstanding the threatening appearance of the weather, hopes were entertained that the day would eventually prove fine; and during the run aneroids were eagerly consulted, particularly when the clouds drifted off, and the rain ceased just as Dundrum was being passed. Arrived at Newcastle, breakfast was speedily discussed in Mr. Lawrence's

hotel, and a start made on cars. The intention was to drive as far as Trassey Bridge, and ascend Slieve Bernagh, commonly known as the Broken Mountain, and then walk through the range of the Hare's Gap, to the Castle Rocks, and the White River Glen to Newcastle; but shortly after passing the English-like village of Bryansford, the mist rolled down the mountains, hill and wood disappeared from view, and the rain fell in heavy showers. When Tullyree Hill was reached, and there being no change for the better, a halt was called, and it was decided that the idea of the mountain walk must be abandoned. So the horses' heads were turned, and a drive taken through Lord Roden's charming park of Tollymore, where the rest of the day was spent in botanising amongst the rare flowering plants, ferns, and mosses, for which, as well as its exquisite scenery, the sides of the Shimna River are noted. After tea, on their return to the Annesley Arms, the more enthusiastic botanists of the party explored the sand dunes till a late hour, and again devoted two more hours before breakfast next morning to the same congenial occupation.

The second day was given up to Slieve Donard. The route taken was by cars to the Bloody Bridge, which takes its lugubrious title from a massacre of Protestant prisoners there in 1641 by a certain Captain Magennis, who had promised to conduct them safely from Newry to Downpatrick. A few minutes were spent in viewing the chasm known as Maggie's Leap, and relating the story of the athletic powers of that virtuous young lady. The cars were left at 9-33, when, with bright, warm sunshine, tempered with plenty of breeze, it was soon discovered that the walk would be dry under foot, and sufficiently cool to be agreeable. Close attention was here paid to the ferns, mosses, and micro-algæ, which were found in profusion along the shady side of the glen through which the Bloody Burn tumbles. During the climb the pleasing phenomena of the development of the scenery were specially admired as peak and crag rose to view, and valley and glen disclosed themselves, and then the coast and sea line, curving away with its fringe of foam to St. John's Point, and the wide channel, with

the Isle of Man in the far distance, appeared. At last, passing the traces of the encampment once occupied by the officers and men of the Ordnance Survey during their sojourn on Slieve Donard, the highest point was reached by the whole party at one o'clock. Refreshments were partaken of, water pure and icy cold being obtained out of a well close to the great cairn, on the lee side of which the usual business meeting was held and a new member elected. The mountain takes its name from Domangard, a saint of the 6th century. There formerly existed some rude ecclesiastical edifices built of dry stones on the summit, as described in Harris's History of the County Down, but no trace can now be discovered of them. Slieve Donard rises to the height of 2,796 feet, and is the highest point in Ulster. Standing on its top the visitor can command a view of the whole of the other mountains of the range, considerably over a dozen of which are more than 2,000 feet in height. He surveys the counties of Down, Antrim, and Tyrone, with parts of Derry and Armagh, Louth, and Meath, while on a clear day Dublin and the Sugar Loaf Mountains in Wicklow are visible—nay, were it not for the perpetual haziness of our British atmosphere, the view would be extended much farther. It is the moisture from the Gulf Stream, and not the curvature of the earth, which hides the Welsh mountains and those of Cumberland from view. This was demonstrated when, by the aid of extra clear weather and the oxy-hydro light, the Ordnance Surveyors united the triangulation of Great Britain and Ireland by obtaining a triangle having for its three points Slieve Donard, Snowdon, and Sca-Fell Pike, in Cumberland, and the highest of the English mountains. These three base lines were about 100, 120, and 130 miles respectively. The views obtained on the present occasion were most satisfactory, and alone more than repaid the fatigue of the climb. According to geologists the Mourne Mountains are composed of a peculiar granite, full of cavities, containing crystals of quartz, orthoclase, topaz, and emerald ; and one spot where they abound goes by the name of the Diamond Rocks. Professor Hull says that the granite of the Mournes is the roots of volcanoes, the trunks

and branches of which have for the most part been removed by denuding agencies, running water, and ice, just as if Etna were to be cut down into a group of hills two or three thousand feet high. Looking from this commanding summit over the other hilltops, we are perhaps better able to realise the action of these denuding agents than when standing at the foot.

Generally speaking, the glacial phenomena of the Mournes are not very prominent. There are several small lakes, whose bottoms may have been partly ground out by the ice and partly dammed up with boulder clay. There are some enormous banks of this latter material to be seen. There are some splendid perched boulders left by the retreating ice, of which the Cloughmore stone at Rostrevor is the most famous, but on Slieve Bingian is a much larger one. There are also the remains of several moraines, left as the ice slowly retreated into the heart of the mountains and the end of the great ice age had arrived. One of these, the finest, crossed the Kilkeel Valley about its middle. There is another very noticeable one across the upper part of the Newcastle River, about a mile or less above Lady Annesley's. But we must hasten down. The descent was made by Blackstairs, where the dykes of basalt that traverse both the granite and silurian rocks are well exposed. During the excursion many rare plants were seen, but as the Club is anxious to preserve their existence, the particular localities cannot be mentioned. Of flowering plants there were noted *Pinguicula lusitanica*, *Saxifraga stellaris*, *Lathræa squamaria*, *Neottia nidus-avis*, *Pyrola minor;* of ferns twenty-two species, and of mosses 110.

On Tuesday, 23rd June.

DREDGING EXCURSION.

Several members, deeply interested in the investigation of marine life, have from time to time during the winter sessions favoured the club with attractive notices of dredging expeditions, and the exhibition of specimens obtained on

them. These naturally created a desire among the less fortunate members that a dredging excursion should be organised on a scale sufficiently large to admit of many taking part in it to witness the methods by which they are carried out, and to share in the spoils brought to light. The project having been fully discussed and approved of, a small sub-committee was appointed to arrange the details and, if possible, carry it into effect. An attractive programme was issued, which resulted in upwards of fifty members and their friends assembling on board the steamer Protector by nine o'clock on Tuesday morning. The object of the expedition was evidently a matter of curiosity to the small band of observers that witnessed the embarkation; the extraordinary number of baskets and hampers, the coils of rope, a ponderous wooden tray, the great variety of dredges, and other inexplicable apparatus, must have been rather puzzling, and no doubt indicated something unusual. Mutual congratulations on the prospects of a favourable day for the work, and the good behaviour of the barometer since the previous afternoon, were freely indulged in as the Protector made her way out of the harbour. Clearing the Holywood Lighthouse a brief programme of the day's proceedings is announced. A business call had to be made at Carrickfergus, off which dredging was to commence, and so be carried on at intervals into the deeper water outside of the lough. A northern course would then be taken, and the return journey would be by the County Down side. Meantime good speed had been made, and soon the steamer was slowing up at one of the new piers under the shadow of Carrick's ancient castle. The Rev. Canon Grainger, the President of the Club, on joining here, was hailed with right loyal cheers. Several oyster dredges, and men experienced in working them, having been taken on board, another start is made, and preparations are at once commenced for working. The ponderous wooden tray is lashed to the bulwarks behind one of the paddle-boxes, coils of rope are unbent, dredges are securely attached, and at about a mile out, under certain land bearings intelligible only to those long experienced in trawling and dredging in the lough, the ground

is pronounced clear of impediment, and the first dredges are put down in five fathoms, the steamer is slowed to allow of their proper working, and time is allowed. Meanwhile the company is not an idle one. Towing nets of muslin and bunting had been provided, wherewith to capture such swimming creatures as are to be found near the surface, and these are plied with more or less success until orders are given to haul the dredges. Many willing hands soon bring them on board, when their contents are emptied on the tray, which now forms a convenient sorting table, round which an eager crowd is gathered, intent on bottling novelties. It is somewhat amusing to note the cool indifference with which the experienced amateur can look on the excited crush round the tray. Five-fathom material has lost its exciting attractions for him. The contents—ascidians and starfish, hermit crabs and spider crabs, nullapores, and all their varied associates—are to him quite familiar objects. A short steam ahead, and the dredges are down again, this time in seven fathoms, again to be hauled in with slightly varying results ; and so the work proceeds, the tray being eagerly examined after every haul, and swept clear afterwards for new material. Between each haul of the dredges specimens are freely handed round in bottles or otherwise for examination. The comparatively shallow water had yielded but few of the sertularian zoophites, several, however, were exhibited with their polypites extended, and were exceedingly interesting and pretty objects under a lens. The larger specimens were put into pails of clear water, the better to watch their movements.

On consultation with our Carrickfergus advisers it is decided, as the tides will soon be setting south, and as it is impossible to dredge successfully against them, to steer northward next the Maiden Lighthouses, and work homewards in deeper water in the direction in which the tides are running. All steam is accordingly put on, and soon we pass Blackhead, and come in view of the bold headland forming the southern end of the Gobbin cliffs. Early breakfasts had been a necessity with all on board, and, the keen sea air being a good appetiser, orders

were given to take advantage of the lull in the work, and have tea served out, and soon the aroma of Assam souchong was being wafted aft, followed by that refreshing beverage, and biscuits in such ample measure as proved that the commissary department had in no way been neglected. It was noted, however, that, although the flavour was all that could be desired, something had gone wrong with the fine grating in the teapots, and several of the cups showed slightly more leaves than would have been considered correct at a fashionable "afternoon." While tea was being enjoyed in easy attitudes, the grand scenery of the Gobbin cliffs was passing in rapid review, and under the most favourable conditions of sparkling sunshine, and comparatively smooth water. Had scenery alone been the object of the cruise, this splendid, and to some unexpected, view of these perpendicular cliffs of basalt, rising to a height of 250 feet above the deep water, would amply have satisfied all. Rounding Muck Island—an outlier of the range of cliffs—and getting into deeper water, soundings are taken and 35 fathoms announced. It is decided, therefore, to again send down

> The dredge with its iron edge,
> And its mystical triangle,
> And its hidden net, with meshes set,
> Odd fishes to entangle!

Rope almost equal to double the depth of water is given, and more time allowed for filling. Towing nets are again in requisition, and perhaps the most remarkable object collected by this means was the cydippe—*Pleurobrachia pileus*—a transparent gelatinous animal belonging to the Actinozoa, furnished with several bands of minute cilia, kept in intense activity.

The bringing in of the dredge this time, from the greater depth of water, was not so easy a matter as before. In addition to the weight of the dredge and its contents, there were sixty fathoms of rope to draw through the water, adding materially to the labour. The steamer's deck had also become a somewhat unsteady footing, but by passing the rope forward and getting as many hands at it as room would permit, it was slowly accomplished and the contents discharged. There were more poly-

zoons than formerly, but apparently naught else but dead and broken shells. Strict orders were, however, given that none of the material be sacrificed, as anything from such a depth is worth the most careful examination, A small trayful is placed on deck, and, under the experienced eye of the President, rarities are soon announced and handed round. *Emarginula crassa*, *Lima losocombii*, odd valves of Terabratula, some of the rarer Trochus, besides many minute things obtained only from such depths, rewarded the search. Still proceeding outwards, greater depths are realised. Near the Maiden Lighthouses, another attempt is made, this time to prove a disappointment, as from some unknown cause the toil of hauling in from 46 fathoms was in vain, the dredge being empty. From two miles south of the Maidens—60 fathoms—a good haul is made, apparently dead shells again. This consignment was, if possible, more closely examined than the last. The small green sea-urchin, *Echinocyamus pusilieus*, was found dead, in some plenty, also several living. A specimen of the purple heart urchin, *Spatangus purpureus*, together with what seemed to be a Thyone, one of the soft-bodied division of the Echinodermata, and a leech-like creature with a powerful sucker, which may possibly on examination prove to be a member of the group Sipunculidæ closely allied to the latter, were carefully bottled. Five miles south-south-east of the Maidens sixty fathoms tried the muscles and patience of the best on board. The dredge had evidently caught on some fixed rock, but, bending-to with a will, and keeping time to "heave-ho," it came away, and was eventually brought to the surface. The dredge, however, was hopelessly broken by the strain it had sustained, the blades bent, and the strong angle iron broken through. The contents, however, sand and shells, were again submitted to close scrutiny. Several additional specimens of Spatangus were secured, and a lively cuttlefish was obtained. The material from these deep dredgings, after having been picked over by those on board in quest of shells, is not lost, but is carefully packed in bags brought for the purpose, duly numbered, and a register kept of the locality where obtained. The washing, sifting, and examination of this

microscopically, will form the work of many winter evenings. It is thus that the highly interesting microscopic group—the Foraminifera—to our knowledge of which Mr. Joseph Wright has added so much, is worked out. The evening wearing on, the steamer is headed for Bangor, and on the way another attempt is made with an oyster dredge. It came up, however, with scarce anything in it but a starfish, which proved to be an exceptionally fine specimen of *Asterias aurantiaca*, the first example ever seen living by any on board. This species does not seem to have ever been found on our shores by any of that ardent band of naturalists the last of whom have but lately passed away from us, and conspicuous in which might be named Templeton, Drummond, Thompson, Patterson, and Hyndman, all, with many others, enthusiastic dredgers and students of nature. In "Thompson's Natural History of Ireland," one specimen of Asterias is recorded from Newcastle, County Down, and another from Bundoran. It is evidently very scarce on our northern coasts, and the specimen deserves a place in the museum of the Natural History and Philosophical Society. Having landed several of the party at Bangor, the next point of call is Carrickfergus, but, anxious to do as much work as possible in the time, another haul is made off Carnalea. The result being a bag of what might be termed ooze, but of such a consistency and flavour that, there being no one on board enthusiastic enough to examine it critically, it was again committed to the deep. Our Carrickfergus friends and dredges having been landed, the straight course is taken for home, and thus ended the first Field Club day at sea—a day, full of interest and novelty to those taking part for the first time in such work, and of health-giving enjoyment to the few friends who have not yet dipped into Nature's storehouses of wonders. To the naturalists, the results will be looked upon from their various special standpoints. Of large forms of life there was not the abundance some might have expected, while in the smaller and microscopic world there is every expectation of good results from the material brought home. Already one of the dredgings, taken five miles S.S.E. of the Maiden Lighthouses, has been partially

examined for Foraminifera and Ostracoda. A very interesting branching Foraminifer, *Hyperammina arborescens*, occurs here in profusion, and is the first satisfactory record of its occurrence off the Irish coast. Very fine examples of this species were recently found by Mr. David Robertson, F.L.S., of Glasgow, off Cumbrae, Scotland. Exceedingly fine specimens of the *Polymorphina rotundata*—a species hitherto recorded from only a few British localities—are in great abundance. One example of *Pssamosphæra fusca* was also found. Among the Ostracoda—an order of small crustaceans—the most interesting finds are *Cylherideis foveolata*, which, although previously found in the lough and at Portrush by Dr. S. M. Malcomson, is extremely rare. Several specimens of *Bairdia inflata*, a species somewhat abundant on the west coast of Ireland, but rather rare on the east, were also found.

On 8th August, to

COLIN GLEN.

The 134th field meeting was held on Saturday, August 8th, in Colin Glen. Upwards of 50 members and friends proceeded by train at 2.15 to Dunmurry, and by kind permission of Finlay M'Cance, Esq., J.P., were allowed to visit such of the grounds as seemed most likely to yield interesting geological and botanical specimens. Colin Glen is well known as one of the best spots near Belfast for the study of our local geology. Not that the geological record to be seen here is of easy interpretation, so that he who runs may read. For the beginner it is quite the reverse. The strata have in long past ages been disturbed and disarranged, and, as the sections made by the river show, are not now in the relative positions in which they were originally deposited. In some places rocks have slipped down, and are now placed lower than their rightful position. In other cases the vertical movements accompanying those fractures of the strata, known to geologists as "faults," have displaced the

beds and interrupted the series, to the confusion of him who, with book in hand, attempts to trace the succession, and correlate the rocks he sees, with typical sections. Such difficulties, however, when once mastered, are of the greatest value, and he who can tell the reason why it is that, in Colin Glen, Triassic rocks may be seen above, and Cretaceous rocks below the Lias, has made a fair start in the interpretation of geological phenomena. On the present occasion, owing to the short time available, but little geological work was done, but information was accorded conversationally, and a few of the characteristic fossils were collected. The botanical section of the party was active in pursuit of the rare woodland plants known to occur in the glen, and were rewarded by obtaining specimens of several which are not often seen. The birds nest orchis *(Neottia nidus-avis)* may be mentioned as perhaps the rarest plant collected. On the invitation of a member of the Club (Geo. Kidd, Esq.), the party repaired to the Glen Cottage, and were entertained with a refreshing tea. Finally, the usual business meeting was held—W. H. Patterson, M.R.I.A, in the chair. On the motion of Mr. Mann Harbison, seconded by Dr. John Moore, the cordial thanks of the Club were tendered to Mr. and Mrs. Kidd for their kindness. Mr. Kidd having responded, a move was made for Dunmurry, and the party returned, with the feeling that they had been privileged to study more or less of nature's ways in a social manner, with all the advantages of delightful weather, beautiful scenery, and considerate hospitality.

On 29th August, to

GREYABBEY.

The fifth excursion of the season was to Newtownards and Greyabbey, starting from the Ulster Hall about ten o'clock, in one of Mr. Johnson's well-appointed brakes. As they passed Dundonald the lofty dun or sepulchral mound near the church, and from which the village derives its name, claimed a moment's attention. Descending the long hill into Newtownards is to

be noticed a number of large stones, now disposed about the entrance to Milecross Lodge, which evidently at one time formed part of a cromlech or kistaven, or more likely a stone circle. The ancient graveyard of Killysuggan is close by. Nearly opposite is a disused Quakers' Meeting-house, dating from the seventeenth century, which is now a barn, noticeable as being one of the many indications that this religious body, originally almost entirely agricultural, has now become in its social avocations almost as completely commercial. Passing through Newtownards a few minutes were given to the market cross, which, as an inscription states, the "rebels pulled down and defaced" in 1653, and was "by this loyal borrow replaced" in 1666. A halt was called at the well-known "butter lump rock," which lies on the beach of Strangford Lough, along which the road passes, to give time for one of the party to obtain a photograph of this ice transported boulder of basalt, which has likely been carried from the top of Scrabo hill, and now reposes on the soft red sandstone of lower Triassic age, which here crops out along the shore. The rock was measured by one of the party, and calculated to weigh 130 or 140 tons at the least. Arrived at Greyabbey, some attention was first given to the memorials of the dead in the old graveyard lying to the east of the Abbey. The oldest stone marks the resting-place of Patrick Hay, 1675. In front of it stands rather a quaint one, bearing on the upper part a skull in the centre, with cross-bones on one side and a bell on the other (query, to keep away the powers of evil), and the inscription—

Here lyes Jean Hay
Who night and day
Was honest good and
Just her hope and
Love was from above
In which place was
Her trust her spirit
Left here terrane
Part with joy to
God wher was her
Hart on the 4 day
Of Jany. 1767.

Another stone commemorates "Esabella Kilpatrick otherwise Webbs who departed this life the 15th March 1788. There is a stone over John M'Dowell, who died 1782, and whose age is recorded as 116, probably another of those exaggerations which sprung up in the days of imperfect or careless registration. A large slab bears the simple inscription of "Rev. James Porter, Dissenting minister of Greyabbey, who departed this life July 2, 1798, aged 45 years." This was the Rev. James Porter who was executed at Belfast for complicity with the rebellion. Had his case occurred in these days he would doubtless have obtained a lighter punishment, or even, possibly, an acquittal. The Abbey ruins, which are probably the most extensive, certainly the most picturesque, ecclesiastical remains in the Northern counties, have been very fully described in Mr. Phillips' "Monograph of Greyabbey" and Father O'Laverty's "Ecclesiastical Remains of Down and Connor;" and with the help of these descriptions, the party was able to trace upon the spot all the leading features of this beautiful Cistercian group of buildings. The only specifically Irish feature is the long narrow nave without aisles. The deep transept, also aisleless, has the four chapels, two on each east side, usual in Cistercian churches, with a pointed waggon vault and narrow lancet window to each. The most striking features still remaining are the double tier of three lofty lancet windows at the east end, with a lancet window in each north and south wall beside the altar, filled with tracery at a later date, and the fine arches at the intersection which supported the low central tower, now roofless. Adjoining the south transept appear the foundations of the sacristy, and next beyond it of the chapter house, lying, of course, east and west, and divided, as usual, into three aisles by two rows of columns, whose bases still remain, and also one very handsome early English capital to attest what must have been the beauty of the apartment before its demolition. Next came the monks' day room, with a row of probably plainer columns down its centre, the bases still remaining. The upper story of this range of buildings formed the Scriptorium, where the MSS. were written, and also the dormitory, from which at

intervals during the night the monks descended by the winding night stair, whose lower steps in the south transept still remain, to their prayers in the church. On the south side of the cloister quadrangle was the refectory, in this case a magnificent hall, 71 feet by 28 feet., with the balcony or reading pulpit in its western side. The three splendid lancet windows in the southern gable still remain, and of all the beautiful features of this beautiful abbey these bear away the palm. They alone are worth travelling miles to see. To the west of the refectory lay the buttery and the Domus Conversorum, or room for the lay brethren, the foundations of which were laid bare in the excavations carried on by Mr. Phillips some years since. Among the minor objects of interest are the numerous "mason's marks," not of Freemasonry, so-called, but the marks made by each workman to identify the particular stones worked by him. Some of the party looked with more interest on these than upon the technicalities of "early pointed," "lancet," "round arched," &c., or upon the effigy, now much decayed, of Africa, wife of John De Courcy, and daughter of Godred, King of Man, the pious foundress of the Abbey, who, in 1193, brought monks from Holm Cultram, in Cumberland, and established them here. The figure of the knight in armour, still more decayed, may, at least possibly, have been her husband. On the return to Newtownards the party visited the Old Church, fully described in O'Laverty's valuable work. Tea at the Londonderry Arms, the election of a new member, and the appointment of the Rev. George Robinson, M.A., delegate from the Club to the forthcoming meeting of the British Association in Aberdeen, brought to a close a very interesting day's proceedings.

On 19th September, to

RADEMON, FOR A FUNGUS FORAY.

The final excursion for the season was to Rademon and Crossgar. A party smaller than it would have been, had the

weather of the previous day and early morning proved more promising, left by the 10.45 train for Crossgar, where they were joined by several other members. At once proceeding to the well-wooded grounds of Rademon, to which entrance had been kindly granted by R. B. Davidson, Esq., a halt was called, and Dr. Beck appointed chairman for the day, and the business commenced. The special feature of this excursion was the collection and study of the fungi of the locality, or, as it has become more popularly termed a "Fungus Foray," this being now the third foray of the kind which the Club has organised and carried out, the former ones to Shane's Castle and Killymoon having been most successful, stimulating research in that department of botany, and adding much to the local knowledge of that interesting group of plants. The Rademon woods, however, proved comparatively barren of fungi, only fifty-eight species having come under notice, whereas nearly three times that number were catalogued at Killymoon, and also at Shane's Castle. The main reason of this paucity of species may be, perhaps, attributed to the geological character of the ground, the silurian rocks not yielding so suitable a soil for the growth of toadstools and their allies. It was noticeable that not a single specimen of the ordinary mushroom, *Agaricus campestris*, was found, and only two other edible species (*A. procerus* and *Boletus edulis*) were collected during the day. The handsome, but poisonous fly agaric—the most showy of our native species *Agaricus muscarius*,—was present in several spots, and a decaying birch tree produced the large white balls with an acid smell and taste that are the immature state of *Polyporus betulinus*. The only rarity picked up was *Agaricus militares*—a fine large species, with a cinnamon coloured cover to its cap. The lacterii, or milky mushrooms, and the russulas, which are mostly very abundant in wooded places, were remarkable by the scarcity of the one family, and the entire absence of the other. The wild undergrowth of the wood, and the absence of leading paths, is to be blamed for breaking up the party, for once having lost sight of the leaders, it was next to impossible to find them again. Thus the party may be said to have hunted in sec-

tions, and it was late in the day before a meeting was effected and an opportunity afforded of comparing notes. The attention of the entire party was not, however, confined to fungi, and notwithstanding that the season was too far advanced to hope for many of the flowering plants, yet the banks of the Annacloy River yielded a rare hawkweed. This was *Hieracium crocatum*, a mountain plant not previously found in the County of Down, its nearest station being the Cave Hill. Rademon is consequently the southern limit of this species in Ireland, and it is remarkable that it grows there at a lower elevation than any which it is known to occupy elsewhere in this country. Sixteen species of ferns were collected, a fair number for the day, when it is considered that research was confined to a limited area, with no great variety of habitat. Specimens of the bladder fern (*Cystopteris fragilis*) were obtained, and also of the scaly hart's tongue (*Ceterach officinarum*), this being a new locality for both these ferns. *Lastrea recurva* and crested forms of Athyrium and Pteris were also found. The moss flora included some of the less common species amongst its constituents; of these there may be mentioned *Leskea polycarpa*, *Cryphea heteromalla*, *Orthotrichum rivularis*, and *O. Lyellii*. On leaving the grounds, a short time was spent in a stroll through the wide and well-kept streets of Crossgar. By six o'clock the party were comfortably seated at tea in the establishment of Mr. Murray, and not the least pleasant part of the day was spent round the well supplied tea-table, where the business meeting was held. Two new members were elected, and other matters transacted. The return journey by the 7.20 train concluded an admirable day, and the Club's twenty-third excursion season.

WINTER SESSION.

NOTE.—The authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

MEETING.

THE twenty-third Winter Session of the Club was inaugurated by a Social Meeting at the Museum, College Square North, attended by a large gathering of members and their invited friends. From seven to eight o'clock tea and coffee were dispensed by the lady members in the "Old Library," after which a general meeting was held in the lecture-room—the Rev. Canon Grainger, D.D., M.R.I.A., President of the Club, in the chair.

The PRESIDENT stated that in looking over a copy of "Steed's Travels," written in 1627, he found it stated that Ulster was then the most savage part of Ireland, but the gathering he (the President) saw before him was an indication of the marvellous change since that time. He also quoted a remark made to him by one of the scientific professors of Dublin, that "there were more naturalists in, and about, Belfast than in all the rest of Ireland put together." In the course of some further remarks, he referred to the various encroachments of the sea during the

later historic period on the shores of Belfast Lough, and suggested that investigation might be made by members of the Club as to whether this had been, or was now, accompanied by any oscillation in the level of the land in the North-East of Ireland or not. He then referred to the various objects of interest exhibited by the members, and called on some of the exhibitors for a few brief remarks. The purport of these may be best gathered from the description of the exhibits themselves.

FUNGI.

Amongst the studies encouraged by the Club during recent years has been that of the various forms of Fungi, and the result was now shown by a large table covered with a magnificent collection of fungi, edible and poisonous, gigantic and microscopic, chiefly collected and exhibited by Rev. H. W. Lett, M.A.; Mr. R. Ll. Praeger, and Mr. J. J. Andrew, L.D.S., F.R.C.S. The series was further illustrated by a number of coloured plates hung upon the wall. In addition, there was laid on the table works by Fries, Cooke, Berkeley, and Smith, to let intending students know what authorities to procure. Most instructive of all was a little catalogue of twenty-two pages, issued by Friedlander, of Berlin, which contains the names and prices of upwards of 900 different publications in various European languages, entirely about fungi. Amongst the specimens was a large puff ball, fully ripe, *Lycoperdon giganteum*, that measured 3 feet 10 inches in circumference, and being edible when young and fresh, would have afforded a rich repast for a large family. It was found in Belvoir Park. A piece of oak wood from Tollymore infected with the green fungus, *Heldium oraginosum*, which renders it suitable for the inlaid work known as Tunbridge ware, was shown; also, the potato blight, *Peronospora infestans*, was shown on some affected tubers. Beside them lay a branch of laburnum, which had been killed by *Cucurbitaria laburuls*, and a specimen of the Polyporus which can be cut into shape and used for razor strops.

SEA DREDGING.

Another special exhibit of the Club's work, shown under

the direction of Mr. Joseph Wright, F.G.S., and Mr. W. Swanston, F.G.S., was that of dredging appliances and the results of sea dredging, illustrating the dredging excursion of the Club off the Maidens, &c., last June, and the dredging expedition under the auspices of the Royal Irish Academy off the south west coast of Ireland, in which several of the Club's members took a prominent part. Here were shown dredges, rope, sounding lines, trays, and sieves, with samples of sand from the bed of the Atlantic, and the same in various stages of preparation for examination under the microscope. The most interesting result of the Club's recent dredging off our lough was the discovery that a peculiar branching foraminifer of the arenaceous type, *Hyperammina arborescens*, found only twice previously off the west coast of Scotland, is in reality extremely common off our coast.

OUTDOOR PHOTOGRAPHY.

Perhaps nothing has made so rapid a progress amongst members of the Club as the practice of outdoor photography, and the members' work was specially illustrated on the present occasion. Mr. William Gray, M.R.I.A., and Mr. George Donaldson, showed a large collection of photographs, chiefly of antiquities in Ulster ; Mr. Stelfox, of micro-photographs and instantaneous views of, and in Tory Island ; Mr. John Donaldson, of photomicrographs ; Rev. H. W. Lett, of fungi ; Mr. Meneely, Mr. George Ward, Mr. Nichol, and Mr. Welch, a number of striking photographs, archæological and general. Mr. James Wilson showed a number of fine pictures, some of them upon dry plates of his own making, the first, it is believed, made in Belfast. An album lent by Mr. Greenwood Pim, F.L.S., of Dublin, containing a series of photographs of tree trunks, was much admired, and set an example to other naturalists of the practical direction their photographic studies ought to take. There were also a large number of cameras and other photographic appliances exhibited by different members.

Amongst the collections sent in for the Club's prizes at the last annual meeting were now exhibited a fine collection of

ferns, Equiseta and club mosses, by Mr. R. Ll. Praeger; microscopic slides, by Dr. S. M. Malcomson and Mr. D. M'Kee; and fossil plants, from Ballypallady, by Mr. C. Bulla. Some fossil ferns from the latter place have attracted considerable notice from Mr. Starkie Gardner and other geological authorities upon the Tertiary flora. As usual, a number of members had their microscopes on the table, amongst others Dr. S. M. Malcomson, Mr. J. J. Andrew, Rev. H. W. Lett, Mr. Hughes, Mr. D. M'Kee, and Mr. Swanston.

A collection of antiquities, chiefly Irish, which had been gathered during a long life by the late Mr. Glenny, was exhibited by Mr. Gray. Amongst them was a very fine and large bronze altar bell, probably of the sixth century, from Cloghan church.

Mr. S. F. Milligan also showed a small, but interesting, collection of antiquities made by him during the last two summers in Counties Cavan and Leitrim. Amongst them was an iron rivetted cauldron found in a bog at Drumlane, County Cavan, near to a crannoge, to the occupants of which it presumably once belonged. The Rev. James Graves, of Kilkenny, states that he is not aware of any rivetted iron cauldron of this type having previously been found; from its resemblance to the bronze vessels it is probably of an early date. There were also in the collection a very fine and still sharp bronze sword, or rapier, from Lough Oughter, and a copper axe found in a bog near Manorhamilton. Ancient weapons and tools of pure copper, the use of which preceded bronze, are somewhat rare.

A case of minerals, agates, chalcedonies, jaspers, &c., was exhibited by Mr. D. M'Kee.

In the new library were exhibited a number of books—some of them valuable illustrated reports by the various American and Canadian Government geologists, and some from our own Board of Works upon Irish antiquities,—forming part of the rapidly growing library of the Club. Here was also the Club's album of sketches, antiquarian drawings, and photographs. In connection with this it may be mentioned

that the Club are preparing an album for the latter, which they wish to render the most complete illustrated epitome of the natural history, antiquities, topography, and scenery of this country to be found in Ireland.

On the table was also the Club's portrait album, which, though it still requires a number of contributions to render it complete, yet, under the direction of their member, Mr. E. T. Church, already contains a number of familiar faces, some of the originals of which have since carried the repute of the Naturalists' Field Club into other and distant lands. Last, but not least, the walls of this room were adorned by a number of very effective water-colour drawings and sketches, kindly lent for the occasion by members of the Ramblers' Sketching Club.

OPENING ADDRESS.

The first ordinary meeting of the session was held in the Museum, on 10th November, when the President (Rev. Canon Grainger, D.D., M.R.I.A.), gave an opening address, taking for his subject "Extinct wild life." The rev. speaker considered the study of extinct wild life, both in the animal and vegetable world, an appropriate one for naturalists, though they more frequently and justly occupy their thoughts with still existing forms. One special feature of all field clubs is the wonderful regard in which its members hold all rare forms of plant and animal. The love of the beautiful is ever strong in the breast of the true naturalist, but the preservation of the rare though humble species has always his especial care and respect. It was, perhaps, a kindred feeling that prompted the members of that admirable society—the Society for the Prevention of Cruelty to Animals—to take under their care our feathered friends, an act which will save many of our rarer birds from extermination by the bird-nesting proclivities of thoughtless boys, or of men who consider the wanton destruction of life "sport." The diminution of forests was noted as an important

factor in destroying many species. Reference was next made to a list of Irish animals given in the writings of St. Augustine, as rendered by Dean Reeves in the Proceedings of the Royal Irish Academy. The species there enumerated are noxious animals, but one in particular, whose name literally translated would mean "one and a half flier," can only be guessed at; the speaker considered it to be probably a large voracious bat or vampire.

The introduction of domestic animals was also noted as a powerful agent in exterminating species, and instanced the destructive work done in some of the Pacific Islands by the pig and the goat, strangers to those sunny climes.

The subsidence of land in later geological times has also played an important part in this work, and Ireland was noted as a good example of this. The speaker then went on to relate the discovery of bones in the gravels of the Curran at Larne. These bones were undoubtedly of whales, but they appeared to be of a species now inhabiting the Antartic Ocean—a fact which opened up a wide field for conjecture and investigation. The bones of an extinct ox were also referred to, and the remains of a still larger animal found when making the road which at present runs between the Sallagh Braes and the Headless Cross. It is to be much regretted that these latter remains fell into bad hands, and that the good intentions of the contractor to preserve the skull, which measured twenty-two inches long by eighteen broad, were frustrated by its being stolen.

The speaker specially directed attention to this find, as the locality in which it occurred was only a mile or so, as the crow flies, from the place where the mammoth's tooth in his possession, and which has caused such discussion, was found. Speaking of the mammoth in Ireland, the Rev. Canon stated that the late Dr. Leith Adams, who at one time strenuously maintained that no satisfactory proof had been brought forward to establish the mammoth in the list of Irish extinct animals, was compelled to admit it on this discovery being brought under his notice. It has been clearly established as Irish by specimens

from four different localities. The tooth of a hippopotamus was also referred to as having, about thirty years ago, been found in the bank of a stream one mile from Carrickfergus. It is a matter of regret, however, that the precise spot and bed from which it was obtained are not on record. Its value, therefore, in fixing its exact geological position, like the tooth itself, is lost to science. The absence of many reptiles from Ireland common to Britain was also referred to, and the frog was specially named, as the speaker said it was the common belief among country people that it was quite a recent introduction, a belief which the Rev. Canon did not seem to credit, from the wide-spread abundance of the creature. The speaker concluded by hoping that the attention of members would, especially on excursions, be more directed to the subjects on which he had touched, and that an effort would be made to examine some of the caves which occur along our coasts, with a view of elucidating their history.

An interesting discussion followed, in which several members joined, giving their opinions and the result of their observations on many of the subjects touched upon by the President. Regarding the frog, it seemed to be the general opinion of the speakers, that the case of its introduction into Ireland about the time of Charles II. or Cromwell was well established.

A second communication, entitled "Notes on Ballywillan Church, Portrush," by Mr. F. W. Lockwood, was, in his unavoidable absence, read by Mr. W. Swanston. The writer directed attention to this roofless structure, standing about a mile from Portrush, and carefully measured drawings of it were exhibited. After describing its remaining architectural features, the opinion was expressed that the date of the erection of the building was the latter part of the 12th century, or what is known as the transition period. It would, therefore, be of the same date as Christ's Church Cathedral, in Dublin, and Greyabbey, in the County Down. This is, in itself, sufficient to make it of considerable interest, for ecclesiastical remains in the North of Ulster are comparatively rare. But quite apart from any question of comparative rarity, the

church is interesting as giving us a good specimen of the early English or transitional Gothic in so peculiarly an Irish type, unless it would be better described as an Irish church clad in an English dress.

It is to be hoped that the small amount of care needed to preserve this structure from further decay will be extended to it. It has been a gratification to the writer to be instrumental in procuring a permanent record of this ancient edifice secure from the vicissitudes of weather, or the encroachment of neglect or vandalism for the archives of the Belfast Naturalists' Field Club.

The second meeting of the Winter Session was held on 15th December—the President (Rev. Canon Grainger, D.D., M.R.I.A.) in the chair.

Mr. John Vinycomb read an interesting paper on "Mythical and Fictitious Creatures in Symbolic Art." The lecturer, in introducing the subject, expressed fear that to the members of the Naturalists' Field Club he could add no new facts to those already possessed, as the subject of his paper lay rather outside the region of the material world, and dealt with creatures that have, as yet, eluded the grasp of the naturalist and man of science. The moralist may revel in Tartarus and the elysian fields with the creatures of the imagination around him, and pass unscathed to impart the knowledge he has gained; but from this pleasant domain the field naturalist, with his scientific appliances, must inevitably be excluded.

In the symbolic art of nearly every country, but more particularly in the heraldry of mediæval Europe, mythical creatures and monsters of terrible aspect are constantly met with as symbols. It may be assumed that they have been adopted and used with some latent meaning or allegory attached to them, as in the case of the natural animals. They may, therefore, equally lay claim to our consideration as emblems or types of qualities, more especially as less attention has been devoted to them, their shapes and their attributes,

than to purely natural emblems. It cannot be said that artists at any period have succeeded, even in a remote degree, in embodying the highly wrought descriptions of the poets, of the terrible creatures of the imagination. "The poet's pen" may turn them into shapes (shadows at the best), but the artist, who follows the poet, finds it totally beyond his art to give material form and expression to his conception with anything like photographic fidelity. Such beings prefer the dim light of allegory to the clear sunlight of reason, and shrink from closer inspection. Like all spectres they are most effective in the dark. Illusions of the mind have from the twilight of history, and all through the dim and credulous ages past, performed an important part in influencing the thoughts, habits, and lives of mankind. Over many lands these inherited ideas still exercise a paramount influence; but in the enlightenment of the coming time it is probable they will fade away like an evil dream, and the memories of their name and influence alone remain.

It is just possible there may be a basis of truth in the conception of some of the fabled monsters of antiquity, in the great birds and beasts long since extinct, whose remains geological science unearths for the wonderment of our times. In the existing representatives of the antediluvian saurians, the crocodile and alligator, we see the prototypes of the dragons and hydras of poetic fancy. "Among the geological specimens in the British Museum," says Hugh Miller, "the visitor sees shapes that more than rival in strangeness the great dragons and griffins of mediæval legends; enormous jaws, bristling with pointed teeth, gape horrid, in stone, under startling eye-sockets a foot in diameter; and necks that half equal in length the entire body of a boa-constrictor. And here we see a winged dragon that, armed with sharp teeth and strong claws, has careered through the air on leathern wings like those of a bat." We are also told in the sacred Scriptures by Moses of "fiery serpents," and by Isaiah of a "fiery flying serpent." Other monsters—dragons, cockatrices, and some of whose form we have no conception—are also mentioned. Euripides describes

a dragon or snake breathing forth fire and slaughter, and rowing its way with its wings. It is evident that such a creature may at one time have existed. Looking at the widespread belief in dragons, there seems little doubt that the semi-myth of to-day is the traditional successor of a really once-existent animal, whose huge size, snake-like appearance, and possibly dangerous powers of offence, made him so terrible that the earlier races of mankind adopted him unanimously as the most fearful embodiment of animal ferocity to be found.

A strange relic of the ancient faith is perpetuated by the remains of early Celtic art, in the curiously wrought interlaced monsters which form the chief ornament of ancient Irish crosses, and particularly in the borders and initials of illuminated manuscripts, where spirals, and interminable interlacements of the most complex character, often allied with equally strange colouring, form a style perfectly unique in itself, and unlike any other ; the elaborate knots terminating in draconic heads, and with wings and animal extremities in wonderfully ingenious patterns that seem almost beyond the limits of human ingenuity. In the kindred art of Scandinavia we find similar decoration founded on serpentine forms. Another survival of the old dragon exists in the name given to some of our fighting men on the introduction of firearms. A kind of blunderbuss gave, to the troops who used it, the name of "dragoneers," whence is derived the well-known term dragoons. They used to be armed with dragons—*i.e.*, short muskets—which spouted fire, like the fabulous beast so named. The head of a dragon was wrought on the muzzles of these muskets. We have all heard of the Dragonades, a series of persecutions by Louis XIV., which drove many thousands of Protestants out of France—and out of the world. Their object was to root out "heresy." A bishop, with certain ecclesiastics, was sent to see if the heretics would recant; if not they were left to the tender mercies of the Dragonniers, who followed these "ministers of peace and good will to men." The same game of conversion was practised on the Presbyterians of Scotland, with its accompaniment of "dragoons let loose"—a fact now forgotten, I think, by their descendants hereabouts.

The fictitious beings used as symbols in heraldry may be divided into two classes—1. Celestial beings mentioned in Holy Writ and those creatures of the imagination which, from the earliest ages, have held possession of men's minds, profound symbols unlike anything in the heavens above or in the earth beneath or in the waters under the earth. It may be an abstract idea embodied in tangible shape, such as the terrible creature, the type of some divine quality, that stands calm, immovable, and imperishable within the walls of our National Museum; such forms as the dragon, of the purely imaginative class, and those creatures compounded of parts of different real animals, yet unlike any one of them, each possessing special symbolic attributes, according to the traditional ideas held concerning them. 2. Animals purely heraldic, such as the Unicorn, Heraldic Tiger, Panther incensed, Heraldic Antelope, &c., owe their origin and significance to other ideas, and must be accounted for on other grounds—namely, the mistaken ideas resulting from imperfect knowledge of these objects in natural history by early writers and herald painters, to whom they were, no doubt, real animals with natural qualities, and, as such, according to their knowledge they depicted them; and although more light had been thrown upon the study of natural history since their time, and which has proved so many of their conceptions to be erroneous, the well-known heraldic shapes of many of these *lusus naturæ* are still retained in modern armory. These animals were such as they could have had little chance of seeing, and they probably accepted their descriptions from "travellers' tales"—always full of the marvellous—and the misleading histories of still earlier writers. Pliny and many of the writers of his day describe certain animals in a way that appears the absurdest fable; even the lion described by him is in some points most unnatural. Xenophon, for instance, describing a boar hunt, gravely tells us—"So hot are the boar's tusks when he is just dead, that if a person lays hairs upon them the hairs will shrivel up, and when the boar is alive they —that is, the tusks—are actually red hot when he is irritated,

for otherwise he would not singe the tips of the dog's hair when he misses a blow at their bodies." The salamander in flames of frequent occurrence in heraldry is of this class. Like the toad, "ugly and venomous," the salamander was regarded by the ancients with the utmost horror and aversion. It was accredited with wondrous qualities, and the very sight of it "abominable and fearful to behold." Elian, Nicander, Dioscorides, and Pliny all agree in that it possessed the power of immediately extinguishing any fire into which it was put, and that it would even rush at or charge the flame, which it well knew how to extinguish. It was believed that its bite was certainly mortal, that anything touched by its saliva became poisonous, nay, that if it crept over a tree all the fruit became deleterious. Even Bacon believed in it. Quoth he, "The salamander liveth in the fire, and hath the power to extinguish it." There is, too, a popular belief that if a fire has been burning for seven years there will be a salamander produced from it. Such is the monstrous character given to one of the most harmless of little creatures: the only basis of truth for all this superstructure of fable is the fact that it exudes an acrid watery humour from its skin when alarmed or in pain. Bossewell, an heraldic writer of the 16th century, after the model of his forerunner, Genarde Leigh, edified his readers with comments on natural history in such a delightful manner (according to his friend Roscarrocke) as to provoke the envy of Pliny in Elysium, though now these descriptions in many instances only serve to call up a smile from their very absurdity. With "veracious" histories of this description, is it to be wondered at that such beings as those referred to were made use of in heraldry, and accepted as types or emblems of some particular quality in man?

As an instance of how an error in the form of an animal may be perpetuated unperceived, it may be mentioned that even in the best books on heraldry, natural history, and in other illustrated publications, the elephant is rarely seen to be correctly delineated. A peculiarity in his formation is that the

hind legs do not show the "hough," but bend in the same manner as the fore legs, so that, unlike other quadrupeds, it can kneel and rest on its four knees, whereas it is usually depicted with the hind legs to bend in the same manner as the horse or the cow. When artists and herald-painters continue to commit this blunder unobserved, some palliation may be afforded to the old heralds for their offences against zoology in the errors and delusions arising from lack of information. They could have had little opportunity of acquiring a correct knowledge of the rarer kinds of animals; they had not the advantage of seeing menageries of wild beasts or of consulting books on natural history, with excellent illustrations, as the modern herald may do; only when their scanty information fell short did they venture to draw on their imaginations for their beasts, after the manner of some ancient worthies, "where the lion's skin fell short they eked it out with the fox's."

Mr. Vinycomb then proceeded to give a most interesting description of some of the many monsters, illustrated by a series of vigorously drawn sketches, with references to ancient poets and writers as to their forms and special attributes, and their symbolic use in art.

At the conclusion of the paper, several members spoke of the extreme value of the communication brought forward by the reader, and an interesting discussion followed, after which

Mr. CHARLES BULLA brought before the notice of the meeting the upper stone of a quern obtained in County Derry by a fellow-member, and sent for presentation through the Club to the Museum. The stone is remarkable from its unusual shape, being of greater diameter and less dome-shaped than any in the Museum.

The SECRETARY next exhibited a large number of the reversed variety of *Helix nemoralis*, which had been sent to him from Bundoran.

The third meeting for the session was held on Tuesday evening, 15th December—The President, Canon Grainger,

D.D., M.R.I.A., in the chair—when an admirable paper was read by Mr. R. Ll. Praeger, B.A., entitled "Notes from Lough Sheelin, County Cavan."

As soon as the chair was taken, the Rev. H. W. LETT rose and begged leave to make the following remarks, which he was sure would meet with the concurrence of all present:—During the present session the Club has lost a student of nature, whose heart was with us when he lived, and whose memory we should value. On Wednesday, the 12th August, 1885, there passed away from the world one of the early members of the Belfast Naturalists' Field Club, and one who for four successive years was elected as our president. I allude to the regretted death of the Rev. Canon MacIlwaine, D.D., M.R.I.A. Distinguished as a clergyman of the Church of Ireland, gifted with literary, poetical, and musical talents, he was also endowed by nature with that refined veneration which constitutes the true antiquary. I would just mention that much of the ecclesiastical and archæological information contained in the Club's "Guide to Belfast and Adjacent Counties" was the contribution of his learned pen. But his investigating mind and necessary craving for knowledge did not search only amongst the relics that tell of a far-off past. The wide world of nature, plants and animals, claimed a large share of his attention, and not seldom did he go on the Club's excursions in the early years of its existence, while his presence and microscope were well known at our winter meetings in the Museum. In our "Proceedings" will be found abstracts of papers by him on "Scientific Nomenclature," on "Sponges, an Account of their Structure and Growth;" and on "Life, as treated in the Theories of Modern Biologists;" whilst his able reply to the attacks of Professor Tyndall on Christianity, which formed the subject of his first address from the chair, was thought worthy of being published *in extenso* in the Club's annual report. Canon MacIlwaine was also a contributor of valuable communications to the *Ulster Journal of Archæology*, *Science*, *Gossip*, and other publications. A great and useful

mind, an active and valuable member, has left us at the bidding of the great God of Nature, and we mourn the loss of a kind and sincere friend.

Several members having spoken of the kindly interest taken in all the transactions of the Club by the late Canon MacIlwaine,

Mr. Wm. Gray proposed, and it was unanimously passed, that Mr. Lett's notice of his death be embodied in the Club's "Proceedings," and that copies of it be sent to his sons.

The Chairman then called upon Mr. Praeger for his notes of Lough Sheelin.

Mr. Praeger commenced by describing the position of Lough Sheelin, which lies on the southern border of County Cavan, and is one of a chain of lakes through which the River Inny flows, which joins the Shannon in Lough Ree. In May last, the reader continued, he had an opportunity of visiting these lakes, and he proceeded to describe two excursions, with notes of some of the plants, birds, &c., observed during a short stay in the neighbourhood. Lough Kinale was the first lake visited. It is a fine fishing ground, trout being caught up to 10lb. and pike up to 30 or 40lb. The weather was very stormy on this day, and twice the party got a thorough drenching in their boat, and were finally compelled to remain on *terra firma*. In a wood on the edge of Lough Kinale the nest of a long-eared owl was found, and the reader described how he subsequently tamed two of the young brood. They became the greatest of pets, and were most amusing in their habits. The same wood yielded a sparrow-hawk's nest, and some remarkable instances were given of this bird's destructive tendencies, and of its daring. An instance was mentioned where no less than twenty-nine dead birds were found in one nest, including chickens, larks, bullfinches, and young pheasants and patridges. The reader condemned the practice so common with boys of robbing nests, remarking that, apart from cruelty, it is a very injudicious thing to destroy the eggs of those birds which are of such service to the farmer and gardener. On the

second morning of his visit, the reader continued, the sun rose without a cloud, and an early start was made for Lough Sheelin. The party rowed across Lough Kinale, and up the Inny to the village of Finnea, where a larger and stronger boat was procured, and Lough Sheelin was soon reached. A line was made for Church Island, which lay some three miles to the north east. The island derives its name from an ancient ecclesiastical edifice which stands in its centre. Some interesting birds' nests were found here, built in very unconcealed positions, which tended to show how free from disturbance the place was. From Church Island the party proceeded to Ross Castle, which stands on a wooded eminence overlooking the lake. This castle is in ruins, with the exception of the central tower, which has been recently restored. There is a story in connection with this castle—one of the romantic tales that often hang round these shattered relics of strife and insecurity. It was in the Commonwealth time. Ross Castle was held by Myles O'Reilly, the Black Baron, who had espoused the Republican cause. He had an only daughter, who was beloved by a young baron who was lord of a castle which may still be seen standing, in picturesque decay, on an island in the lake a few miles north of Ross. The latter had strong sympathies with the Irish Royalist cause, and when war broke out found himself opposed to the father of the girl he loved. But worse was coming. The Royalist party in that district were defeated, and a price was set upon his head. Owing to treachery within his own walls he was compelled to fly from his castle, and he found a refuge on Church Island, where the baron's daughter rowed at intervals with provisions. But she was suspected by her father, who shut her up in Ross Castle, and demanded of her the outlaw's hiding place. Indignantly she refused any information ; better for her lover to die of hunger than to suffer an ignominious death at the hands of his enemies. Left alone on the island, deserted, though not through her fault, by the only one who knew his retreat, the chieftain died of want. His body was found by some fishermen and conveyed

to O'Reilly's castle. The Baron's daughter, when she saw the body of her lover lying there cold and stiff, with one look of reproach to her father, dropped dead by his side. They buried them side by side on the sunny slope below Ross Castle, where their graves may still be seen.

From Ross Castle the party proceeded westward along the edge of the lake, and the reader described many interesting plants that were noticed, including some ferns and fungi. A pleasant row across the calm lakes, amid the gathering mists of evening, brought a most delightful excursion to a close. The paper was illustrated by a large number of specimens, including flowering plants, ferns, fungi, fossils, shells, and eggs.

Several members spoke of the great value of the paper, and the interest that the reader had imparted to his notes in almost every department of natural history, and the hope was expressed that a Club's excursion could be organised to the locality, so full of the various objects for the study of which Field Clubs are established.

The election of a new member and the closer examination of the specimens on the table and displayed on the walls brought the evening's business to a close.

The fourth meeting of the Session was held in the Museum, College Square, on Tuesday evening, 19th January—the President (Rev. Canon Grainger, D.D., M.R.I.A.) in the chair—when two communications were brought forward on

BEES.

The Rev JOHN ANDREW read a communication on "The British Bees." Mr. Andrew commenced by indicating the place bees held in nature's order, and stating it was one of the sections of the Hymenoptera—namely, the Anthophila, which again is divided into the Andrenidæ and Apidæ. He then proceeded to speak of their numbers, structure, homes, and habits. Of the Andrenidæ there are 117 species, under 8 genera, and of the Apidæ 93 species, under 18 genera. Having spoken at length

of the wings, legs, tongues, and eyes, he concluded his discussion of their structure by describing their stings. The stings of bees, he remarked, are very interesting objects under the microscope. The sting is composed of a pair of lancets in a horny sheath or scabbard, smooth and sharp-pointed, is under the control of powerful muscles, by which the bee can plunge it into the object of attack ; and when the scabbard has been thrust in, the lancets, which are connected with the poison glands, are projected through the open point of the scabbard, and inject the poison into the wound. The lancets are barbed ; they are slender things ; and, if they are projected into a tough substance like the thickened skin of the palm of the hand, very frequently they are unable to extract them again, and so they are left in the wound. The bee, in such a case, suffers by the tearing of the delicate viscera, with which the lancets are connected, and is liable to die from such injury. Of course, it is a great mistake to suppose that the sting is always left in the wound. The scabbard usually makes a sufficient opening in tender skin to leave the lancets no danger from being sufficiently projected for their purpose, the scabbard keeping the wound open till the lancets are withdrawn. It is only when the substance beyond the point of the scabbard is tough enough to hold the barbs of the lancets that the bee gets damaged by their loss. There are two chitinous brackets on the upper part of the lancets, which, being jammed into the neck of the scabbard, allow the lancets only a certain length of projection through the point of it, so that if the barbs hold in the skin then either the lancets must be violently pulled through the scabbard, crushing the brackets and tearing the viscera, or else the muscles which work the scabbard must give way, and the whole apparatus be left in the wound when the bee takes flight, for the future *hors de combat.* Speaking of stings, Mr. Andrew further remarked that if a bee or wasp alights on the hand or face for a moment, it will probably be as harmless as a fly if the person be quite quiet till it takes flight ; but if he makes some sudden, jerky movement to be rid of it, the little creature,

frightened by such movement, will in all likelihood defend itself by its only weapon. It is quite a calumny to say that the nasty creatures are constantly prowling about for something or somebody to sting. Nothing of the kind ; they are simply looking for something to supply their own wants, or the wants of their families at home, and, as a rule, only sting in self-defence. Mr. Andrew also remarked that none of the males have stings, and that they may be captured with the naked hand, with impunity, when they are known by their marks. Having finished on the structure of bees, Mr. Andrew proceeded to speak of their homes and their habits. He illustrated the manner of the Bombus by giving a life history of *Bombus lucorum*, and the habits of *Andrenidæ* by the life history of *Andrena albicans*, and *Andrena cineraria*, of which there is a very populous mixed colony in the Ormeau Park, near the gardener's lodge—a colony of many hundreds of burrows. Mr. Andrew's paper aimed at stirring up the members of the Club to an extensive study of this most marvellous of all the sub-hosts of the great host Insecta, saying that if half-a-dozen members were to work their might, for one summer season, they could bring to the acquaintance of the Club a notice of the many interesting species that may be annually fulfilling their life's history in our own vicinity, with no cultured eye observing them.

The second paper was by Rev. H. W. Lett, M.A., T.C.D., on "The Races of the Honey Bee."

The increase of bee-keeping, the spread of literature treating exclusively of the subject, and the attention paid by bee-keepers in Europe, America, Asia, and Africa to the improvement of the honey bee (*Apis mellifica*), have demonstrated that there are at least ten distinct varieties of this insect which are kept in hives.

And though this has occurred within the last 15 years, no notice seems to have been taken of the existence of these well-marked races of the domesticated insect in its bearing on the theory of evolution. That interesting chapter in the history of that teaching has not yet been written, indeed the facts

summarised below are only to be found scattered over the pages of many bee-publications, some of which are difficult of access. The present paper is offered as a contribution towards that part of the natural history of the honey bee.

The following are the names and distinguishing features of each of the races of honey bees that are best known to the bee-keeping community.

I.—Black or Brown. The ordinary hive or honey bee, called by way of distinction the Black or Brown, from being of almost one uniform brown-black colour, with slight indications of paler bands on the abdomen, and clothed with greyish brown hairs. Till within the last fifteen years no other bee was known in North or West Europe. This is also the bee, which after escaping, has made itself wild in the American and New Zealand woods.

II.—Italian Alp. The Italian Alp bee, sometimes called Ligurian, is indigenous to the mountainous district that lies in the North of Italy round about the Lakes Maggiore and Como. It is of a light orange yellow colour with two orange red bands on the abdomen, and is longer and more slender than the Black. They are better honey gatherers, more hardy and prolific, and very courageous in defending their own hives, even from the ravages of the wax moth.

III.—Cyprian. The Cyprians are natives of Cyprus and part of Turkey in Asia. They are yellow, quite slender, wasp-like, and smaller than Italians. They always have a yellow shield mark on the back between the wings. They are strong, excellent honey gatherers, winter better than any other race, and are proof against being robbed by other bees. But they are easily excited, and most revengeful stingers.

IV.—Syrian. The Syrian bees are found on that part of Asiatic Turkey which lies north of Mount Carmel. They are of the same size, qualities, and temper as the Cyprians; from whom they differ, in showing less yellow, and being on the whole of a greyer colour over their whole bodies. They are quite distinct from the next.

V.—Holy Land. The Holy Land, or as the natives call them, the Holy Bees, are found in Palestine, south of Mount Carmel. They are marked like the Cyprians, but their hair is so light in colour they appear to be beautifully striped. Their size is smaller than Italians but larger than Cyprians. They are very active and far flying, most wonderful cell builders, and get honey from red clover ; but they are ready to sting, become furious at the least smoke, and run off their combs when one is lifted from the hive.

VI.—Tunisian. Tunis, on the North of Africa, has a peculiar race of bees. They are the same in size as the Cyprian and Syrian, but their colour is dark brown—even darker than the common Black or Brown. They are active workers, keep on the combs when being handled, and bear smoke better than other Eastern races ; but they are liable to attack a person coming near them, even though not interfered with.

VII.—Carniolan. The Carniolan bees are natives of Carniola, in South Austria. They are longer and thicker than the Black or Brown, being the largest domesticated European bee. The colour is a rich dark brown, nearly black, while each ring of the abdomen is clearly marked by whitish grey hairs giving it a silvery look. They are equal to Italians in honey gathering, fecundity, and hardiness, while they are of a most remarkably gentle disposition, never attacking the manipulator except when treated with improper roughness.

VIII.—Hungarian. The bees peculiar to Hungary are the size of, but far blacker than, the common Browns. They are very fair honey gatherers, and as gentle as Italians, but their propensity to swarm renders them unprofitable.

IX.—Egyptian. The Egyptian bees are like Syrians in size, but quite yellow like the Italians. They abound, both wild and in domestication, along the valley of the Nile, and while famed for good honey gathering qualities, are without exception the most ferocious bees known outside of India.

X.—South African. There is an excellent race of bees both wild and hived in the Cape Colony, which it is to be hoped will

soon be introduced to British beekeepers. They are the size and colour of Italians but greyer, while they are more tractable, and at the same time very prolific and of most remarkable working powers, where honey is to be gathered they keep at it early and late, and often even by moonlight.

Whilst all these races breed freely when crossed with each other, so that they cannot be regarded as separate species, they all differ in certain particulars, the most striking of which are noted above. The differences are, no doubt, the result of their being influenced by climatic surroundings, as well as, in some districts, of a long course of too close breeding.

Studying these ten varieties with the aid of the map of the world, it appears that the nearer India is approached so much fiercer is the temper of the bees found to be. The question then might arise, Was this the condition of the first original bee, and have her descendants, as they migrated into colder climes, lost some of that ferocity which renders the Indian bee the terror to all travellers through the woods of that continent?

A point which opens a wide field of study is the colour of several races, and what developed it, and how far it is to be taken as an index of common descent; thus dark-coloured races are found in north-west Europe, Hungary, Carniola, and Tunis, where they are wide apart from each other.

American bee-keepers have set before them the project of breeding bees by a judicious selection of queens and drones, with what they consider these six indispensable qualifications in bees kept for profit: 1, Hardy; able to bear bad winters without too great dwindling. 2, Good breeders; the queens laying in abundance, early in spring and late in autumn. 3, Gentle and quiet; not attacking mankind without provocation, and allowing themselves to be examined on a bar-frame comb when lifted from the hive. 4, Good honey-gatherers; working on the flowers from sunrise till sunset. 5, Strong and active; flying long distances to pasturage, and vigorously defending their stores. 6, Long tongued; being able to get honey from many flowers which defy most bees.

And, so far, intelligent bee-masters have been partially successful; indeed, there is every reason to expect that the honey-bee of the future will be as different from, and as much more valuable than, "the little busy bee" of the past, as an English Shorthorn excels an Irish brindled cow.

It is to be hoped that before the modern bee-breeders have obliterated the old distinct varieties, those who have the opportunities will make careful coloured drawings, measurements of queens, drones, and workers, and further observations of all their peculiarities. It will be too late to attend to this branch of natural history when *Apis Americana*, as we are told the new and improved bee of the "good time coming" is to be called, has taken possession of the hives of the world.

Both papers were listened to with great attention, and elicited an interesting discussion. Mr. Andrew's paper was well illustrated by a series of specimens, beautifully mounted on cards, and of parts of the various species set up for microscopic examination.

THE OLD NORTH GATE OF CARRICKFERGUS.

The SECRETARIES then announced that a most important matter had been brought under their notice, that was, that an effort was being made to have the only remaining gate—the old North Gate—of Carrickfergus removed. It was stated that the subject was brought forward at a late road presentment sessions for the district, and that it had apparently been approved of by the majority of that meeting. The matter still, however, required the confirmation of the Grand Jury of the county, and it was sincerely hoped the motion would not meet with their sympathy.

The Chairman and several members spoke with regret that such a thing as the removal of the "old gate" should be for a moment thought of, and the hope was expressed that the loyal inhabitants of the ancient borough would not allow such a sad event to take place, and that Carrickfergus would not be at variance with other ancient cities, whose worthy fathers were using every endeavour to preserve such remnants of architecture as still remained to remind them of their past honourable histories.

After considerable expression of feeling, the following resolution was proposed by Mr. W. H. PATTERSON, M.R.I.A. :— "That the Belfast Naturalists' Field Club have learned with regret that it is proposed to remove the old North Gate at Carrickfergus. They hope that arrangements may yet be made, without unduly sacrificing the public convenience, for the preservation of this interesting relic."

Mr. WILLIAM GRAY, M.R.I.A., in seconding the resolution, thought it hardly necessary to do so at such a meeting, of which the chairman and several other members were prominent and active members of the Royal Historical and Archæological Society of Ireland, and the tenor of which was so much in harmony with the objects for which the Club was originally founded.

The resolution having been passed by acclamation,

The CHAIRMAN hoped that the secretaries would see that it reached the proper quarter, and would be supported by a deputation, if considered necessary.

THE OLD CROSS OF DROMORE.

Another archæological subject was also brought forward—namely, the Old Cross of Dromore, County Down.

The SECRETARY read a letter which appeared in the *Banbridge Chronicle* of 6th January, to the effect that, the Dromore Town Commissioners having commenced building operations in the Market Square, the writer suggests that steps should be taken to restore the old cross, whose remains lie at the corner of the Market house. It is believed that the entire of the cross is available, and that, as it seems to have formerly stood in the square and been the silent witness of many stirring events associated with the history of ancient Dromore, the hope was sincerely expressed that so ancient a monument, to which many a more populous town would be glad to point visitors with pride, should no longer be allowed to continue in its present state of degradation. On two occasions when the Club visited Dromore the condition of the ancient cross was a subject of

deep regret ; and it would be with sincere pleasure, perhaps on a future excursion, that the members would look upon this interesting relic in a conspicuous and honourable position.

The CHAIRMAN, on taking the opinion of the meeting, instructed the secretaries to act as they thought best to secure this end, and the Board of Works was suggested as a body invested with powers to act in such matters.

The fifth meeting was held on Tuesday evening, 16th February, in the Museum, College Square—W. H. Patterson, Esq., M.R.I.A., president of the Natural History Society, in the chair—when a lecture was delivered by Mr. William Gray, M.R.I.A., entitled "A survey of the lower organic world on a frond of laminaria." Mr. Gray explained that the laminaria was one of the common olive sea-weeds found abundantly around our shores, and collected for manure or burnt for kelp. In its native element it formed a thick and tangled submarine forest, and as the forest trees on land support and protect various forms of animals and plants, so also the sturdy fronds of laminaria support and protect a great variety of marine organisms in such numbers as to form a little world in themselves. In describing this little world, Mr. Gray assumed that the entire organic world might be represented by a sphere, each half representing the animal and the vegetable kingdoms. His survey was to be of the lower portion of both, and assuming that the division of the animal and vegetable kingdoms represented areas, or more properly zones, he exhibited a map showing the relative positions of the several zones, and marked on the map the course of his survey. Commencing with the lowest zone of the vegetable kingdom, he described the sea-weeds as without stem or root, leaf or flower, and yet by their beautiful forms and colours they prefigured the higher forms of vegetable life. Having described the fructification of the sea-weed he went on to describe the diatoms, a division of the algæ, which were simple plants, and yet were composed of glass or

flint, had the power of motion, were to be collected everywhere, and although so extremely small, were of the most beautiful forms, and so varied in character as to furnish an endless store of subjects for the ornamental designer. Limelight illustrations were thrown upon the scene, and one diatom, a type of the class, was shown enlarged some 15,000 times, and displayed a most elaborate and beautiful design. To enlarge a penny in the same proportion would form a disc one third of a mile in diameter.

Mr. Gray then described the amœba, the lowest form of animal life, and its relation to the Foraminifera, the minute and beautiful shells of which are found along our coast, and of which our limestones are almost entirely composed. Advancing higher, Mr. Gray described the hydra, and the very extensive variety of the same group that live along our coast, and so often taken for seaweed. They were, indeed, plant-like colonies of minute polyps, a colony of hundreds forming a beautiful plant-like organism not more than one inch in height. Examples of these were thrown on the screen, and a great variety of preserved specimens were on the table. Minute as these lovely organisms were, Mr. Gray explained that the jellyfish, so very common in our lough, represented only a stage in the development of the minute hydrozoa. Passing on to the starfish and sea urchins, Mr. Gray explained their relationship, their strange characters, and their occurrence in our locality. Even the sea-worms he discussed, and illustrated on the screen, completing his survey with a description of the polyzoa and shellfish. Mr. Gray concluded his highly-instructive lecture amid applause. During its delivery he was frequently applauded for his happy similes, while his lantern illustrations were perhaps the most satisfactory ever brought before the Club. Some were actual specimens mounted as slides, but most of the illustrations were his own photographs of microscopic organisms enormously enlarged. The photos of diatoms—the lowest and most minute and lovely groups in the vegetable kingdom—were especially remarkable for their sharpness and definition.

The Chairman, on rising, congratulated the audience on being favoured with such an interesting run through the lower organic world, and said that frequently distinguished men were brought to Belfast from a distance to lecture, but he was compelled to admit that he had never attended so instructive and so well illustrated a lecture as the one that had been just delivered. Several other members spoke in very complimentary terms of both the lecture and the manner in which it was brought forward.

An election of new members and the examination of the extensive series of specimens on the table concluded the meeting.

ANNUAL MEETING.

THE twenty-third annual meeting was held on 21st April, in the Museum, College Square. The President (Rev. Canon Grainger, D.D., M.R.I.A.) occupied the chair. There was a good attendance of the more active members, and a hearty interest was evinced in the business of the evening.

The PRESIDENT, on opening the meeting, called on the Hon. Secretaries for their Annual Report of the Committee, of which the following is a summary :—

Your Committee, in again meeting you at the close of another year, have the pleasure of reporting a continuance of the prosperity which has marked the Club's history from its commencement. The Summer Session may be considered to have been a successful one, the usual number of excursions having been held, and the localities selected proved suitable for furthering the Club's aims and objects. It is to be regretted that the unfavourable weather, on the occasion of the "long excursion" to the Mourne Mountains, prevented the full programme from being carried out. Much good work was, however, done on the excursion, as may be seen from the report of the conductor.

A sub-committee having been appointed at the last annual meeting to make arrangements—if found practicable—for carrying out a dredging excursion in the lough, that excursion took

place on June 23rd, and proved successful, 54 members and friends joined, and it is very satisfactory to state that only a few shillings of the £5 granted from the funds of the Club were required. A full report of this, as well as of other excursions, appeared in the local papers, and will be found embodied in the volume of Report and Proceedings for the year. Advantage was taken of the delay in issuing the Proceedings for 1884-85 to embody in it a list of the Foraminifera of that cruise by Mr. Joseph Wright, F.G.S., and also a list of the Ostracoda then obtained by S. M. Malcomson, M.D. Both these lists are illustrated with plates, and form valuable contributions to our knowledge of local natural history.

The winter session was opened by a social meeting, and in addition five ordinary meetings were held, at which seven distinct communications were brought forward. The Secretaries, also, at one of the meetings brought under the notice of the members, the fact, that an effort was being made to have the Old North Gate at Carrickfergus removed. The unanimous feeling of the meeting was that the Club would much regret the removal of such an interesting archæological relic, and the Secretaries were instructed to convey to the Grand Jury of the town and county of Carrickfergus the sense of the meeting, as expressed in the resolution then passed. This was done, and it is gratifying to know that the gate is for the present safe, but the question of its removal may at any time be revived. Your Secretaries having learned that the Old Cross of Dromore, County Down, which has for a long time remained in a neglected state, was likely to be removed from its site on the rebuilding of the Market House, brought the matter before the same meeting, on which they were instructed to write the Dromore Town Commissioners, expressing a hope that the opportunity would be taken advantage of, to have the cross restored, and erected on a suitable site. Your Secretaries learned, in reply, that such was the intention of the Commissioners, and that the question of a proper site was under consideration.

During the Winter Session, seven communications were brought forward on local subjects, at which the attendance was good. The number of members on the roll shows a slight falling off from the previous year, the new members elected scarcely balancing the loss by death and removal.

Among those lately removed by death your Committee have to record the loss which the Club has sustained in the death of the Rev. Canon MacIlwaine, D.D., M.R.I.A., a gentleman who ever took a deep interest in the Club's pursuits, and who was ever ready to assist and encourage the younger members in their studies and researches. A resolution was brought forward at one of your meetings, expressing the feelings of the Club, copies of which were forwarded to members of Canon MacIlwaine's family.

Your Committee also regret to have to record the death of the Rev. Canon Graves, D.D., M.R.I.A., of Kilkenny, who was for many years a corresponding member of your Club. Dr. Graves' contributions to the early history and archæology of Ireland are everywhere well known and appreciated. One of the founders of the Kilkenny Archæological Society—whose transactions are such a storehouse of Irish antiquarian information—he was, from its origin in 1849, till his death, its honorary secretary, and editor of its numerous publications. This arduous task, however, did not prevent him compiling the several most valuable works which bear his own name. Canon Graves' labours were valued and recognised by the Government, and on their account, during the latter part of his life, he enjoyed a small pension from the Civil List, which it is to be sincerely hoped will be continued to his family.

Your Committee have also to lament the death of Mr. Henry Knight, who was early connected with the Club, but who, though for several years previous to his death, residing in England, never lost his strong interest in your work. Mr. Knight's speciality was the study of mosses and microscopic manipulation, and he did much to stimulate these sections of the Club's work.

Your Committee avail themselves of this opportunity of expressing their thanks to all who in any way contributed to the success or pleasure of the excursions during the past year, and would especially name John Jellie, Esq., J.P., for his kindness and hospitality on the excursion to Woodburn ; to Hugh Montgomery, Esq., D.L., for liberty to visit the grounds and interesting ruins of Greyabbey ; and to Wm. Dawson, Esq., J.P., for permission to hold a fungus foray in the wooded grounds of Rademon.

Your Committee would also express their warm thanks to Lancelot Turtle, Esq., J.P., for the comprehensive summary of meteorological observations and monthly weather notes which form part of your Proceedings. There will also be found embodied in your Proceedings a voluminous appendix on four distinct subjects, two of which, as before stated, arise out of the dredging cruise of the Protector. These are by Messrs. Wright and Malcomson. Mr. Wright also contributes an additional list of the Cretaceous Microzoa of the North-East of Ireland. Mr. S. A. Stewart, F.B.S., Edin., edits a list of Coleoptera made by the late Robert Patterson, Esq., F.R.S. ; and Rev. H. W. Lett, M.A., T.C.D., furnishes a list of the Fungi of Antrim and Down. This latter is, perhaps, the most complete made from any Irish locality. It will, therefore, be evident that this appendix forms an important addition to the volume in progress upon the fauna and flora of Ulster.

Your Committee have also to report that albums have been purchased for the insertion of photographs of antiquities, natural history, and general scenery of Ireland, and would take this opportunity of requesting members to favour the Club with copies of such photographs as may be suitable.

The Treasurer's report was next read, which, though showing a smaller balance than the preceding year, exhibited a very prosperous financial position. The decrease was due in a great measure to the extra expense incurred on the Proceedings referred to in the Secretaries' report, which is considered well-spent money.

The awards of the judges appointed to examine the collections submitted in competition for the Club's prizes were next read. They were briefly as follow :—Mr. R. Ll. Praeger, B.A., was awarded the first prize for a collection of flowering plants, numbering 475 named species, among which are examples of some of our rarest forms. Mr. D. Redmond was awarded the second prize for a collection numbering 257 species ; Mr. John J. Andrew was awarded the prize for the best collection of mosses ; Mr. D. M'Kee, for a fine set of Carboniferous fossils, chiefly fish remains, from Armagh ; Mr. C. Bulla gained the prize for land and freshwater shells ; Mr. Glen carried off the prize for the best set of microscopic slides, although followed hard by a set sent in by Mr. D. M'Kee ; Dr. S. M. Malcomson gained the prize for the best set of fungi made during the season. Altogether, the interest in the prize list was highly praiseworthy, and the standard of the various collections was very high.

The election of officers was next proceeded with, Canon Grainger being unanimously re-elected President, and Mr. Hugh Robinson Vice-President, for the ensuing year. It is most gratifying to note that these gentlemen, on entering upon the twenty-fourth year of the Club's history, have both sustained a hearty interest in its pursuits from its infancy, the President having referred with pardonable pride to the fact that he was Chairman at the first Club meeting. The Hon. Secretaries and Treasurer were also re-elected, as was also the Committee, with some slight changes.

The meeting then became more conversational, and suggestions were invited tending to the advancement of the Club's aims, and to suitable places for next summer's excursions. Many tempting places were named. The final settlement, however, of this important point rests with the new Committee.

The PRESIDENT stated that the meeting was honoured by the presence of — Kane, Esq., M.R.I.A., of Kingstown, an ardent lepidopterist, who was most anxious to see something of the working of the Club, being deeply interested in a similar

society just started in Dublin on rules founded on the lines of the premier Field Club of Ireland—the Belfast Naturalists' Field Club.

Mr. KANE, on being invited to the platform, paid a very high compliment to the Belfast Club for the amount of good work the members have accomplished, and for the hearty spirit which pervaded their meeting, and proceeded to point out the great importance of carefully and fully recording natural history facts and discoveries, more especially in the formation of lists and collections, much patient work having recently come under his notice which has been rendered valueless by the reception of specimens from sources admitting of error or doubt, or by imperfect or misplaced labels.

An examination of the collections submitted for the prizes, and the election of nine new members, concluded a very interesting meeting.

METEOROLOGICAL SUMMARY FOR 1886.

To the kindness of LANCELOT TURTLE, Esq., J.P., Aghalee, we are again indebted for the following exhaustive tables, giving a summary of meteorological phenomena for the year 1886, and accompanying monthly notes.

The observatory at which the records are made is situate at Aghalee, in the extreme southern point of the County of Antrim, at an elevation of 130 feet above sea-level. The country to the west is flat, and very little above the level of Lough Neagh, which is $2\frac{1}{2}$ miles distant in that direction, and to other points the country is gently undulating and well wooded. The nearest mountains are those surrounding Belfast, distant about 12 miles east, while the Tyrone Mountains are about 25 miles west. The nearest point of sea is the upper end of Belfast Lough, while the open sea may be said to be about 20 miles east of the observatory.

REVIEW OF THE WEATHER.

METEOROLOGICAL Observations for the year 1886, taken at Aghalee, County Antrim. Latitude, 54° 31′ 15″ N.; Longitude, 5° 16′ 0″ W.

1886.	BAROMETER 130 Feet above Sea Level. Corrected and Reduced to 32 degrees Fahrenheit and mean Sea Level.				SELF-REGISTERING THERMOMETERS in a "Stevenson" Stand.							Nights below 32 Deg. on the grass.	Maximum Black Bulb in vacuo, 4 feet above grass.	Mean Amount of Solar Radiation.	HYGROMETER at 9 a.m.	
	Max.	Min.	Mean.	Range.	Highest of the Month.	Lowest of the Month.	Mean Maximum.	Mean Minimum.	Mean Temperature of the Month.	Greatest daily Range.	Monthly Range.				Mean of dry Bulb.	Mean of wet Bulb
	Inches.	Inches.	Inches.	Inches.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.					
January.....	30·219	28·925	29·626	1·294	52	16	40·58	32·00	36·27	23	36	17	80	20·42	37·8	36·0
February.....	30·543	29·207	30·021	0·336	50	23	42·68	33·40	38·04	18	27	14	86	29·32	38·8	37·2
March	30·415	29·000	29·664	1·415	62	19	45·74	34·06	39·90	27	42	17	114	36·06	41·6	39·6
April.....	30·568	28·998	29·558	1·570	64	25	54·23	37·20	45·71	34	17	7	120	44·90	45·6	42·5
May.....	30·301	29·038	29·670	1·293	70	29	56·89	42·70	49·70	34	41	3	124	40·51	49·9	47·5
June	30·264	29·558	29·911	1·706	80	38	63·67	47·70	55·68	30	42	0	137	50·85	55·8	53·3
July	30·277	29·288	29·782	0·489	85	40	67·84	52·00	59·92	25	45	0	139	50·90	59·5	56·3
August.....	30·241	29·370	29·800	0·862	73	43	66·94	51·58	59·26	24	30	0	135	45·86	58·4	55·2
September...	30·547	29·332	29·939	1·215	71	33	62·36	47·00	54·67	29	38	0	121	46·17	55·5	52·2
October.....	30·426	28·622	29·524	1·804	63	31	56·03	44·74	50·39	22	32	1	108	30.52	51·0	49·0
November....	30·739	29·136	29·937	1·603	55	32	49·46	39·86	44·67	21	23	4	98	29·00	45·2	43·4
December...	30·457	27·452	29·500	3·015	52	10	40·00	29·42	34·30	21	54	18	85	26·00	37·1	35·4
Totals.....	364·997	347·926	356·932	16·602	777	339	646·42	491·66	568·51	308	427	81	1347	450·51	576·2	547·6
Means.....	30·416	29·000	29·744	1·383	64·7	28·2	53·87	40·97	47·37	25	35	7	112	37·54	48·0	45·6

Review of the Weather.—*Continued.*

1886.	Dew Point.	Comparative humidity Saturation—100—	Elastic Force of Vapour.	Mean Amount of Ozone.	WIND. Number of Days on which the Wind blew from the following points at 9 a.m.									RAINFALL. Gauge—Diameter of Receiver, 5in.; height above the ground, 1 foot; height above sea, 105 feet.			
					N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Total depth in inches.	Greatest fall in 24 hours. Inches.	Greatest fall in 24 hours. Date.	Number of days rain.
		Per Cent.	Inches.														
January.....	33·5	84	0·192	7·1	4	1	4	2	0	4	8	4	4	3·00	0·59	12th	28
February.....	35·2	86	0·204	7·1	1	3	5	3	6	4	3	1	2	2·46	0·56	12th	19
March.....	35·9	78	0·212	7·0	3	2	8	4	4	1	5	0	4	2·71	0·50	27th	17
April.....	38·9	78	0·238	8·2	4	2	7	3	1	2	6	3	2	1·18	0·20	2nd	11
May.....	45·0	84	0·289	9·3	5	2	4	4	5	0	4	4	3	3·65	0·94	11th	19
June.....	51·0	85	0·375	9·5	7	0	2	1	2	2	9	4	3	1·36	0·31	12th	11
July.....	53·5	81	0·410	8·5	2	1	0	3	2	3	10	6	3	3·31	0·55	14th	21
August.....	52·3	81	0·394	7·3	2	0	1	2	7	3	7	2	7	2·42	0·56	6th	15
September...	49·0	80	0·349	7·8	1	1	7	2	3	4	8	2	2	3·25	0·55	13th	18
October.....	45·9	86	0·323	7·0	4	2	4	1	7	1	6	0	6	3·77	0·78	15th	21
November...	41·4	87	0·260	7·0	4	0	2	0	5	3	3	6	7	2·70	0·45	14th	17
December....	33·0	77	0·118	6·5	4	0	2	1	2	1	7	6	8	4·00	0·57	21st	22
Totals.....	514·6	987	3·364	92·3	41	14	46	26	45	28	76	38	51	34·61			219
Means.....	42·9	82	0·208	7·7	8	1	5	4	9	6	10	8		Direction of Wind on calm days.			

Review of the Weather—*Continued.*

Comparison of Annual Temperatures.

Thermometers Shaded.

	Highest Degrees.		Lowest Degrees.		Mean Temperature Degrees.
1869	82	on the 17th July	15	on the 28th Dec.	48·80
1870	86	„ 10th Aug.	5	„ 24th Dec.	48·68
1871	80	„ 8th Aug.	19	„ 15th Dec.	48·98
1872	77	„ 18th July	23	„ 30th Dec.	49·05
1873	81	„ 22nd July	15	„ 24th Feb.	48·52
1874	84	„ 18th July	20	„ 17th Dec.	49·31
1875	77	„ 29th July	22	„ 9th Dec.	49·43
1876	94	„ 16th July	20	„ 20th Feb.	48·84
1877	79	„ 20th June	25	„ 19th Mar.	48·94
1878	84	„ 22nd July	10	„ 25th Dec.	48·54
1879	81	„ 11th Aug.	14	„ 12th Jan.	45·51
1880	83	„ 12th Aug.	17	„ 21st Dec.	48·82
1881	83	„ 31st May	4	„ 22nd Jan.	47·28
1882	85	„ 10th Aug.	11	„ 14th Dec.	48·67
1883	75	„ 24th Aug.	20	„ 15th Nov.	48·00
1884	84	„ 28th June	22	„ 20th Dec.	49·06
1885	82	„ 24th July	19	„ 11th Dec.	47·49
1886	85	„ 1st July	10	„ 20th Dec	47·37
	1482		291		871·29
Mean	82·33		16·17		48·40

Comparison of Annual Rainfall.

	Inches.	No. of Days Rain.		Inches.	No. of Days Rain.
1869	28·82	181	1880	30·11	150
1870	28·86	170	1881	36·49	201
1871	30·18	176	1882	39·59	219
1872	47·09	222	1883	31·92	176
1873	31·94	178	1884	32·51	195
1874	30·03	170	1885	26·31	172
1875	33·63	172	1886	34·61	219
1876	38·83	174			
1877	41·68	229		607·72	3361
1878	30·02	175			
1879	35·60	182	Mean	33·76	187

1886 { Mean temperature, 1·03 deg. below the average of 17 years.
Maximum temp. 2·82 „ above „ „
Minimum temp. 6·53 „ below „ „
Rainfall 0·90 in. above „ „

Lancelot Turtle.

MONTHLY NOTES.

JANUARY was remarkably changeable, though cold had on the whole a decided predominance. Changes of frost and thaw, of snow and rain, were so rapid that change itself remains the one certain characteristic by which to describe January. The barometer on the 17th fell to 28·80 inches, but no special weather resulted on that or the following days. There were frequent and heavy snowstorms, and only one gale of high wind.

FEBRUARY.—The cold weather with which January departed continued till the 7th of this month, then became milder, and closed with renewed snowstorms and biting east wind.

MARCH began with a memorable snowstorm, and for three days the local mail-car did not deliver the mails. The snow was followed by frost, and bitterly cold weather continued till the 9th, when a sudden change transported us at once from the snows of winter to the warmth of spring. No finer or milder weather probably ever was seen here at this season than that of the following seven days; but on the 28th we were again plunged into the depths of winter, and the month ended with snow showers and a gale of wind.

APRIL.—Easterly and northerly winds obtained the mastery, and from the 6th to the 12th it was very cold. There was a period of spring-like warmth at the close of the month, but April nearly all through was bleak and bare. Swallows seen on the 10th, landrail heard on the 16th, and the cuckoo on the 23rd. All a few days earlier than last year. Hawthorn bursting into leaf on the 11th, chestnut on the 18th, and willow on the 29th. Willow four days, hawthorn three days, and chestnut one day later than in the previous year.

MAY.—A wet and cold May, the rainiest we have had for a long time, and May is usually one of the driest months of the year. A very noticeable wave of cold passed over on the 12th. Snow lay on the ground in considerable quantity, and large numbers of swallows perished in the cold. Poor little wanderers, they had an inhospitable reception this spring. It is usual to associate May with growing warmth and brightness, but a temperature of 27 degrees gives quite another aspect to a spring morning.

JUNE was far from being a warm summer month. It was almost two degrees below the average warmth, with a cold period of two or three days between the 13th and 15th. Rainfall and number of wet days less than the mean. Cuckoo heard on the 27th.

July.—June ended and July came in with brilliant sunshine. It began with the promise of great summer heat, but failed to keep that promise. The highest figures touched were 85 degrees on the 1st and 81 degrees on the 2nd. These two days were also the days of greatest heat of the year. The deep springs were lower than is usual for this month of the year, which is curious considering the heavy rainfall which we had in May, and June only one inch below the average.

August did not promise much warmth to begin with, but closed with delightful summer weather. In the South of England the month ended with scorching summer heat.

September.—A fine and seasonable month. Second and third weeks rather cold in consequence of a continuance of E. and N.E. winds. Maximum temperature three degrees below the average. Mean temperature 0·27 degree below the average, and rainfall also slightly less than the mean.

October continued the mild autumn weather with which September ended, and the mean temperature was 2 degrees above the average; the first month in the year having an excess of average heat. Swallows last seen in this neighbourhood on the 17th, but nearly all left on the 11th.

November came in with change of colour, and the beautiful tints of autumn everywhere apparent. It had more than the average sunshine, and only two frosty nights. The mean temperature was 2·12 degrees in excess of the average. October and November were the only two months of this year which had more than the average heat. November had the highest barometer of the year—30·739 inches on the 24th.

December.—Violent fluctuations of the barometer, floods and snowstorms, marked the course of December. It had on Wednesday, the 8th, a large, deep, and very important atmospheric depression, with readings as low as 27·452 inches (sea level, and 32 degrees). Wind south at lowest time of pressure, and at the force of half a gale. It is the lowest barometer on record for this country, yet there was nothing unusual—locally—in the force of the wind. Rain and snowfall almost 100 tons to the acre in excess of the average.

1886, all the year through, excepting October and November, there has been less than the average warmth, and less than the average light, with the number of calm days in excess of the mean. Mean temperature of the whole year 0·12 degree lower than 1885, and 1·10 degree below the average of seventeen years. The gauge of rainfall exceeded that of last year by 8·30 inches, with an increase of 47 wet days, and exceeded the seventeen years average by 0·90 inch, with an excess of 34 wet days. The year came in and ended with the rainiest months of 1886.

Lancelot Turtle.

RULES

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "The Belfast Naturalists' Field Club."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that Candidates for such Membership shall be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of the Votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club, and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be

eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological researches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition af twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursion to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expenses incurred, except by the consent of the majority of the members present.

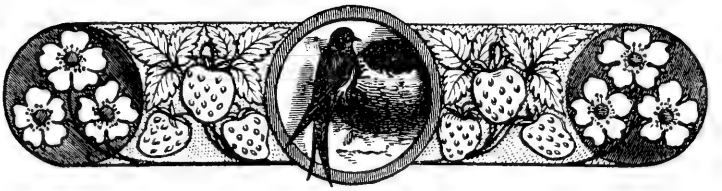
V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB

TWENTY-FOURTH YEAR.

THE Committee offer the following Prizes to be competed for during the Session ending March 31st, 1887:—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species,	...	0	10	0
III.	Best Collection of Mosses, ...	...	0	10	0
IV.	„ „ Lichens, ...	...	0	10	0
V.	„ „ Seaweeds, ...	...	0	10	0
VI.	„ „ Ferns, Equiseta, and Lycopods, ...	...	0	10	0
VII.	„ „ Tertiary and Post Tertiary Fossils,	...	0	10	0
VIII.	„ „ Cretaceous Fossils,	...	0	10	0
IX.	„ „ Liassic do.,	...	0	10	0
X.	„ „ Permian and Carboniferous Fossils,	...	0	10	0
XI.	„ „ Older Palæozoic do.,	...	0	10	0
XII.	„ „ Marine Shells, ...	...	0	10	0

XIII.	Best Collection of Land and Freshwater Shells, ...	...	0	10	0
XIV.	„ „ Lepidoptera ...	...	0	10	0
XV.	„ „ Hymenoptera, ...	...	0	10	0
XVI.	„ „ Coleoptera, ...	...	0	10	0
XVII.	„ „ Crustacea and Echinodermata, ...	...	0	10	0
XVIII.	Best Set of 24 Microscopic Slides, ...	...	0	10	0
XIX.	6 Best Field Sketches appertaining to Geology, Archæology, or Zoology, ...	...	0	10	0
XX.	Best Collection of Fungi; names of species not necessary. Collectors may send (Post-paid, from time to time during the season) their specimens to Rev. H. W. Lett, M.A., T.C.D., Loughbrickland, who will record them to their credit, ...	...	0	10	0
XXI.	Best Collection of Fossil Sponges, ...	...	0	10	0

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

SPECIAL PRIZES.

XXII. The President offers a Prize of £1 1s. for the best set of three or more original sketches, to be placed in the album of the Club. These may be executed in pen and ink, or water colour, and must illustrate one or more ancient monuments somewhere in Ireland. In determining the relative merits of the sketches accuracy in representing the subjects and their details will have chief place.

XXIII. Mr. William Swanston, F.G.S., offers a Prize of 10s. 6d. for the best Two Studies, illustrative of Geology, contributed to the Club's Sketch Album. The subjects must be from nature, and may be either in the form of Drawings or Measured Sections. Size not to exceed 15 x 9 inches.

XXIV. Lieut-General Smythe, R.A., F.R.S., M.R.I.A., &c., offers a Prize of £1 1s. for the best list of names of places in the Counties of Antrim and Down (not hitherto published) giving their Irish meaning and derivation, on the plan of Dr. Joyce's "Irish Names of Places."

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same Prize twice within three years.

A member to whom Prize 1 has been awarded shall be ineligible to compete for Prize 2.

All collections to be made personally during the Session, in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Sketches, Drawings, and Microscopic Slides to be the Competitors' own work.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.

NOTICE.

EXCHANGES OF PROCEEDINGS.

The Committee of the Club acknowledges with thanks the receipt of the following publications, which have been received during the past year from the various societies and institutions :—

Amiens—Société Linneeane du Nord de la France.
Memoirs, 1884-85, Tome VI.
Bulletin, Tome VII., Nos. 139 to 162.

Belfast Natural History and Philosophical Society.
Proceedings, 1885-86.

Belfast Society for Promoting Knowledge.
Catalogue of early Belfast Printed Books, No. 1, from A.D. 1694 to 1751.

Berwickshire Naturalists' Club.
Proceedings. Vol. XI., No. 1.

Brighton and Sussex Natural History Society.
Annual Report for 1885, and for 1886.

Bristol Naturalists' Society.
Proceedings, New Series. Vol. V., Part 1.

Cardiff Naturalists' Society.
Report and Transactions. Vol. VII., 1885.

Dublin Naturalists' Field Club.
Rules, and List of Original Members.

Dublin Geological Society of Ireland.
Journal. Vol. VI., Part 3. Vol. VII., Part 1.

Dublin Royal Irish Academy.

Transactions—Polite Literature and Antiquities. Vol. XXVII. Nos. 6, 7, 8.

,, Science. Vol. XXVIII., Nos. 21 to 25.

,, Cunningham Memoirs. Nos. 2 and 3.

Proceedings—Science. Series II., Vol. IV., No. 5.

,, Polite Literature and Antiquities. Series II., Vol. II., No. 7.

Edinburgh Botanical Society.

Transactions and Proceedings. Vol. XVI., Part 2.

Essex Field Club.

Journal and Proceedings. Vol. IV., Part 1.

Transactions. Vol. IV., Part 1.

Glasgow Natural History Society.

Proceedings and Transactions. Vol. I., Part 2, New Series, and Index, Vol. I. to V.

Hertfordshire Natural History Society, and Field Club.

Transactions. Vol. III., Parts 7, 8, and 9, and Vol. IV., Parts 1, 2, 3.

Huddersfield Naturalists' Society.

Annual Report, 1885.

Liverpool Geological Association.

Transactions. Vol. V., 1884-85.

Liverpool Geologists' Society.

Proceedings. Vol. V., Part 2.

London Geologists' Association.

Proceedings. Vol. IX., Nos. 4, 5, 6, 7.

Manchester Field Naturalists' and Archæologists' Society.

Report and Proceedings, for 1884, and for 1885.

Manchester Microscopical Society.

Annual Report, 1885.

New Brunswick Natural History Society.

Bulletin. Vol. V.

Plymouth Institution and Devon and Cornwall Nat. Hist. Soc.

Annual Report and Transactions. Vol. IX., Part 2.

Toronto Canadian Institute.

Proceedings. Vol. XXI., Nos. 144, 145, and 146.

,, 3rd Series, Vol. III., Fasc. No. 4.

U.S.A.—American Association for the Advancement of Knowledge.

Twenty-third Meeting, 1884, Parts 1 and 2.

U.S.A.—Boston Society of Natural History.
Proceedings. Vol. XXIII., Part 2.
,, California Academy of Sciences.
Bulletin. No. 4.
,, Essex Institute.
Bulletin. Vol. XVII., Nos. 1 to 12.
,, Geological Survey.
Fifth Annual Report.
,, Milwaukee Public Museum.
Annual Report, 1885.
,, Minnesota—Geological and Natural History Survey.
Final Report. Vol. I.
,, New York—American Museum of Natural History.
Bulletin. Vol. I., Nos. 7 and 8; and Annual Report.
,, New York Academy of Sciences.
Annals. Vol. III., Nos. 7 to 10.
Transactions. Vol. III., and Vol. V., Nos. 1 to 6.
,, New York Microscopical Society.
Journal. Vol. I., Nos. 8 and 9.; Vol. II., Nos. 1 to 8.
,, Philadelphia Academy of Sciences.
Proceedings. Parts 1, 2, and 3.
,, Salem—Peabody Academy of Sciences.
Annual Report, 1886; and Memoirs, Vols. I. and II.
,, Washington Smithsonian Institution.
Annual Report, 1884.
,, Trenton, N. J.
Journal. Natural History Society, Vol. I., No. 1.
Warwickshire Naturalists' and Archæologists' Field Club.
Proceedings, 1885.
Yorkshire Naturalists' Union.
Transactions. Parts 1 to 9.

The following were received from the Authors:—
By John C. Branner, Esq., Ph.D.
Glaciation of Wyoming and Lackawanna Valley.
By Joseph Ewart, Esq., M.D.
Louis Pasteur—His Life and Work.

BELFAST NATURALISTS' FIELD CLUB.

TWENTY-FOURTH YEAR, 1886-87.

LIST OF OFFICERS AND MEMBERS.

President:
REV. CANON GRAINGER, D.D., M.R.I.A., F.G.S.I.

Vice-President:
HUGH ROBINSON.

Treasurer:
JOSEPH WRIGHT, F.G.S.

Secretaries:
WM. SWANSTON, F.G.S. | F. W. LOCKWOOD.

Committee:

CHARLES BULLA.
W. A. FIRTH.
WILLIAM GRAY, M.R.I.A.
REV. H. W. LETT, M.A., T.C.D
S. M. MALCOMSON, M.D.
DANIEL M'KEE.
WM. H. PATTERSON, M.R.I.A.
R. Ll. PRAEGAR, B.A.
S. A. STEWART, F.B.S., EDIN.
JOHN VINYCOMB.

Members.

Any Changes in the Addresses of Members should be notified to the Secretaries.

Edward Allworthy, Langford Villas.
John Anderson, J.P., F.G.S., Hillbrook, Holywood.
Robert Anderson, Meadowlands.
Rev. John Andrew, Belgravia, Lisburn Road.
John J. Andrew, L.D.S., R.C.S., Eng., Belgravia, Lisburn Road.
Samuel Andrews, J.P., Seaview.
Mrs. Andrews, Seaview.

James M. Barkley, Mountpottinger.
Robert Barklie, Holywood.
James Barr, Sandringham.
William Batt, Ormeau Road.
Miss Emma Beck, Old Lodge Road.
Geo. R. Begley, Wolfhill, Ligoniel.
E. H. Bell, Knockdara, Strandtown.
George E. Bell, Wellington Park.
James Best, Great Victoria Street.
Francis J. Biggar, Airdrie, Antrim Road.
Edward Bingham, Ponsonby Av.
D. A. Black, Wellington Place.
Davys Bowman, University Street.
William Thomas Brand, Florida, Killinchy.
Hugh B. Brandon, Oceanic Avenue.
Chas. H. Brett, Gretton Villa South.
Rev. John Bristow, M.A., St. James' Parsonage.
James A. Brown, Wilmont Place.
John Brown, Edenderry House.
Robert Brown, Donaghmore.
Thomas Brown, Rosemary Street.
Thomas Brown, Donegall St.
John Browne, J.P., Ravenhill.
John Browne, M.R.I.A., Drapersfield, Cookstown.
W. J. Browne, M.R.I.A., Omagh.
W. W. Brydon, Silverstream House, Greenisland.
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
John R. Burnett, Martello House, Holywood.
William Campbell, Allworthy Av.
John Carey, Claremont Street.
Joseph Carey, Claremont Street.
Miss Carruthers, Claremont Street.
John Carson, Church Lane.
E. T. Church, Donegall Place.
William Clibborn, Windsor Terrace.
Sir Edward Coey, D.L., Merville.
David Corbett, J.P., Hope House.
W. F. C. S. Corry, Chatsworth.
Rev. W. Cotter, D.D., Riversdale Terrace.
Elisha Crawford, University Road.
James Creeth, Riversdale Terrace.
Robert Culbert, Distillery Street.
Samuel Cunningham, Glencairn.
Francis Curley, Dunedin.
Mrs. Curley, Dunedin.

John H. Davies, Glenmore Cottage.
Henry Davis, Percy Street.
Robert Day, F.S.A., M.R.I.A., Cork.
E. O'Rorke Dickey, Castleton Ter.
Rev. John Dickson, Ballycarry.
Wakefield H. Dixon, Dunowen.
George Donaldson, Church Street.
John Donaldson, Eglinton Street.
Right Hon. Lord Dufferin and Clandeboye (Hon. Mem.).

David Elliott, Albert Bridge Road.
Lavens M. Ewart, J.P., Glenbank.

John Fagan, M.D., F.R.C.S., Glengall Place.
William Faren, Mountcharles.
Stephen Feary, Cameron Street.
W. J. Fennell, Chichester Street.
Godfrey Ferguson, Fisherwick Pl.
J. H. Ferguson, Belgrave, Knock.
Joseph Firth, Whiterock.
W. A. Firth, City View Terrace.
Thomas J. G. Fleming, Limavady.
T. M. H. Flynn, Sunnyside, Bessbrook.
Rev. G. Foster, Albertville.
Thomas Fraser, Wellington Park.

J. Starkie Gardner, F.G.S., F.L.S., M.G.S.France, Chelsea (Hon. Mem.).
W. J. Gilmore, Clanchattan House.
R. M. Gilmore, Coleraine.
Wm. Gilmour, Diamond, Coleraine.
D. Corse Glen, F.G.S., Glasgow.
George J. Glen, Stranmillis Road.
William Goodwin, Queen Street.
Rev. David Gordon, Downpatrick.
James J. Goskar, Carlisle Circus.
James Gourley, J.P., Derryboy, Killyleagh.
Robert Graham, Cliftonville.
Rev. Canon Grainger, D.D., M.R.I.A., &c., Broughshane, (Hon. Mem.)
William Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
Edward Gregg, Claremont Street.
Miss Sara T. Greer, Seville Lodge, Strandtown.
George Greer, Woodville, Lurgan.

W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Rev. T. Hamilton, M.A., Brookvale House.
Ernest Hanford, India Street.
Richard Hanna, Perth Street.
Mann Harbison, Ravenhill Terrace.
Rev. Canon Hartrick, A.M., The Rectory, Ballynure.
James H. Haslett, J.P., Princess Gardens.
Rev. Canon Hayes, Dromore.
W D. Hazelton, Cliftonville.
F. A. Heron, Clermont, Holywood.
Mrs. Heron, Clermont, Holywood.
James Hogg, York Street.
J. S. Holden, M.D., F.G.S., Sudbury, Suffolk (Cor. Mem.).
Thomas Holden, Royal Avenue.
John Horner, Cliftonville.
Alexander Hunter, Northern Bank.
Wm. J. Hurst, J.P., Drumaness, Lisburn.
Rev. Henry Hutchings, Kilclooney Rectory, Markethill.

James Imrie, Fitzroy Avenue.
Rev. Richard Irvine, D.D., Hampton, Windsor.

H. Jamison, Duncairn Terrace.
John Jellie, J.P., Farmhill House, Carrickfergus.
James Johnston, West Elmwood.
James Johnston, Whitehouse.
W. J. Johnston, J.P., Dunesk, Stranmillis.

John Kane, B.A., Crown Entry.
W. Kennedy, Crescent Terrace.
William Kernahan, Antrim Terrace.
George Kidd, Lisnatore, Dunmurry.
W. J. Knowles, M.R.I.A., Flixton Place, Ballymena.
Robert A. Kyle, Richmond.
W. W. Lamb, Chichester Avenue.
Prof. Charles Lapworth, F.G.S., Mason College, Birmingham (Hon. Mem.).
F. R. Lepper, Avonmore.
Rev. H. W. Lett, M.A., T.C.D., Aghaderg Glebe, Loughbrickland.
F. W. Lockwood, Wellington Park.
James Logan, Donegall Street.
W. B. Lowson, Chichester Park.
H. Waldemar Luther, M D., Chlorine House.

John Mackenzie, Balmoral.
Henry Magee, Eglantine Avenue.
Rev. J. J. Major, Bright.
Greer Malcomson, Fitzroy Avenue.
Jas. Malcomson, Rosemount, Knock.
Mrs. Malcomson, Rosemount, Knock.
S. M. Malcomson, M.D., Great Victoria Street.
John Marsh, Glenlyon, Holywood.
Mrs. Marsh, Glenlyon, Holywood.
Joseph C. Marsh, Castleton Terrace.
——— Marshall, Atlantic Avenue.
Rev. James Martin, Eglintoun, Antrim Road.
Mrs. Martin, Eglintoun, Antrim Rd.
John Martin, Gilwally House, Newtonbreda.
John G. Mathewson, Londonderry.
John Meenan, M.D., Donegall Street.
James Meneely, Donegall Pass.
A. S. Merrick, M.D., Belfast District Asylum.
Seaton F. Milligan, Royal Terrace.
William Milliken, Wilmont Terrace.
Thomas Morrison, Donegall Street.
George Morrow, North Queen St.

D. Morrow, Church Hill, Holywood.
John Morton, Clifton Park Avenue.
J. R. T. Mulholland, J.P., Northumberland Street.
Rev. William Munce, Glenavy.
James Murdoch, Denmark Street.
Joseph John Murphy, Osborne Park.
Geo. Erskine Murray, Botanic Av.
J. R. Musgrave, J.P. Drumglass, Malone.
Arthur Mussen, Rubicon, Lisburn.
Mrs. Mussen, Rubicon, Lisburn.
John M'Alister, Fitzwilliam Street.
Robert M'Cann, Wellington Place.
Joseph M'Chesney, Holywood.
Francis P. M'Clean, Huntly Villas.
H. M'Cleery, Donegall Sq. South.
James M'Clenahan, Tennant St.
Rev. Ed. M'Clure, A.M., M.R.I.A., Lincoln's Inn Fields, London, (Cor. Mem.)
Sir Thomas M'Clure, Bart., Belmont.
W. J. M'Clure, Elizabeth Street.
Thomas J. M'Conkey, York Street.
James M'Connell, St. Helen's.
F. W. M'Cullough, Garfield Chambs.
Hugh M'Elwee, Carlisle Street.
Miss M'Gaw, Ashley Avenue.
J. H. MacIlwaine, Brandon Villa.
Mrs. MacIlwaine, Brandon Villa.
Mrs. M'Ilwrath, Claremont Street.
Danl. M'Kee, Adela Place.
W. S. M'Kee, Fleetwood Street.
A. MacLaine, J.P., Queen's Elms.
Miss A. M'Liesh, The Mount, Mountpottinger.
John M'Liesh, The Mount, Mountpottinger.
John M'Liesh, Jun., The Mount, Mountpottinger.
Robert M'Liesh, The Mount, Mountpottinger.
T. J. M'Mahon, Northcote Villa, Knock.
Wm. Macmillan, Parkbrook, Greencastle.
John M'Stay, L.D.S., R.C.S.Eng., King Street.

W. Courtney Nesbitt, Kinnaird Ter.
Jerdan Nichols, Ovoca Street.
Wm. Nicholl Adela Street.
H. J. Nicholson, Ardsallagh, Windsor.
Rich. Niven, Chrome Hill, Lisburn.
George O'Brien, Botanic Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
G. M. Ogilvie, Antrim Terrace.
H. O'Neill, M.D., College Sq. East.
James O'Neill, College Sq. East.
Graham L. Owens, Victoria St.

W. J. Pasley, Carrickfergus.
D. C. Patterson, Craigavad.
R. L. Patterson, J.P., F.L.S.. Croft House, Holywood.
Robert Patterson, Kilmore, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Strandtown.
Frank Peel, Annesley Street.
William Perry, Deramore Terrace.
W. H. Phillips, Lemonfield, Holywood.
E. Wakefield Pim, Elmwood Ter.
John Pim, J.P., Bonavon.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
T. W. Pim, The Lodge, Strandtown.
Thomas Polley, Fitzroy Avenue.
W. E. L. Polley, Fitzroy Avenue.
R. Lloyd Praeger, B.A., The Croft, Holywood.

J. Radley, Prospect Hill, Lisburn.
G. Raphael, Galgorm, Ballymena.
Fred. Wrathall, Ulster Prov. School, Lisburn.
John Rea, M.D., Gt. Victoria St.
D. Redmond, Antrim.
Daniel Reid, Portstewart.
Jas. T. Richardson, J.P., Glenone, Lisburn.
Richard Riding, Hampton Terrace.
Rev. George Robinson, Beech Hill House, Armagh.
Hugh Robinson, Clive Villas.
James R. Robinson, St. Helen's.
W. A. Robinson, J.P., Culloden House, Cultra.
R. Ross, M.D., Wellington Place.
Mrs. Rowland, University Street.
Robert A. Russell, Colinview, Lisburn Road.

J. Shanks, Ballyfounder, Portaferry.
Thomas Shaw, J.P., Pine Lodge.
Mrs. Shaw, Pine Lodge.
Edward Smith, Chichester Terrace.

Rev. W. S. Smith, The Manse, Antrim.
Rev. George C. Smythe, M.A., Coole Glebe, Carnmoney.
Rev. J. H. Smythe, Fortwilliam Pk.
Lieut-General Smythe, R.A., F.R.S., Carnmoney.
Wilson Smyth, Virginia Street.
Adam Speers, B.Sc., Holywood.
Mrs. White Spunner, Armagh.
Sir N. A. Staples, Bart., J.P., Lissan, Dungannon, (Life Member).
James Stelfox, Oakleigh, Ormeau.
J. M'N. Stevenson, Carrickfergus.
John Stevenson, Coolavin.
Richard Stevenson, Ashley Avenue.
S. A. Stewart, F.B.S.Edin., Springfield Road.
W. A. Story, Windsor Terrace.
William Strain, Windsor Terrace.
R. S. Strafford, The Mount, Mountpottinger.
Wm. Swanston, F.G.S., Cliftonville Avenue.
Mrs. Swanston, Cliftonville Avenue.
Richard Glascott W. Symes, M.A., F.G.S., Portrush.
Samuel Symington, Ballyoran House

Prof. Ralph Tate, F.G.S., F.L.S., Adelaide, South Australia, (Hon. Member).
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
S. G. Thomas, Limestone Road.
Mrs. Henry Thompson, Crosshill, Windsor.
George Thomson, Falls Road.
Prof. James Thomson, A.M., LL.D., F.R.S., Glasgow, (Hon. Mem.).
John Todd, Regent Street.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Portrush
William J. Trelford, Vicinage Park.
James Turner, Mountain Bush.
James G. Turtle, Cambridge Ter.

James W. Valentine, Cromwell Ter.
John Vinycomb, Mountcharles.

W. F. Wakeman, M.R.I.A., Portora, Enniskillen (Cor. Mem.).
Robert Walker, Atlantic Avenue.
T. R. Walkington, Laurel Lodge.
George G. Ward, Eversleigh, Strandtown.
Isaac W. Ward, Salisbury Terrace.
Marcus J. Ward, Clonaver.
E. H. Watson, Ardmore, Windsor.
Thomas Watson, Shipquay Gate, Londonderry.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, Clifton Park Avenue.
T. K. Wheeler, M.D., Clarendon Pl.
Robert J. Welch, Lonsdale Street.
Louis Werner, B.A., Thorndale Ter.
Walter L. Wheeler, Lennoxvale.
Robert Whitfield, Kenbella Avenue.
Wm. Whitla, M.D., College Square North.
Jas. Wilson, Oldforge, Dunmurry.
James F. Wilson, Ventry Street.
J. Wilson, Ballybundon, Killinchy.
John Workman, J.P., Windsor.
Rev. R. Workman, A.M., Glastry.
Thos. Workman, J.P., Craigdarragh.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street.
Samuel O. Wylie, Clarendon Place.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club,

1886-87.

Series II. Volume II. Part VII.

CONTENTS:

PRINTED FOR MEMBERS ONLY.

PRICE OF EXTRA COPIES FOR MEMBERS 2/-.

ANNUAL REPORT

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club

FOR THE

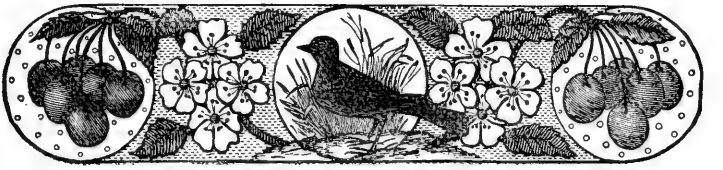
Year Ending 31st March, 1887

(TWENTY-FOURTH YEAR).

SERIES II. VOLUME II. PART VII.

Belfast:
PRINTED FOR THE CLUB
BY ALEXANDER MAYNE & BOYD, CORPORATION STREET,
PRINTERS TO THE QUEEN'S COLLEGE.

1887



REPORT

OF THE

Belfast Naturalists' Field Club

FOR THE

Year ending 31st March, 1887.

YOUR Committee, in reporting on the working of the Club during the year now brought to a close, have still the pleasure of recording its continued prosperity. The excursion programme carried out last summer proved attractive to the members, the various excursions having been well attended. In June, a special investigation of the Larne gravels took place, with the view of settling the disputed question of the position of the worked flints in them. A dredging cruise was held in August; which, though favoured with admirable weather, and otherwise successful, proved a serious monetary loss to the Club, the attendance being so much below what was anticipated. The Fungus Foray, arranged to be held in September, at Glasslough, was, on the suggestion of several of the members, changed to Hillsborough. The

Report on the Larne gravel investigation, and special reference to the species observed on the Fungus Foray, were brought before the members during the winter session ; these, together with notices of all the ordinary excursions, will appear in your annual report of Proceedings.

The following places were visited :—

1.	Downpatrick	22nd May.
2.	Clandeboye and Conlig	19th June.
3.	Blackhead and Whitehead	10th July.
4.	Magilligan and Limavady	10th & 11th August.
5.	Knockagh	4th September.
6.	Hillsborough (Fungus Foray)	25th September.

The following were special excursions :—

Divis Mountain	F. W. Lockwood, Conductor.
Dredging Cruise	W. Swanston and J. Wright, Conductors.
Larne Gravel Investigation ...	Wm. Swanston, Secretary.

The Winter Session was opened, as has been the custom for several years past, by a social meeting, which was well attended. Six ordinary meetings were held, at which seven communication were brought forward. The meeting in March was devoted to the illustration of microscopic objects, and proved exceptionally popular. The following is a list of the subjects brought forward during the winter, abstracts of which will also appear in your Proceedings :—

29th Oct.	I.	—Social Meeting.
16th Nov.	II.	Presidential Address—"An Ancient Irish Lake Dwelling," by Rev. Canon Grainger, D.D., M.R.I.A., &c. "Report on the Larne Gravels," by Wm. Swanston, F.G.S.
14th Dec.	III.	"Notes on Fungi Collected in Co. Down," by Rev. H. W. Lett, M.A., T.C.D. "Observations on Alleged Heliotropism of the Common Sunflower," by Rev. H. W. Lett, M.A., T.C.D. "Notes on the Sections Recently Exposed at the Alexandra Docks," by Mr. R. Ll. Praeger, B.A.
18th Jan.	IV.	"Notes on the Reproduction of Ferns, Especially on the Observed Phenomenon called Apospory, with Some Remarks on Hybridization," by Mr. W. H. Phillips.

15th Feb. V. "On the Worked Flints from the Raised Beaches at Larne and elsewhere in the North of Ireland," by Mr. W. J. Knowles, M.R.I.A.

22nd Mar. VI.—Microscopic Evening, by the members generally.

A valuable contribution to local botany appears as an appendix in the part of your proceedings just issued. It is a list of the ferns of Ulster, including their varieties, and is the joint labour of Messrs. W. H. Phillips and Mr. R. Ll. Praeger, B.A.

Your Committee, with a view of enriching your Photo-Album of Antiquities, offered a prize to be competed for by the Ulster Amateur Photographic Society. It is gratifying to find that this prize has been won by your fellow-member, Mr. Wm. Gray.

Your Committee, in order to bring more conveniently before the public the valuable papers which from time to time have been issued in the form of appendices to your annual Reports and Proceedings, have ordered a limited number of the extra copies to be bound. These form a neat and desirable volume, of great local interest.

The number of members on the roll is about the same as at the close of last year. Among those removed by death, your Committee regret to record the loss of Dr. S. M. Malcomson, one of your most ardent and active members. A short sketch of his brief, but promising career will be embodied in your Proceedings. Your Committee also regret to record the death of Dr. John Beck, who, though joining your Club in maturer years, took a deep and hearty interest in its work.

Your Committee take this opportunity of thanking all who have in any way contributed to the success of the excursions, by guiding the parties to places of interest or otherwise assisting, and would especially name Major Maxwell and the Rev. David Gordon, for their kindness on the occasion of the visit to Down-patrick; and to Canon Ross and T. J. G. Fleming, Esq., F.G.S., for their attention when visiting Limavady and neighbourhood; also to H. S. M'Clintock, Esq., for leave to hold a Fungus Foray in Hillsborough demesne.

To Lancelot Turtle, Esq., J.P., the thanks of the Club are also again due, for the admirable Meteorological Report and Weather Summary with which he has again favoured your Committee.

Your Committee again avail themselves of this opportunity of thanking those kindred societies and public bodies who continue to exchange Proceedings with your Club.

The following collections were submitted in competition for the Club and special prizes :—

Mr. R. Ll. Praeger, B.A., Flowering plants, for prize 2.
Mr. D. M'Kee, Cretaceous fossils, for prize 8.
Mr. Robert J. Welch, Liassic fossils, for prize 9.
Mr. R. Ll. Praeger, B.A., Post Tertiary fossils, for prize 7.
Mr. R. Ll. Praeger, B.A., Fungi, for prize 20.

The following are the awards of the judges appointed to examine the above collections, and to report upon them :—

For Prize II.—Mr. R. Lloyd Praeger contributes a series of 203 flowering plants, each of which represents a species not included in the 475 plants collected in the preceding year. Thus the entire collection made by Mr. Praeger during the two years embraces 678 species, being very near the limits of the flora of the district. We recommend that the prize in question be awarded to Mr. Praeger.

For Prize VIII.—Mr. D. M'Kee submitted an extensive series of Cretaceous fossils, very characteristic of the formation, and representing a great amount of patient work. We have great pleasure in awarding the prize to Mr. M'Kee.

Prize VII.—For this prize a collection has been put in by Mr. R. Lloyd Praeger. Mr. Praeger's specimens form a fine series of 137 species, from the Post Tertiary beds of Belfast and Larne. The specimens are well displayed, some are rare forms, and a good number are additions to the lists already published for this district. The collection is of the highest merit, and we have pleasure in awarding this prize to Mr. Praeger.

PRIZE IX.—Mr. Robert J. Welch has sent in a collection of fossils from the Lias rocks, mainly from Islandmagee, in competition for prize 9. This is a highly creditable collection, embracing over 30 species, represented by more than 300 specimens. They are, in general, excellent examples, and illustrate very well the species they represent, and we have no hesitation in deciding that Mr. Welch's collection is well worthy of the Club's prize.

S. A. STEWART.
WM. GRAY.
JOSEPH WRIGHT.

FOR PRIZE XX.—Mr. R. Ll. Praeger sent me, from time to time during the past year, nearly 200 species of Fungi, which are well deserving of the prize. There was no other competitor.

H. W. LETT.

Belfast Naturalists' Field Club in Account with Treasurer,

Dr. **For Year Ending 31st March, 1887.** **Cr.**

To Balance from 1885-6				£34	7	0	
,, Subscriptions, 239 (less 5 for 1887-8), 234 ...				58	10	0	
,, Gain on Excursions				0	6	6	
,, Guide Account				8	19	6	
,, Dr. Beck's Special Prize				1	0	0	
,, Wm. Swanston's Special Prize				0	10	6	
,, Interests (approximated)				1	10	0	
				£105	3	6	

By Expenses of Social Meeting:—							
J. Wright	£3	3	5				
W. Swanston	0	19	1				
F. W. Lockwood ...	0	16	6				
	£4	19	0				
Less Tickets Sold	1	8	0				
				£3	11	0	
By Printing Annual Report, A. Mayne & Boyd ...				20	19	0	
,, Binding Appendices, Marcus Ward & Co. ...				7	17	6	
,, Advertising, Printing, and Stationery:—							
Northern Whig	£8	15	0				
Robinson Brothers	1	4	6				
				9	19	6	
,, Delivery of Circulars				1	10	0	
,, Postage				4	13	0	
,, Museum Expenses:—							
Rent	5	5	0				
W. Darragh	3	3	0				
				8	8	0	
,, Loss on Dredging Excursion				7	6	10	
,, Insurance				0	11	6	
,, Prizes				2	10	0	
,, Balance				37	17	2	
				£105	3	6	

Audited and found correct,

JOSEPH WRIGHT, *Treasurer.*
WILLIAM SWANSTON, *Hon. Sec.*

Summer Session.

The following Excursions were made during the Summer Session:

On 22nd May, to

DOWNPATRICK.

The first excursion of the season was taken on Saturday, 22nd May, and a numerous party, precisely at noon, alighted upon the platform of the railway station of that interesting town—Downpatrick. Here they were met by the Rev. David Gordon, who very kindly acted as guide, and came prepared to show the "lions" of the ancient capital of Down, whose merits did not in the least suffer in the reverend gentleman's handling of them. After climbing the steep street that leads to the cathedral, its massive east front comes into view, standing out well, with its encircling trees, upon the summit of the hill. Before entering the building a visit was paid to the reputed site of St. Patrick's grave, marked solely by the small hole, constantly refilled, from which the faithful as constantly remove handfuls of the gravel, valued not merely as a memento of the departed saint, but as being of more or less benefit to mind and body through all the vicissitudes that mortal flesh is heir to. It

seems reasonable to suppose that tradition is right—that all now left of St. Patrick sleeps, if not in this identical spot, yet somewhere within the precincts of the church that bears his name, and that St. Brigid's and St. Columb's remains may also be enshrined in proximity to his. Although of many of the minute details of traditionary lore we may well be sceptical, of the broad, general features we can hardly be too believing.

A century ago the cathedral was a ruin ; it is now, though not architecturally imposing, yet a substantial and shapely structure. As a building, it does not call for much remark. There are no transepts and no choir in the usual manner, a screen across the western part of the nave answering that purpose. Almost the only features that tell now of the fourteenth century church are some five or six stone capitals of the piers, grandly carved with animals and human heads, and a figure of a bishop and crozier built into the inside face of the western wall. From the cathedral the party made their way to the great fort, the greatest in the district, that overlooks the marshes through which flows the Quoile. The central stronghold of this island—for so it still is in time of flood, and must always have been before the tidal water was banked out—forms quite a lofty hill, the base of which is surrounded by a double, in some places a triple, rampart and fosse. Here, secure amid their morasses, dwelt a line of heathen warriors and princes, and when, as we may suppose, St. Patrick, or one of his disciples converted the then holder of the great dun to Christianity, on the hill immediately adjoining was reared a church of the tiny dimensions that marked these early structures, with its narrow door, having flat lintelled head and sloping jambs, such as in the one still to be seen upon St. John's Point, near Ardglass. Three times at least, Dun-da-Leathglas, as it was now called, was plundered by the Danes, and after one of these plunderings a new and larger church was built on the site of part of the present cathedral, and across the foundation of the smaller and earlier one a lofty round tower was raised, either as a refuge for the ecclesiastics or to mark the site of an episcopal see, or for both purposes combined. This may perhaps have been in the

tenth century, for early in the next—A.D. 1015—the church and tower, presumably the woodwork only, were destroyed by fire, and twice during the succeeding hundred years a similar calamity overtook the port and town, the last occasion being due to lightning. Next came St. Malachy, who founded a monastery, in which he ended his days, a stone's throw off the cathedral, and upon the site of what is now called the old gaol. With him the native Irish record closes and the Anglo-Norman begins; for, in 1177, John de Courcy, with his men-at-arms arrived from Dublin. By them Dun-da-Leathglas, for the last time, was plundered and destroyed, but upon its ruins was raised the modern town of Downpatrick; for so the English knight willed that it should henceforth be called. Three times before the year was out the best and bravest of the Irish shed their blood to expel the invaders, but in vain, the horses and steel armour of the Norman knights and men-at-arms, and the "cloth yard arrows" of their bowmen, were more than a match against any odds of the half naked Irish kernes; and since that day Lecale and the Ards have remained with scarcely an interruption under English rule. Of the many ecclesiastical establishments which the next two centuries saw planted in the rising city of Downpatrick, very few traces now remain, the only one being Trinity Church, now the Cathedral, which was converted into the Benedictine priory of St. Patrick, for whom De Courcy had a great reverence. Saint Malachy's, which then became known as the Irish monastery, was close by, on the site of the old gaol; a Franciscan friary occupied the site of the present parish church, and to the north stood a convent for nuns of the Cistercian order. The crutched, or cruched friars had a priory dedicated to St. John, where a meeting-house now stands, and a sixth priory of regular canons was founded by De Courcy beside a holy well (Toberglorie), where tradition reported that Saint Patrick had seen a vision of angels. In 1260, when England was convulsed with civil war, another great effort was made by the Northern Irish, led by Bryan O'Neill, to drive the English out of Ulster. It met with no more success than the former ones, for the Lord Justice, Stephen Longsword, defeated

the Irish, and slew their chief, just outside the walls of the city.

From the summit of the great rath one looks across (it seems but a stone's throw over the water, but it is three miles round by Quoile Bridge and the road) to the wooded vale, in which stands Inch Abbey, one of the finest of De Courcy's works. This, like all other Cistercian abbeys, is pitched in a quiet and secluded spot, close to the water for fishing, and with fertile lands around it. To it the party now bent their way. By the energy of Mr. Gordon, and the kindness of Major Maxwell, a boat was in readiness, and after some difficulty, owing to the flooded state of the meadows, the river side was reached, and the party was safely ferried over. The ruins at Inch have suffered more dilapidation than Greyabbey, but, aided by the skilled assistance of a former member of the Club, Mr. J. J. Phillips, Major Maxwell a few years since had excavations made that revealed pretty clearly the original plan, showing that the building adhered closely to the regular Cistercian arrangement. Unlike Greyabbey, the church at Inch had narrow side aisles, the foundation of the piers of which alone remain. The nave has gone, so has the central tower, and of the refectory, which at Greyabbey is such a noble feature, no trace remains. The chancel, with three lofty lancet windows in front and two on each side, with the chapels on the eastern side of the transepts, are the principal features that now remain, and, clad in the greenest of ivy, form a picturesque group, whose pictorial merit, however, would be even more enhanced, and the stability of the ruins secured, if the bulk of the ivy were judiciously removed, especially such as seems likely to disintegrate the stonework. In the graveyard adjoining stood for many centuries the old Irish church that preceded Inch Abbey, and which was used as a chapel or oratory. It is much to be regretted that this was many years ago demolished to make space for a tomb, because it is recorded that over the doorway was a sculpture representing the crucifixion. If so, it would be nearly unique, the only counterparts being the fine sculpture of the crucifixion at Maghera Church, County Londonderry, and a slab now used as

a gravestone at Carndonagh, County Donegal, which is supposed to have originally been over the door of some church there, contemporary, doubtless, with the sculptured crosses. Their comparative rarity over the church doorways, and the consequent value of the few that exist, seems hardly to have been enough recognised by our antiquarians. Meanwhile, the photographers of the party had not been idle, and several negatives were secured of the ruins, while some old trees and a detached fragment of crumbling wall formed a background to a group of the party, who then made the best of their way through the lanes, now rich with spring flowers, to Finnebrogue House. Here they were cordially welcomed by Major Maxwell, D.L., who, after offering refreshment, conducted the party through the gardens and greenhouses, and then mounting them on brakes and cars, drove them round the grounds and beautiful lake in Finnebrogue demesne, enabling them to return to Downpatrick in time for a comfortable tea at Denvir's Hotel. Before starting for the train a brief meeting was held, at which, after a vote of thanks was passed to Mr. Gordon for his services as conductor, and to Major Maxwell for his kindness and hospitality, a number of new members were elected. During the ride home the judges adjudicated upon the collections of native plants in flower made during the excursion, for which a prize had been offered, Miss Patterson being declared the winner, having collected eighty species. The most important of these was the rare bedstraw (*Galium cruciatum*), which has been recorded nowhere in Ireland except at Downpatrick Cathedral and Fort, the last record being eighteen years since. It could not be found about the cathedral, but was growing in some abundance about the fort, so it is not likely yet to become extinct. The shepherd's needle (*Scandix-pecten-veneris*) was found near the cathedral, and on the way to the park were noted the burnet saxifrage (*Pimpinella saxifraga*) and the fool's parsley (*Æthusa cynapium*) neither, of course, yet in flower. The river and ditches near yielded the great water dock (*Rumex hydrolapathum*), the water crowfoot (*Ranunculus peltatus*), and the very rare water violet (*Hottonia palustris*),

near Inch Abbey, the Dane's blood, or dwarf elder (*Sambucus ebulus*) was observed. An interesting variety of the soft shield fern (*Polystichum angulare*), known as *fimbriatum*, was also obtained.

On 19th June, to

CONLIG AND CLANDEBOYE.

The second excursion of the season was made on Saturday, 19th June, to Conlig and Clandeboye. Splendid weather again favoured the Club, and a numerous party of the members and their friends left the Ulster Hall at ten o'clock in three well-appointed brakes, and the road was taken for Newtownards. A short halt was made near Dundonald, in order to procure specimens of a very rare plant, the corn salad (*Valerianella carinata*), which grows by the roadside at this place—its only station in Ireland. A short search along the hedge bank was rewarded by a number of fine specimens. A visit was paid to a small lake, not far from the road, where our smallest British umbelliferous marsh plant (*Apium inundatum*), a tiny species, was collected. A prize having been offered for the largest collection of native flowering plants in blossom found during the day, a keen competition resulted, hedges, fields, marshes, and ponds alike undergoing a close search.

Shortly after noon, Newtownards was reached, and the opportunity was taken to visit the old ivy-clad church, with its carved doorway and quaint inscription, also the restored town cross. The secretary's whistle having called the members together, a start was made for Conlig. Below the lead mines the party separated, the more energetic section starting off on foot to visit the mines, and gather some rare plants which occur on the hill, while others preferred to drive round in the brakes to Helen's Tower, where it was arranged the party would assemble an hour later. The washing floors of the mines were first visited, where the process of separating the galena, or lead ore, from the various impurities excited considerable interest

The ore, having been crushed to the size of fine gravel, is thrown upon a sloping floor over which water flows, when the pulverised rock and earthy matter are carried away, and a mixture is left, consisting chiefly of lead ore and baryta, or heavy spar, which latter, on account of its high specific gravity, is very difficult to separate from the ore. This mixture is placed in rectangular boxes filled with water, to which an up-and-down vibratory motion is given, which causes the lead ore to slowly sink to the bottom of the boxes. The water is then run off, and the contents carefully removed in horizontal layers. The uppermost layers, containing hardly any ore, are thrown on one side. The middle layers are set aside to be washed again, while the lowest layers consist of nearly pure ore. From the ore thus obtained the metal is elsewhere extracted by roasting in the usual way.

Specimens of galena, iron pyrites, and barytes having been obtained, the party moved towards Helen's Tower. The hill above, covered with a yellow blaze of whin and broom, with here and there a dash of purple heather, proved very attractive to the botanists of the party, and a number of interesting and rare plants were obtained, Eight species of the orchid family were found, including the deliciously perfumed *Gymnadenia conopsea*, which, though it is to be accounted a rare plant, is extremely abundant on this hill. The green habenaria *(H. viridis)*, was also found here. Those two curious carnivorous plants, *Drosera* and *Pinguicula*, were obtained in marshy spots, and the rocks were covered with the white and rose-coloured flowers of the mountain everlasting (*Antennaria dioica)*. A pool on the western slope of the hill yielded two uncommon plants, *Sparganium minimum*, our smallest native bur-reed, and *Hypericum elodes*, the marsh St. John's wort. Among the heather a few specimens of the moonwort (*Botrychium lunaria*) were obtained, and the winter green (*Pyrola media*) was also found. In marshy places the yellow, star-like flowers of the bog asphodel (*Narthecium ossifragum*) were noticed, and the pink blossoms of that most beautiful of tiny plants, the bog pimpernel (*Anagallis tenelea*).

A pleasant walk brought the party to Helen's Tower, where they were joined by those who had preferred to drive round, and by several photographic friends who had come *via* Clandeboye. The view from the top of the tower was most beautiful, and was highly appreciated. In the foreground were the woods of Clandeboye demesne, now clad in all the verdure of early summer, with here and there the bright surface of a sheet of water. To the north and east stretched a broad expanse of sea. A summer haze rendered the more distant objects indistinct, but the coast of Scotland was plainly visible, and far to the southward rose the dim forms of the Mourne Mountains. At the foot of the tower a photograph was taken of the party, after which the route was taken for Clandeboye House, which was reached after a very pleasant walk. The banks of the lake, which was passed on the way, yielded the mare's tail (*Hippuris vulgaris*), and abundance of that beautiful flower, *Menyanthes trifoliata*, the marsh buckbean; also the moss, *Hypnum dendroides*, with abundant fruit. It was noticed that the whole surface of the lake was rendered brown by myriads of the tiny flowers of the water milfoil (*Myriophyllum spicatum*). Growing among trees in one place, a very rare plant, *Symphytum tuberosum*, was found. This plant can hardly be considered native, but still the find was a very interesting one, as there are very few localities in Ireland where it is certainly known to exist. Shortly, all were assembled at the mansion, and in readiness for the homeward journey, well satisfied with a glorious and varied day's work. A further pleasure was, however, in store. Clandeboye House, with its art treasures, its trophies, and its choice collections, historical and natural, was thrown open to view, and it was sincerely regretted that the time at the disposal of the party proved much too short for more than a cursory glance at the more prominent objects in the hall and principal rooms. Leaving Clandeboye House, the party drove to Crawfordsburn, where a substantial tea was provided, after which, a new member having been elected and judges appointed to examine the collections of flowers, a visit

was paid to the beautiful glen, so well known to all Belfast pleasure-seekers. Near the glen some fern-hunting members found truncated and variegated varieties of the soft shield fern, *Polystichum angulare.* At 7-30 the party reassembled in the village, and the return journey was commenced. The examination of the collections of flowers made during the day resulted in the awarding of the prize to Miss Phillips, whose collection numbered no less than 125 species in blossom. The party reached Belfast, after a quick drive, at about nine, all very well pleased with their day's outing.

On Saturday, 9th July, to

WHITEHEAD AND BLACKHEAD.

On Saturday, 9th July, shortly after noon, a considerable number of members and their friends met on the commodious platform of the Whitehead Station, the day being most favourable for Field Club work. A visit was paid to the extensive quarries, where is a fine example of columnar Basalt resting on the chalk. This is a feature observable perhaps nowhere else in the county, as it has been noticed that the columnar bands occupy a higher zone in the outflows. Their occurrence in this position here might be accounted for by the previous denudation of the traps that usually intervene, or by the outflows which formed the lower zones of the basalt having spent themselves before they reached this, the southern margin of the formation. A fine example of the denudation of the glacial period is also observable in the face of the cliff, showing the basalts and chalk, both shorn by the great leveller—the ice—in its passage over them. Several members, armed with cameras, secured negatives of these most interesting geological sections. Proceding along the shore, Chichester Castle is visited, and further on a resident pointed out what he considered the remains of masonry—probably another castle—now between tide marks. On examination, the majority of the members gave it as their

opinion that the cement-like matrix binding the irregularly laid boulders together, was nothing more than a natural calcareous paste, common enough in localities where limestone is the prevailing rock. The huge boulders of basalt on the beach are next visited, and photos of these—perhaps among the largest of the grinding tools of the glacier epoch—are taken. Blackhead, with its caves excavated in the trappean cliff, is another interesting geological lesson. The restless sea makes little inroad on these rocky bulwarks; here and there, however, vertical rifts are observed along the cliff line, these almost invariably mark the site of an ancient fissure, through which, in a distant past, welled up the lava which formed the upper hands of the Antrim basaltic plateau. They speak of frequent stupendous eruptions extending over vast time. Previous outflows had solidified, and had perhaps become covered with vegetation, then subsequently rent and fissured and overflowed by succeeding outbursts. The deeply indented caves which now form a striking feature in the Gobbin cliffs, and at Blackhead, are carved out of fissures or rents of these later outflows, the softer filling of which has yielded to time and the ocean waves. A scramble over the headland and a leisurely return concluded an instructive afternoon's excursion.

On 10th and 11th August, to

MAGILLIGAN AND LIMAVADY.

The party reached their destination by means of the Northern Counties Railway; picking up stray members at various points of the very pleasant journey. At Limavady, all, under the guidance of a local contingent in the persons of Thomas Fleming, Esq., F.G.S., and the Rev. Canon Ross, proceeded on their tour of exploration, visiting ruins of churches, and other ancient remains in the locality, and then proceeded on foot through Roe Park, exploring the beautiful valley of the Roe, and halting at the celebrated Lim-an-madadh, or "Dog's Leap," discussed

the antiquarian and other subjects suggested by the surroundings ; returning to the hotel, where the merits of another and no less acceptable subject was thoroughly investigated, and unanimously approved.

After dinner, a visit was paid to a grand old fort within a mile of the town, and on its site a pleasant hour was spent in the evening twilight.

Early next morning the whole party were astir, some on geological, some on antiquarian, and some on natural history explorations. All assembled at breakfast, and immediately after set off, and traversed the slopes of the basaltic cliffs that fringe the railway below Bellarena and Magilligan, and constitute scenery of the most picturesque description. The party extending their survey, passed on to the magnificent head that runs out to Magilligan Point, and forms a rich collecting ground for all who are interested in marine zoology.

A hard day's work, and a long day's walk, were finished at Castlerock, which was reached late in the evening, just in time to get a cup of tea and catch the last train for Belfast.

On Tuesday, 24th August,

DREDGING EXCURSION.

On Tuesday, the 24th, the Society carried out a very successful cruise, and conducted a series of scientific dredgings in the lough and far into the channel. This is the second time that such work has been conducted under its auspices, the first having been held in June of last year, and the results then obtained were subsequently published in the Club's Proceedings. This year similar arrangements were effected, and by nine o'clock a very varied assortment of apparatus, conspicuous among which were five heavy iron dredges and about 600 fathoms of rope, were put on board the steam-tug, " Protector."

The order having been given to start, all steam is made for Carrickfergus, where other members join. Additional dredges

and men whose hands are hardened by daily toil at ropes and fishing tackle, and whose knowledge of the sea bottom, and the tides and currents of our bay, has been gained by the hard experience of necessity, are also taken on board to assist. The work shortly after commences in a few fathoms of water, with the result of an ample supply of the varied forms of marine life being soon emptied on the large receiving trays for the examination of the party. Without intermission the work proceeds, two dredges going down each time, and immediately on their being brought on deck again, full speed is given to the steamer to effect a change of ground, and gradually gain deeper water. Starfishes of varied forms, echini, ascidians, and sponges, crabs of strange proportions, and numerous forms of life new to many present are soon bagged. The gambols of a captured cuttlefish were being watched with a lively interest, when suddenly it ejects the contents of its ink-bag, and is hidden from sight until the renewal of the water in its prison is effected. At a depth of about 30 fathoms a "foul" is made, the dredge having caught on what is averred to be a sunken wreck; but, fortunately, soon freeing itself, the dredge and tackling are saved and brought on deck, the former in a dismantled condition, and the heavy rope considerably frayed. A busy band of members early in the cruise took possession of the stern, from which to ply their lines and deadly hooks, and every advantage is taken of the frequent slowing of the steamer's speed to capture their finny prey, frequent notes of applause telling of pleasing success. Surface nets were as earnestly handled, but with less noticeable results. The steamer is now well out of the lough, and its irregular movement has damped somewhat the enthusiasm of a few; but steadily the work proceeds; the labour of hauling the dredges from the greater depth is much increased, and the apparent results diminished; but the search among the material brought up is noticeably keener on the part of those most experienced in such work, lest, perchance, some prized zoophite or shell be overlooked. Terebratula and Crania are among the coveted finds. The rarer Pectens, and the deep-water species of Trochus

are keenly looked for. Nothing is, however, now sacrificed. After the general members pick over the lot, and leave apparently not a trace behind worth having, the "specialist," with scrupulous care, washes every particle of sand and mud into his strong calico bag, duly numbered, and, having carefully tied the same, and registered locality, depth, and other minute details in his log-book, he smiles as he views his accumulating wealth, and, like a true man of business, works and plans to again increase his store.

Meanwhile, tea and biscuits are being freely handed round, the refreshing aroma of which arouses the stricken and gives fresh zest to the active. A hazy horizon has blotted out the land all round, and charts and sounding lines have to be consulted to ascertain the exact whereabouts of the ship. It is found that a few minutes' run would put the steamer over the deep trench in the Channel, which lies nearer the Scotch than the Irish side. The decision is at once made to make the last haul of the day in this abyss. The sounding line gives out eighty-six fathoms. More to the east or Scotch side is the order, and soon another sounding announces 114 fathoms. A dredge is at once sent down, and 220 fathoms of rope given to it. After some time to fill, the tedious work of hauling is commenced, and it is finally brought on deck, when, with dismay, it is found that its precious cargo of mud had almost all escaped through imperfect fastening of the dredge-bag. The little remaining is poured on the tray. It is not attractive. The naked eye fails to detect in it anything desirable; but golden sands were never more carefully gathered than was this, the deepest material ever brought up from our northern Irish seas. The microscope will reveal its wonders, and at the winter meetings of the Club more will doubtless be heard of it. The dredging is now over, and all steam and sail are made for Carrickfergus, and later our own new harbour, with its magnificent range of sheds, and its perfect lines of lamps, now seen to full advantage in the absence of every cross-channel steamer, is soon reached, and thus ends a most successful day's cruise, giving material for many winter evenings' work.

P.S.—A hurried microscopic examination of the material obtained from the deepest dredging shows an abundance of large typical examples of *Hyperammina elongata*—an arenaceous Foraminifer—and it is specially interesting as being the first record of this species from the northeast coast of Ireland.

On Saturday, 4th September, to

THE KNOCKAGH.

The fifth excursion of the present season was made on Saturday, September 4th, to the Knockagh, when, tempted by the fineness of the day, a numerous party gathered on the platform of the Junction station upon the arrival of the twelve o'clock train from Belfast. The route was first taken along the base of the cliffs, which, comparatively inconspicuous from a distance, swell out as they are approached into boldly projecting masses and buttresses of rock, not without deeply cut gullies, and ivy-clad turrets and pinnacles, the haunt of the kestrel, or wind-hover, generally to be seen overhead with expanded wings and outspread tail, hanging apparently motionless against the wind, as his piercing eye searches the rocks and glades below for his customary prey of "frogs and mice and such small deer." The Knockagh is a fine typical specimen of the basaltic escarpment that lines the northeast coast from the head of Belfast Lough to the mouth of Lough Foyle, and that gives to the Antrim coast scenery its peculiar and striking character. Below the basaltic masses that form the face of the cliff lies the Chalk, and under the Chalk the Lias clays and shales, and the Keuper marls, and to the slippery and treacherous nature of these two latter when worked on by the water that percolates through the chalk and greensands we owe the picturesque "undercliff," where the basalt and chalk have so often slidden forward so as to leave deep hollows between these landslips and their parent cliffs.

Over and round these broken masses the party made their way, some of the members climbing along the grassy ledges of the cliffs, and searching the rock crannies for ferns and other

plants, whilst the photographic members were not idle to procure "negatives" of the picturesque bits. Then, near the northern end, where a larger talus of debris than usual offered access to the top, the cliffs were ascended. Here a new field of labour presented itself, and some of the members spread out in search of two small ferns which grow sparsely on the mountain top. Others directed their search after such moths and their larvæ as frequent upland heaths and bogs. One or two of the more contemplative naturalists sat on the brow of these noble cliffs and gazed seaward, and to them was open almost as much opportunity of instruction as to the collectors of specimens. There, at the foot of the cliffs, lay the broken masses of the landslips and the scattered piles of fallen boulders, telling of the subterraneous springs and alternations of frosts and rains that in these climates play such a conspicuous part in modelling the face of nature. The two or three caves in the face of the rock tell of the wane of an age when the sea was six hundred feet higher, or, more properly speaking, when the land was so much lower, than at present, and the broad, flat, fertile plain which lies between the foot of the cliff and the present sea-line tells even more clearly the same tale, and marks a lengthened pause in the oscillation between land and sea, when what is known to northern geologists as the six hundred feet terrace was being formed. If we choose we can glance back, with the eye of the mind, an incalculably longer period still, and conceive the scene before us as one of low banks of sea sand, with broad salt lagoons behind them, in which, as the land year by year slowly subsided, the brine gradually precipitated itself, until rock salt to a thickness of one hundred aud fifty feet has been the result, now being again restored to daylight by the works of the Duncrue Salt mining Company. Ages before the salt again there were estuaries in which sand and mud, which were being deposited, became in due time carboniferous sandstone and shale, and there may also have been the vegetable products that would form coal; but the vast coal cellar that Dame Nature built at this time in Ireland, she, with the caprice that is the prerogative of her sex, subsequently

swept bare again, and Ireland now possesses but the naked limestone floor, and in Belfast Lough a patch, comparable to a single tile only, is all that now remains. Leaving the hill, the descent is made by a deep cut through the rocks, known as the "Deer's Path," itself a reminiscence of a bygone state of things, and way was made slowly towards the station. Just when all search for the ferns had been given up as useless, owing to the lateness of the season—as they die down in autumn—a botanist of the party, with eyes always on the alert, came upon one of them, the adder's tongue (*Ophioglossum vulgatum*), growing in a hayfield, an unexpected place for it, in some profusion, and the prize that had been offered was accordingly awarded to the finder, Mr. R. Ll. Praeger. There was not much else of speciality found during the day. The parasitical broom rape (*Orobanche rubra*) was found in quantity, as usual parasitic upon the slender fibrous roots of the wild thyme. The general report was that the Knockagh, contrary to expectation, is rather a barren hunting-ground for the rarer plants and insects, but a most picturesque and delightful place to spend a summer's day upon.

On Saturday, 25th September, to

HILLSBOROUGH, FOR A FUNGUS FORAY.

The sixth and last field meeting of the season was held on Saturday, 29th September, at Hillsborough, the special object being an examination of the Fungi of the demesne and park, for which permission had been kindly granted. About thirty members left by the eleven o'clock train, and soon after reaching the neat town the well-kept grounds adjoining the castle were entered. By the side of the little lake, along whose banks the chestnut trees were showing their rich autumn tints, a halt is called, and the business of the day announced. A prize—a botanist's vasculum—is offered for the best collection of Fungi made during the day, the judges to examine the collections after tea in the hotel. Fungus hunts or forays have apparently

become established as one of the institutions of the Club, this being the fourth that has now taken place in four successive years. Nor is this to be wondered at, as the variety and beauty of the members of this humble section of the plant kingdom are worthy of more attention than they have hitherto received. The results of the past forays, too, have proved very interesting. By their means much knowledge of the fungus floras of the districts examined has been gained, and many additional records of species made, as may be noted in the important list lately contributed by one of the members to the Club's Proceedings.

It was soon felt that the demesne grounds were kept too trim and neat to produce a great variety of species, and, after a short search in the rougher ground, and admiring the beauties of the situation, the party left for the park. Here "The Fort"—a sturdy relic dating from 1642, and famous as one of the halting-places of William III. on his march southward—is first visited. The room, a spacious one, said to have been occupied by that distinguished monarch, has, owing to necessary repairs, entirely lost its ancient character, and is now used as a store. The party were glad of its shelter on this occasion, as the rain, which had been increasing as the day advanced, had now gained full force, and threatened to stop the foray. Brightening up, however, the search is again commenced, and some good finds are made by the lake shore and through the underwood. All kinds of fungi were, however, scarce ; the dry weather and the frosty nights of the previous fortnight had not favoured their growth. They need a warm damp atmosphere to call them up, the collections, therefore, displayed after tea were small compared with those of any former year. However, about seventy species were found during the day, but they did not include anything unusual. The beautiful orange species (*Pholiota squarrosa*) was found in fine form on two trees. The curious little *Geoglossum hirsutum*, which grows like little black tongues protruding from the grass, was obtained along the lake margin. Six species of Boleti (one of which, *B. pachypus*, measured nine inches across the cap) and seven species of Polypori were collected in the woods, where also were noticed *Marasmius*

urens and *Cantharellus cibarius*. This last, as the name denotes, is an edible species, but the wholesome fungi were the rarest, and of these there were gathered only four species besides the above—viz., *Boletus edulis*, *Helvella crispa*, *Hydnum repandum*, and *Tricholoma albo-brunneus*, but the Hydnum alone was in a proper condition for cooking. Of the smaller or microscopic division of the family only four were noticed, among which was a white mould on sycamore leaves, which appeared to make them toothsome to the slugs, which were revelling on the affected parts. The unpleasant looking and smelling *Russula ingricans* was the sole fungus that was found in any quantity. Notwithstanding the scarcity of the specimens that were the objects of the foray, the day was pleasantly and, as far as becoming acquainted with the commoner forms met with, profitably spent. The three collections submitted to the judges (Rev. H. W. Lett and Mr. R. Ll. Praeger) numbered respectively 38, 51, and 54 species. The latter belonged to Master E. A. Praeger, to whom the prize was accordingly awarded.

Owing to the lateness of the season, but few flowering plants could be expected, and the flora on the whole seemed poor; nevertheless, one exception may be noted. By a pardonable departure from the programme one member was enabled to bring up specimens of the sweet flag (*Acorus calamus*) from the Lagan Canal, where this extremely rare plant grows in great profusion. Not the least pleasant part of the day's proceedings was a visit paid to the beautiful church situated on its admirably kept grounds, and the refreshing tea served at the hotel, where the business meeting of the day was held. The return journey concluded a successful season's excursions—the twenty-fourth in the Club's history.

Winter Session.

SOCIAL MEETING, 29th Oct.

The Winter Session was inaugurated on Friday evening, October 29th, by a Social Meeting in the Museum, College Square North, when the rooms of the Museum, crowded with the members and their friends, testified to the continued popularity of the Club. After tea had been served, the arrangements for which were most successfully carried out by several of the lady members, a general meeting was held in the lecture-room—the Rev. Canon Grainger, D.D., M.R.I.A., President of the Club, in the chair. The president, having made a few remarks drawing attention to the principal objects of interest on view, called upon several of the exhibitors for more detailed explanations. Amongst these was the Rev. Canon Hayes, of Dromore, who directed attention to a drawing by Thomas Drew, Esq., R.H.A., of the proposed restoration of the old market cross of Dromore, part of which at one time formed the base of the public stocks. This cross, if re-erected, will be taken charge of by Her Majesty's Board of Works, which will, furthermore, undertake a large part of the cost of the necessary base or pedestal, &c., provided enough public interest is shown to justify the Grand Jury in granting the balance of the sum required—possibly about £30—or, also, if this amount can be raised in any other way. A resolution was then proposed and

passed, expressing the hope of the Club that some means should be found for the preservation of this interesting relic.

After a number of new members had been elected, and a vote of thanks passed to the ladies who had officiated at the tea tables, the formal meeting broke up, and the company scattered through the rooms for a more thorough examination of the various objects lent for the occasion. As usual, the Committee had selected a special subject for illustration, which this year was the Echinodermata, fossil and recent. These form a branch of the group of Radiata, or ray-like animals ; which, besides the Echinodermata, includes the jelly fish and their congeners, and also the coral animals, sea anemones, hydras, &c., &c. The Echinodermata comprise within their limits not merely the common sea urchins washed upon our coasts, but also the star fishes, and the Encrinites, or stone lilies, of the deep tropical seas. The group, as illustrated on Friday evening, displayed many fossil urchins, encrinites, and other kindred forms, from the Devonian, Carboniferous, Permian, Liassic, and Chalk formations, conspicuous amongst which was a large slab, bearing trace of the richness of life of an ancient sea bed, from the Lias of Lyme Regis. Amongst the representatives of the group of the present day, were a number of rare specimens lent by Professor A. C. Hadden, F.L.S., gathered during the recent cruise of the "Lord Bandon" off the south-west of Ireland. This cruise, and a similar one of last year, was undertaken upon a grant from the Royal Irish Academy, and several members of the Field Club were associated in the work. These species, inhabiting deep water, undisturbed by the action of waves, and even of currents, acquire a fantastic elaborateness of form, and a development of spines and other appendages, not often found in those of shallower and more disturbed waters, and some of them were of remarkable delicacy and beauty.

Close beside the section devoted to the Echinodermata were the drawings and specimens exhibited by Mr. W. Gray, M.R.I.A., used in his lecture, during the previous winter, upon "A frond of Laminaria, and the lowly forms of life to be found thereon." This was, in fact, an illustration of the harmonious connection

that exists between all the lower forms, both animal and vegetable, showing how they all form one complete ladder of life, mounting gradually from the lower to the higher forms. Those who were not present at the lecture had an opportunity of gathering some of these ideas from Mr. Gray, as he explained them with his specimens around him, and others were enabled to have their recollections revived of that most interesting lecture.

The members' prize collections of the previous year formed, as usual, a conspicuous feature. Amongst these, Mr. R. Ll. Praeger, B.A., showed a collection of native ferns ; Mr. Charles Bulla, of land and fresh water shells ; Mr. J. J. Andrew, one of mosses ; Mr. D. M'Kee, of Carboniferous fossils ; and Mr. J. J. Andrew, of microscopic slides. In the lecture-room were also exhibited some growing ferns, by Mr. W. H. Phillips, illustrating varieties, and what botanists call "sports ;" and also some sprigs of mistletoe having curiously variegated leaves.

Close by these was a case exhibited by Mr. S. F. Milligan, containing a large number of the small, old-fashioned clay tobacco pipes, commonly known as "Dane's pipes ;" Estuarine shells, &c. These were found nearly ten feet below the surface in foundations of new works at the Bank Buildings. The purposed foundations coming too near to the wall of the large sewer, down which the stream once known as the Belfast river, that flowed through High Street, now runs, it had to be partly diverted, and in the bed these objects have been found, and also some of the stout oaken piles that once formed the margin of the river. Mr. Milligan also exhibited some bronze swords, spearheads, and part of a bronze reaping-hook, from bogs in the Counties of Tyrone and Cavan. A collection of birdskins from America was exhibited by Mr. R. Ll. Praeger, who also showed a curious cylinder of solid brown felt, a yard long and three inches in diameter, the true nature of which elicited many random guesses from the curious, whose astonishment was hardly lessened when they learned it was neither more nor less than the roots of a poplar tree that had found their way into a field drain-pipe and grown and matted themselves into this unique substance.

Mr. W. Gray, M.R.I.A., exhibited some cavern deposits from North Wales, recently presented to him for the town museum. The flint implements found in conjunction with the bones of extinct animals presented, he says, a more convincing evidence of human antiquity than any that he has before met with.

Two cases of exquisitely mounted specimens of seaweed were exhibited by Mrs. J. Stelfox, and Mr. Stelfox showed a fine set of photographs of the Antrim coast, taken by him during the past summer. Some of these of the caves and arches of the white rocks, Portrush, were very striking illustrations of the work of denudation incessantly being carried on by the Atlantic waves.

The Rev. Mr. Andrew exhibited a pendulograph, and explained the rythmic properties of this curious instrument.

A number of members, as usual, had their microscopes at work. Amongst these Mr. J. J. Andrew, L.D.S.E., exhibited the blood system of the frog; the Rev. H. W. Lett, M.A., the mosses, and especially the sphagnum, or peat moss, showing the various stages in the formation of peat.

Mr. Glen showed a number of sections of precious stones with polarised light. Mr. I. W. Ward and Mr. Gray, amongst other objects, a number of slides to illustrate the special feature of the evening, such as sections of spines of the Echinodermata, &c.

Mr. Joseph Wright, F.G.S., exhibited a number of Foraminifera, mostly the result of the dredgings taken in deep water during the cruise of the S.S." Lord Bandon," off the south-west coast last July. Amongst those a dimorphous Foraminifer, —*Amphycorhyne phalx* is quite new to British waters, having never hitherto been found in the North Atlantic.

The literature belonging to the Club derived from exchanges with various scientific societies is getting very bulky, and the more recent contributions were laid upon the tables in the library. Amongst these are a variety of Reports of extreme value presented by the Government of Canada, and various surveys of the United States and their territories, containing a mass of information, hardly as much appreciated as it might be, upon

the geology, natural history, and general features of the western part of the North American continent. In this room, too, was exhibited the Club's portrait album, in which there are still many gaps, and also many once familiar faces that will never again be seen in their accustomed seats at the winter meetings, or at the excursions. The Club's sketch album was also on view, but does not appear to have received any accessions during the year. This want has been partly compensated for, however, by the Club's photographic albums—three in number —now exhibited for the first time, and which have been already nearly filled by the contributions of the members, many of whom are engaged in the work of illustrating, by these means, the natural history, antiquities, and typical scenery of our island. This work is as yet only in its beginning, and it is hoped the efforts of the members will not be relaxed until the Club possesses a more valuable series of Irish photographs than are to be found in any private collection. The field is practically inexhaustible, and the archæological and scientific knowledge possessed by the members of the Club, gives them advantages in this pursuit rarely to be found in the professional photographer or the ordinary amateur.

Some beautiful photographs of tree trunks, by an English artist, lent by Mr. R. Welch, and a number of local photographs by Mr. George Donaldson, Mr. John Donaldson, and other members of the Club, were also exhibited.

On 16th November,

PRESIDENTIAL ADDRESS, ALSO REPORT OF THE LARNE GRAVEL INVESTIGATION COMMITTEE.

The opening meeting of the session was held in the Museum on Tuesday evening, when the President (Rev. Canon Grainger D.D., M.R.I.A.,) delivered an address, selecting for his subject "An Ancient Irish Lake Dwelling." The learned speaker, after referring to the widespread use in ancient times in

Western Europe of dwellings isolated for protection, stated that Ireland was peculiarly rich in remains of such nature, which were well known by the name of Crannoges. He said, however, that, though much has been written on them, very little was still known with certainty of the people who constructed them, or of the age in which they were most generally used. He also said that our own Club could claim some credit for endeavouring to settle these interesting questions by the systematic examination of the Lough Mourne crannoge. The Rev. Canon then proceeded to refer to a remarkable crannoge that had lately been discovered at Lisnacroghera, near Broughshane, in his own parish. This crannoge has yielded a vast amount of interesting and valuable remains of stone, bronze, iron, and wood. The first of these was represented by a polished stone hatchet or celt, picked up by the Canon himself on the surface of the crannoge. Bronze is represented by vast quantities of objects of various character, several sacksful, it was stated, having been taken away and sold in Ballymena to dealers before their value became known. Many objects, have, however, been secured, consisting of spears, swords, and personal ornaments. One notable peculiarity, however, in many of them is the combination of bronze and iron in the same article. For example, spear heads with bronze rivets in them, by which they had been affixed to their handles, iron swords in bronze sheaths, and with bronze handle fittings, &c. Perhaps the most valuable relic is a spear handle complete, with a bronze knob on its butt end to the iron tang of the head on the other, measuring in all six feet. This is perhaps the only example of the kind known. Iron tools were also found, and several quaint wooden utensils, the uses of which are not now easily determined. It will thus be seen that the three "ages"—the stone, bronze, and iron—are here blended or obliterated, and rendered valueless so far as chronological order is recognised. Among the wood objects exhibited were the top and bottom of a vessel which once contained bog-butter. Regarding this puzzling material, the reverend lecturer stated that it was found in such quantities in his neighbourhood, that

the druggists of Ballymena sold it for cart grease, throwing the vessels away that contained it. In conclusion, he stated that the general opinion now was that the constructors of these lake dwellings were a highly advanced race, trading with their neighbours, and manufacturing articles such as are now found in their buried remains, but that they unfortunately seemed to have eventually succumbed to their more powerful and ruder neighbours.

The next part of the evening's business was to hear the report of the sub-committee appointed to investigate the Larne gravels. The secretary, after reading the minute referring to the subject, stated that, acting as secretary for the committee of investigation, he drew up a report of it, which he afterwards circulated among the members of the committee with the request that they would each express in writing their individual opinions on it. These opinions are now embodied with this report, also two letters from Mr. Knowles referring specially to the subject.

REPORT OF THE COMMITTEE APPOINTED TO INVESTIGATE THE LARNE GRAVELS, AND DETERMINE THE POSITION IN THEM OF THE FLINT FLAKES AND CORES FOR WHICH THEY ARE NOTED. Held on Saturday, 29th May, 1886.

I.—*The object and preliminaries of the investigation.*

In a paper read by Mr. Wm. Gray, M.R.I.A., in the Museum on April 24th, 1884,* the reader, among other things, challenged the accuracy of statements made by Mr. W. J. Knowles, M.R.I.A., in a paper read by him before the Royal Irish Academy, in reference to the position of the flint implements found in the gravels of the Curran of Larne, and the conclusion drawn from them ; † and at the conclusion of the paper a committee was appointed to investigate and report on the

* B.N.F.C., Annual Report of Proceedings, Series II., Vol. II., Part IV., p. 288.

† Transactions, Royal Irish Academy—"Flint Implements from the Raised Beach at Larne and other parts of the North-East Coast of Ireland." Series II., Vol. II., page 209.

subject to the Club. No action was at that time taken in the matter, and the question was again raised at a committee meeting, when the following resolution was passed :—"Moved by Mr. Vinycomb, seconded by Dr. Malcomson, and passed unanimously, that inasmuch as the committee appointed to investigate the question of the presence of flint implements in the Larne Gravels has brought in no report, the following be appointed to investigate and report upon the question :—John Anderson, J.P., F.G.S.; Charles Bulla, Wm. Gray, M.R.I.A.; Canon Grainger, D.D., M.R.I.A.; W. J. Knowles, M.R.I.A.; Daniel M'Kee, W. H. Patterson, M.R.I.A.; S. A. Stewart, F.B.S.Edin.; Robert Young, C.E.; Wm. Swanston, F.G.S., and F. W. Lockwood, Hon. Secs. Honorary Secretaries to convene the meeting."

The attention of the general members of the Club was called to the investigation by a special notice in the circular, dated 17th May, 1886, convening the first excursion of the session. The members of the committee above named were specially notified by letter, and their co-operation requested. The following members attended :—John Anderson, F.G.S.; Wm. Gray, M.R.I.A.; S. A. Stewart, F.B.S.Edin.; Daniel M'Kee, and Wm. Swanston, F.G S., Honorary Secretary. Mr. Wm. H. Patterson, M.R.I.A., joined later. In addition, Mr. R. Ll. Praeger, B.A., and George Donaldson were present, and were requested to assist by acting on the committee. Apologies were read from Rev. Canon Grainger, D.D.; W. J. Knowles, M.R.I.A., and Robert Young, C.E.

II.—*General features of the Curran and the Gravels.*

The portion of ground known as the Curran lies to the south of Larne, forming an irregular peninsula, the greatest width of which is about a quarter of a mile. Its surface was originally of an undulating character, with a maximum elevation of eighteen feet. An extensive deep-water landing-stage has been formed near its southern extremity, which is in direct railway communication with the main lines of the Northern

Counties Railway Company. In the construction of these railway works, cuttings were made in the Gravels, and the general contour of the ground greatly altered. Irregular escarpments were left in places by these cuttings, and one of them, on the west side of the railway, at the point nearest to Larne, was selected for investigation.* The escarpment at this place is about fourteen feet high. It is composed of sand and gravel, with a band distinctly clayey ; but its greatest portion might be termed coarse gravel with stones, many of the stones being from six to eight inches in diameter. The entire section, except about 2·6 inches at the surface, which had evidently been disturbed by cultivation, is regularly stratified—the lowest beds being sandy. At a depth of ten feet from the surface is a band of reddish clay. The dip of the deposit is to the south-west, at a low angle—perhaps eight or ten degrees ; but, unfortunately, no section was sufficiently exposed in a direction to allow of this being accurately determined. An examination of the undisturbed face of the escarpment discovered shells in some of the sandy beds and in the clayey band. They are of the common existing littoral species. The following were collected :—*Cardium edule*, *Littorina rudis*, *L. litorea*, *L. litoralis*, *Anomia ephippium*, *Tellina Balthica*. The stones and gravel were mostly of local origin—basalt, chalk, and flint forming, perhaps, 95 per cent of the whole, all rounded and water-worn.

III.—*Investigation.*

The services of four workmen had been kindly granted by Robert Collins, Esq., Engineer of the Railway Company, and under the direction of one of the committee a portion of the escarpment above referred to, about fifteen feet in length, had been cleared of the talus and debris that had partially obscured its base, thus leaving a clean natural face—the material having been wheeled back a distance of about thirty feet. Your committee first proceeded to examine the surface of the ground above this escarpment. This was found to be a corn field, on which a young braird of two or three inches in length had

* Marked A on accompanying Map.

made its appearance. On this surface thus admirably suited for examination specimens of flakes and cores were found in great profusion, a few minutes' search sufficing to fill one's hands with as many as could be conveniently carried. Above the cleared face of the escarpment a space was next marked out, six feet long by two feet in depth from the face inwards, and two workmen with shovels were directed to remain in readiness there, while the committee went to the foot to examine the material as it was sent down in small quantities at a time. Flakes and cores were picked out as they fell, and the material was by the other workmen spread out, the better to facilitate the search. Soon a large number were collected, some members picking out from twenty to thirty each. At a depth of two feet the workmen were directed to halt, and level the bottom of the cleared space, while the workmen below cleared back all the material that had been sent down. Another layer was next proceeded with in the same way until a depth of 3′3 inches was reached. Fewer specimens were found in this clearing, on an average only from one to six by each member, and these were remarked to possess sharper angles than those found above. The material being again cleared away, a further depth reaching to 4′6 inches was sent down. Although a keener search was now, if possible, made—every likely piece of flint being lifted and examined—yet no specimens which did not admit of a doubt as to their probable human origin were found. From 4′6 inches to 5′6 inches several rude flints, in all eight examples, were found—these are retained by Mr. Donaldson. From 5′6 inches to seven feet two similar rude specimens, or flints, were obtained, which were retained by Mr. Praeger. At a depth of ten feet is a clayey band, followed by sand containing shells of the species above-mentioned, with the addition of *Venus lincta*, *Pectin maximus*, and *Lucina borealis* (one valve). The examination still proceeding, no specimens are detected between seven feet and 11′6 inches, at which latter depth Mr. Praeger picked up a well-formed flake, which had just been shovelled out by one of the workmen ; most of the other members of Committee were at the same time closely watching. The speci-

men being dissimilar to the general character of the material then being thrown out, the question was raised as to the probability of its having fallen from the loose gravel of the higher zone, against which the workmen might come in contact when standing erect in the contracted space in which they worked. No additional specimens were found in the section, which was excavated to the base. About fifty yards further south, on the same escarpment, another face had been cleared of debris. Time would not permit of the same investigation being carried out in it, but it was clearly an extension of the same beds. It was observed, however, that the upper bed of coarse gravel with stones had gradually thickened, and here reached a depth of 12′6 inches; the bottom beds being as before sandy with clay band—shells more abundant.

Your committee—now joined by Mr. W. H. Patterson, M.R.I.A.—next directed their attention to the section on the north side of the railway (marked B on accompanying map), where excavations had been made for clay for pottery purposes. The place is marked "Pottery" on the 6-inch ordnance survey map, and the excavations are there indicated. On the occasion of the visit of your committee the deeper portion of the excavation was hidden by water. Enough, however, was still visible to show that the deposit at the base was a tough blue clay containing shells, of which the following were collected:—*Cardium edule*, *Littorina litorea*, *Turritella terebra*, *Tapes aurea*, and *Scrobicularia piperata*. From the character of the clay and the few shells collected, this is undoubtedly the Estuarine Clay,* of which the last-named shell, not now found living on our coasts, is specially characteristic. Resting on the Estuarine Clay is a series of stratified sands and gravels with stones, about six feet in depth, very similar to the sections already described on the south side of the railway, with the

* The term Estuarine Clay is intended to signify those deposits, mostly of clay, which have been accumulated in our existing bays and estuaries since the close of the Glacial Period. They are the latest of a long series of deposits, and resting as they most commonly do on the Boulder Clay they unite the present to the past.—See "List of Fossils of the Estuarine Clays of Down and Antrim," by Samuel A. Stewart, Eighth Annual Report Belfast Naturalists' Field Club, appendix ii., 1871.

exception (which it is perhaps necessary to note) that the matrix, or fine material of the coarse gravel with stones, was in places of a reddish, clayey character. The junction of the Estuarine Clay and the sands of the overlying beds was well exposed in two places. It was observed that the finer sand at the base of the upper, and the clay of the lower beds, gradually blended, so to speak, and that a zone of a few inches, almost entirely composed of shells of Littorina, &c., marked an apparent beach line, which had formed during the transition period. No section was made here as was done on the south of the railway. It was, however, clearly observed that the deposit was a stratified one, in every respect similar to the first section systematically examined, with the exception above-named, and also the absence of much of the sand from its lower bands. The surface was a cultivated field, on which flakes and cores were in abundance. An excavation southward, across a lately constructed street, or road, was next examined, but it added nothing new, no lower beds being exposed, and much of the gravel being hidden by debris.

IV.—*Conclusion.*

Your committee have ascertained that the sands and gravels of the Curran form a stratified deposit; that the various places examined are portions of the same deposit; that this extended deposit of gravels rests upon the Estuarine Clay, and is consequently of more recent date. Your committee are of opinion that its basement beds of sand, and its clayey band containing well-defined layers of littoral shells, indicate a shore deposit which accumulated at a comparatively slow rate; that the coarse gravels with stones indicate a more rapid accumulation, due perhaps to more rapid subsidence of the land causing powerful currents to flow down what is now Larne Lough, which currents were met at this point by conflicting currents in the open channel, which caused the deposit of the heavy material, thus forming a bar; that a subsequent upheaval left the Curran about its present elevation. Man seems now to have appeared on the scene, attracted, perhaps, either by the

desirability of the place for fishing, or on account of the numerous flints contained in the gravels being found convenient and suitable for the manufacture of the rude implements which formed so important a part of his equipment ; or he may have put in an appearance here from some other cause beyond our finding out.

Flixton Place,
Ballymena, 26th May, 1886.

Dear Sirs,

I have your letter of 24th instant saying that I have been appointed on a committee to investigate the gravels at the Curran, Larne, and determine the position of the worked flints in those gravels. I am sorry that I shall not be able to go to Larne on Saturday, 29th inst., the day appointed for the investigation, as owing to Saturday being our market day it is impossible to get away. I expect, however, you will have no difficulty. If you take any of the sections that are open and clear away the rubbish till you get a clean face, and then clear away the undisturbed gravel slowly, you will gradually come upon flakes and cores at depths down to twelve feet and even more. I have found them at a depth of eighteen feet. On one occasion, when I took down Mr. Kinahan and five or six other gentlemen, some of whom were also officers of the Geological Survey, they found flakes and cores without much labour, *in situ*, at depth of twelve and thirteen feet.

I would also advise you to examine the section running from the cross street near where pottery was once made and see how the boulder clay is mixed up with flakes, cores, and boulders. Wednesdays are also busy days with me, but if your committee meeting had been on any other days of the week I should have made it a point to attend.

Yours faithfully,

W. J. KNOWLES.

Messrs. Wm. Swanston, F.G.S., and
F. W. Lockwood, Secretaries B.N.F.C.

Flixton Place,
Ballymena, 28th May, 1886.

Dear Sir,

You have perfect liberty to read my letter to the committee if you think it desirable to do so. Perhaps sometime at your convenience you would kindly take the trouble of letting me know the result of your investigation.

Pray don't forget to look at the section farthest inland, where pottery and brick were made. You will see there a section about five feet in depth resting on blue clays

These five feet are made up of boulders resting at various angles, mixed with boulder clay, flakes, cores, &c. I would like to have your opinion as a geologist as to how the boulder clay came there. I give you a rough sketch on the opposite page showing the position of the section I refer to.

Yours very truly,

W. J. KNOWLES.

W. Swanston, Esq.,
50 King Street, Belfast.

REMARKS BY MEMBERS OF INVESTIGATING COMMITTEE.
(IN ALPHABETICAL ORDER.)

Mr. Anderson agrees with Mr. Stewart's statement in every particular, and says further for himself that he did not observe any deposit of boulder clay proper "*in situ*," at either of the two stations examined. His opinion is that the deposit in both cases is one and the same. The underlying Estuary Clay was exposed only at that further to the north.

EAST HILLBROOK, *12th June*, 1886.

J. ANDERSON.

That flakes are only found on the surface, or at such depths in the gravels that proved they were not deposited with the gravels, but were evidently manufactured after the beds had attained their present elevation.

G. DONALDSON.

The systematic examination of the beds was conducted with a member of committee at the top of the bank to see that no flint fell from the top. This investigation was suspended at a depth of eleven feet six. Up to this there was no indication whatever of worked flakes or lower flints of any kind for the last five feet. At this depth a very rough bed of stones was reached. After some consultation and examination of the specimens found, the committee (standing some distance from the cutting) resolved to cut down deeper. Up to this time the workmen were standing in the cutting and commenced their work again as some members of the committee came forward, Mr. Praeger being first, and followed by me and Mr. M'Kee. Mr. Praeger

at once picked up an undoubted flake. None of us saw where it came from. We did not see it dug out, I certainly did not, and if Mr. Praeger said he saw it dug out I would have every confidence in what he states regarding it. The bed was carefully examined and no other indication of worked flints was found. For my part, I do not think that the result was satisfactory. It is quite possible that a lower bed such as this at 12′6 may contain worked flints, and I look upon this single flake as sufficient to make us hesitate in coming to a final opinion until this very bed is re-examined over a larger area.

We have, however, clearly established the fact that the gravels are stratified, and that the worked flints are not mixed through them. We may be able to prove ultimately that the worked flints are confined to certain beds, some very much deeper than others. I am prepared for this when proved ; but up to the present I hold that all the evidence tends to show that the flakes are confined to the upper gravels.

WILLIAM GRAY.

Dear Sir,

I have read over your report on the flint flakes, which is very full and comprehensive. I think it will meet with the entire approval of those present on the occasion.

With regard to the flake which gave rise to some discussion at the time. I was standing close by Mr. Praeger at the time when he lifted it off a shovelful of loose sand and gravel. We neither saw it dug up when the men were loosening the solid strata, nor falling from above ; but when they turned between us and the escarpment to throw it out, particles already loosened at the top were occasionally trinkling down behind them, and in that way it might have got into the loosened stuff unnoticed. This is the only way I can account for its presence, as wherever the original strata remain unbroken by traffic or agriculture, no indication whatever of flint flakes, either in the north or south escarpments could be found. They seem to be

entirely confined to the surface, or to a depth to which in the course of time the surface may have been broken up.

Yours very truly, &c.,

DANIEL M'KEE.

Having been detained in Belfast, I arrived upon the ground too late to take any part in the careful and systematic examination of the first site.

At the second site I could not observe any flint flakes in the gravel, except near the surface. Here the gravels, which are rudely stratified, and which I would not be inclined to call boulder drift, rest upon an estuarine clay, and it therefore appears to me that the Curran gravels represent a raised sea-beach or bar, such as would form near a river mouth ; or it might have been formed under certain conditions by tidal currents.

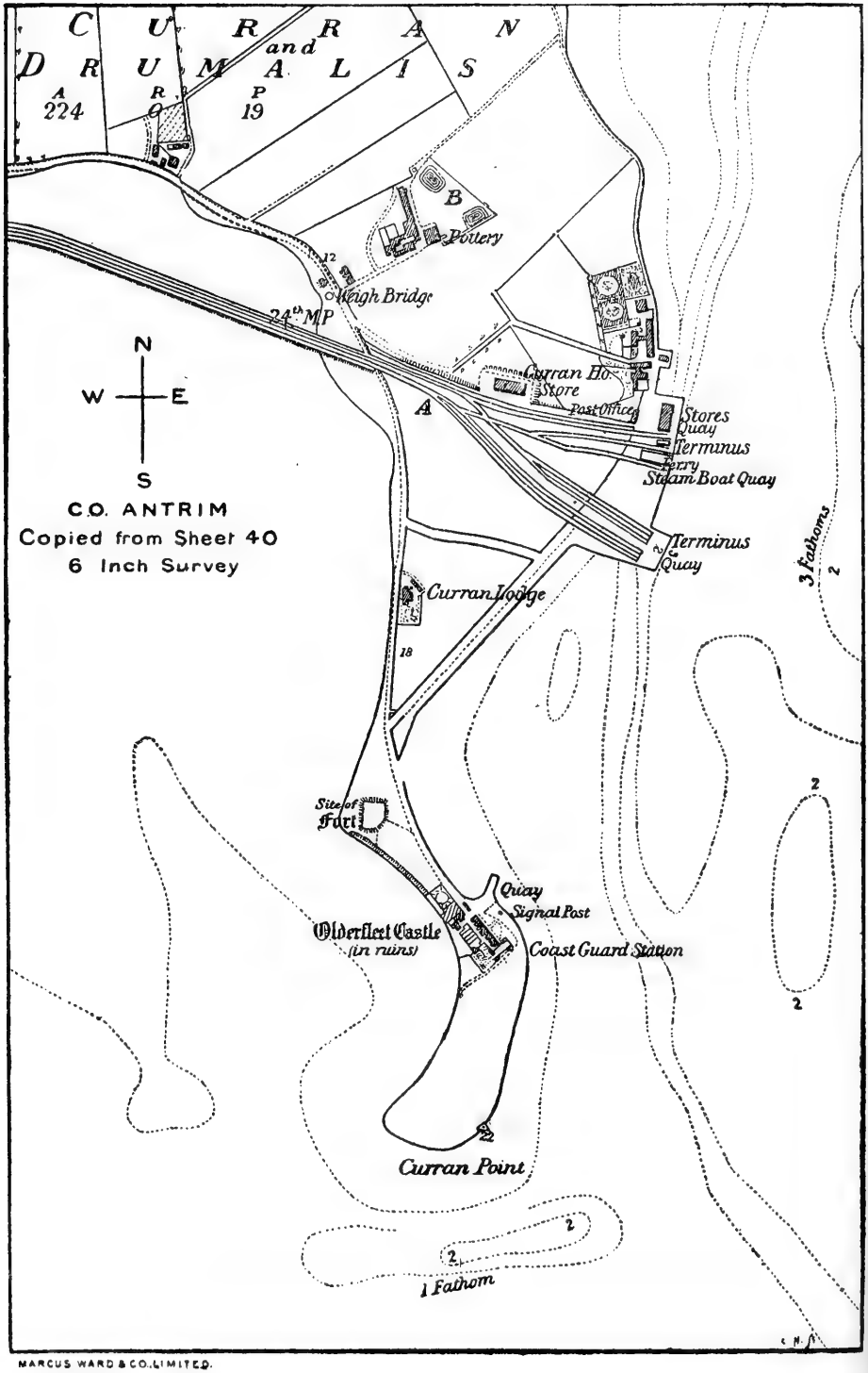
W. H. PATTERSON.

All the specimens picked up between the 3 feet 3 and the 7 feet levels were mere accidental chips of flint, such as are met with in all flint gravels, having merely a resemblance to the general form, but none of the characters of the implements designedly made, and known as "flint flakes."

The flake here picked up has so entirely the aspect of the best specimens from the surface deposit that the question was raised as to the probability of its having become detached from the loose gravels of the upper zone and fallen into the excavation then being made. It was not seen to fall from above, nor was it noticed to be dug up at the 11½ feet level, but was first observed when on the shovel of the workman. Though a keen watch was maintained for further specimens, none were forthcoming ; and the fact that eight feet of barren gravels had been dug through, and that no corroboration of the evidence was obtained, leads to the conclusion that the flint in question was not *in situ* where found.

On the whole case the result of the investigation seems to indicate the resort to these gravels by the flake makers, and the manufacture of implements on the spot in large quantities. That the surface was strewn with defective and lost specimens ; and that the gravels, frequently disturbed by natural and by artificial causes, are more or less charged with rude flint implements to a depth of less than four feet ; and that no certain evidence was forthcoming to demonstrate the occurrence of manufactured flints below this level.

S. A. STEWART.



MARCUS WARD & CO. LIMITED.

The Second Meeting of the Winter Session was held on 14th December, in the Museum—Canon Grainger, D.D., M.R.I.A., President, in the chair.

The programme of the evening embraced three distinct items. Before proceeding with these, however, the Hon. Secretary begged leave to read a minute that had been prepared by a small sub-committee on the late lamented death of a fellow-member :—"In referring to the decease of our late colleague, S. M. Malcomson, M.D., it is with the keenest regret that one so young and promising has been removed, just as his work amongst us had been commenced."

Dr. Malcomson was son of the late Mr. Samuel Malcomson. He was born at Belfast in November, 1857, and educated at Friends' School, Newton, County Waterford, and with private tutors. He matriculated in Queen's University in 1875, and, having chosen the medical profession, he graduated M.D. and M.Ch. in 1879. Dr. Malcolmson became a member of the Belfast Naturalists' Field Club in 1879, and being recognised as one likely to contribute time and talent to the work of the Club, he was elected on the commitee in April, 1882. The anticipations thus formed were not destined to be disappointed, as the record of his work will show. In 1879 he commenced examining rock-pools and shore gatherings at Rockport, in Belfast Lough, for Foraminifera, and two years were spent at this work, his researches being thorough and exhaustive. The result of this investigation was a list of eighty-seven species two of which had not previously been found in Britain, and another, which, though known as British, was an addition to the Irish fauna. All these discoveries have been communicated to the Club, Mr. Wright having included them in his report on the Foraminifera of the cruise made by the Club in June, 1885, and published in the Appendix to our Proceedings for 1884-85. Subsequently, Dr. Malcomson made recent British Ostracoda his special study. In the appendix just referred to he contributed an important paper on the Ostracoda of Belfast Lough and Irish Channel. In this paper he recorded 100 species. This is a most valuable paper to those studying the geographical distribution of these lowly

forms, and it was thus referred to in the "Annals and Magazine of Natural History for August, 1886:"—"Besides notes on species, we have here two elaborate tables showing the distribution of Ostracoda in the Irish Channel and Belfast Lough, with positions, depths, and bottoms of the dredgings, and references to the descriptions and figures of the many known species met with. Six forms new to Britain are recorded; three of these are new species, and are fully described and figured; and one new to Britain is also figured."

In 1885, a scientific expedition was sent, under the auspices of the Royal Irish Academy, to explore the marine fauna of the south-west of Ireland. The steam tug "Lord Bandon," which was engaged for the purpose, left Queenstown on 3rd August for a six days' cruise, and Dr. Malcomson formed one of the staff, taking charge of recording the Ostracoda and the Copepoda. The first report on the results obtained was read before the Academy on 22nd February, 1886. Dr. Malcomson reported sixty-seven species of Ostracoda, and six of Copepoda, one of the former being a form which had not previously been known to occur as a recent species. Dr. Malcomson did not confine his attention to one subject, but took a lively interest in natural history generally. He was well acquainted with most of our native wild flowers, and had paid considerable attention to mosses. At our recent fungus forays he was very active, and pursued the subject more or less zealously during the year as opportunity offered. It is only seemly that in closing these remarks there should be some reference to the amaibility and accomplishments of our late friend. The modesty of true genius characterised all his proceedings, and he shared the retiring disposition displayed by the most profound students of nature. In delineating minute microscopic objects he had a ready pencil, and while pourtraying such with all the finish of an artist, he never failed in bringing out all that detail which is so essential to the discrimination of closely allied species. By his death the Club have lost one who seemed destined to advance its objects, and to sustain its prestige, while, individually, many of us must lament the loss of a true friend.

At the close of the reading of the above minutes several members spoke in very pleasing terms of the memory of the late Dr. Malcomson.

The first item on the programme was a communication from the Rev. H. W. Lett, M.A., T.C.D., "On the Fungi collected in County Down in 1886." The speaker remarked that the scarcity of fungi so noticeable on the occasion of the Club's excursion to Hillsborough, was also observed throughout the British Isles, and was attributed to the unfavourable weather. It was perhaps due to this cause that the foray of 1886 produced only three species new to the locality. The leaf and similar microscopic fungi should have more attention paid them. Comparatively, they are very easy of study, and with Cook's "Rust, Smut, and Mildew," and a pocket lens, it is surprising how many can be identified, In this branch the late Dr. Malcomson did much, and gave promise of good work, but a vast field still remains unexplored. In the neighbourhood of Loughbrickland nine new species were found during the summer, and a private ramble in the Carngaver and Clandeboye woods in October produced fourteen, also, not hitherto recorded from the North of Ireland.

The second communication was also by Mr. Lett, "On the alleged Heliotropism of the Common Sunflower." The sunflower is one of a family of thirty-five members. In France it is cultivated for the sake of the oil yielded by the seeds, and in Central America for the purposes of fuel, the dry stems making a good fuel for cooking. The heliotrope of the classics is quite a different plant from the sunflower, or the modern "cherry pie" of the flower garden, though, strange to say, the name and the fabulous turning of the flower after the sun have got mixed up. Heliotropism means turning after the sun—just what the poet describes in the lines :—

> "The sunflower turns on her god when he sets,
> The same look that she turned when he rose."

This fancy—for it is nothing else—has just been given as a fact in natural history by Mr. Worseley Bennison, Lecturer on Botany in the Westminster Hospital, London, in a paper in the

Journal of Microscopy, "On the Power of Movements in Plants." It is there stated that "the sunflower twists its flower-stalk in a circle during the day, bringing its flower continually towards the sun." To test this, Mr. Lett established a series of careful observations, by means of indices fastened to stout stakes driven into the ground close to the sunflowers. These observations were carried out last September, in the garden at Aghaderg Glebe, Loughbrickland. The flower experimented upon grew in an open space, and faced, north, south, east, south-west, north-west, and north-east, and in no instance was there any alteration of position at morning, mid-day, or sunset.

The concluding Paper of the evening was by Mr. R. Ll. Praeger, B.A., entitled, "Notes on the Sections Recently Exposed at the Alexandra Dock." The author went minutely into a description of the various beds cut through in the work of excavating for this dock, and gave lists of the fossils found during the progress of the work. The communication has been considered of a character more suited for an appendix, and it will therefore be found in full at the end of this Report.

On 13th January the Third Meeting was held in the Museum —the president, Rev. Canon Grainger, D.D., M.R.I.A., in the chair—when a paper was given by Mr. W. H. Phillips, of Holywood, "On the Reproduction of Ferns, specially on the observed phenomenon called Apospory, with some remarks on Hybridisation."

The reader commenced with a description of an excursion to the West of England, to inspect the extensive collections of ferns in cultivation in that district. The collections in Bristol Zoological Gardens, Shirenewtown Hall, near Chepstow, and at Usk, in Monmouthshire, were described. The reproductive organs of flowering plants and ferns were contrasted. In flowers, the various parts are conspicuous and easily seen, whereas in ferns these parts are so minute it is not to be wondered that the study of the *modus operandi* of their development progressed at a very slow rate, it being only forty years ago that the last step was attained in the investigation of the normal mode of their reproduction, by the discovery that ferns, like flowers, were the result of sexual action. Haegele, in 1844, discovered the antheridia, or sperm cells, and Simmonski, a Polish botanist, the archegonia, or germ cells, two years later. The greatest obstacle to the earlier discovery of these phenomena was, that the first result of the germination of a fern spore is the production, not of a fern nor anything resembling one, but of a flat, green disc, called prothallus, upon the under side of which the antheridia and archegonia are produced, and the fertilising takes place, which results in the reproduction of the parent plant. When the antheridia are ripe their cells burst, and from them issue numerous spermatozoids, which make their way to the archegonia, and fertilise the ovary seated at its base. From this it will be seen that the prothallus represents the flowers of the higher orders of plants, in so far that it bears the homologues of the stamens and stigma in the forms of the archegonia and antheridia, and also the ovary and ovum. The spermatozoids take the place of the pollen grains, but seem endowed with a certain amount of volition, in addition to a power of locomotion, as they have been observed to travel

direct towards the archegonia, and Mr. F. O. Bower has observed that they have made their way unmistakably towards simulated archegonia, consisting of minute applications of malic acid to the surface of the prothallus, which points to sensory organs of some sort. It will thus be seen that in the normal development of ferns, the prothallus constitutes a separate generation, and, therefore, it would form an approach to the higher orders of plants did the prothallus spring direct from the parent plant instead of through the mediation of the spore, since the fern would then be the bearer, if not of flowers proper, at least of these homologues. There has lately been observed on some varieties of *Athyrium filix fœmina* an abnormal growth, which on close examination has revealed the wonderful phenomenon—viz., the production of the prothallus upon the parent plants without the mediation of the spore—*i. e.*, apospory, and that is what has rendered *A. f. f. clarissima* so remarkable, since it was upon it that this peculiarity has been first observed. Professor Farlow, in 1874, discovered an abnormal mode of reproduction, called apogamy, which consists in the occasional development of the fern by direct bud growth from the prothallus without the intervention of the fertilising organs, a phenomenon which is quite the converse of apospory ; the fern in the one case growing direct from the prothallus by a simple vegetative process, and in the other the prothallus growing in like manner directly from the parent fern. The discovery of apospory had been preceded by that of sundry other forms of proliferation upon our native *Athyriæ*, which really led up to it ; and, in 1872, Mr. Druery, in examining a batch of young plants raised from spores, was struck with the appearance of two whitish dots upon the first frond of an *Athyrium*. On examination by a lens, they were found to be bulbils. This could scarcely be credited, as at that time no proliferous form of *Athyrium* was known. Pursuing these researches, another form was found, far more proliferous, bearing seven bulbils. Stimulated by this discovery, Mr. Druery was able, in 1883, to record the proliferous character of the *Athyrias* in the plumose varieties. On examining a large specimen of *A. f. f. plumosum*

divaricatum for spores, he was much struck by finding the under side of the pinuæ profusely studded minute with nodules, surrounded, shuttlecock fashion, by scales. Applying a lens, the central excrescence was found to be rounded, and of a brilliant green, while the scales were of asymmetrical lanceolate shape, and beautifully reticulated. It was difficult to believe that these were bulbils, as then no ferns had been known to produce bulbils on the under side of the fronds, and in the place of sori. To test this, some of the pinuæ were laid down on sandy soil, and in a short time their bulbil character was established, as in one case a frond with three pinuæ had arisen, and in many cases the circinate form had been assumed by other less devoloped ones. The next discovery was that of the singular and different phenomenon observed on *A. f. f. clarissima*, in which there is a development of a perfect prothallus, without the agency of the spore or apospory. Some years ago, this very distinct and beautiful form of *Athyrium* was found wild by Mr. Moule, of Ilfracombe, from whom it passed into the possession of Colonel Jones, of Clifton. Many attempts were made at the time to propagate from what were supposed to be spores, but always without success, and at last it was thought that the peculiar growth produced on this fern, instead of sori, were merely abortive spore cases, and that the plant, like some other abnormal forms, lacked the special vigour necessary for the formation of perfect reproductive spores. In 1883, after the previous discoveries had been made known, the singular barren excrescences on *A. f. f. clarissima* were examined microscopically, and were found to have very material structural differences from the bulbils of *A. f. f. plumosum*, the former being solitary, budlike growths, seated in the centre of a number of brown lanceolate scales, and without a trace of indusium, while the latter were composed of five or six, or more, flask-shaped bodies, each one larger than the aforesaid bulbils, and seated within an undoubted indusium. The masses were sufficiently large for the formation to be seen by the naked eye, covering more than the space of an ordinary sorus. At this stage no sign of spore or spore cases could be

detected, nor could any axis of growth be perceived, so that it was impossible to form any theory as to the eventual mode of reproduction which might result, for, although the tips of the flask-shaped pseudo bulbils were in some cases elongated into filiform processes, no sign of circination or resemblance to fronds was visible, added to which the presence of an indusium in the place of scales, common to true bulbils, led to the assumption that they were abnormal sporoid growths, and not proliferous ones, likely to produce plants by direct bud growth. To test their capabilities, numerous pinuæ were laid down on November 27, on suitable soil, and placed in heat, and on December 24 pseudo bulbils showed an evident foliaceous extension of their tips, and the appearance of numerous long, rigid, glassy-looking rods or hairs, which sprang from their bases. These rods bore a strong resemblance to the root hairs common to the underside of prothalli, but their decided upward growth radiating stiffly seemed opposed to this view. It is probable that they acted as aerial roots, for the growth of the tips of the pseudo bulbils proceeded rapidly, and on February 10 they had assumed a decided prothalloid form, while the upright rods had either become deflected or absorbed. Eventually, all the tips of the flask-shaped bulbils assumed the form of perfect prothalli, of the usual shape and size, the pseudo bulbils themselves being absorbed and disappearing, and the usual root hairs developing under the prothalli. On March 17, several of the prothalli were examined microscopically, and well-developed archegonia were found in the usual place and number, but no antheridia were able to be detected. Early in May a single antheridium was found, and it is evident many others were there, but not noticed, as on May 21 the final stage was reached, small fronds being visible, in several cases, projecting from the bifurcation of the prothallus, and evidently, therefore, produced from the archegonia by the ordinary fertilising mode of reproduction through the prothalli ; which as had been shown, had developed from growths that differed widely from spores in their form, their size, persistent adherence to the penuæ, their production of root surface, and, finally,

the development of the prothallus from their apices by simple extension of growth. It will thus be seen that the fact has been established that this beautiful *Athyrium* forms a new link between the ferns and the flowers. The subject of hybridisation of ferns was then explained, and the mode of raising new varieties by judicious mixture of spores from plants of different varieties.

A great many specimens of ferns were shown, giving illustration of the two parent plants and the resultant cross, thus: a *Polystichum divisilobum* and *P. cristatum* producing *P. divisilobum cristatum.* Some of the crosses were of great beauty, and the notes of the raisers most interesting. Ferns and their allies are perhaps the most popular and attractive department of botany. Mr. Phillips, however, in his paper opened up quite a new field of observation to their admirers and cultivators, and the clear and comprehensive manner in which he brought his subject forward will no doubt stimulate many to follow the line of investigation which his paper suggested.

The Fourth Meeting of the Winter Session was held in the Museum on Tuesday evening, February 15th—the Rev. Canon Grainger, D.D., M.R.I.A., President, in the chair—when a paper was read by Mr. W. J. Knowles, M.R.I.A., on "The Worked Flints from the Raised Beach at Larne, and elsewhere in the North of Ireland."

Mr. Knowles, in the introduction to his paper, complained that Mr. William Gray, M.R.I.A., in his paper on "Erroneous Statements," read before the Field Club on 24th April, 1884, gave extracts from a paragraph of a paper read by him (Mr. Knowles) in June, 1883, before the Royal Irish Academy, from which he excluded certain qualifying phrases, without giving any indication that part of a sentence was dropped. In the part most complained of, Mr. Knowles had said—"*In the majority of sections I have had the opportunity of examining*, there is a general absence of any stratified arrangement, *such as would*

ordinarily be made by water," and Mr. Gray leaves out the words in italics, making Mr. Knowles speak of the gravels as a whole, while he only spoke of the *majority* of the sections he had the opportunity of examining. Besides, Mr. Knowles gave it plainly to be understood in his paper that the subjects referred to in the paragraph in question were to be further studied, and that they did not in the interim influence his conclusion ; yet Mr. Gray takes no notice of this, but proceeds to refute the extracts as given by himself, regardless of the before-mentioned qualifying passages. Considering the stand taken by Mr. Gray as a corrector of loose and careless statements, Mr. Knowles considered that this matter should be set right, as many persons believed he had spoken of the gravels and raised beach at Larne in a sense entirely different from what is stated in his paper. Mr. Knowles then traced the history and change of opinion regarding the worked flints from 1867, and proceeded to show that various authors had shown that the worked flints were found through the body of the gravels. Extracts were read from a paper by the late G. V. Dunoyer, M.R.I.A., to the Royal Geological Society, 18th December, 1868, that the worked flints were found in the raised beach, Ballyholme, six to eight feet from the surface. Mr. G. H. Kinahan, M.R.I.A., writing to the Belfast papers in May, 1884, says he found a flake *in situ* at a depth of over twelve feet at Larne. Mr. J. H. Staples, in a paper before the Field Club in March, 1869, says distinctly that the worked flints are found in the gravel of the raised beach at Holywood ; and in the Proceedings of the Liverpool Geological Society for 1880-81 there is a paper on the "Worked Flints of the Raised Beaches of the North-East coast of Ireland," by Mr. F. Archer, in which the author states that from watching the men removing the whole bank of gravels for ballast at Kilroot, he became convinced that many flakes occurred in the lower part of the bank, but that owing to doubts expressed by Mr. Gray he would not publish his opinion until he had confirmed it by a re-examination with great care, upon which occasion he obtained from the gravels on the first day's search twenty-eight specimens. Mr. Knowles also quoted the Rev. G. R. Buick,

M.A., and the Rev. Leonard Hasse, M.R.I.A., for similar statements corroborating his views. Opposite this mass of positive evidence we have the opinion of Mr. Gray stated in the Journal of the Royal Historical and Archæological Association of July, 1869, and in the reports of the Field Club, that "the worked flints are not mixed through the gravel, but occur only on the surface of the undisturbed gravels, and, therefore, the men who worked the flints lived subsequent to the formation of the raised beach." The sub-committee appointed by the Field Club to investigate these gravels support Mr. Gray's views, notwithstanding that they found in the section dug by them a flake at the depth of eleven feet six inches. Mr. Knowles argued that if conclusions could be arrived at from merely negative evidence, as had apparently been done by Mr. Gray and the sub-committee, there was not a well-established doctrine in all geological science that could not be overturned.

The author then stated that not only were these flakes and cores found embedded at all depths in the gravels, but he could show that there were grounds for supposing them other than the gravels themselves. There was evidence that the flakes had become weathered, and had obtained a thick, whitish, delft-like crust, covered with porcellaneous glaze before being included in the gravels, and he produced several specimens found at various depths, showing that before being so embedded the exposed edges of the glaze had been worn off, just as we see the glaze worn off pieces of crockery rolled about on the shore at the present day. Besides, he showed that all along the coast, as far as Dublin, the neolithic flint workers—that is, the manufacturers of scrapers and arrowheads—had scarcely any other material than old, thckly-crusted cores to work from ; and he produced examples of old cores re-wrought from Dundrum, County Down, and from Malahide. His opinion was that the older flakes and cores from Larne and Belfast Lough were drifted by currents along the coast, and that people who worked in flint at a later date re-wrought this old material. The flakes and cores of the older series as they were drifted along appear to have become smaller the farther they got away from their source, and,

consequently, the implements made from them are much smaller than implements of the same class in Antrim. At Dundrum all the objects are small, but many scrapers are not as large as a lady's finger-nail, and many showing portions of the old crust. At Malahide the flakes are still smaller than those found at Dundrum.

An animated discussion followed, in which Mr. Gray defended himself with considerable force from Mr. Knowles' strictures, and Messrs. Robt. Young, W. H. Patterson, John Carson, Joseph Wright, R. Ll. Praeger, G. Donaldson, and others took part. The general impression appeared to be that, in face of the positive statements of Mr. Knowles and those he had quoted, the report of the sub-committee though perfectly unbiassed, had not absolutely set the question of the position the worked flints occupy in the gravels at rest. The Hon. Secretary pointed out that Mr. Knowles had now raised two other points, which, if substantiated, would be of extreme interest—viz., that these worked flints, or some of them, had been washed out of some older raised beach or bed of clay, and re-deposited in the Larne bed, making them, if this were true, of a vastly greater age ; and also, that the implement workers further south had been to a considerable extent dependent for their stock of material upon the old, cast-off cores and flints of the northern workers washed along the beach, and re-worked when picked up further south ; and he suggested that the members of the Club should keep their eyes open for proof or disproof of these novel statements. With regard to the latter statement, it is reasonable to suppose that the natural flints and fragments embedded in the southern drift would be much smaller than those in Antrim found *in situ*, and it would be from these that the bulk of the southern implements would of necessity be made.

The Fifth Meeting of the Winter Session was held in the Museum on Tuesday evening, 22nd March—the Rev. Canon Grainger, D.D., M.R.I.A., presiding. On this occasion no paper was read, but the evening was devoted to the microscope.

The members mustered in force, and all sorts and conditions of microscopes were soon at work ; and it is astonishing what a number of lines of study were represented. Of these a brief enumeration here only can be given.

Mr. J. J. Andrew, L.D.S., F.R.C.S. Eng., exhibited a number of sections of bones, teeth, and other hard materials. Mr. G. J. Glen and Mr. D. M'Kee having also exhibits, including various native and foreign rocks and precious stones, such as Onyx, Jasper, Indian Agates, Chalcedonies, &c.; and Mr. M'Kee accompanied them by a case of specimens, rough and polished, and with books explaining their history and uses, localities, &c. Mr. Wm. Gray, M.R.I.A., exhibited specimens of microscopic marine objects. Mr. W. A. Firth exhibited a number of rare Diatoms from Samaru, Otago, New Zealand. These comprised some rarely beautiful forms, many quite new, and others described from the Barbadoes deposit by the late Dr. Greville in "Trans. Royal Microscopical Society ;" also other interesting slides of Diatoms from North American deposits. These Diatoms, the silicious skeletons of minute water plants, extremely beautiful, seem to have a large attraction for the members of the Club, for many members exhibit them in their collections, and a large number of specimens have been enlarged by micro-photography. Mr. George Donaldson exhibited a set of these beautiful photographs, a number being also shown by Mr. R. Welch and Mr. Stelfox. Mr. Stelfox went farther, and exhibited by microscope and camera the method adopted for producing these and other examples of micro-photography. Many of the forms offer valuable suggestions to our art designers and glass and jewel workers.

Mr. Welch also showed Ostracoda from the Alexandra Dock, and from the Estuarine clay in the foundations of Messrs. Robinson & Cleaver's.

Mr. Joseph Wright exhibited a variety of Foraminifera, some beautiful and others rare, from the dredging of the S.S. "Lord Bandon" off the south-west coast of Ireland,

Mr. W. Swanston, F.G.S., rare microscopic shells from the same dredgings.

Mr. J. W. Ward exhibited the manipulation of the polariscope. Mr. Barklie and others a number of general objects ; and Mr. John Donaldson specimens of dirty water from the Victoria Park, teeming with infusorial life, in which rotifers and other creatures were seen at work or at play, regardless of the "fierce light" of criticism that was directed upon them. The Rev. H. W. Lett, M.A., T.C.D., exhibited a new fungus—*Pimmia parisitica*—recently discovered by Mr. Greenwood Pim upon the decaying stalks of the Passion flower.

The election of a number of new members brought the proceedings to a close.

ANNUAL MEETING.

The twenty-fifth Annual Meeting of the Members of the Club was held in the Museum, College Square, on Tuesday, 19th April—the chair (in the absence of the President) being occupied by Mr. William Gray, M.R.I.A. This being the final meeting for the year much interest attaches to it. The reports of Secretaries and Treasurer are brought forward, and the election of officers for the ensuing year takes place. The collections submitted in competition for the various prizes offered are also on view. These on the present occasion formed an attractive feature, occupying the space afforded by two large tables.

Before proceeding to the official part of the evening's work, the Senior Hon. Secretary called attention to a large piece of silicified wood which was exhibited, and stated that, in company with Mr. S. A. Stewart, Scientific Curator of the Museum Collections, he had visited the works of the Belfast Water Commissioners, in progress at Stoneyford, to ascertain the conditions of occurrence of several large pieces of this fossil wood found there. It was ascertained that they occurred in the Boulder Clay, at a depth of about twenty-two feet from the surface, having evidently been transported to the site by the same agencies which formed the deposit. Several blocks

had been found, which, owing to their weight, had unfortunately to be broken before they could be removed from the excavation. Some of the pieces showed the rounding and scratchings incident to their removal by ice. It was evident, however, from the woody structure still remaining on several of the examples that the spot from which they were originally derived was not a very distant one. It was observed at the same time that the clay exposed by the deep cutting was divided by a sharply-defined line into a dark or lower bed, the base of which was not reached, and an upper light reddish deposit. Packets of both these deposits were brought away and submitted to Mr. Joseph Wright, F.G.S., for microscopic examination.

Mr. WRIGHT, on being called upon, stated that the results of his examination were very instructive. The only organisms recognised in the packets were Foraminifera, which occurred in both. This points to the marine origin of the deposits, and it is worthy of note that the remarkable branching arenaceous form *Hyperammina arborescens* occurs in the lower bed, and is the first record of its having been found fossil.

The SECRETARY requested leave also to direct the attention of members to the fact that an effort is again being made to have the ancient cross of Dromore erected, and he expressed a hope that this time the exertions of those interested in so worthy an object would be crowned with success. The former site having been objected to, a new and perhaps even more suitable one has been chosen close to the cathedral. It was stated that a sum of about £40 would be necessary in order to secure the assistance granted by the Board of Works. If this were accomplished, this valuable and highly interesting relic will be rescued from further degradation, and would be for ever after carefully preserved as public property. It was also stated that the Committee of the Club had unanimously voted a subscription in aid of so laudable an object, confident that private subscriptions would soon secure the ends in view.

The CHAIRMAN then called upon the Secretaries and Treasurer for their Reports, from which it appeared that the Club

continued to enjoy prosperity. The summer programme proved successful, the excursions having been well attended. A dredging cruise was held in August, which, though favoured with fine weather and otherwise successful, it is to be regretted proved a serious monetary loss, owing to the attendance being much less than was anticipated. The winter session was well supported by papers of local interest; an evening devoted to the examination of microscopic objects proved highly popular. The Committee, in order to bring more conveniently before the members and the public the valuable papers which from time to time have been published as appendices to the annual Reports, ordered a limited number of the extra copies to be bound, and these form a neat and desirable volume on local subjects. The number of members on the roll is about the same as last year. Among those removed by death the Committee regret to record the loss of Dr. S. M. Malcomson, one of the most ardent and energetic members, and they also regret to record the death of Dr. John Woods Beck, who, though joining the Club in maturer years, took a deep and hearty interest in its work.

The next business of the evening was the election of Officers for the ensuing year. The Chairman referred to the hearty and genial interest which their President (Rev. Canon Grainger, D.D.) had ever evinced in the Club's aims, and to the admirable way in which he had performed the presidential duties during the past two years; while regretting the loss of the valued services of so tried a friend, he stated that in this instance the parting was unavoidable, owing to what he termed a very salutary rule of the Club prohibiting the offices of President and Vice-President being held by the same person for a longer term than two years. On taking leave of the President at the close of his short term, this rule has often, as in the present case, appeared to press harshly on kind associations and friendships. It has, however, another aspect, in that it affords an opportunity to the members of honouring others who have loyally worked for the Club's good. The Chairman then proposing that Mr. Hugh Robinson, the Vice-President, be elected Presi-

dent for the ensuing year, paid a well-deserved tribute of praise to the long and valued services which he had ever cheerfully given to the Club. From its earliest inception Mr. Robinson had been intimately connected with its working, having been a member of its first Committee, and for many years one of its Honorary Secretaries during a period of its history requiring the greatest care and watchfulness.

Mr. Lockwood, in seconding the Chairman's proposition, also referred to Mr. Robinson's long and intimate connection with the Club.

The resolution on being put to the meeting was carried unanimously.

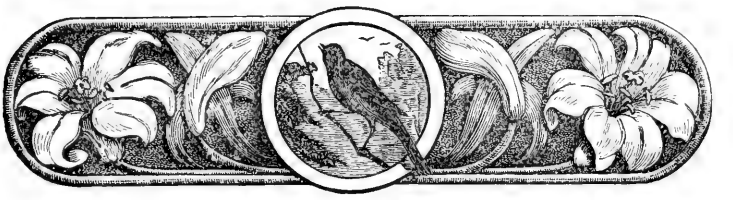
Mr. Robinson, in thanking the Chairman for the kind manner in which he had referred to him, also the members for the honour they had conferred on him, was at the request of Mr. Gray invited to the chair, which he then vacated in his favour amid applause.

Mr. Joseph Wright, F.G.S., was unanimously elected to the office of Vice-President, and Mr. S. A. Stewart, F.B.S.Edin., to that of Honorary Treasurer.

The Hon. Secretaries, Messrs. Swanston and Lockwood, were re-elected, as were also the Committee, with the following new members to fill the vacancies:—Mr. John J. Andrew, Mr. G. Donaldson, and Mr. John Hamilton.

The judges appointed to examine the collections sent in to compete for the Club's prizes then read their awards, from which it appeared that there were three geological collections sent in. Mr. D. M'Kee was awarded the prize for a set of Cretaceous fossils; Mr. Robert J. Welch carried off the prize for a remarkably fine series of Liassic fossils; while Mr. R. Ll. Praeger, B.A., was awarded the prize for a fine series of 137 species from the Post-tertiary beds of Belfast and Larne, a good many of which are additions to the lists already published for this district. Mr. Praeger was also awarded the prize for a series of 203 species of flowering plants, each of which represents a species not included in the 475 plants collected in the preceding year, thus bringing up the entire collection made by

Mr. Praeger during the two years to 678 species, being very near the limits of the flora of the district. The same indefatigable member had also submitted to Rev. H. W. Lett during the year 200 specimens of fungi, which was entitled to the prize for that department; it was pointed out, however, that under a rule the prize could not in this case be awarded. A general conversation then followed on localities suitable for visiting during the summer, and on various matters tending to popularise and improve the standing of the Club. The election of new members closed the business of the evening.



METEOROLOGICAL SUMMARY FOR 1887.

To the kindness of LANCELOT TURTLE, Esq., J.P., Aghalee, we are again indebted for the following exhaustive tables, giving a summary of meteorological phenomena for the year 1887, and accompanying monthly notes.

The observatory at which the records are made is situate at Aghalee, in the extreme southern point of the County of Antrim, at an elevation of 130 feet above sea-level. The country to the west is flat, and very little above the level of Lough Neagh, which is $2\frac{1}{2}$ miles distant in that direction, and to other points the country is gently undulating, and well wooded. The nearest mountains are those surrounding Belfast, distant about 12 miles east, while the Tyrone mountains are about 25 miles west. The nearest point of sea is the upper end of Belfast Lough, while the open sea may be said to be about 20 miles east of the observatory.

REVIEW OF THE WEATHER.

METEOROLOGICAL Observations for the year 1887, taken at Fern Brook, Aghalee, County Antrim. Latitude, 54° 31′ 15″ N.; Longitude, 5° 16′ 0″ W.

1887.	BAROMETER 130 Feet above Sea Level. Corrected and Reduced to 32 degrees Fahrenheit and mean Sea Level.				SELF-REGISTERING THERMOMETERS in a "Stevenson" Stand.										HYGROMETER at 9 a.m.	
	Max.	Min.	Mean.	Range.	Highest of the Month.	Lowest of the Month.	Mean Maximum.	Mean Minimum.	Mean Temperature of the Month.	Greatest daily Range.	Monthly Range.	Nights below 32 Deg. on the grass.	Maximum Black Bulb in vacuo, 4 feet above grass.	Mean Amount of Solar Radiation.	Mean of dry Bulb.	Mean of wet Bulb
	Inches.	Inches.	Inches.	Inches.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.					
January.....	30·538	28·826	29·782	0·712	54	11	42·90	30·00	37·92	25	43	17	95	17·81	40·3	39·0
February.....	30·676	29·445	30·060	1·231	55	25	47·21	34·68	40·94	22	30	8	104	34·04	41·7	39·7
March	30·542	29·142	29·842	1·300	61	20	47·45	33·42	40·42	31	41	14	121	44·71	41·2	38·8
April.....	30·574	29·018	29·780	1·556	69	25	54·53	34·60	44·56	38	44	15	125	53·30	45·5	42·1
May.....	30·465	28·900	29·680	1·565	70	29	60·93	40·03	51·48	30	41	2	132	54·17	51·3	48·2
June	30·702	29·802	29·750	0·900	88	44	74·65	50·56	62·61	39	44	0	133	45·00	62·2	57·9
July	30·467	29·224	29·890	1·243	83	41	70·84	53·93	62·40	28	42	0	136	52·16	62·5	58·6
August.....	30·356	29·236	29·790	1·120	78	38	71·90	51·97	62·00	38	40	0	134	49·70	61·4	58·0
September...	30·600	29·088	29·844	1·512	68	36	61·03	45·43	53·23	29	32	0	124	38·13	53·5	50·9
October.....	30·626	29·116	29·890	1·510	64	30	54·95	42·10	48·53	26	34	3	121	35·89	49·7	47·0
November....	30·280	28·505	29·550	1·775	52	25	45·27	35·40	40·33	17	27	11	102	27·13	41·2	39·4
Deeembcr...	30·291	28·888	29·600	1·413	51	21	41·84	33·10	37·47	19	30	18	80	20·56	38·7	37·0
Totals.....	366·117	349·190	357·458	15·837	793	345	673·50	488·22	581·89	342	448	88	1407	472·60	589·2	556·4
Means	30·509	29·100	29·788	1·320	66·0	28·7	56·12	40·68	48·50	28·5	37·3	7	117·2	29·33	49·1	46·3

REVIEW OF THE WEATHER.—*Continued.*

1887.	Dew Point.	Comparative humidity Saturation—100—	Elastic Force of Vapour.	Mean Amount of Ozone.	WIND. Number of Days on which the Wind blew from the following points at 9 a.m.									RAINFALL. Gauge—Diameter of Receiver, 5in.; height above the ground, 1 foot; height above sea, 105 feet.			
					N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Total depth in inches.	Greatest fall in 24 hours. Inches.	Greatest fall in 24 hours. Date.	Number of days rain.
		Per Cent.	Inches.														
January.....	37·3	89	0·222	6·3	0	0	0	1	9	4	8	4	5	2·48	0·43	18th	15
February.....	37.2	86	0·223	6·0	2	0	1	0	8	4	6	2	5	0·94	0·25	2nd	10
March	33·8	75	0·195	6·2	4	2	5	0	2	3	7	4	4	1·00	0·32	24th	12
April.....	38·1	77	0·213	8·6	7	3	3	3	2	2	4	4	2	1·14	0·18	20th	14
May.....	45·0	79	0·300	9·3	6	2	3	5	0	2	2	10	1	1·69	0·66	19th	11
June	52·4	68	0·394	9·0	3	1	8	2	1	2	7	4	2	0·51	0·38	5th	5
July.....	61·8	95	0·554	8·1	6	0	0	1	5	1	12	4	2	2·10	0·47	3rd	18
August.....	55·1	80	0·434	8·0	2	1	0	2	10	1	5	7	3	2·66	0·72	31st	18
September...	48·3	83	0·238	7·5	9	1	2	0	1	3	5	5	4	2·46	0·72	1st	13
October.....	44·1	81	0·289	7·2	9	1	0	0	1	3	5	7	5	1·52	0·24	31st	15
November...	37·1	86	0·221	6·5	3	5	3	1	2	7	5	0	4	2·58	0·45	6th	17
December....	34·7	86	0·210	5·2	6	0	1	3	1	0	12	5	3	2·04	0·28	16th	18
Totals.....	524·9	985	3·511	87·9	57	16	26	18	42	32	78	56	40	21·12	5·10		166
Means	43·7	82	0·291	7·3	9	2	2	3	7	0	10	7		Direction of Wind on calm days.			

Review of the Weather.—*Continued.*

Comparison of Annual Temperatures.

Thermometers Shaded.

	Highest Degrees.		Lowest Degrees.		Mean Temperature Degrees.
1869	82 on the	17th July	15 on the	28th Dec.	48·80
1870	86 „	10th Aug.	5 „	24th Dec.	48·68
1871	80 „	8th Aug.	19 „	15th Dec.	48·98
1872	77 „	18th July	23 „	30th Dec.	49·05
1873	81 „	22nd July	15 „	24th Feb.	48·52
1874	84 „	18th July	20 „	17th Dec.	49·31
1875	77 „	29th July	22 „	9th Dec.	49·43
1876	94 „	16th July	20 „	20th Feb.	48·84
1877	79 „	20th June	25 „	19th Mar.	48·94
1878	84 „	22nd July	10 „	25th Dec.	48·54
1879	81 „	11th Aug.	14 „	12th Jan.	45·51
1880	83 „	12th Aug.	17 „	21st Dec.	48·82
1881	83 „	31st May	4 „	22nd Jan.	47·28
1882	85 „	10th Aug.	11 „	14th Dec.	48·67
1883	75 „	24th Aug.	20 „	15th Nov.	48·00
1884	84 „	28th June	22 „	20th Dec.	49·06
1885	82 „	24th July	19 „	11th Dec.	47·49
1886	85 „	1st July	10 „	20th Dec.	47·37
1887	88 „	25th June	11 „	6th Jan.	48·50
Total	1570		302		919·79
Mean	82·63		15·90		48·41

Comparison of Annual Rainfall.

	Inches.	No. of Days Rain.		Inches.	No of Days Rain.
1869	28·82	181	1881	36·49	201
1870	28·86	170	1882	39·59	219
1871	30·18	176	1883	31·92	176
1872	47·09	222	1884	32·51	195
1873	31·94	178	1885	26·31	172
1874	30·03	170	1886	34·61	219
1875	33·63	172	1887	21·12	166
1876	38·33	174			
1877	41·68	229	Total	628·84	3527
1878	30·02	175			
1879	35·60	182	Mean	33·10	186
1880	30·11	150			

1887 { Mean temperature, 0·09 deg. above the 19 years' average.
Maximum temp. 5·37 „ above „ „
Minimum temp. 4·90 „ below „ „
Rainfall 12·61 in. below the 18 years' average.

Lancelot Turtle.

MONTHLY NOTES.

Not often are we favoured with such a fine season throughout as 1887. Sunshine was in excess in nearly every month of the year. Storms were very few; and with the exception of two nights in January, there was not any really extreme frost during the whole year. Except June, the heat was not extreme at any time, though the summer was warm. There was, indeed, drought in excess, and the greater part of Ireland felt the want of rain most seriously during the summer and autumn months.

Of the twelve months of 1887, ten were drier than usual, and two had average rainfalls. Five were colder than usual; five warmer than usual; one of great heat, and one of average temperature.

Mean temperature of the whole year 1·04 degrees higher than 1886, and 0·09 of a degree above the average of nineteen years.

The gauge of rainfall was less than that of last year by 13·49 inches, with a decrease of 43 wet days, and less than the 19 years average by 11·98 inches, with 20 wet days below the average. The deficiency of rain for the whole year was 12·12 tons to the statute acre.

January was our coldest month. In its opening weeks it threatened for a time to rival the frosts of the early parts of 1886, when for a period of 78 days 52 degrees was only once reached; but the frost of January, 1887, was short-lived, it was gone by the 18th, and the rest of the month was exceedingly mild and pleasant. The coldest day of Jannary was also the coldest day of 1887. On the morning of that day the shaded temperature fell to 11, or 21 degrees of frost.

February was all through a fine month, bright, sunny, and mild. There was a brief period of frost from the 9th to the 16th, but with that exception it was genial and springlike. The lowest point touched was 25 degrees on the 10th. Rain was considerably below the average, in fact it was the beginning of the long summer drought. Locally, snow was never seen, and February did not justify its old name, "Fill the dyke."

March was decidedly cold, but not boisterous. It opened and closed fine and bright, like the greater part of February; but, from the 9th to the 23rd, frost, snow, and hail took the place of mild sunshine. Snow fell on six days—no place within the British Isles quite escaped snow in March. The highest temperature was 61 degrees; lowest, 20, and the thermometer fell below freezing point on 14 nights.

April was a dry month, and the coldest April since 1879. Snow fell on 5 days, with the usual spring inflictions of east winds, while the days of genial warmth, premonitory of summer, were very few. Cuckoo heard and swallow seen on the 16th, and landrail on the 18th. Hawthorn bursting into leaf on the 18th, willow on the 21st, and chestnut on the 23rd. Hawthorn 7 days and chestnut 5 days later than last year, and willow 8 days earlier.

May was dry and rather cold; it was also a month of easterly wind, and gave little indications of the approach of a warm summer. There was a brief period of 5 days, near the close of the month, when the warmth was above the average; but from the 1st to the 21st the summerlike days were very few, and there were almost no indications of a good and early harvest. Elm tree bursting into leaf on the 2nd, beech on the 6th, and the late ash on the 14th, all on the same dates as last year.

June was our first summer month; it is very rare to have the warmest day of the year at Aghalee in June, only twice during twenty years has it happened, and it so fell out this year. The drought also was the greatest in June. On the 5th the temperature rose, and for the remainder of the month we had a combination of heat and drought which lasted till the close. After Tuesday, the 7th, not a drop of rain fell during the remainder of the month, and there was very little dew. Such figures as 0·51 of an inch as the rainfall of the whole month are extremely rare.

July was also very hot, but not so remarkable as June for its high maximum temperature, or small rainfall. Its night temperature, however, was higher than that of last month, and thus almost equalizing the mean value of June and July. There was a partial recovery from the drought of June, still the rainfall was below the average. Many rivers and springs were dried up, and water every where deficient. It was a warm and sunny month, but the heat was not distributed regularly over the month; it came in spells. There is no recent instance of the mean temperature of June and July, taken together, being so much above the average, and, probably, no instance can be shown of such a hot and dry June and July following such a cold and dry spring.

August had a few more showers than July. Rain came on the 17th, and the remainder of the month proved moderately wet. At the close of August there was heavy rainfall, and rivers that had been dried up commenced to flow—rain only half an inch deficient. The average of all the maximum readings of the thermometer was higher than last month's; the average of the night temperatures considerably lower; mean temperature lower than July mean, and 2·10 degrees above the average mean temperature. On the 8th harvest had commenced all round—there has not been so early a harvest since 1868.

September was dry and cold, it saw the close of the warm weather of 1887. Last year September reached 71 degrees; this year 68 degrees was the highest. Maximum temperature below the average; night temperature, average; mean temperature 1·54 degrees less than the average. Rain almost an inch less than the mean.

October was very dry and cold, yet a beautiful month, with much sunshine. Last year it was warm and damp, with less sunshine. Rain again deficient, and 1·75 inches below the average. Swallows last seen on the 20th, but almost all had left by the 9th of the month.

November was wet and cold. Rainfall was not at any time heavy. It was distributed by very moderate falls over a period of 17 days. Rain was up to the average, but was above the average in most of places. Mean temperature 2·10 degrees below the standard.

December was the most variable month of all the months of the year. It had spells of everything by turns—fresh clear weather, rain, frost, mist, snow, fog, and in no phase did it continue long. Temperature 0·22 degrees above the mean. Rainfall 0·96 of an inch below the average.

LANCELOT TURTLE,
Fern Brook.

RULES.

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "The Belfast Naturalists' Field Club."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that Candidates for such Membership shall be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club, and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Two Secretaries, and Ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be

eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collection of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological researches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of Twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subjects mentioned in such written requisition.

XI.

That the Committee be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its Members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I. The Excursion to be open to all Members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expense incurred, except by the consent of the majority of the members present.

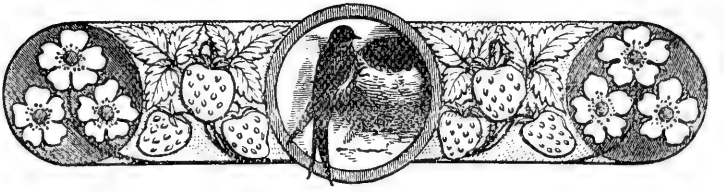
V. No fees, gratuities, or other expenses to be paid except through the conductor.

VI. Every member or visitor to have the accommodation assigned by the conductor. When accommodation is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion, without previous notice, will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

TWENTY-FIFTH YEAR.

The Committtee offer the following Prizes to be competed for during the Session ending March 31st, 1888:—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species,	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species,	...	0	10	0
III.	Best Collection of Mosses,	... ...	0	10	0
IV.	,, ,, Lichens,	... ...	0	10	0
V.	,, ,, Seaweeds,	... ...	0	10	0
VI.	,, ,, Ferns, Equiseta, and Lycopods,	... ...	0	10	0
VII.	,, ,, Tertiary and Post Tertiary Fossils,	...	0	10	0
VIII.	,, ,, Cretaceous Fossils,	...	0	10	0
IX.	,, ,, Liassic do.,	...	0	10	0
X.	,, ,, Permian and Carboniferous Fossils,	...	0	10	0
XI.	,, ,, Older Palæozoic do.,	...	0	10	0
XII.	,, ,, Marine Shells,	... ...	0	10	0
XIII.	,, ,, Land and Freshwater Shells,	... ...	0	10	0

XIV.	Best Collection of Lepidoptera, ...	£0 10 0
XV.	„ „ Hymenoptera, ...	0 10 0
XVI.	„ „ Coleoptera, ...	0 10 0
XVII.	„ „ Crustacea and Echinodermata, ...	0 10 0
XVIII.	Best Collection of Fungi; names of species not necessary. Collectors may send (post-paid, from time to time during the season) their specimens to Rev. H. W. Lett, M.A., T.C.D., Aghaderg Glebe, Loughbrickland, who will record them to their credit, ...	0 10 0
XIX.	Best Collection of Fossil Sponges, ...	0 10 0
XX.	Best Collection of 24 Microscopic Slides, illustrating some special branch of Natural History, ...	0 10 0
XXI.	Best Set of 24 Microscopic Slides shewing general excellence, ...	0 10 0
XXII.	Best Set of 6 Field Sketches appertaining to Geology, Archæology, or Zoology, ...	0 10 0
XXIII.	Best Set of 12 Photographs, illustrative of Irish Archæology. This Prize is open to Members of the Ulster Amateur Photographic Society, ...	0 10 0

SPECIAL PRIZES.

XXIV. The President offers a Prize of £1 1s. for the Best Set of three or more Original Sketches, to be placed in the Album of the Club. These may be executed in pen and ink or water colour, and must illustrate one or more ancient monuments somewhere in Ireland. In determining the relative merits of the sketches, accuracy in representing the subjects and their details will have chief place. This Prize is open to the Members of the Ramblers' Sketching Club, and to the Students of the School of Art.

XXV. Mr. William Swanston, F.G.S., offers a Prize of 10s. 6d. for Six Photographs from Nature, illustrative of Geology, contributed to the Club's Album.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same Prize twice within three years.

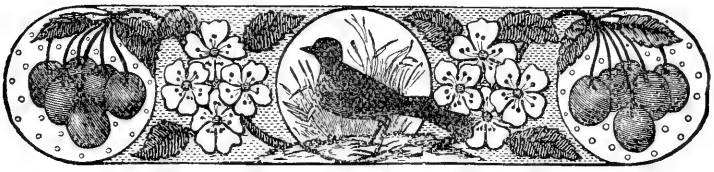
A member to whom Prize No. 1 has been awarded shall be ineligible to compete for Prize No. 2, unless the plants are additions to those in previous collection.

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

All Collections to be made personally during the Session, in Ireland. Each species to be correctly named, and locality stated. The Flowering Plants to be collected when in Flower, and classified according to the Natural System. The Microscopic Slides to be the Competitors' own work. The Sktches and Photographs to be Competitors' own work, and those sets for which Prizes are awarded to become the property of the Club.

No Prizes will be awarded except to such Collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.



NOTICE.

EXCHANGES OF PROCEEDINGS.

The Committee of the Club acknowledge with thanks the receipt of the following publications, which have been received during the past year from the various societies and institutions :—

Belfast Natural History and Philosophical Society.
Procoedings, 1886-87.

Belfast, Society for Promoting Knowledge.
Catalogue of Early Belfast Printed Books, 1694-1830.

Brighton and Sussex, Natural History and Philosophical Society.
Annual Report, 1887.

Bristol Naturalists' Society.
Proceedings. Vol. V., Part 2, List of Members and Index.

Cardiff Naturalists' Society.
Report and Transactions. Vol. XVIII., 1886.
Flora of Cardiff, by John Storrie.

Dublin Royal Geological Society of Ireland.
Vol., VIII., New Series. Parts I. and II.

Dumfries and Galloway Natural History and Antiquarian Society.
Transactions. Sessions 1883-84, 1884-85, 1885-86.
List of Flowering Plants of Dumfries and Galloway, by Jas. M'Andrew.

Edinburgh Geological Society.
Transactions—Vol. V., Part III., and Catalogue of Library.

Edinburgh—Botanical Society of.
Transactions and Proceedings Vol. XVI. Part III.

Essex Field Club.
"The Essex Naturalist"—No 1, 2, 3, 4, and Map of Essex.
Transactions IV., Part 2.

France—Society Linneenne du nord de la France.
Bulletin Tome VII., Nos. 151 to 162. Tome VIII. Nos. 163 to 174.

Frankfort—Monatliche Mirttbreilungen.
April to September, 1887.

Glasgow—Natural History Society of
Proceedings and Transactions. Vol. I., New Series. Part III.

Hertfordshire Natural History Society and Field Club.
Transactions. Vol. IV., Parts 4, 5, 6, 7.

Leeds Philosophical and Literary Society.
Annual Report—1886-87.

Liverpool Geological Society.
Proceedings. Vol. V., Part III.

,, Naturalists' Field Club.
Proceedings—1886-87.

,, Literary and Philosophical Society.
Proceedings. Vols. XXXIX., and XL.

,, Geological Association.
Transactions. Vols. VI., and VII.

London—British Association for the Advancement of Science.
Report of Fifty-sixth Meeting.

Manchester Field Naturalists' and Archæologists' Association.
Report and Proceedings, 1886.

,, Scientific Students' Association.
Report and Proceedings—1885.

,, Microscopical Society.
Transactions and Annual Report—1886.

New Brunswick—Natural History Society of.
Bulletin. No. VI.

Penzance Natural History and Antiquarian Society.
Report and Transactions—1886-87.

Plymouth Institution, and Devon and Cornwall Natural History Society.
Annual Report and Transactions. Vol. IX., Part III.

Toronto—Canadian Institute.
Proceedings. Third Series, Vol. IV., Fas., 2, and Vol. V., Fas., 1.

U.S.A.—Californian Academy of Science.
Bulletin. Vol. II., Nos. 5, 6, 7.

,, Essex Institute.
Bulletin. Vol. XVIII., Nos. 1 to 12.

,, Geological Survey.
Sixth Annual Report, 1884-85.

,, New York—American Museum of Natural History.
Annual Report, 1886-87, and Bulletin, Vol. II., No. 1.

,, New York Microscopic Society.
Journal. Vol. II., Nos. 9 and 9a.

,, New York Academy of Sciences.
Transactions. Vol. V., Nos. 7 and 8.

,, Philadelphia Academy of Natural Sciences.
Proceedings. Part III., 1886, and Part I., 1887.

,, Philadelphia—Wagner Free Institute of Science.
Transactions. Vol. I.

,, Raleigh—Elisha Mitchell Scientific Society.
Journals, 1884 to 1887.

,, Salem—Peabody Academy of Science.
Annual Report, (Nineteenth).

,, Salem—American Association for the Advancement of Science.
Proceedings of 24th and 25th Meetings.

,, St. Paul's—Geological and Natural History Survey of Minnesota.
Annual Report, (Fourteenth).

,, St. Louis Academy of Science.
Transactions. Vol. X., No. 4.

,, Trenton, N.J.—Natural History Society of.
Journal No. 2.

,, Washington—Smithsonian Institute.
Annual Reports—1884-85.

Warwickshire Naturalists' and Archæologists' Field Club.
Proceedings, 1886.

The following were received from the Publisher:

London, Scientific News, New Series, Vol. I., No. 1.

,, Naturalists' Monthly, Vol. I., No. 1.

BELFAST NATURALISTS' FIELD CLUB.

TWENTY-FIFTH YEAR, 1887-88.

LIST OF OFFICERS AND MEMBERS.

PRESIDENT:
HUGH ROBINSON, M.R.I.A.

VICE-PRESIDENT:
JOSEPH WRIGHT, F.G.S.

TREASURER:
S. A. STEWART, F.B.S.Edin.,
THE MUSEUM.

SECRETARIES:

WM. SWANSTON, F.G.S.,	F. W. LOCKWOOD,
50 King Street.	Eagle Chambers, Royal Avenue.

COMMITTEE:

JOHN J. ANDREW, L.D.S., R.C.S., Eng.	JOHN HAMILTON.
CHARLES BULLA.	REV. H. W. LETT, M.A., T.C.D.
GEORGE DONALDSON.	DANIEL M'KEE.
W. A. FIRTH.	R. Ll. PRAEGER, B.A., B.E.
WM. GRAY, M.R.I.A.	JOHN VINYCOMB.

Members.

Any changes in the Addresses of Members should be notified to the Secretaries.

Edward Allworthy, Langford Villas.
John Anderson, J.P., F.G.S., Hillbrook, Holywood.
Robert Anderson, Meadowlands.
Rev. John Andrew, Belgravia.
Jno. J. Andrew, L.D.S., R.C.S. Eng., Belgravia.
Mrs. Andrews, Seaview House.

Jas. M. Barkley, Mountpottinger.
Robert Barklie, Wilmont Terrace.
James Barr, Sandringham, Malone Road.
William Batt, Sorrento, Windsor.
Miss Emma Beck, Old Lodge Road.
George R. Begley, Wolfhill Lodge.
Elias H. Bell, Knockdarra.
James Best, Great Victoria Street.
Fras. J. Biggar, Ardrie, Antrim Rd.
Edward Bingham, Ponsonby Av.
D. A Black, Wellington Place.
Mrs. Blair, Camberwell Terrace.
Edward Braddell, St. Ives, Malone Park.
Wm. Thos. Brand, Florida Manor, Killinchy.
Hugh B. Brandon, Atlantic Avenue.
Chas. H. Brett, Gretton Villa South,
Rev. John Bristow, St. James' Parsonage.
John Brown, Edenderry House.
Miss Rowena Brown, Edenderry Ho.
Robert Brown, Donoughmore.
Thomas Brown, Donegall Street.
James A. Browne, Wilmont Place.
John Browne, J.P., Ravenhill House
John Browne, M.R.I.A., Drapersfield, Cookstown.
W. J. Browne, M.A., M.R.I.A., Omagh.
W. W: Brydon, Silverstream, Greenisland.
Charles Bulla, Brougham Street.
H. Burden, M.D., M.R.I.A., Alfred Street.
J. R. Burnett, Martello, Holywood.

Wm. Campbell, Allworthy Avenue.
Miss Carruthers, Claremont Street.
John Carson, Church Lane.
E. T. Church, Donegall Place.
James Cleland, Tobar Mhuire, Crossgar.
Wm. Clibborn, Windsor Terrace.
Stanley B. Coates, L.R.C.P., Edin., Shaftesbury Square.
W. F. C. S. Corry, Chatsworth.
Rev. W. Cotter, D.D., Riversdale Terrace.
Elisha Crawford, University Road.
James Creeth, Riversdale Terrace.
Robert Culbert, Distillery Street.
Samuel Cunningham, Glencairn.
Francis Curley, Dunedin.
Mrs. Curley, Dunedin.

John H. Davies, Glenmore Cottage.
Henry Davis, Holywood.
Robert Day, M.R.I.A., F.S.A., Cork.
E. O'Rorke Dickey, Castleton Ter.
Wakefield H. Dixon, J.P., Dunowen.
George Donaldson, Bloomfield Av.
John Donaldson, Eglinton Street.
Right Hon. Lord Dufferin, Clandeboye. (Hon. Mem.)

David Elliott, Albert Bridge Road.
Lavens M. Ewart, J.P., Glenbank.

John Fagan, F.R.C.S., Glengall Pl.
William Faren, Mountcharles.
Godfrey W. Ferguson, Murray's Ter.
J. H. Ferguson, Belgrave, Knock.
Joseph Firth, Whiterock.

W. A. Firth, City View Terrace.
Thomas J. G. Fleming, F.G.S., Limavady.
T. M. H. Flynn, Sunnyside, Bessbrook.

J. Starkie Gardner, F.G.S., Damer Terrace, Chelsea, London. (Hon. Mem.)
R. M. Gilmore, Londonderry.
W. J. Gilmore, Camberville Villas.
D. Corse Glen, F.G.S., Annfield Place, Glasgow.
George J. Glen, Hartington Street.
William Godwin, Queen Street.
Rev. David Gordon, Downpatrick.
James J. Goskar, Carlisle Circus.
Jas. Gourley, J.P., Derryboy, Killyleagh.
Robert Graham, Brookview Terrace.
Rev. Canon Grainger, D.D., M.R.I.A. Broughshane.
William Gray, M.R.I.A., Mountcharles.
Miss Gray, Mountcharles.
George Greer, J.P., Woodville, Lurgan.
J. H. Greenhill, Richmond, Antrim Road.
Edward Gregg, Claremont Street.
Rev. S. Griffiths, Ponsonby Avenue.

W. A. Halliday, Fountainville Ter.
John Hamilton, Mount Street.
Rev. Thos. Hamilton, M.A., D.D., Brookvale House.
Richard Hanna, Charleville Street.
Mann Harbison, Ravenhill Terrace.
Rev. Canon Hartrick, The Rectory, Ballynure.
Sir James Haslett, J.P., Princess Gardens.
Thomas Hassan, Strangemore House
Rev. Canon Hayes, Dromore.
W. D. Hazelton, Cliftonville.
F. A. Heron, Clermont, Holywood.
Mrs. Heron, Clermont, Holywood.
J. S. Holden, M.D., F.G.S., Sudbury, Suffolk. (Cor. Mem.)
John Horner, Cliftonville.
Alexander Hunter, Northern Bank.
W. J. Hurst, J.P., Drumaness, Lisburn.
Rev. Henry Hutchings, Markethill.
James Imrie, Fitzroy Avenue.
Rev. Richard Irvine, D.D., Hampton, Windsor.
H. Jamison, Duncairn Terrace.
John Jellie, J.P., Farmhill House, Carrickfergus.
James Johnston, Royal Avenue.
W. J. Johnston, J.P., Dunesk, Stranmillis.
Prof. T. Rupert Jones, F.R.S., &c., Riverdale Road, Chelsea, London (Hon. Mem.)

John Kane, B.A., Crown Entry.
W. Kennedy, Crescent Terrace.
Rev. S. Kershaw, Eblana Street.
Wm. Kernahan, Wellington Park.
George Kidd, Lisnatore, Dunmurry.
F. Kirkpatrick, Ann Street.
W. J. Knowles, M.R.I.A., Ballymena
Robert A. Kyle, Richmond.

Prof. Chas. Lapworth, F.G.S., Mason College, Birmingham. (Hon. Mem.)
W. W. Lamb, Chichester Terrace.
F. R. Lepper, Carnalea.
Rev. H.W. Lett, M.A., T.C.D., Aghaderg Glebe, Loughbrickland.
Fredk. W. Lockwood, Wellington Park Terrace.
James Logan, Donegall Street.
W. B. Lowson, Chichester Park.
H. W. Luther, M.D., Chlorine House

John Mackenzie, Myrtlefield.
Henry Magee, Eglantine Avenue.
Rev. J. J. Major, Bright, Downpatrick.
Greer Malcomson, Granville Ter.
Jas. Malcomson, Rosemount, Knock.
Mrs. Malcomson, Rosemount, Knock.
John Marsh, Glenlyon, Holywood.
Mrs. Marsh, Glenlyon, Holywood.
Joseph C. Marsh, Castleton Terrace.
Rev. James Martin, Eglintoun.
Mrs. Martin, Eglintoun.
John G. Mathewson, Londonderry.
James Meneely, Donegall Pass.
A. S. Merrick, M.D., District Asylum, Falls Road.
Seaton Forrest Milligan, M.R.I.A., Royal Terrace.
Wm. Milliken, Fitzroy Crescent.
Joseph P. Moran, Chichester Av.
Thomas Morrison, Gt. George's St.

David Morrow, Church Hill, Holywood.
George Morrow, North Queen Street
John Morton, Clifton Park Avenue.
J. R T. Mulholland, J.P., Norththumberland Street
James Murdoch, Denmark Street.
Jos. J. Murphy, Osborne Park.
J. R. Musgrave, J.P., Drumglass House.

John M'Alister, Fitzwilliam Street.
Robert M'Cann, Wellington Place.
Joseph M'Chesney, Holywood.
Francis P. M'Lean, Huntly Villas.
H. M'Cleery, Clifton Park Avenue.
James M'Clenahan, Tennent Street.
Rev. Ed. M'Clure, A.M., M.R.I.A., Onslow Pl., South Kensington, London, (Cor. Mem.).
Sir Thos. M'Clure, Bart., Belmont.
W. J. M'Clure, Elizabeth Street.
Thomas J. M'Conkey, York Street.
James M'Connell, Caledonia Terrace
Hugh M'Elwee, Carlisle Street.
Miss M'Gaw, Ashley Avenue.
John H. MacIlwaine, Brandon Villa.
Mrs. MacIlwaine, Brandon Villa.
Daniel M'Kee, Adela Place.
W. S. M'Kee, Fleetwood Street.
Alex. MacLaine, J.P., Queen's Elms
Miss Annie M'Liesh, The Mount, Mountpottinger.
John M'Liesh, The Mount, Mountpottinger.
John M'Liesh, Jun., The Mount, Mountpottinger.
Robert M'Liesh, The Mount, Mountpottinger.
Thos. J. M'Mahon, Brenthamville, Knock.
John M'Stay, King Street.
William MacMillan, Enniscorthy.

W. Courtney Nesbitt, Kinnaird Ter.
Jerdan Nichols, Avoca Street.
Wm. Nicholl, Donegall Sq. South.
Henry J. Nicholson, Ardsallagh, Windsor.
Rich. Niven, Chrome Hill, Lisburn.

A. T. Osborne, Rosetta Terrace.
Graham L. Owens, Henry Street.

George O'Brien, Botanic Avenue.
Dr. O'Flaherty, R.N., Botanic Av.
Henry O'Neill, M.D., College Square East.
James O'Neill, M.A., College Square East.

W. J. Pasley, Carrickfergus.
D. C. Patterson, Craigavad.
R. Lloyd Patterson, J.P., F.L.S., Croft House, Holywood.
W. H. Patterson, M.R.I.A., Garranard, Sydenham.
Frank Peel, Annesley Street.
William Perry, Deramore Terrace.
W. H. Phillips, Lemonfield, Holywood.
Mrs. Pickop, Green Lane, Heywood, Manchester.
E. Wakefield Pim, Elmwood Terrace
John Pim, J.P., Bonaven.
Joshua Pim, Slieve-na-Failthe, Whiteabbey.
Thomas W. Pim, The Lodge, Strandtown.
R. Lloyd Praeger, B.A., B.E., The Croft, Holywood.

Joseph Radley, Prospect Hill, Lisburn.
Dr. J. H. Rea, Shaftesbury Square,
D. Redmond, Antrim.
Richard Ridings, Hampton Terrace.
Rev. George Robinson, Beech Hill House, Armagh.
Hugh Robinson, M.R.I.A., Helen's View, Antrim Road.
Jas. R. Robinson, George's Terrace.
Wm. A. Robinson, J.P., Crofton, Holywood.
Richard Ross, M.D., Wellington Pl.
Wm. A. Ross, Craigavad.
Mrs. Rowland, University Street.

James Shanks, Ballyfounder, Portaferry.
Edward Smith, Chichester Terrace.
Rev. W. S. Smith, The Manse, Antrim.
Wilson Smyth, Virginia Street.
Rev. Canon Smythe, M.A., Coole Glebe, Carnmoney.
Adam Speers, B.Sc., Holywood

A. C. Stannus, Chichester Street.
Sir N. A. Staples, Bart., Lissan (Life Member).
James Stelfox, Oakleigh, Ormeau Park.
John B. Stephens, Loughview, Holywood.
John Stevenson, Coolavin.
J. M'N. Stevenson, Carrickfergus.
Richard Stevenson, Ashley Avenue.
S. A. Stewart, F.B.S., Edin., Springfield Road.
W. A. Story, Windsor Terrace.
R. S. Strafford, The Mount, Mountpottinger.
Wm. Swanston, F.G.S., Cliftonville Avenue
Mrs. Swanston, Cliftonville Avenue.
Richd. Glascott Symes, M.A., F.G.S., Portrush.
Saml. Symington, Ballyoran House.

Prof. Ralph Tate, F.G.S., F.L.S., University of Adelaide, South Australia. (Hon. Mem.)
H. F. Thomas, Lower Crescent.
Mrs. Thomas, Lower Crescent.
S. G. Thomas, Limestone Road.
George Thomson, Falls Road.
Mrs. H. Thompson, Crosshill, Windsor.
Professor J. Thompson, F.R.S., University of Glasgow. (Hon. Mem.)
John Todd, Clonavon.
W. A. Todd, Elgin Terrace.
W. A. Traill, M.A.I., B.E., Portrush.
W. J. Trelford, Vicinage Park.
James Turner, Mountain Bush.
James G. Turtle, Cambridge Ter.

James W. Valentine, Cromwell Ter.
John Vinycomb, Holywood.

Robert Walker, Brookhill Avenue.
T. R. Walkington, Edenvale.
W. F. Wakeman, M.R.I.A., Dublin. (Cor. Mem.)
George T. Ward, Eversleigh, Strandtown.
Isaac W. Ward, Salisbury Terrace.
Marcus J. Ward, Clonavor.
Thomas Watson, Londonderry.
Isaac Waugh, Clifton Park Avenue.
Mrs. Waugh, Clifton Park Avenue.
Robert J. Welch, Lonsdale Street.
Louis Werner, B.A., Thorndale Ter.
Walter L. Wheeler, Lennoxvale.
Robert Whitfield, Kenbella Avenue.
W. Whitla, M.D., College Sq. North.
Jas. Wilson, Old Forge, Dunmurry.
James Wilson, Ballybundon, Killinchy.
James F. Wilson, Ventry Street.
Rev. Robert Workman, Rubane, Glastry.
Thos. Workman, J.P., Craigdarragh.
Fred. A. Wrathall, Lisburn.
Joseph Wright, F.G.S., York Street.
Mrs. Wright, York Street.
S. O. Wylie, Melbourne, Australia.
William Wylie, Belgravia Terrace.

Robert Young, C.E., Rathvarna.

INDEX.

LIST OF DRAWINGS, &c.,

In the Club's Sketch Album.

NATURAL HISTORY.

ANTIQUITIES.