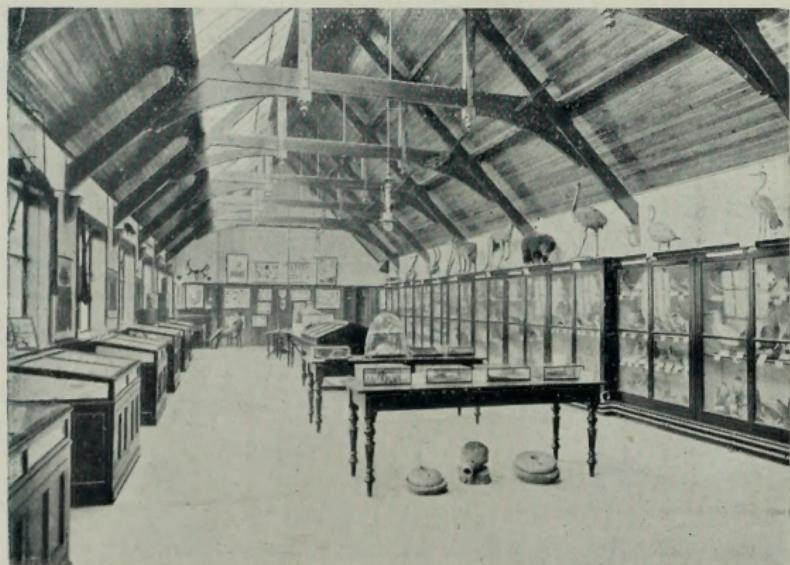






Robert Patterson, F.L.S., M.R.I.A.

President, 1907-08, 1908-09.



The Patterson Museum, People's Palace, Belfast.

ANNUAL REPORTS

AND

PROCEEDINGS

OF THE

Belfast Naturalists' Field Club.

SERIES II.

VOLUME VI.

1907-08
TILL
1912-13.



Belfast:

PRINTED AT "THE NORTHERN WHIG" OFFICES, VICTORIA STREET.

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1913.

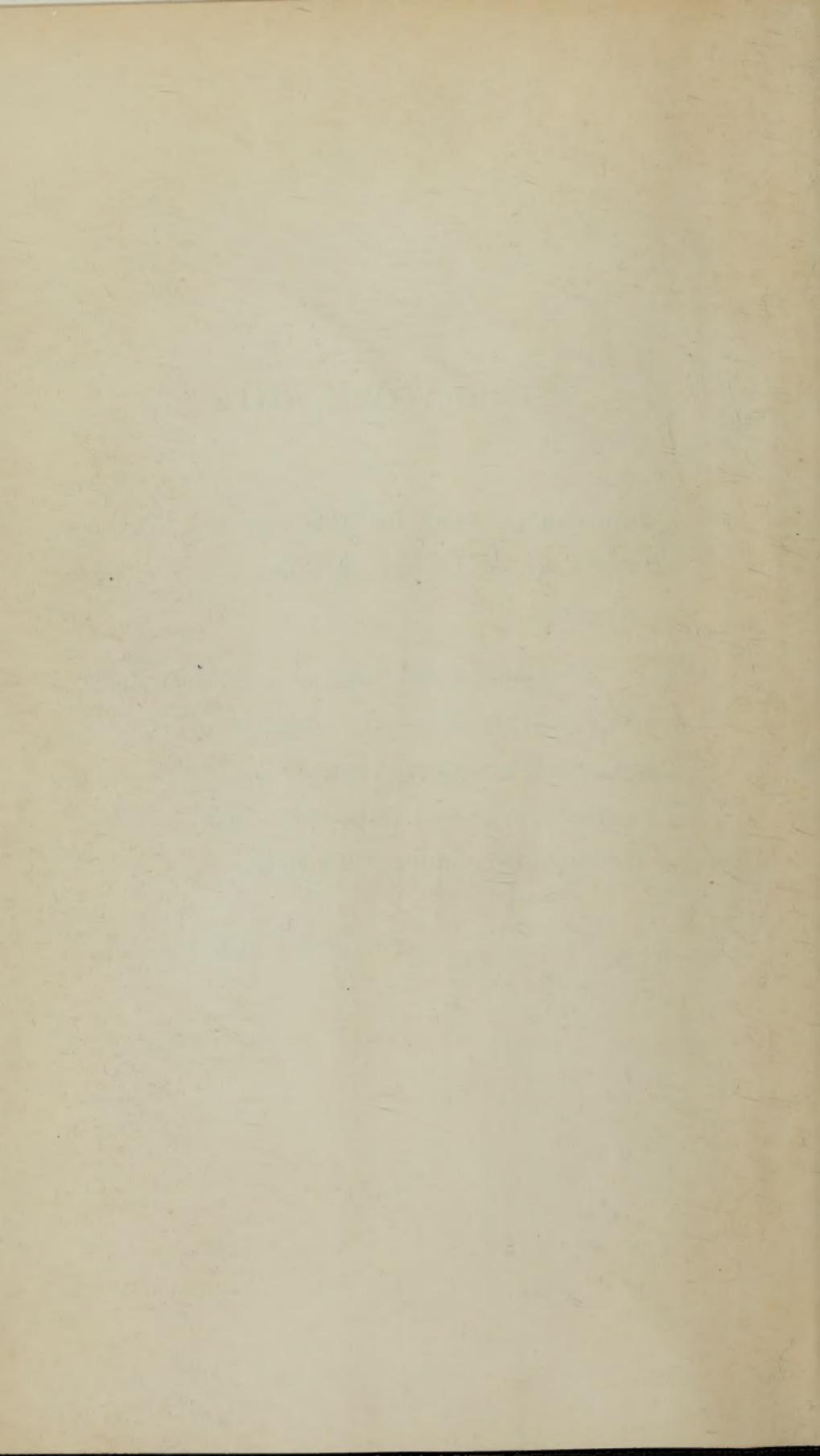
PREFATORY NOTE.

HEREWITH are issued the Title Page and Index to Volume VI. of the Second Series of the Club's Proceedings.

This volume extends over six years, from April, 1907, till April, 1913, and contains many valuable and interesting papers and notes. The Editors have compiled a voluminous index which should facilitate reference to the contents of the Volume.

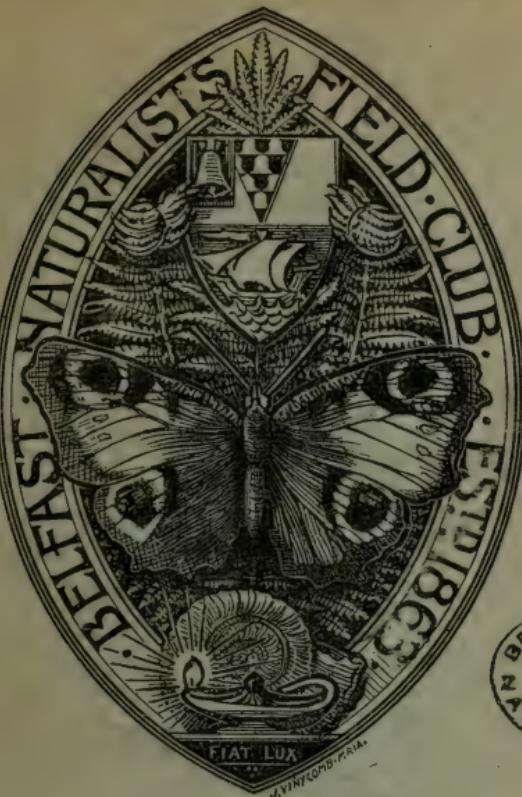
PUBLICATION SUB-COMMITTEE.

AUGUST, 1913.



25 SEP. 1908

Annual Report and Proceedings.



SERIES II.

VOLUME VI.

PART I.

1907-08.



CONTENTS

	PAGE
List of Officers	2
Annual Reports	3
Statement of Accounts	18
Excursions—Roughan Park, Islandmahee, Slieamish, Cork, Gre... Harbour, Ballycastle	Glendun, Larne
	19
Conversazione	41
Papers—Links in Man's Ancestral Chain—Professor C. J. Patten	45
The Great Burial Mounds of Lough Crey—Mrs. Hobson	48
An Elementary Outline of Zoology—Nevin H. Foster	51
A Week with Field Club Union, Cork—Nevin H. Foster, Robert J. Welch, J. L. S. Jackson, W. H. Gallaway	Patterson,
	52
Local Botanical Field-Work in 1907—W. J. C. Tomlinson	56
Cluster-Cups; and Microscopic Fungi—Sylvanus Wear	62
Tombs, Temples, and Pyramids of Egypt—Thomas Plunkett	63
Kells Abbey—Joseph Skillen	66
The Scandinavians in Ireland—Major Berry	67
The Derbyshire Toadstones—Miss M. Andrews	70
A Holiday Trip to West Kerry—E. J. M'Kean	72
Hydra—J. H. Harbison	74
Lower Forms of Plant Life—A. Milligan	76
Folk Lore—Miss E. Andrews	77
Volcanoes—T. Dewhurst	79
The Markings of Nestling Birds—Robert Patterson	82
Notes on Palæolithic Deposits—R. Bell	83
Conjectures on Recent Sand Dune Finds—R. May	84
Colours and Superficial Appearances of Flint Implements—J. Strachan	85
Report of Delegate to British Association—Mrs. Hobson	86
Leicester; and its Antiquities—Mrs. Hobson	86
Early Christian Ornament in Italian Churches—Miss Lamb	89
Beekite—Robt. Bell	91
The Origin and Formation of Zeolites in Basalt—J. Strachan	92
The Dispersal of Seeds—A. Deane	98
Annual Meeting	101
Rules	104
Exchanges	107
List of Members	111
List of Officers (1908-09)	119
Sectional Committees (1908-09)	120

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PRICE OF EXTRA COPIES TO MEMBERS, 1/6.



ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST NATURALISTS'
FIELD CLUB,

FOR THE YEAR ENDING 31ST MARCH, 1908,

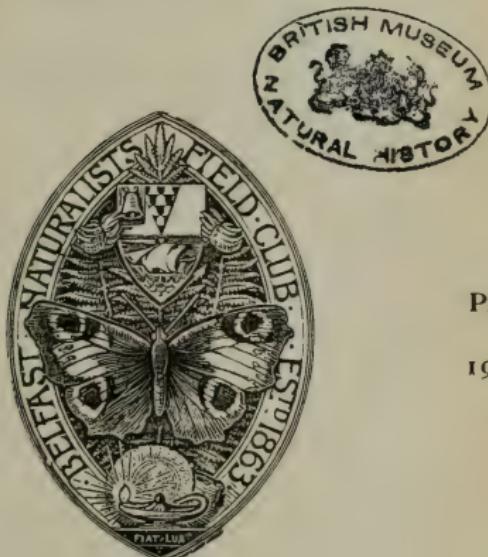
(FORTY-FIFTH YEAR.

SERIES II.

VOLUME VI.

PART I.

1907-08.



Belfast:

PRINTED AT "THE NORTHERN WHIG" OFFICES, VICTORIA STREET.

1908.

BELFAST NATURALISTS' FIELD CLUB.

FORTY-FIFTH YEAR, 1907-08.

LIST OF OFFICERS.

President:

ROBERT PATTERSON, F.L.S., M.R.I.A., M.B.O.U.

Vice-President:

NEVIN H. FOSTER, M.B.O.U.

Treasurer:

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BELFAST.

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HUGH L. ORR.
W. J. C. TOMLINSON.
ROBERT WELCH, M.R.I.A.
PROF. GREGG WILSON, M.A.,
D.Sc., M.R.I.A.

Hon. Secretary:

W. H. GALLWAY, BELGRAVIA, BANGOR, CO. DOWN.

Annual Report.

Your Committee, in presenting the forty-fifth Annual Report, have pleasure in recording the continued prosperity of the Club.

During the year 51 new members were elected, of whom 46 qualified by paying their fees. There were 7 deaths and 18 resignations. On the 1st April, 1907, the membership was 418; on the corresponding date this year it was 439, leaving a nett increase of 21 members.

Two new Sections, the Archæological and Zoological, were formed at the beginning of the Session and, with those of the Botanical and Geological, have proved very successful. The several Sections have held a large number of meetings during the Winter, at which some valuable papers have been read, many of these papers being the result of original research. The amount of interest created and the attendance at these meetings has been very gratifying to the Committee, who look forward to really valuable work being done in the future. The Committee have also to report the very much improved attendance at the Monthly meetings.

Eight Committee meetings have been held during the year, at which the average attendance was 12 out of a possible 15.

The Programme of the Summer Session was carried out, the following being a list of the Eight Excursions:—

Roughan Park	25th May.
Islandmahee (Half-day)	15th June.
Slemish, and Valley of the Braid .. .	29th June.
Cork (Irish Field Club Union Triennial Conference)	11th to 18th July.
Greyabbey (Half-day)	27th July.
Glendun	10th August.
Larne Harbour (Half-day)	24th August.
Ballycastle and District	7th September.

The Excursions were not so well supported as in former years, owing probably to the inclemency of the weather. The average number was 50, and the largest Excursion was that to Islandmahee, when 110 were present.

The Committee desire to acknowledge the indebtedness of the Club to W. G. Robinson, Esq., and Mrs. Robinson, of Roughan Park ; D. E. Lowry, Esq., and Miss Lowry, of Ringneill (at the Islandmahee Excursion Mr. and Miss Lowry entertained 110 members and friends) ; and John Dinsmore, Esq., J.P., of Crebilly House, Ballymena, for hospitality accorded the members during the several Excursions ; and to General Montgomery and his Agent, James Phair, Esq., of Greyabbey ; the Belfast Coal and Iron Co., Ltd., Ballycastle, and their Manager, Mr. Braudie, for kind permission to visit their grounds. Last but not least, the best thanks of the Club are due to our President, Robert Patterson, Esq., F.L.S., and Mrs. Patterson, who entertained the members to Tea on the Larne Harbour Excursion, and who also bore the entire expenses of the Conversazione in October, when over 500 members and friends were present. Mr. Patterson also kindly invited and bore the expense of bringing over Professor C. J. Patten, who lectured before the Club on 19th November, 1907. This opportunity may be taken of offering to Mr. Patterson the hearty congratulations of the Club on his election as a Fellow of the Linnæan Society.

At the Greyabbey Excursion the following resolution was proposed by Mr. Robert Welch, M.R.I.A., seconded by Mr. George Donaldson, and carried unanimously :—

“That the Members of the Belfast Naturalists’ Field Club desire to place on record their regret that, owing to advancing years, Mr. S. A. Stewart, A.L.S., has felt obliged to resign his position as Curator of the Belfast Museum—an institution with which he has been intimately connected for 27 years. They gratefully

remember Mr. Stewart's many and valuable contributions to local scientific research, and they unite in wishing him many happy days of leisure."

The Winter Session was opened as usual with a Conversazione, which was held in the Patterson Museum, People's Palace, Donegall Road, on Friday Evening, 25th October, at which over 500 members and friends were present.

A complete list of Lectures and Papers delivered at the Ordinary Monthly and Sectional Meetings is as follows :—

1907.

Tuesday, 19th November—"Links in Man's Ancestral Chain," Professor C. J. Patten, M.A., M.D., D.Sc.
Notes on the Discovery of *Bythinia leachii*, Mr. Robert Welch, M.R.I.A.

Monday, 25th November—"The Great Burial Mounds of Lough Crew," Mrs. Hobson.

Wednesday, 27th November—"An Elementary Outline of Zoology," Mr. Nevin H. Foster, M.B.O.U.

Tuesday, 10th December—"A Week with Field Club Union, Cork," at which the following subjects were brought before the Club :—

Isopods, Mr. N. H. Foster, M.B.O.U.
Mammoth Cave, Mr. J. L. S. Jackson.
Ornithology, Mr. Robert Patterson, F.L.S.
Conchology and General Geology, Mr. Robert Welch, M.R.I.A.
Archæology, Mr. W. H. Gallway.

Saturday, 14th December—"Local Botanical Field-Work in 1907," Mr. W. J. C. Tomlinson.

"Cluster-Cups; and Microscopic Fungi," Mr. Sylvanus Wear.

Tuesday, 17th December—"The Tombs, Temples, and Pyramids of Egypt," Mr. Thomas Plunkett, M.R.I.A.

Thursday, 19th December—"A Chat on Crystal Forms," Mr. Thomas Dewhurst, A.R.C.Sc.

1908.

Wednesday, 8th January—"The Scandinavians in Ireland," Major R. G. Berry, M.R.I.A.

"Kells Abbey," Mr. Joseph Skillen.

Wednesday, 15th January—"The Derbyshire Toadstones," Miss M. K. Andrews.

1908.

- Tuesday, 21st January—"A Holiday Trip to West Kerry," Mr. E. J. M'Kean, B.A., B.L.
- "Hydra: Its Movements and Reactions," Mr. John H. Harbison.
- Wednesday, 29th January—"Lower Forms of Plant Life; and the Phenomena of Reproduction," Mr. Alexander Milligan.
- Wednesday, 12th February—"Folk Lore connected with the Ulster Raths and Souterrains," Miss E. Andrews.
- Tuesday, 18th February—"Volcanoes; and Volcanic Action," Mr. Thomas Dewhurst, A.R.C.Sc.
- Saturday, 22nd February—"Our Native Orchids; How they grow and where to find them," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 26th February—"On the Markings of Nestling Birds," Mr. Robert Patterson, F.L.S.
- Wednesday, 4th March—"Conjectures on Implements from Co. Down Sand Dunes," Mr. Robert May.
- "Palaeolithic Flints," Mr. Robert Bell.
- "Colours and Superficial Appearances of Flint Implements," Mr. James Strachan.
- Tuesday, 17th March—"Report as Delegate to the British Association," and—"A Sketch of Leicester; Its Scenery and Antiquities," Mrs. Hobson.
- Wednesday, 18th March—"Notes on Early Christian Ornaments in Italian Churches," Miss Lamb.
- Wednesday, 25th March—"The Origin and Formation of Zeolites in Basalt," Mr. James Strachan.
- "Beekite," Mr. Robert Bell.
- Wednesday, 8th April—"The Dispersal of Seeds," Mr. Arthur Deane.

Mr. W. J. C. Tomlinson was nominated as Delegate to the Centenary Meeting of the Geological Society of London, which was held in London on 26th to 28th September, 1907. Mr. Tomlinson, however, was unable to attend, and we regret to say the Club was unrepresented.

Mrs. Hobson was nominated as Delegate to the British Association Conference, held in Leicester on 31st July to 7th August. Mrs. Hobson attended, and submitted her report to the Club on the 17th March, which will appear in the Proceedings.

Messrs. W. J. Fennell, F.R.I.B.A., and Will Rankin were elected as Members of the Council of the Ulster Fisheries and Biology Association.

The Treasurer will submit his Statement of Accounts, which is very satisfactory. Last year the deficit was £3 9s 1d, this year shows a balance to the credit of the Club of £16 17s 7d, all ascertained accounts having been paid. The Librarian's Report, and the Reports of the Botanical, Geological, Zoological, and Archaeological Sections, and that of the Sub-Committee appointed to adjudicate on Collections submitted for Club Prizes, will be presented.

Your Committee desire to thank the "Erratic Blocks" Committee of the British Association, through Professor Percy F. Kendall, for the grant of £4 for the purchase of Maps and Memoirs on Glaciation.

Your Committee also desire to record their thanks to the Superintendents of the several Railway Companies for facilities afforded on the different Excursions; to the Press for publishing reports of the Club's Meetings; and to the Public Bodies and Kindred Societies who have favoured us with their publications during the past year.

(Signed)

W. H. GALLWAY, *Hon. Secretary.*

Librarian's Report.

During the year we received the usual exchange of Proceedings from the various Kindred Societies of Great Britain, America, the Colonies, and the Continent, and in return we have forwarded copies of the Proceedings of our Club. Applications have been received from a few other Societies for our Proceedings, and, as far as possible, their requests have been complied with.

We beg to tender our sincere thanks to Mr. Wm. Swanston, F.G.S., for his kind donation of 28 volumes of "Science Gossip." These contain very interesting papers on Natural History, Botany, Geology, and other allied subjects, and should prove very instructive to students of the various Sections:

These new books and Proceedings form a very welcome addition to our Library, and will be greatly appreciated by the members.

It is gratifying to find that Members of the Club shew their interest in the Library by a regular demand for books, the demand being greater than in the previous year. Also we notice that the Members are more punctual in returning books, and this, in a large measure, helps to make the working of the Library a success.

(Signed)

J. L. S. JACKSON, *Hon. Librarian.*

Report of Committee of Geological Section.

The Committee of the Geological Section beg to submit the following report of the year's work.

The work of the Section has been satisfactorily carried out, and the interest formerly taken in it still remains vigorous, also we are pleased to record the addition of several new members.

The following Excursions were successfully carried out during the year :—Coalpit Bay, Glassdrummond, Ballypallidy, and Whitehead. The attendance of Members at these excursions was fairly good, and the discussions which arose out of the geological features presented at these localities showed a great deal of enthusiasm, which helps to make the working of the Section successful. Owing to the severity of the weather, an excursion to Scawt Hill, although carried out, resulted in no practical work being done.

During the winter the following papers were read :—"A Chat on Crystal Forms," by Mr. T. Dewhurst; "The Derbyshire Toadstones," by Miss M. K. Andrews; "The Mineral Beekite," by Mr. Robt. Bell; and "The Origin and Formation of Zeolites in Basalt," by Mr. J. Strachan. These papers were illustrated by diagrams, specimens, and microscopic slides, which were greatly appreciated and led to some very interesting talks.

The Members beg to express their thanks to Professor Percy Kendall, who forwarded a grant with which several geological works were purchased.

Miss M. K. Andrew's report on Glacial Geology will be found following the report of the Section.

The Committee of the Section earnestly invite any Members of the Club, who are interested in Geology, to forward the work by their presence and help. The Secretary will be pleased to receive the names of any new members.

(Signed)

J. L. S. JACKSON, *Hon. Secretary of Section.*

Glacial Geology:—The following sections were examined in continuation of the Club's glacial work.

XLVIII.—Armagh District, Parish of Armagh, Co. Armagh. Cutting—new Light Railway—road to Navan Fort crosses the railway near to Section. Hard reddish brown clay, about 120 feet above sea-level. 230 boulders were counted, 36 per cent. being Erratics. Subjacent rock, Carboniferous limestone. Erratics—Granite, Pomeroy N.W., Gneiss, Slieve Gallion N.N.W., Porphyry, Cushendall N.N.E., Lignite, Crumlin N.E., Schist, Co. Derry or Co. Antrim, Finegrained Granite, Pomeroy or Scotland, Dolerite, Chalk, Flint, Co. Antrim or Co. Derry, Syenite, Sandstone, Permian, Shale, Granite Rock, Quartz, Grit, Quartzite, Jasper.

Mr. Joseph Wright, F.G.S., examined the clay for Foraminifera and only found two specimens of *Nonionina depressula*, and one specimen of *Miliolina auberiana*. Ailsa Craig Eurite, with Riebeckite, was not noted in this section, but it had been previously recorded from Armagh by Mr. J. St. J. Phillips, and has also been found there by Mr. Robert Bell. Mr. Phillips has also recorded foliated Gneiss and Petrified wood (Lough Neagh) from Armagh.

XLIX.—Cookstown, Parish of Derryloran, Co. Tyrone. About 240 feet above sea-level—Quarry and Railway cutting,

Unstratified red sandy Boulder clay. 112 boulders counted in quarry, 26 per cent. being Erratics. Subjacent rock Carboniferous limestone.

Erratics—Dolerite, Quartz, Quartzite, Basalt, Grit, Felstone, Decomposed Schist, Granite probably from Pomeroy S.W., Aphanite, possibly from Sl. Gallion area, N. A fragment of Carboniferous bivalve was found.

Mr. Joseph Wright, F.G.S., kindly examined the clay, and only found one specimen of *Discorbina rosacea*. Mr. Wright thinks this clay and the clay from Armagh contained a large proportion of Iron, which acts as a cement and makes such clays difficult to rub down.

L.—Lisburn, Parish of Blaris, Co. Antrim. Esker, Causeway End Road, and Sand-pit near. Porphyry, Cushendall and Cushleake N., Felstone, Porphyry, and Porphyrite, N. Antrim. Granite, Basalt, Bole, Triassic sandstone, Grit, Quartzite, also clay Ironstone, Lough Neagh, N.W., and Conglomerate, Cushendun N. or Lagan, N. or N.E.

LI.—Coleraine, Parish of Coleraine, Co. Londonderry. Spittle Hill Quarry—100 feet above sea-level. Earthy Boulder clay. Height of clay from subjacent Basalt, varied from a few feet up to 20 feet. 100 boulders counted, 42 per cent. being Erratics, mostly sub-angular, a few striated.

Erratics—Eurite (with Riebeckite), Ailsa Craig, E., Flint, Quartzite, Quartz, Eurite, Bole, Granite, Decomposed Beauxite.

The thanks of the Geological Section are due to Mr. J. St. J. Phillips for four hand specimens, from rock exposures North of Pomeroy, which will be of great use in helping to identify Erratics from that area.

Report of Committee of Botanical Section.

Your Committee have much pleasure in reporting that the work done by this Section during the Session of 1907-08 has been well maintained, with results which we regard as very satisfactory.

We are also pleased to report a considerable increase of Members since last Annual Meeting.

Our Herbarium, which was in a very disorganised condition, has been very carefully re-arranged, all the plants are named and numbered according to the 9th Edition of the London Catalogue, the underlined plants in the Herbarium Copy are now all to be found in their proper places ; by this arrangement any plant wanted for reference can be easily found. During the Session about thirty carefully mounted Sheets of plants have been added, bringing the total number of species up to nearly 900, which fairly represent not only the Flora of our district, but also that of Ireland ; typical English and Scotch plants are also well represented.

As to the Field work done during the Summer Session the results are nearly all enumerated in a paper read before the Section by Mr. W. J. C. Tomlinson, and fully reported in your Proceedings. A few other special finds worthy of notice are as follows :—

Dipsacus sylvestris, by N. H. Foster, M.B.O.U., about one mile N.E. of Moira, Co. Antrim.

Galium sylvestre & *Lepidium Draba*, by Mr. J. H. Davies, at Lenaderg, Co. Down.

Ligusticum scoticum, by Mr. W. H. Robinson, on sea shore, near Larne, Co. Antrim.

Linaria sepium, at Killowen Point, Co. Down.

Origanum vulgare & *Fæniculum vulgare*, near Rostrevor, Co. Down ; and

Orchis pyramidalis, near Ringsallan, Co. Down, by myself.

During the Winter Session the following meetings were held :—

Nov. 23rd.—Address by Rev. C. H. Waddell, B.D., on “Plants collected during 1907,” also a paper by Mr. W. H. Robinson, on “The Life History, Composition, and Function, of Foliage Leaves.”

Dec. 14th.—Paper by Mr. W. J. C. Tomlinson, Subject : “Local Botanical Field Work in 1907,” Illustrated by Mounted Specimens of some Rare Plants collected during the Season, also paper by Mr. Sylvanus Wear, on “Cluster Cups,” &c. (Micro-fungi), illustrated by special Micro-slides.

Jany. 29th.—A paper by Mr. A. Milligan, Subject :—“Lower forms of Plant Life and the Phenomena of Reproduction.”

Feby. 22nd.—Lecture by Rev. C. H. Waddell, B.D., Subject :—“Our native Orchids, how they grow and where to find them,” illustrated by Mounted Specimens.

The attendance of Members at all these meetings was considerably over the average of previous Sessions.

During the coming Summer Session should any Member of the Field Club discover any rare or strange plant, the Committee would be glad to hear about it, and if possible to get a specimen for the Herbarium.

(Signed)

N. CARROTHERS, *Hon. Sec. of Section.*

Report of Committee of Archaeological Section.

Your Committee have to report that the Section, which commenced its career in 1907, has been fairly successful in its work, which was chiefly confined to the Winter Session, when the following papers were read, viz. :—

- I. “Great Burial mounds of Lough Crew,” by Mrs. Hobson.
- II. “The Scandinavians in Ireland,” by Major Berry, M.R.I.A.
- III. “Kells Abbey, with special reference to the tomb of the O’Haras,” by Mr. Joseph Skillen.

- IV. "Folk Lore, connected with the Ulster Raths," by Miss E. Andrews.
- V. "Notes on Palæolithic Deposits," by Mr. Robert Bell.
- VI. "Conjectures regarding recent Sand Dune finds at Dundrum," by Mr. Robert May.
- VII. "Colours and Superficial Appearances of Flint Implements," by Mr. James Strahan.
- VIII. "Early Christian Ornament in Italian Churches," by Miss Lamb.

The Committee wish to record that some interesting relics of the Woodburn Monastery were discovered by Mr. F. J. Bigger, a member of this Club, and he has taken steps for their preservation (see Ulster Journal of Archæology); and it is also worthy of note in our Proceedings that during the year the Board of Works took charge of Greyabbey to preserve it, and that much of the thirteenth century work which was hidden in the walls of Carrickfergus Church has been brought to light, giving a great additional interest to that ancient church.

There is still much work to do, and many interesting subjects to bring forward and record.

(Signed)

W. J. FENNELL, *Hon. Sec. of Section.*

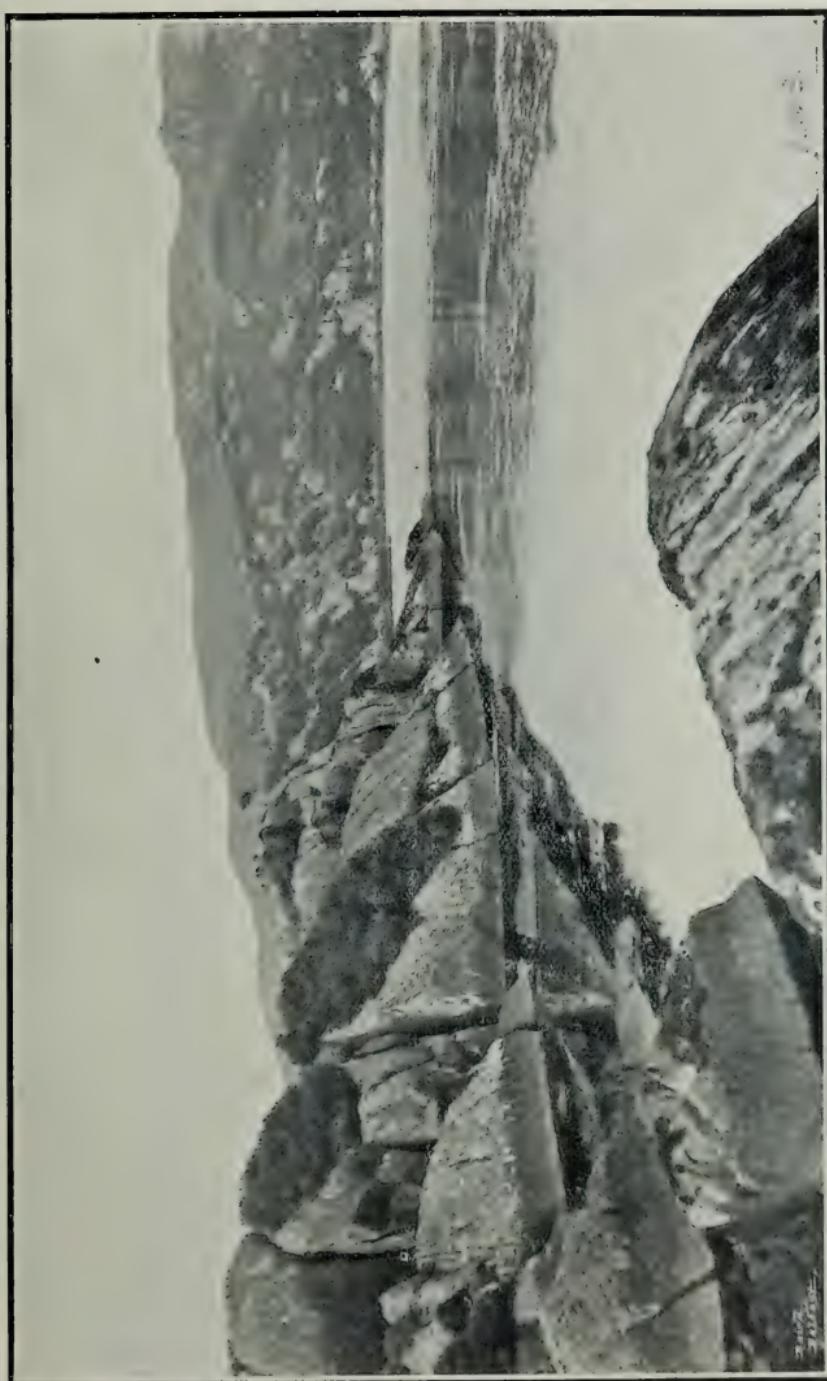
Report of Committee of Zoological Section.

Owing to the immense variety of organisms the work of this Section lends itself much more to individual effort than to Sectional Meetings. An Excursion to Carnlough in May was arranged for and duly carried out, and on this occasion many interesting observations were made by the Members participating. Two Meetings were held during the Winter Session, at the first of which N. H. Foster read a paper entitled "An Elementary Outline of Zoology," this paper being illustrated by a number of specimens of the various orders, kindly lent by Professor Gregg Wilson. At

the second meeting Robert Patterson read a paper on "Colour and Markings in Nestling Birds," which suggested profitable lines of research for workers during the ensuing Summer months.

In Vertebrate Zoology nothing new has been recorded by members during the year, but many valuable observations have been made and notes taken; and it is interesting to record that W. A. Green has again found a living specimen of the green Tree-Frog in Bananas imported from the Canary Islands.

In Mollusca some striking discoveries have rewarded the exertions of our members. Of these, the most important undoubtedly, was the finding by J. N. Milne and A. W. Stelfox of a freshwater shell new to science—*Limnaea praetenuis*, Bowell—in a mountain tarn above Glengariff, Co. Cork. Full descriptions and plates are published in the *Irish Naturalist* for September, 1907, and March, 1908. The members mentioned and R. Welch published in the same journal, as a result of the Cork Week Excursion, a list of the L. and F.W. Mollusca of Co. Cork, with a small area of Co. Waterford adjoining. In addition A. W. Stelfox and R. Welch worked out the distribution of another freshwater shell new to Ireland—*Bythinia leachii*—which the latter embodied in his paper read before the Club, and published with a map of the distribution in the Journal already mentioned. As a result of specimens collected by these two members of the non-typical *Hyalinia (Vitrearia) cellaria*, of Murlough Bay, Co. Antrim, and other localities in Ireland, it was shown by Mr. A. S. Kinnard, F.L.S., that the species was a new one, and he named it *Vitrearia hibernica*, sp. nov. In addition A. W. Stelfox published (*op. cit.*) a very complete list, revised to date, of the L. and F.W. Mollusca of West Galway, with a portion of East Galway fringing on Lough Corrib. This young worker deserves great credit for the careful way in which his papers are prepared, and for the County Division lists which accompany them. The latter have not hitherto been used in Mollusca papers.



Lough Narriva, the Home of Pisidium Hibernicum.

A. W. STELTON.

PHOTO, Reproduced by kind permission of the Editors of the *Irish Naturalist.*



and are most useful for those studying the geographical distribution of any given species, or of the Mollusca (or other *phyla*) generally. In a nursery in Belfast R. Welch discovered two West Indian species of land-shells alive, which are known to exist in some English greenhouses, but which had not hitherto been recorded from Ireland. Some dredging was carried out at the mouth of the River Six-Mile-Water, Co. Antrim, by the three members named, with F. Balfour Browne, and *Paludestrina jenkinsi*, a small shell usually found in brackish water, was proved to be spreading enormously here since 1900, as it was also doing in inland waters in England. Further information on this point and on other faunal changes noted here will be brought before the Club at an early date.

Some attention has been paid to the group of Terrestrial Isopods or Woodlice, of which eight species were recorded (*Irish Naturalist*) as having been found in the three divisions of Co. Cork during the Field Club Conference Week in July. N. H. Foster has made some interesting discoveries in Co. Down in the finding of *Armadillidium pictum*, Brandt, which has not hitherto been recorded from the British Islands, and of *Trichoniscus pygmaeus*, Sars, a species new to the Irish fauna. He has also taken at Hillsborough the rare species *Trichoniscus roseus*, *Porcellio dilatatus*, and *Metoponorthus pruinosus*. In the same County D. R. Pack-Beresford found *Cylislicus convexus*, which had not previously been obtained in Ulster. In Co. Antrim R. Welch discovered *Porcellio lœvis* (a species new to Ulster), as well as *Trichoniscus roseus*, *Metoponorthus pruinosus*, and *Cylisticus convexus* in a Belfast Nursery. The distribution of Woodlice in Ireland is very imperfectly known, and the Secretary will be glad to receive specimens from various Counties for identification and record. Specimens should be put in a 30 per cent. solution of alcohol, which is sufficient to preserve them for a few weeks pending their examination.

F. Balfour Browne has added several species of Water-Beetles to our local list, and will shortly publish the results of his investigations in this group. He has also devoted much time to the study of the life history of the Dragon-Flies. W. A. Green reports the capture of two of our rarer Butterflies—the Marsh Ringlet, *Cæronympha tiphon*, and the Dark Green Fritillary, *Argynnis aglaia*. In the other insect groups nothing of interest has been reported.

Leaving Marine Zoology to be dealt with by the Ulster Fisheries and Biology Association, there are several of the terrestrial invertibrata *phyla* in which nothing is being done here, and it is hoped that more workers will come forward in the Club, not only to give attention to these neglected branches, but also to work in conjunction with those members who are devoting their time to special faunal groups.

(Signed)

NEVIN H. FOSTER, *Hon. Secretary of Section.*

Report of Sub-Committee on Prize Competitions.

It is disappointing to find that, despite our increased membership, so few collections are submitted in competition for the 21 prizes offered in the Club's Programme. Only four collections have been sent in this year, and as each is for a different prize there has been no competition.

Prize 4.—Mrs. Green submits a very fine set of 36 specimens of Fossils from the Lower Lias Formation. These are carefully prepared and neatly labelled, and well merit the award of this prize.

Prize 6.—We award this prize to W. A. Green for his collection of 29 Fossils characteristic of the life of the Carboniferous Formations. These specimens are capitally chosen and well displayed, and the affixed labels indicate the localities in which he has obtained them.

Prize 10.—A valuable collection of 120 species of Marine Shells accompanied by detailed notes as to their distribution is submitted by George Donaldson, and we consider it well worthy of this prize.

Prize 19.—J. Strachan sends in a set of six Photos illustrating the Formations of the Upper Basalt and Inter-basaltic Beds of Co. Antrim. Each photo is suitably mounted and accompanied by descriptive notes, and the set will prove a valuable acquisition to the Club's album. We are pleased to award this prize to Mr. Strachan.

(Signed)

ROBERT PATTISON.

NEVIN H. FOSTER.

W. J. C. TOMLINSON.



Dr. Treasurer's Account for the Year ending 31st March, 1908. **Cr.**

To Subscriptions ...	... ...	£100 0 0	By Balance from last Account	... ...	£3 9 1
" Entrance Fees	... ...	10 10 0	" Type Writing ...	... ...	0 4 0
" Balance of Excursions ...	... ...	0 15 9	" Advertising ...	... ...	3 5 10
" Mr. Fennell's Prize	... ...	2 0 0	" Stationery and Printing	... ...	7 17 10
" Sales of Publications ...	... ...	0 17 4	" Printing Report, 1906-7	... ...	20 15 0
			" Rent of Museum	... ...	18 0 0
			" Commission to Collector	... ...	3 17 0
			" Donation to <i>Irish Naturalist</i>	... ...	2 0 0
			" Do. Irish Field Club Union	... ...	2 2 0
			" Expenses of Lectures ...	... ...	3 15 6
			" Postages ...	... ...	25 2 11
			" Gas £0 12 4. Prizes £4 0 0	... ...	4 12 4
			" Delegate's Entrance Fee to British Association Conference	1 0 0
			" Journal of Archaeology	1 4 0
			" Balance	16 17 7
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					£114 3 1

W. H. PHILLIPS, Honorary Treasurer.

Proceedings.

SUMMER SESSION.

ROUGHAN PARK.

The Members opened the Summer Session of their Forty-fifth year by an excursion to Roughan Park on the 25th May. Twenty-six members and friends travelled by the eight o'clock train from Belfast, to a district which to almost all the members was a *terra incognita*. The train was left at Coalisland Station, and passing through the thriving little village, the members stopped for a few minutes at the terminus of the canal which runs from here to Lough Neagh. The promoters had originally intended to make the waterway at least as far as Omagh, and it was actually finished to Donaghmore, but the scheme was abandoned.

After a pleasant walk of a little more than a mile, Roughan Park, the residence of Mr. W. G. Robinson, was reached, and here a pleasant surprise awaited the party, for Mr. and Mrs. Robinson kindly provided a sumptuous luncheon for the visitors. The Park is situated on the shores of Roughan Lough, by the margins of which the collectors found ample material, and here an interesting photograph of a moorhen's nest in a tree was secured. In the Lough is a Crannoge, or artificial island. Roughan Castle, standing on an eminence overlooking the lough, is said to have been built by Lord-Deputy Sydney, in the reign of Queen Elizabeth, to curb the Northern Irish. It was afterwards dismantled by order of Parliament, and is now a picturesque ivy-clad ruin. The group of members, with their hosts, having

been duly photographed, the President, Mr. Robt. Patterson, F.L.S., M.R.I.A., proposed, and Mrs. Courvoisier seconded, a cordial vote of thanks to Mr. and Mrs. Robinson for their hospitality, which was enthusiastically received and carried with acclamation. The members could scarce regard Mr. Robinson as a stranger, he being the son of the late Rev. George Robinson, an enthusiastic ornithologist, who compiled for the B.N.F.C. British Association Guide Book, 1874, the valuable section relating to the bird-life of the district.

Almost two hours were allotted to the walk to Stewartstown, and collectors found plenty of material by the way. In the neighbourhood are many places of prehistoric and historic interest, notably the fort of Tullahoge, three miles to the north-west, the crowning place of the ancient Kings of Ulster. At Donahenry, in a field, is an upright stone, one of the supporters of a Cromleac, and near it another lying on the ground, in the upper side of which is a circular cavity or basin. Not far from Donahenry is a large and perfect Cromleac, with a table-stone weighing more than 20 tons, placed within a circle of smaller stones. In the small lake of Ardpatrick, within a mile from the town, is a floating island, and around the shores of this lake human bones, camp poles, &c., have been discovered. Close behind the town rises Crew Hill (398 feet) on the top of which is a Rath still in a fair state of preservation. Tea was admirably served in the Imperial Hotel, and afterwards a short business meeting was held under the chairmanship of the President, Mr. Robert Patterson, F.L.S., who at the first meeting of the Session thanked the members for the position in which they had placed him, and announced that the Committee would be pleased to see more competition for the many prizes offered in the Club's programme. A vote of thanks to the conductor for the day, Mr. Nevin H. Foster, M.B.O.U., was passed, and the election of Mr. Joseph Skillen concluded the proceedings. The members left Stewarts-town by the 4-35 train.

Though the district is very interesting from a geological point of view, no report of the observations in this department of the Club's work had been handed in. The Botanical members were handicapped by the lateness of the season, and the walk from Coalisland to Roughan Park, and again from the Lough to Stewartstown, did not reveal any exceptionally rare species among the Phanerogams. Several plants noted should, however, be mentioned, such as the White Mustard, *Brassica alba*, the Dusky Crane's-bill, *Geranium Phæum*, the greater Celandine, *Chelidonium majus*, and the Soapwort, *Saponaria officinalis*. About the shores of Roughan Lough, among other interesting plants observed were *Ranunculus trichophyllum*, *R. hederaceus*, the Bird Cherry, *Prunus Padus*, the Bog-bean, *Menyanthes trifoliata*, the Hemp-Agrimony, *Eupatorium cannabinum*, and *Arenaria trinervia*. Of the Cryptogams, many fine specimens of the common species of ferns were observed, including some nice varieties of *Scolopendrium vulgare*, and good collections of mosses were obtained, among which special mention should be made of *Fontinalis antipyretica* var. *giganteum*, found growing in roadside well, and *Orthotrichum disphanum* from elder bushes. The Ornithological members reported having noted 35 species of birds. The list included nine species of our Spring migrants, as well as the Great Crested Grebe, which was seen on Roughan Lake and breeds there. It had not been recorded as a breeding species in County Tyrone before. The Molluscan collectors did not find any rare species. Six species of slugs were observed, including *Agriolimax lœvi* of remarkable large size, and *Arion hortensis* very light in colour and found near the lough ; four species of *Hyalinia*, including *nitida*, were taken ; but only two of *Helix nemoralis* and *rotundata* the latter with a remarkably high spire. Other land shells, including *Clausilia bidentata*, *Cochlicopa lubrica*, &c. Several captures of freshwater shells were made, including *Limnea stagnalis* and *L. palustris* of a very small and beautiful variety ; *Succinea putris* all young in great numbers ; *Planorbis albus*, and

numerous specimens of that rather intricate genus *Pisidium*. Not many Lepidoptera were observed, but the Large, Small, and Green-veined Whites, the Orange-tip, the Smaller Tortoiseshell, and the Brown Argus were noted. Specimens of Coleoptera and other insects were taken and brought home for further investigation.

ISLANDMAHEE.

(HALF-DAY EXCURSION.)

The second excursion of the Summer Session took place on 15th June to Mahee Island, in Strangford Lough. Ninety-six members and friends assembled at the County Down Railway Station, and travelled down to Comber by the 1.50 express train.

The Party were welcomed at Comber by the Rev. C. H. Waddell, M.A., Chairman of the Botanical Section of the Club, and by Canon Pooler and a few other friends. A number of brakes and cars were in readiness, which were soon filled, and the drive commenced via Killinchy Road. A short halt was made at the farm of Mr. Montgomery, Ballygraffin, where a Cromleac was to be seen. A few photographs were taken, and the drive continued to Lisbarnet, where the party had an opportunity of examining a very fine specimen of a Lint-wheel on the farm of Mr. Johnston, which proved quite a novelty to the majority, as very few present had ever seen one before. The wheel was in work up till a few years ago. A number of photos having been taken, the brakes were once more mounted for the drive to Mahee Island. The road lay through a lovely though hilly country, and glimpses were got from time to time of the summits of the Mourne Mountains, far to the south, while Strangford Lough, with its numerous islands, formed a picture that would delight the eye of an artist.

Mahee Island was reached at last, and the party dismounted at the Castle, which was apparently built to command the narrow

channel which divided Mahee from that of its neighbour, Reagh Island. The two islands are now connected by a causeway. The party now mounted the hill, and having a short time to spare, soon scattered, each bent on his or her particular hobby, some shore-collecting, some botanising, while others examined the geological aspects of the islands and lough, and speculated on their formation. Mr. D. E. Lowry kindly enlightened the party on the history and antiquities of the lough and islands in a concise and able lecture.

The Secretary's whistle announced, all too soon, the time for departure, and seated again in the brakes the party were driven to Ringneill, prettily situated on Strangford Lough, the residence of Mr. D. E. Lowry, of Donegall Place, Belfast, who had kindly invited the members to tea. On reaching Ringneill a number of other friends, who had cycled from Comber, joined, and, with those who travelled from Belfast, made a total of one hundred and ten members and visitors. The party were welcomed by Mr. Lowry and Miss Lowry, and were quickly seated round the tea-tables, enjoying the good things provided.

Afterwards a business meeting was held in front of the house, Mr. Nevin H. Foster, M.B.O.U., Vice-President, announced that the President of the Club, Mr. Robert Patterson, F.L.S., who was unavoidably absent that day, had been elected a Fellow of the Linnæan Society, and in one of his happiest speeches Mr. Foster formally proposed that the heartiest congratulations of the Club be given to Mr. Patterson on the honour conferred upon him, which motion was ably seconded by the Rev. C. H. Waddell, B.D., and right loyally supported by the whole meeting. Mr. W. H. Patterson, M.R.I.A., then moved that the best thanks of the meeting be given to Mr. and Miss Lowry for the splendid hospitality accorded the members and their friends that evening. Dr. Sheldon supported the motion in a characteristically humorous speech, the vote being carried with great enthusiasm. Mr. Foster having conveyed the vote, Mr. Lowry suitably replied, giving all

the credit of the arrangements to Miss Lowry. One new member, Sergt. David Brownsworth, having been elected, the meeting broke up. Bidding adieu to their host and hostess, the party were driven, via Castle Espie, into Comber, which was reached in time to catch the 7.53 train, and arrived in Belfast shortly after eight o'clock.

The time at their disposal did not permit of much exploration, nevertheless the Botanists reported having noted a few interesting, and by no means plentiful, plants, among them being *Geranium Striatum*, *Ranunculus trichophyllum*, *R. peltatus*, *R. sceleratus*, *Habenaria bifolia*, and the Comfrey, *Symphytum officinalis*. The common Hemlock was abundant on Mahee Island, and the Henbane was obtained at Comber.

The Ornithologists reported having noted 29 species of birds, and as the excursion was purely a driving one, opportunities for observing the avi-fauna of the district were very meagre.

SLEMISH, AND THE VALLEY OF THE BRAID.

The third excursion of the Summer Session took place on the 29th June, the place chosen being Slemish, and the Valley of the Braid. It is a district rich in antiquities and archæological lore; and would afford the members of the new Archæological Sub-Committee at least one good opportunity for getting properly into harness. Mr. W. J. C. Tomlinson acted as conductor for the day, and he was met at York Road Terminus by a party of fifty-six members. In a few minutes all were comfortably seated in reserved carriages, and took their departure for Ballymena by the 9-15 a.m. Portrush express. An hour's ride brought the party to Ballymena, where they were joined by a few local friends. An ample supply of cars was in readiness at the station. In less than ten minutes the full party of sixty were comfortably seated, and at 10-30 sharp the drive commenced. Taking at first the Cushendall

road and then the old road to Broughshane, the first halt was made at the Moat of Drumfane (*Dun-na-Feinne*—"the Fort of the Fenians"). This great mound is 30 feet in height, and is still surrounded in part by the original trench and rampart, and on the east side are the remains of an extensive fortified earthwork. Quite recently this fine monument of a past age has been taken under the official guardianship of the Antrim County Council. The drive was then continued to the smiling village of Broughshane—the bru or border of Shane, meaning "Shane's (Shane O'Neill) border or place." This old road is most charming, especially about Ballygarvey, and nearing Broughshane fine views were obtained of the woods surrounding Tullymore Lodge (the residence of the Hon. Robert Torrens O'Neill, M.P.) and Whitehall (General Sir George White's). Some of the geological members dropped behind here for a few minutes to examine a very fine section of a huge esker deposit of glacial sands and gravels which occurs near Broughshane, on the north side of the road. Canon Grainger's old residence, St. Patrick's House, situated across the river, on the new road, also came in for passing observation. A short stop was made in the village, and most of the members visited Dr. Grainger's grave in the churchyard. Tubbernasool (*Tober-na-Suil*, "the well of the eyes") Holy Well was the next place visited. It is in the centre of a boggy pasture field adjacent to the public road, on the south side. Leaving Tubbernasool, a short run brought the party to Skerry (a "sharp" usually "sea," rock) Rock, on which the remains of the old church of Skerry stand in lonely ruined grandeur. Tradition, which in this case is supported by very ancient authority, attributes the foundation of this church to St. Patrick. The old ruined edifice now crowning the hill measures 69 feet by 26 feet, taken on the outside. The longitudinal walls are $2\frac{1}{2}$ feet thick, and the gable 4 feet. The western gable, which contains the solitary window now remaining, and the northern wall, are nearly complete. The eastern gable and the south wall are badly delapidated. There is a large tomb

in the eastern end, occupying the whole breadth and taking up 19 feet of the length. Its roof is formed by a bridge-like arch, and a small iron gate closes the entrance. Nothing shows to whom it belonged, but it was for some generations the burial-place of the O'Neill family in the latter part of the 17th century and during the earlier years of the 18th. The church appears to have been destroyed during the rebellion of 1641. The remains of a belfry and of monastic buildings formerly existed on the north side of the church ; and St. Patrick's praying-stone, showing the alleged imprints of the Saint's knee and nose, is a few feet to the north-east.

Just when within sight of the woods of Cleggan Lodge, the cars took the road to the right at the Priest's Bridge, and struck south-westward for Slemish, which was reached at 1-40 p.m. Gathering round St. Patrick's stone "chair," with the President in the centre of the group, soon all were enraptured by the declamation of the accomplished literary lion and poet of the party, Dr. Clarke Robinson, who recited his poem entitled "Antrim County," Dr. Robinson also read Dr. Buick's short poem "In Praise of Slemish." Leaving the summit at three o'clock the descent was made, the cars remounted, and the drive to Craigbilly, the next halting-place, entered upon. Craigbilly ("the rock of the spreading tree") is situated most picturesquely on the summit of the ridge between the Kells Water and the Braid Water. It is about two miles east of Ballymena. Crebilly House, with its large and splendidly wooded demesne, dominates the hilltop. Mr. Dinsmore, with his usual kindness and generosity, not only gave the party permission to visit the demesne, but invited all to tea at Crebilly House prior to their departure. The customary business meeting of the Club was subsequently held, under the chairmanship of the President (Mr. Robert Patterson, F.L.S., M.R.I.A.), when, after a most felicitous speech from the Chairman, an enthusiastic vote of thanks was accorded to Mr. Dinsmore and his daughter for their kind invitation and generous hospitality. The following new

members were elected :—Miss Colvin, Messrs. J. M. Colton, John M. Rankin, Thomas Clarke, jun., and Samuel Morton. Bidding adieu to the Crebilly friends, the cars were mounted at seven o'clock, and the last stage of the drive to Ballymena undertaken. The party left Ballymena at 7-36 p.m., and after a fast run duly reached Belfast at 8-35.

Some of the rarer orchids known to occur in this neighbourhood were observed by the Botanists, such as *Gymnadenia albida* and *G. conopsea*. *Lastrea æmula* was noted at Skerry. *Ceterach officinarum* was growing profusely on a bridge, a hitherto unrecorded locality. In the Crebilly demesne *Lathraea squamaria*, *Anchusa sempervirens*, and *Epipactis latifolia* were obtained. A specimen of *Helix hortensis* was picked up on Slemish, which is a new County record for Antrim.

A Special Prize, offered by the President for the first to reach the top of Slemish, was won by Miss Pim. The prize was a beautiful bronze paperweight in the shape of a frog, cast from nature, and mounted on Carrara marble.

CORK.

(IRISH FIELD CLUB UNION CONFERENCE.)

The Field Club Union of Ireland, consisting of the Belfast, Dublin, Cork, Limerick, and Omagh Clubs, held their fifth Triennial Conference at Cork, from July 11th to 17th, under the Presidency of Mr. Robert Patterson, F.L.S. An elaborate and carefully thought-out programme was sent out beforehand by the energetic Secretary of the I.F.C.U., Mr. R. Lloyd Praeger, M.R.I.A., Dublin, to whom too much praise cannot be given for his admirable arrangements for the comfort of the party and the complete success of the conference.

Thursday morning, the 11th July, saw the Belfast contingent comfortably seated in the reserved carriages of the 7-30 a.m. train.

Mr. W. H. Gallway, being in charge, made all local arrangements for tickets, luggage, &c. Six members joined at Portadown, making a total of thirty-three from the North. Dublin was reached at 10.30. A special rail motor was in waiting to convey the party and their luggage over the loop line to Kingsbridge terminus to catch the Killarney express, which left at 11 o'clock. At Kingsbridge the Belfast and Dublin contingents amalgamated. After a splendid run through beautiful scenery Cork was reached at 2.40, and the party driven to the Hotel Metropole, the headquarters for the week. The Limerick members had already arrived, so that a total of forty-nine sat down to lunch at 3 o'clock.

The afternoon was devoted to sight-seeing, some visiting St. Finn Barr's Cathedral, Queen's College, &c., while others roamed along the banks of the River Lee, made classic by the muse of the famous Father Prout (Father Mahony).

At 6.30 dinner was served, after which all adjourned to the Council Chamber of the City Hall, kindly placed at the disposal of the naturalists by the Lord Mayor. At 8 o'clock a meeting was held—Mr. Robert Patterson, F.L.S., in the chair. The President, in a capital speech, explained the aims and objects of these triennial conferences, and strongly advocated the furtherance of the study of the Natural Sciences, especially in Ireland, which was so rich in material.

Mr. Farrington, President of Cork Field Club, having extended a hearty welcome to all, Mr. J. W. Taylor, F.L.S., Leeds, was called upon to read his promised paper on "Irish Mollusca," and announced the discovery in Louth by Mr. T. H. Grierson of a new species of *Vitrina* named *Vitrina elongata*, being the second species of this shell found in the British Islands, the other being *Vitrina pellucida*. Mr. Taylor illustrated his paper with beautiful diagrams of the new species, and also of *V. pellucida*, pointing out the difference between the two. The paper was discussed by Mr. Robert Welch, M.R.I.A., Mr. J. N. Milne, of Belfast, and Mr. R. Standen, of Manchester Museum. Mr. R. L. Praeger, M.R.I.A.,

brought up the question of the extension of the time for the conferences, and advocated that they be held every five years instead of three, but, after discussion by Messrs. Robert Welch, F. Balfour-Browne, and W. H. Gallway, of Belfast ; W. D. Roebuck and J. W. Taylor, of Leeds ; and J. de Wett Hinch, Dublin, it was finally decided to let the matter stand over for the present.

The President having offered a prize for the best find of the week, the meeting concluded.

After partaking of an early breakfast on Friday morning, the party left Cork by the 9-50 train for Youghal. Youghal was one of the strongholds of the powerful and haughty Desmonds, and there are many fortified buildings, a castle, and a college, all erected by the last Earl, but now in ruins. A visit was made to St. Mary's Church, founded by the Fitzgerald family in the twelfth century. It contains an especially beautiful Gothic window. Of peculiar interest, however, was Myrtle Grove, adjoining the grounds of the church, the residence of the accomplished and ill-fated Sir Walter Raleigh.

The party was conducted over the town by Dr. Charles Romayne, a well-known antiquarian. The learned doctor kindly pointed out the most interesting antiquarian parts of the old town and vicinity, and gave a brief sketch of the most salient parts of their histories. After lunch an extra driving excursion was arranged to Ardmore, under the leadership of Mr. W. H. Gallway, those left behind being looked after by Mr. Praeger. At Ardmore the party had an opportunity of examining a fine example of a *cloic-teac*, or round tower, 97 feet high, and in perfect preservation. Adjoining the tower were the ruins of the ancient church known as Teampull-Deiscart, and at a short distance St. Declan's Oratory and Holy Well. The party, having again come together at Youghal, dined at the Devonshire Arms Hotel, and returned to Cork at 9-30.

On Saturday the 9-15 train for Macroom was taken, passing on the way the ruins of several castles, and near Kilumney Station

the Abbey of Kilcrea—*Cill-Cera*, or Cera's Church—founded in 1465 by Cormac M'Carthy, Lord of Muskerry. Driving through Macroom a glimpse was obtained of its famous Castle, built by the Carews in the time of King John. Admiral Sir William Penn, father of the founder of Pennsylvania, was born here.

The Gaorha or Garra—"The Valley"—watered by the little River Toon—the Wave—two miles distant from Macroom, is a most remarkable and interesting place, and proved a veritable paradise for the Zoologists and Botanists, who explored its wooded islets, and maze of waters in flat-bottomed boats. The place is out of the beaten track, but would well repay a visit as being one of the most unique bits of scenery to be found anywhere. The river sub-divides into a maze of streamlets, there being one, it is said, for every day of the year, its small islets being chiefly covered with oak, under which the Royal fern, *Osmunda regalis*, flourishes in immense quantities. The drive was continued, the scenery becoming bold and rocky, and, passing through Inchigeela, the road followed the windings of Lough Allua, the largest of the Inchigeela lakes, where the party lunched, and spent three very pleasant hours exploring its shores and the woods on its margins, and making collections. The conductor's whistle having sounded the time for departure, all were driven back to Macroom, where a refreshing cup of tea was partaken of at Williams's Hotel before leaving by the 7.30 train for Cork, where dinner was served at nine o'clock.

There being no fixed programme for the Sunday, members were at liberty to make their own arrangements for the day. Nearly all decided for Blarney—(*Blarna*, the little field)—and its famous castle, not forgetting the Blarney Stone, of which Father Prout gives a most amusing and learned history. Having paid their devotions, and kissed the sacred stone, visits were paid to the famous groves and the Rock Close, with its rockeries and amazing wealth of ferns, to the lake, where numerous water lilies in full bloom were floating on its surface, while St. Anne's Hill came in

for its share of attention. Fota and its famous gardens were visited by some of the members, who spoke in raptures of its beauties.

The programme for Monday was a sail down the lovely River Lee to Queenstown, Aghada, and Rostellan. The beautiful East River was explored, one of the old submerged river gorges, cutting through the old red sandstone ribs that form so conspicuous a feature of the district. The party finally landed at Aghada for lunch. After lunch the collectors, under the charge of Mr. Praeger, explored the shores and woods of Rostellan, while the remainder, under Mr. Gallway's charge, drove to Cloyne, which contains a round tower 100 feet high, situated in the street of the village. A visit was also paid to the old cathedral. Driving back through Castlemary demesne, a halt was made to examine its Cromleac. The drive was continued, and, passing through Rostellan demesne, Aghada was reached once more, and embarking on the steamer all were landed at Monkstown, from whence the train brought the party back to Cork in time for dinner at 8.30.

The last excursion of the week took place on Tuesday to the quaintly picturesque old town of Kinsale, with its narrow streets and quaint houses built in terraces one above the other on the steep hill side leading down into the harbour. The French prison and the old church were visited, the latter containing a pair of stocks. The town having been explored, the party made their way round the harbour to the lunching ground, which was arranged on a height overlooking the fine harbour, and from which a commanding view was obtained. All scattered after lunch to meet again at the railway station at 5.30, when a special train conveyed the members back to Cork.

On Tuesday evening an exhibition was held in the Assembly Rooms, Cork, illustrating to a small extent the scientific results of the trip. Large and rich collections were obtained by the different specialists. Full details appeared in the September

number of the *Irish Naturalist*, which was fully illustrated with plates of the new records and the districts visited. A most cordial and hearty vote of thanks was conveyed to the Conductor, Mr. Praeger, on the motion of Mr. J. W. Taylor, seconded by Mr. R. Standen, and supported by Mrs. Birnall, Mrs. Ridge-Millar, and Messrs. W. D. Roebuck, Robert Walsh, T. Farrington, and W. H. Gallway. Two new members, Rev. Dr. Hamilton and Miss Milligan, having been elected into the Belfast Club, the meeting concluded. The President's prize was won by F. Balfour-Browne of the Belfast Club.

Wednesday morning saw the break-up of the party, everyone loud in their praises of the week's holiday, and delighted with the scenery of the districts visited, the leader, Mr. Praeger, being specially pleased with the scientific results obtained.

During the week the Ornithologists reported having observed seventy-five species of birds, none of them being uncommon to their Northern experiences, though one or two are less known in the Southern half of Ireland. The cliffs of the Old Head of Kinsale proved very interesting. Here were seen a vast colony of Kittiwakes, Herring-Gulls, Razorbills, Guillemots, and Puffins, with their young in various stages of development.

GREYABBEY.

(HALF-DAY EXCURSION.)

The fifth excursion for this Session took place on 27th July to Greyabbey, when forty-seven members and friends attended. The party assembled at 2-15 at the County Down Railway terminus, and, in the unavoidable absence through illness of the Secretary, the task of conducting the excursion fell to the President. Punctually at 2-30 all were seated in the specially-reserved carriages, and the journey was begun. At three o'clock Newtownards was reached, the members quickly took their seats

in the three large brakes in waiting, and the drive was commenced. In the main street of Newtownards the conductor pointed out the monument that embraces all that is left of the old town cross. Near the cross are the ruins of the Dominican Priory of St. Columba, founded in 1244 by Walter de Burgo, Earl of Ulster. A high square tower and ivy-mantled walls remain to tell us of the former greatness of the Priory. These were pointed out as the brakes drove rapidly past. The road to Greyabbey lies along the edge of Strangford Lough, and, the tide being well in, the views are very charming, the quiet waters of the lough being broken here and there by some of the numerous islets which are scattered through Strangford, and away in the misty distance the blue Mourne Mountains, standing like grim sentinels keeping watch and ward over the Irish Sea. The well-known "Butterlump stone" was an object of interest to the geologists of the party. The woods of Mountstewart demesne afforded a pleasant change of green after the white of the dusty road, and ten minutes before the scheduled time the brakes drew up at the entrance to the ruins of Greyabbey. All alighted, and under the guidance of the sextoness, were soon exploring the wonders and beauties of the celebrated Abbey. Of the Abbey ruins as they exist at present rising among aged trees on a beautiful sward, the most perfect portions are the church and the refectory.

The members were glad to note that, acting on a former recommendation of the Club, General Montgomery had the ivy, which was threatening the destruction of the walls, cut down and removed. The result is a great improvement in the appearance of the ruins, the safety of which is now assured.

Having examined the ruins, the members made their way to the crowded graveyard to the north-east of the Abbey, and inspected several interesting gravestones. The old table tomb of the "Rev. James Porter, dissenting minister of Greyabbey," came in for special attention. It was he who wrote the famous letters in the "Northern Star," entitled "Squire Firebrand," for which he

was hanged in 1798 in view of his own Manse. Mr. A. R. Hogg having taken several photographs, a slight shower drove the members in to tea. The rain was of short duration, and tea was partaken of in the open-air at "The Nunnery" on the hill close by. Here an extensive view delighted the eyes of all present, and rarely has the Club had tea in such an attractive spot.

Immediately after tea the usual short business meeting was held, the President (Robert Patterson, F.L.S., M.R.I.A.) in the chair. Mr. Patterson called upon R. Welch, M.R.I.A., to move the following resolution:—"That the members of the Belfast Naturalists' Field Club desire to place on record their regret that, owing to advancing years, Mr. S. A. Stewart has felt obliged to resign his position as curator of the Belfast Museum—an institution with which he has been intimately connected for twenty-seven years. They gratefully remember Mr. Stewart's many and valuable contributions to local scientific research, and they unite in wishing him many happy days of leisure." The resolution having been seconded by George Donaldson, was put to the meeting, and carried unanimously. There being no new members to be elected, this concluded the formal meeting. The brakes were mounted again, and punctually at 6-30 the return drive began. Newtownards was reached without further incident, in nice time to catch the 7-50 train to Belfast. Here the members separated, well pleased with the enjoyable and instructive afternoon they had spent.

GLENDUN.

One of the most delightful of the many excursions held by the Club took place on the 10th August, to Glendun, this making the sixth outing this Season. A party numbering twenty-six met the conductor, Mr. W. J. Fennell, M.R.I.A., at the York Road terminus of the Midland Railway, and travelled by the 9.15 train

to Parkmore, where brakes were in waiting for the drive to perhaps the wildest and most romantic of the nine Glens of Antrim—that of Glendun—via the Glen Ballyemon new road. With the exception of one or two light showers, the weather conditions were all that could be desired. Leaving Parkmore by the old road to Cushendall, a splendid view was obtained of the Crockalough and Lurigethan mountains on the right, while on the left towered in all their grandeur Slievenanee and Trostan, the latter being the highest mountain in Antrim. Just before reaching Retreat the road branched off to the left, and passing to the north of Ballyemon came out on the new road, with Tievebulliagh on the left and the rounded cone of the extinct volcano known as Tieveragh Hill in front. The Tievebulliagh district has now become famous for the number of stone implements found there. On reaching the tourist coach road the drive was continued to the left and northward to Glendun, passing on the way Glenann, and almost within sight of the so-called Ossian's Grave, consisting of a group of about 34 stones forming a well-defined semi-circle, about 18 feet in diameter. A halt of about two hours was made at Glendun viaduct, an imposing structure built in 1837 of old red sandstone, to give time for lunch and enable the members to explore the glen. During lunch it was announced that the President, Mr. Robert Patterson, F.L.S., and the Vice-President, Mr. Nevin H. Foster, M.B.O.U., offered prizes for the best collection of wild flowers and the best collection of ferns respectively. The Rev. Canon Lett, an old and respected member, also offered a prize for the re-discovery of two scale mosses, *Aplozia cordifolia* and *Riccia glaucescens*. The former had not been found in Glendun for fifty years, and the latter for fifteen years, and the reverend gentleman was anxious to know if either one or both had reappeared in the interval. While the collectors examined the glen for plants, &c., some of the party walked down to Cushendun, a distance of about two miles, for the purpose of exploring its wonderful caves cut out of the old red sandstone conglomerates, and built up apparently of paving stones,

principally rolled quartz. Punctually at three o'clock the cars were once more mounted for the return drive to Parkmore, passing this time along the road up the south side of Glen Ballyemon and getting a glimpse of Cushendall and the ruins of Retreat Castle. Parkmore was reached about 5-30, and after tea at the railway company's refreshment-rooms, a brief business meeting was held, Mr. W. J. Fennell, M.R.I.A., occupying the chair. Letters of apology were read from the President and Vice-President for non-attendance, after which it was announced that Miss A. M'Connell had won the President's prize, having collected 56 species of wild flowers, Miss Willis carrying off the Vice-President's prize with 10 species of ferns. After a very keen search the botanical members failed to find either of the two scale mosses for which Rev. Canon Lett offered a valuable prize. There being no further business to put before the meeting, and train time having arrived, the party boarded the 6-5 train, and reached Belfast at 8-10, all thoroughly well pleased with their day's outing, and desirous of paying a second visit to beautiful Glendun and district.

LARNE HARBOUR.

(HALF-DAY EXCURSION.)

The seventh excursion of the Summer Session took place on the afternoon of August 24th, to Larne Harbour. The President (Mr. Robert Patterson, F.L.S.) arranged to act as conductor for the day. The Railway Company placed specially-reserved carriages with ample accommodation at the disposal of the Club, so that they had a very pleasant run down on the 2-15 train, picking up at Carrickfergus and Larne, a few more members. On reaching their destination the combined party exceeded sixty. At the harbour a division was made. The majority visited the Marine Laboratory of the Ulster Fisheries and Biology Association, situated on the Curran. Owing to the absence on holidays of the

resident naturalist, Mr. F. Balfour-Browne, Mr. Patterson acted as guide, and with his all-round scientific knowledge made a very efficient substitute. A large number of living animals were displayed in tanks and basins, such as Pipe-Fishes, Hermit-Crabs, Tunicates, various species of crabs, &c., &c. A few of the party went out for a trip on the Lough in the steam launch belonging to the Association, kindly lent for the occasion, while others crossed the ferry to Islandmagee and spent several pleasant hours wandering about this beautiful district, not forgetting to pay a visit to its famous "Druids' altar," a very perfect one of its kind. The celebrated Larne gravels also came in for a share of attention, under the guidance of Mr. Robert Welch, M.R.I.A., a large number of worked flints being carried away. The Lias section at Waterloo attracted half a dozen of the geologists, who, after working for a few hours were rather disappointed at the results, the fossils being badly crushed, so that very few specimens were worth bagging. *Avicula contorta*, *Modiola minima*, *Lima*, and spines of *Echinus* were numerous. On the shore road, above Waterloo, a fine section of green sand, coloured red by oxide of iron, yielded *Rhynchonellas*, *Terebratula*, *Ostrea carinata*, *Spondylus*; and in the limestone quarry, a short distance inland, *Belemnitelli* in the chalk and *Echinoconus conicum*, *Pectens*, and *Sponges*, including *Ventriculites*, &c., in a small pocket of green sand. The rock pools on the shore were examined for sea anemones, but only the two common kinds were observed—viz., *Telia crassicornis* and *Actinia mesembryanthemum*.

At 6-30 all met at the Laharna Hotel, as the guests of the President, who hospitably entertained the party to a sumptuous tea, to which all did full justice. After tea the usual business meeting was held, and one new member elected, Miss M'Fadden. Before breaking up, Mr. William Gray, M.R.I.A., in a characteristically racy speech, moved a hearty vote of thanks to Mr. and Mrs. Patterson for their kind hospitality, which vote was ably seconded by Mr. J. M'Caughen, J.P., and conveyed to the host in a few well

chosen words by Mr. Walter Chambers, C.E. The President replied in a neat and somewhat humorous speech. Mr. William Gray, M.R.I.A., favoured the meeting with an address on the flint flakes found in the district, of which he possessed some choice examples. At the close of Mr. Gray's address the proceedings terminated, and the party adjourned to the station in time to catch the 8-10, arriving in Belfast at 9-15, all highly pleased with their afternoon trip.

BALLYCASTLE.

The eighth and last excursion of the Summer Session took place on the 7th Sept., to Ballycastle coal mines, and Mr. Robert Welch, M.R.I.A., acted as conductor for the day. Notwithstanding the early hour of the start, forty-two members and visitors met on the platform of the Midland Railway Co., and travelled down by the 8-25 Portrush express to Ballymoney, where the party changed to the narrow gauge, and, taking the 10-15 train, reached Ballycastle in due course. Having picked up three members at Ballymena, six more were waiting the arrival of the train at Ballycastle, making a total of fifty-one taking part in the excursion. A number of large brakes awaited the party, which were soon mounted, and the drive commenced. On reaching the outskirts of the town, anciently known as Baile-cashlin, the remains of the Castle of Dunayannie could be seen on the bold headland a little beyond the pier.

The party drove to Ballyvoy to visit the new colliery opened up recently, and were shown over the works by the courteous under-manager—in the absence of his chief—who kindly explained the mode of working. Of the value of the coal there seems to be a difference of opinion among experts, but of the value of the fire-clay there can be no doubt, it being very rich in silica, and the bricks turned out being of first-class quality. In addition to the coals and fire-clay, the amount of cannel coal and iron carbonate produced is certain to pay.

Leaving the mines about one o'clock, the party were driven back as far as the golf links, and, turning sharp to the right, came out on the coast road to Benmore, where the sandstones and shales, being highly fossiliferous, especially in plant and fish remains, yielded numerous specimens. *Sigellaria*, *Stigmaria*, *Lingula*, and small specimens of *Orthoceras* measuring from one to three inches long, were fairly common.

Most of the party having lunched at the mines, no time was lost, and abandoning the brakes half a mile from Carrickmore Port, the more energetic members pressed on on foot. After resting a short time at the port, the return walk was commenced, the intention being to walk back along the shore road to Ballycastle. On the way back the North Star Dyke, on the shore, standing out boldly through the sandstone into which it had intruded, created much interest. The North Star mine, runs under the cliff, above the dyke, its mouth opening out on the road side. After an hour's walk Ballycastle was reached shortly after four o'clock, when the majority of the party visited the shop of the toy industry of the district, in which Mrs. Riddell takes a kindly interest, and made purchases.

At five o'clock all adjourned to the Antrim Arms Hotel for tea, which was much enjoyed after the exertions of the day. After tea, the usual business meeting was held, and it being the last of the excursions of the season, the President (Mr. Robert Patterson, F.L.S.) reviewed the work of the Summer Session, and drew the attention of the meeting to the lectures to be delivered during the winter months.

The Ornithologist of the party reports that twenty-five species of birds were observed during the day. Of these undoubtedly the most interesting were the numerous Hooded Crows seen along the sea shore from the golf links to Carrickmore. The Hooded or Grey Crow is the only crow known in Ireland, and it is pleasant to think that here at least their numbers are not diminishing. Many family parties of old and

young Wheatears and Stonechats were seen, and the very light-coloured young Pied Wagtails formed a marked contrast to the dark rocks. Oyster-catchers were conspicuous and common. A single Gannet was seen fishing off the shore about a mile out. Strangely enough the only Herons seen were three in an inland bog. Only two species of Gulls were observed, and the only remnant of the huge army of summer visitants consisted of a few Swallows, House Martins, and Sand Martins.

Among the plants observed were the grass of Parnassus—*Parnassia palustris*—in flower; the Sea Spleenwort, *Asplenium marinum*, and the Crowberry, *Empetrum nigrum*. One member picked up on the shore a seed pod, round and about the size of a penny, an interesting waif carried to our coast by the Gulf stream from the West Indies. Among the shells found on the sand dunes were the two Xerophile species—*Helix acuta* and *H. virgata*.

The party left Ballycastle by the 5-45 train, arriving in Belfast at 8-35, tired but happy.



Winter Session.

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

ANNUAL CONVERSAZIONE.

A reception by the President and Mrs. Robert Patterson was held in the Patterson Museum, People's Palace, on Friday, 25th October. Entering the gates of the Palace the courtyard was prettily lighted up with fairy lights, which looked most charming. The main hall, where the guests were received, underwent a complete metamorphosis for the occasion, the floors of the hall, lounge, and museum being carpeted in crimson, and otherwise beautified with tastefully arranged palms and other plants. The walls were gaily decorated with bunting by the boys of the Cripples' Institute, under the supervision of Mr. Howe, while flags floated in graceful folds from the beams supporting the roofs, giving to the whole a most pleasing effect. The entire scheme of decoration reflects the greatest credit on Mr. Howe and his boys for their excellent taste. At seven o'clock the guests, numbering nearly five hundred members and friends, were entertained to tea by Mr. and Mrs. Patterson, who were indefatigable in their exertions for the comfort and enjoyment of their numerous guests. The tea-tables looked very pretty in their floral decoration, and the catering, being in the hands of Mr. Henry, of Ye Olde Castle Restaurant, was carried out in the best possible style. To add to the pleasure of the evening the hosts had engaged Mr. Wright's well-known bijou orchestra, who performed during tea and later on at the conversazione. After tea all adjourned to the

Patterson Museum, in connection with the Palace, where a Conversazione and Exhibition was held to inaugurate the Winter Session of the forty-fifth year of the Club's existence.

While the company were eagerly examining the numerous exhibits of the members in the Museum and in the hall underneath it, or enjoying the strains of the music of Mr. Wright's band, let us turn to the neatly-printed programme, a copy of which was presented to each guest on their entrance, and we find as usual that each department of science is strongly represented. The following is a summary of the principal exhibits :—

BOTANY.—Botanical Section, Specimens from the Club's Herbarium. N. Carrothers, Plants collected during Summer Session. J. H. Davies, *Galium sylvestre* from County Down. W. Gray, M.R.I.A., Microscopical Demonstration. J. Hamilton, *Bertholletia excelsa*, from the Amazons, showing growth of nut. W. H. Phillips, Four new varieties of exotic ferns growing, also a series of dried specimens of choice varieties of British ferns. W. Porter, *Athyria*, raised from spores. J. Strachan, Iron bacterium (*Cladotrichix*) from the Six-Mile-Water, growing on basalt; Ferruginous deposits caused by same. Rev. C. H. Waddell, M.A., B.D., Some rare flowering plants and mosses.

GEOLOGY.—Miss M. K. Andrews, Microscopic sections of Derbyshire "Toadstones." R. Bell, Palæolithic implements from drift gravels, England. C. Bulla, Remains of *Megaceros hibernicus* from County Tyrone. T. Dewhurst, A.R.C.Sc. (London), Demonstration in optical properties of minerals, also staining of rock sections. W. J. Fennell, M.R.I.A., Minerals from the Mourne granite. F. C. Forth, A.R.C.Sc.I., Geological specimens, minerals, and models. W. A. Green, Plant remains from the coal measures, Ballycastle; and other Carboniferous fossils. W. Gray, M.R.I.A., Microscopic Demonstration. W. H. Gallway, Teeth of fossil sharks. J. L. S. Jackson, Portion of stalagmitic flooring from pre-historic cave, Doneraile; also section to show growth of stalagmite. J. Strachan, Specimens of Jasper and Chert,

Hydrophane-opal, from Sandy Braes; Tube amygdaloid from Ballypallidy; Primary Natrolite in Basalt from near Carnmoney. W. J. C. Tomlinson, Cretaceous fossils (gault and chalk) from Folkestone; Kentish rag fossils from Hythe beds, Kent; Pyrites nodules from the gault and green sand, Folkestone. J. Wright, F.G.S., *Foraminifera* from Lough Swilly and Sheephaven, North Donegal.

ZOOLOGY.—F. Balfour Browne, M.A., F.R.S.E., Stages in the life histories of aquatic insects; specimens and drawings. J. Cottney, Uncoloured eggs from covered nests. G. Donaldson, Marine shells. N. H. Foster, M.B.O.U., Woodlice (*Isopoda*) collected during Cork Conference week, July, 1907. W. H. Gallway, Development of Dog-fish (*Scyllium canicula*); also jaws of Port Jackson, Greenland, and common sharks. J. Hamilton, Insects from the Amazons. J. L. S. Jackson, Living specimens of Toads, Natterjack, Changeable and Fire; also Salamanders, Common Frog, and Newts. W. S. M'Kee, Pond life (microscopic demonstration). H. L. Orr, Skulls of Mammals. R. Patterson, F.L.S., Pair of adult Tree Sparrows and young from County Donegal, the first obtained in Ulster; case of young Coots to illustrate independent young; also skull of American Coypu (water rat), recently captured at Holywood, compared with skull of common rat. S. M. Stears, Night Heron (*Nycticorax griseus*) and Glossy Ibis (*Plegadis falcinellus*). A. W. Stelfox, Land and Fresh-water shells collected during Cork Conference week, July, 1907. Professor Symington, M.D., F.R.S., A series of illustrations of the brains of Apes and Man. Professor Gregg Wilson, D.Sc., M.R.I.A., Demonstration showing how to tell the age of fishes; Snakes, poisonous and non-poisonous; also living marine animals. R. Welch, M.R.I.A., Land and Fresh-water shells.

In addition to the above exhibits, F. C. Forth, A.R.C.Sc.I., showed a number of beautiful models of the eye, ear, and throat; glass crystal models; models of dynamo armatures, &c. W. Gray, M.R.I.A., Models of pre-historic Irish monuments. W. A. Green,

Crusies Irish and Continental. A. R. Hogg showed examples of the new colour photography, which excited considerable interest, as very few had seen such. R. May, as usual, had an excellent exhibit, this time of an old Ulster door and gate keys, two ancient iron hammers, and an ivory paper-knife found in excavating the site for the Scottish Provident Buildings. D. C. Patterson showed an interesting and humorous drawing of the exterior of Dr. J. S. Bowerbank's house in 1846; while S. M. Stears exhibited a fine example of an ancient steel gun cross-bow.

Microscopic Demonstrations were given during the evening by Miss M. K. Andrews and Messrs. Dewhurst, Gray, M'Cleery, M'Kee, Wright, and Professor Gregg Wilson.

At 9-15 an adjournment was made to the large hall, where a short business meeting was held, which enabled the President to give a brief summary of the Club's aims and objects, and in the course of his remarks he said, after expressing his pleasure that so many members had responded to his invitation, that the Club was never in a more flourishing condition than it is now. The average attendance at the eight summer excursions was fifty, which, considering the unfavourable summer, was very satisfactory. He appealed for papers to be read during the coming winter session, and also indicated that larger attendances at the various meetings of the Club would be encouraging to all concerned. He concluded by welcoming that veteran local naturalist, Mr. S. A. Stewart. Ten new members were elected—Miss Anguin, Miss E. B. M'Dowell, and Messrs. A. B. Morris, W. H. Curragh, H. V. Walsh, F. G. Walsh, T. Dewhurst, J. H. Harbinson, W. Minnis, Saml. Henry. At the close of the meeting a cinematograph film of "animated pictures of birdland," quite a unique and beautiful series of pictures of wild-bird life on our coasts, were thrown on the screen. Mr. Patterson, after very considerable trouble and at his own expense, secured this beautiful film for the Club's Conversazione. A series of views were afterwards thrown on the screen, the lantern being in the hands of Mr. A. R. Hogg. Dr. Robert E. Hadden

showed a number of beautiful slides from photographs of Kinsale, Youghal, The Geragh, Inchigeela, &c. Mr. W. A. Green showed some excellent slides of views in and about Ballycastle, among the slides being one of a prehistoric snail-hunter, said to be an ancestor of a well-known member of the Club, and certainly the likeness was recognised and was unmistakable. Mr. R. Welch, M.R.I.A., showed some exquisite slides from photographs taken during the Cork Conference week, July, 1907. The slides of Mr. A. R. Hogg were also very fine, and were made from photographs taken on the different excursions. Mr. W. Gray, M.R.I.A., as usual had a number of unique slides, while Mr. R. J. Walsh's and Miss Holland's slides were excellent, giving views of many of the interesting spots visited during the Cork Conference week. Mr. N. H. Foster, M.B.O.U., the Vice-President, also showed views taken on the Club's excursion. This concluded one of the most enjoyable, most successful, and in point of numbers present the largest Conversazione ever held by the Club.

"LINKS IN MAN'S ANCESTRAL CHAIN."

The first meeting of the Winter Session was held in the Museum, College Square North, on Tuesday Evening, 19th November. The usual Science-Gossip Half-hour was held previous to the public meeting. Mr. Robert Welch, M.R.I.A., gave a brief description of the discovery of *Bythinia leachii*, a shell new to the Irish Fauna, and also showed specimens from several localities in Counties Kildare and Dublin. At eight o'clock an adjournment was made to the Lecture Hall, when Professor C. J. Patten, M.A., M.D., D.Sc., of Sheffield University, delivered a lecture on "Links in Man's Ancestral Chain," illustrated by diagrams, casts of celebrated skulls, and an admirable series of lantern slides.

Mr. Nevin H. Foster, M.B.O.U., the Vice-President, occupied the chair, and in a few suitable words introduced the lecturer.

Professor Patten, in the course of an interesting and instructive lecture, referred to the strides which had taken place in recent years regarding knowledge of man's origin and his "place in nature." Less than seventy years ago, he said, it was universally believed that man was "specially created" within, comparatively speaking, recent years. The year 1841 saw a remarkable revelation in respect to the evidence of man's origin. In that year Mons. Boucher de Perthes discovered rudely chipped and unpolished flint implements in quaternary deposits and associated with the now extinct mammoth. Since then thousands of these stone implements, undoubtedly the work of man's hands, had found their way into museums, and considering the deposits in which they had been found and the extinct animals with which they had been associated, the great antiquity of man had been arrived at. The Palæolithic man who fabricated these rude stone implements existed in Europe perhaps during—at all events towards the close of—the Glacial epoch at least 100,000 years ago. Apart from what science had told them, much information regarding man's antiquity had recently come to light from the researches of the historian and antiquarian. From extensive excavations made in Egypt and Babylon had been recovered tablets, monuments, and clay cylinders, bearing hieroglyphics which proved that at the time of the supposed creation of man in Asia great and populous cities, with their magnificent temples, high arts, advanced literatures, and philosophical religious systems had been existing for 2,000 years; indeed further excavations might yet reveal an older script for both Egypt and Babylon. How long it took for the inhabitants of these great ancient Empires to reach such an advanced stage of civilization could only be estimated by hundreds of thousands of years. In advancing towards their conceptions of civilized humanity, man, over vast periods of time, passed through a slow and often painful process of very gradual evolution from the rudest of beginnings. Before dealing more fully with the origin of man and his relation-

ship to the rest of the animal world, Professor Patten dealt with the links connecting some of the most primitive of the living races of mankind with the highest types, and also with those connecting man with his nearest ape-like kinsman. In conclusion, the lecturer touched briefly on the anatomy and habits of the man-like apes now existing, first throwing on the screen pictures of several of the fictitious forms described by the older naturalists, and assured his audience that even if they were obliged to give up their older and more poetical fancies of man's "all-glorious" origin for what hard scientific truths whispered in their ears, they had nought to be ashamed of, for, with the strong flowing tide of evolutionary progress over countless ages, their reverence for the nobility of manhood would not be lessened by the knowledge that man was, in substance and in structure, one with the brutes; for he alone possessed the marvellous endowment of intelligible and rational speech, whereby, in the secular period of his existence, he had slowly accumulated and organised the experience which was almost wholly lost with the cessation of every individual life in other animals; so that now he stood raised upon it, as on a mountain top, far above the level of his humble fellows, and transfigured from his grosser nature by reflecting here and there a ray from the infinite source of truth. (Applause.)

An interesting discussion then took place.

Professor Symington said Dr. Patten, who was a man of versatile talents, had raised a number of very controversial points. For his own part he (the speaker) thought the missing link had not yet been discovered. Even if they took the lowest of mankind and compare with the anthropoid ape, there was a considerable difference. The top of the skull and the thigh bone were the most rigid and enduring parts in the scheme of development, and, although estimates from the size of the brain were somewhat hypothetical, yet between the lowest human and the highest ape there was the wide difference of at least twenty ounces. That was the main distinctive feature of man. They could not lay claim to

the same superiority in the case of the senses, but in the development of the nervous centres the gap was decided. Still, from the lowest ape to the highest there was a gradual approach to man, and the whole evidence of the evolution of man from ape was irresistible, although at the same time they had not yet got absolute evidence on the subject.

Professor Gregg Wilson said they had had a great treat that night, and they were all indebted to Professor Patten for giving them so straightforward an account of all the points they were more or less anxious to know about.

Mr. C. Cunningham referred to the change that had taken place in the attitude of public opinion towards the Darwinian theory.

The formal thanks of the Club were voted to the lecturer, on the proposal of the Hon. S. S. Knabenshue, United States Consul, seconded by Mr. J. M. Dickson.

Professor Patten, in acknowledging the compliment, said it was a great joy to him to find so many seriously interested in—he would not call it the theory or the hypothesis—but the guiding truth of evolution.

The public proceedings then terminated.

Archæological Section.

“THE GREAT BURIAL MOUNDS OF LOUGH CREW.”

The first meeting of the newly-formed Archæological Section was held in the Club's room at the Museum, College Square, on Monday evening, 25th Nov., the chair being occupied by Mr. W. J. Fennell, F.R.I.B.A., who in the course of an address said they proposed in future to bring before this Section, and also before the Club proper, all matters of Archæological interest brought to light in the Club's area of action. Having referred to the work of the coming session and the papers to be read, the Chairman called on

Mrs. Hobson to give her lecture on "The Great Burial Mounds of Lough Crew," in the course of which she said for a long time she had promised herself the pleasure of visiting the great pagan necropolis on the Loughcrew Hills, and last April found herself at Oldcastle, the nearest village. The chief tombs are on the tops of the hills, and are easily seen from the train. They are two miles from Oldcastle, rather in the direction of Kells, at an elevation above sea-level of 904 feet, and forced out of the lower silurian rocks. There are two main peaks with tombs still surmounting them; the others are covered with demolished cairns. The two principal tombs are open, and easily entered. Ancient writers say there were fifty of them. In 1864 there were thirty. To-day the number is hard to ascertain. Some are merely heaps of debris, others grass-grown and hard to determine. Externally they appear heaps, or rather hills, of small loose stones. The interiors are composed of a passage and rude circular chamber divided into compartments, one into four and another into seven niches. The largest of the cairns now demolished must have been sixty yards in diameter at the base. The Hag's Chair cairn is $115\frac{1}{2}$ yards in circumference, base to summit 21 spaces (Conwell). The legend goes that a hag named Calleach Bearthe started to jump from one peak to another with her apron full of stones, but, as might be expected, she fell, and so scattered her load, and at the same time lost her life. At the side of this cairn is a great stone sofa 10 feet long and about 10 tons weight, probably a seat of justice, or used for some ceremonial now long forgotten. The interiors are most impressive and magnificent examples of dry cyclopean masonry, formed of huge boulders and slabs, the centre chambers being built of overlapping courses till closed, as were so many of the early buildings in Ireland, "with a single stone." Passage and chamber combined are cruciform. The impression forces itself upon one that here we have buildings of a ruder and more primitive type than at New Grange. On the next height is an even larger and more

impressive tumulus. It contains the same sort of passage and chamber, the latter divided into seven niches by great stones placed upright, sideways, and in the form of seats. Not the least remarkable thing about them is the enormous number and variety of inscriptions on the stones—viz., cup-markings—cups singly and in groups, cups surrounded by circles, quadrilateral figures, lines, zigzags, rayed circles, &c. Mr. Conwell recorded the amazing number in the various tombs as 1,393 separate devices. They are much weathered, and it is doubtful if now they could be accurately counted. Numbers of megalithic monuments are quite close by, and the surrounding country is studded with moats, standing stones, stone circles, souterrains, &c. One asks, who built and used the tumuli, and at what time? They are said to be the resting-places of the kings of Ulster from long prior to the Christian era. The Four Masters say that Ollambh Fodhla died in 1277 B.C., and that he was buried at Faillten (which is considered to be this necropolis), and his descendants down to Conchobbhar, perhaps better known as "Connor Mac Nessa," who is supposed to have died in 33 A.D., at Tara, and who wished after death to be carried to a place "between Slea and Sea" and buried with his face to the east on account of the faith he had embraced. In the "History of the Cemeteries," one of the most ancient of the Irish MSS., we read—

"The three cemeteries of the idolaters are
The Cemetery of Faillten the Select,
The ever-clean Cemetery of Cruachan,
And the Cemetery of Brugh.

"The Host of Great Meath are buried
In the middle of the lordly Brugh;
The great Ultonians used to bury
At Faillten with great pomp."

The paper was illustrated by measured drawings, photographs, and rubbings by the lecturer. A most interesting discussion followed, in which Messrs. Dickson, R. Welch, E. J.

M'Kean, A. Milligan, and W. J. Fennell took part and the proceedings terminated with a well-earned vote of thanks to Mrs. Hobson.

Zoological Section.

"AN ELEMENTARY OUTLINE OF ZOOLOGY."

The first meeting of the Zoological Section was held in the Museum, College Square North, on Wednesday evening, 29th November—Mr. Robert Welch, M.R.I.A., in the chair. The Chairman called upon Mr. Nevin H. Foster, M.B.O.U., the Vice-President, to deliver his address on "An Elementary Outline of Zoology."

Mr. Foster said that in connection with the Club two new sections devoted to Archæology and Zoology had been inaugurated this year, and that it was hoped this step would tend to draw more closely together the members who were interested in these studies. Zoology—the science of animal life—dealt with a vast multitude of organisms differing widely in structure and habit, and, while he did not think that in this science much good would be accomplished by means of sectional meetings, yet he considered that at the beginning of the session a paper dealing with its outlines might render service in encouraging members to take up some of the branches of this fascinating science. The Club had several members actively pursuing research in some of our faunal groups, but many branches were quite neglected, and, whilst there was plenty of room for more workers in those groups to which attention is being paid, there was also almost if not altogether virgin ground for new recruits. After alluding to the unity of original structure in all living organisms—vegetable and animal—Mr. Foster proceeded to define the different branches into which zoological study might be directed, and said that it was with the departments of classification and distribution that Field Club

workers were principally concerned. He then gave a short outline of the various branches into which the animal kingdom was naturally divided, and drew attention to some of the types of structure included in each class, from the Amoeba, a primitive unicellular animal, up to the most highly-developed organism—that of man. In conclusion, he said that by the study of structure and habits of one or more groups of animals we are enabled to identify the particular species which may be observed or obtained, and then are in a position to render valuable service in recording the particular habitats of such species in our district, thus in our limited sphere contributing our mite to the general record of the world's faunal distribution.

Mr. Foster was enabled through the kindness of Professor Gregg Wilson, of Queen's College, to illustrate his remarks with quite a large number of preserved specimens, some unique, illustrating the life history of different animals. A specimen with egg was shown of that paradox in the animal world the duck-billed Platypus from Australia.

A very interesting discussion followed the close of the paper, several members speaking warmly on the able manner in which Mr. Foster treated a difficult subject, his descriptions being simple and clear. The following members took part in the discussion:—Robert Welch, M.R.I.A., T. Dewhurst, A. Deane, J. N. Milne, J. Carson, Rev. J. Shiels, and W. H. Gallway.

Mr. Foster having replied, the proceedings terminated.

"A WEEK WITH FIELD CLUB UNION."

A special meeting was held in the Museum, College Square North, on Tuesday evening, 10th December, the President (Mr. Robert Patterson, F.L.S.) in the chair. The Chairman explained the object of the meeting, which was to place before the Club the work done during "A Week with the Field Club Union," held in

Cork in July last. He said a large number of special lantern slides had been prepared for this night, the slides being grouped into four divisions—Geology, Botany, Zoology, and Archaeology—and in addition views would be shown of the different places visited during the week. Certainly the work done and the new records made by the Northern contingent reflected the greatest credit on the individual workers. Mr. Nevin H. Foster, M.B.O.U., Vice-President, first took up the group of the Terrestrial *Isopods* or Woodlice, and mentioned the interesting fact that of the 17 species which had been recorded as found in Ireland, 8 species were noted during the Conference week. Many of these animals were more brightly coloured than the Northern forms, this being, as a rule, a characteristic of the Southern fauna. Mr. Foster had prepared slides of the different species of this rather curious and pretty group, which evoked loud applause from the audience. In addition to the above subject Mr. Foster took up the botany of County Cork, and showed slides of some of the more notable plants.

The President, Mr. Robert Patterson, F.L.S., next gave his observations on the birds of Cork, illustrating his remarks by throwing on the screen very many beautiful slides of different species of birds. Seventy-five species were observed during the week, none of them being new records, the time of the year the Conference was held in, however, being the very worst season for ornithological observations; a more suitable time being June instead of mid-July. The Old Head of Kinsale was the home of countless numbers of birds, the cliff face, stacks, and sea being literally covered with Herring-Gulls, Shags, Kittiwakes, Great Black-backed Gulls, Puffins, Razorbills, Terns, and Guillemots. Up to 1845 there were recorded from the County Cork 165 species of birds, and in 1900 this number had increased to 225. This result was mainly due to better observation and also the lightship notes. Mr. Patterson wound up his remarks by mentioning, in connection with the remains of Lemmings recently found in the Buttevant caves, that the bones of both the Norway

and Arctic Lemmings have been found in caves in Sligo, Clare, and Cork. This little animal increases so rapidly—two litters being born every year, the average number in each being five, but sometimes there are as many as seven and eight—that, owing to excess of numbers and consequent scarcity, they are obliged to migrate in search of food. This migration takes place every ten or fifteen years, when millions start off in a straight course, eating everything before them and leaving desolation behind. Nothing will turn the animals from their course ; over mountains, swimming rivers and lakes, they swarm, and in populated places fall into the wells and produce the well-known (on the Continent) Lemming fever. This migration may take from one to three years, and usually ends in the little animals entering the sea, and, as they will not turn aside, they are drowned in large numbers.

Mr. Robert Welch, M.R.I.A., described the Geology of the County Cork. He gave a description, with measurements and also slides, of a submerged Cromleac at Rostellan, and then passed to his favourite study, the land and freshwater Mollusca, briefly describing the various species collected during the Conference week, and showing slides to illustrate many points in species which would otherwise have been obscure.

The mammoth cave at Buttevant, the latter name a corruption of the warcry of the Barry's, "Boutez en avant" (push forward), created much interest, Mr. J. L. S. Jackson giving quite a romantic description of the interior of the now famous cave and the difficulties of its exploration. The cave has now come into the hands, by purchase, of Mr. R. J. Ussher, the well-known authority on birds. This gentleman for some years past has taken up the task of excavating some of the caves distributed over Ireland, and has published the results. Mr. Ussher is now at work on the Buttevant cave, and kindly gave several of the members an opportunity of examining it. Mr. Jackson was enabled, through the kindness of Mr. Robert Welch, M.R.I.A., to show the meeting some unique slides from flashlight photo-

graphs, which gave a vivid idea of the magnitude and beauty of this remarkable cave. The explorers had in many instances to wriggle their way along the ground, and force themselves through the narrow apertures leading from one part to another. The different galleries are called by distinctive names, according to the variety of animal remains found in each. The list of animal remains discovered in the caves up to the present include Mammoth, Bear, Wolf, Hyæna, Norwegian and Arctic Lemmings, Irish Elk, Reindeer, Fox, Hare, Rabbit, and a few bones of birds. Slides were shown of Reindeer skulls gnawed by Hyænas, jaw of Hyæna, this being the first evidence of this animal ever found in Ireland in conjunction with Arctic animals; jaws and bones of Lemmings, and the jaw of a baby Mammoth.

Mr. W. H. Gallway dealt with the Archæology of the districts visited, and was able to increase the interest in the subject by showing slides of Round Towers, Churches, Castles, Forts, &c., and the famous Myrtle Grove, the home of Sir Walter Raleigh at Youghal. Ardmore, nine miles from Youghal, contains an interesting group of ruins, consisting of a Round Tower and the remains of a Cathedral, Church, and Oratory, also a Holy Well, all more or less connected with St. Declan, who began his missionary work in the year 402. The Cathedral and Church contain some remarkable sculptures and a few headstones, with Ogham writings. The Cathedral is supposed to have been erected in the fourteenth century on the site of an older structure believed to have been built by St. Colman, who died in 604. Views were shown of the different ruins and also of the fine Cromleac at Castlemary; the large flat stone of the latter measured 15 feet in length and 8 feet in breadth. Mr. Gallway also showed numerous slides, and gave brief descriptions of the many charming spots visited during Conference week, such as the beautiful scenery to be seen in the sail down to Queenstown; Youghal, and Kinsale, with their quaint old-world houses, Inchigeela, the Gearagh, a curious maze of the River Lee, views in Cork, &c.

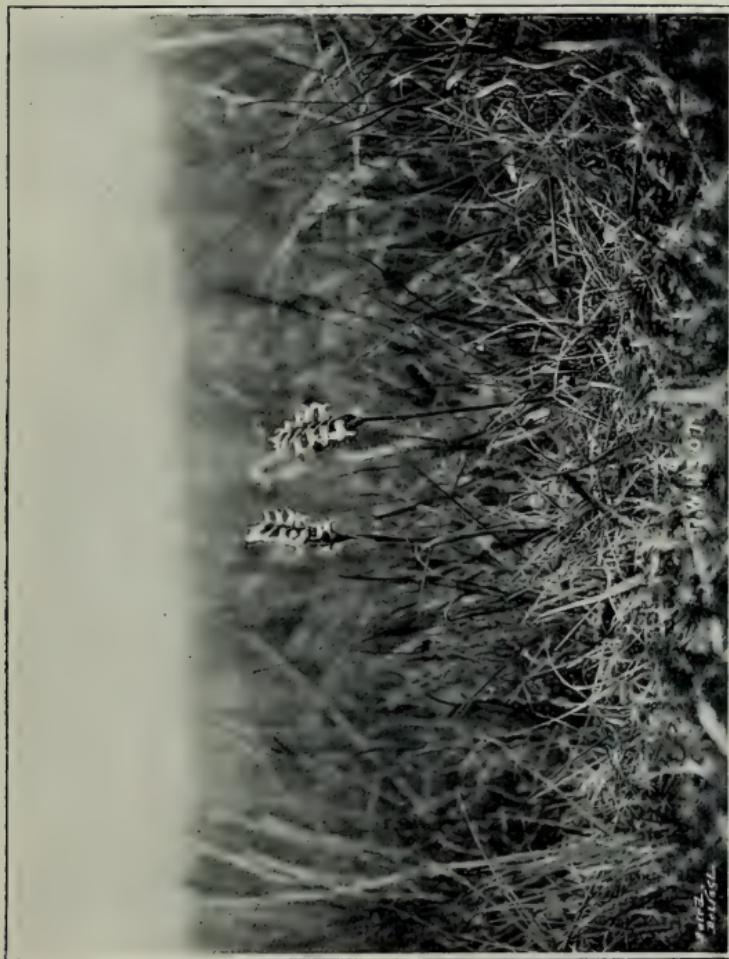
This concluded a very enjoyable evening, the different speakers being followed with keen interest, and the slides being much admired.

Botanical Section.

"LOCAL BOTANICAL FIELD-WORK IN 1907."

At a meeting of this Section on 14th December, Mr. W. J. C. Tomlinson read a paper with the above title. He said : Our district Flora has been so closely examined in bygone days that few discoveries of consequence are likely to reward the exertions of field-botanists to-day. It will, therefore, be well understood that I can have comparatively little of a fresh nature to bring before you. Still, a short summary of my season's notes regarding a few of our rarer species may prove acceptable to local workers. Most of the plants to be mentioned were found in new stations, and the remainder were seen in old localities where no recent botanist had confirmed their existence.

I have elsewhere (*Irish Naturalist*, Vol. XVI., pp. 311-314, October, 1907), given some particulars regarding the occurrence of the remarkable orchid, *Spiranthes Romanzoffiana*, Cham., in Co. Antrim. The little bit of work involved in this investigation was perhaps the most valuable result of the year's rambles. This exceedingly rare species of *Spiranthes* is unknown in Europe outside Ireland. It was originally recognised in Kamchatka, and then in the Northern parts of the North American Continent. It was first found in Ireland, in 1810, by J. Drummond, near Castletown-Berehaven, Bantry Bay ; but it was not till some years afterwards that the correct identity of the species was established. From the point of view, therefore, of distribution, this orchid, which has been called " Irish Lady's Tresses," occupies an almost unique place in the British Flora.



Spiranthes Romanzoffiana,
ON SHORES OF LOUGH NEAGH.

PHOTO.

R. WELCH.



The Cork station for *Spiranthes Romanzoffiana* held the field exclusively until 1892, when Mr. R. Lloyd Praeger, discovered a few plants of it in a bog in North Armagh. In the following year Mrs. Leebody found it by the River Bann, near Kilrea, Co. Derry. Six plants were seen by her. A few years later another lady botanist discovered a couple of plants in another locality near Kilrea. Then, in 1901, Mr. William West, F.L.S., found a specimen in Co. Antrim, the locality for which was stated to be "between Antrim and Toome." No further discoveries were made regarding its occurrence and distribution until the present year, when I had the pleasure of finding it growing profusely on certain wet, spongy pastures and marshes, bordering the North shore of Lough Neagh. At one of the stations, practically identical, I understand, with Mr. West's, I counted eighty-eight separate plants in flower, the area occupied being from two to three acres. At another locality, four miles distant from the preceding one, a still larger total of plants in flower was met with, though the area over which they were located was correspondingly greater. A third station was subsequently found on the eastern shore of the Lough, about a couple of miles south of the town of Antrim. Only four plants were seen at the last-mentioned locality; but the extension of range indicated is most important. It is to be hoped that further investigation will be rewarded by the discovery of additional stations in the Lough Neagh basin. The month of August is decidedly the most hopeful time to prosecute the search.

The occurrence of this orchid in such plenty at these new stations transfers the known focus of its distribution in Europe from the shores of Bantry Bay to those of Lough Neagh. For, it appears that no botanist ever saw more than three dozen separate plants at the Berehaven locality, and latterly, owing doubtless to the depredations of collectors, it has greatly diminished in quantity. The existence of this orchid in Ireland, under the conditions stated, raises important considerations with reference to plant

distribution generally and past geological land connections. It may be noted that I visited two of the newly-found Antrim stations late in September with the object of getting specimens in fruit, but most of the plants had then withered off. The few I did procure seemed to be all quite abortive. Whether the exceptional wetness of the season had anything to do with this, by extinguishing the life of the insect by which ordinarily this orchid is pollinated, I cannot say.

The next plant to be noted is the Wood Bitter Vetch, *Vicia Orobus*, DC. This is one of our rarest plants. Until last year only one known station for it existed in the North-East, namely, Sallagh Braes, Co. Antrim, where a single plant was discovered in 1873 by Mr. Stewart. In 1906, however, Mr. C. J. Lilly found this Vetch growing plentifully on Lower Ballygowan Hill, and also sparingly at two other adjacent localities. In July of the present year I discovered it growing on a shrubby, rocky pasture in the townland of Ballybracken, a little bit east of Ballyboley railway station, at an elevation of about 440 feet. This station is almost two miles south-west of Lower Ballygowan, and six miles south-west of Sallagh Braes. Half-a-dozen plants were noted. I also found it more sparingly on Irish Hill, south of Straid. It occurred here at an elevation of 700 feet, and with gorse and heather as associates. Irish Hill marks an important extension of range, as it is four miles south-west of Ballyboley.

The two stations here listed for *Vicia Orobus* yielded other plants of sufficient rarity to merit enumeration, as they have not been recorded therefrom before. On Irish Hill, whose summit is characteristically that of a grassy-heath, I found *Gynnadenia conopsea* and *G. albida*, both in abundance. *Pyrola media* also occurred in plenty. At Ballyboley the same three plants grew profusely on the area associated with the Bitter Vetch, as also did *Melampyrum pratense*; *Antennaria dioica* occurred more sparingly. This locality, being near to "the head of the Six-Mile-Water," is probably the "heathy ground" where Templeton, in 1794, found

Pyrola media. If so, it would be interesting if his record of *Pinguicula lusitanica* from "marshy places" in the same locality could now be similarly confirmed. The marshes on the north, or Ballyboley, side of the railway line yielded all the common orchids. On higher ground, towards Ballyboley Hill, I found *Habenaria viridis* associated with *Rosa spinosissima*, and also a delightful profusion of the Moonwort Fern, *Botrychium lunaria*. The richness of the flora here in orchids and other rare plants points to the desirability of a closer acquaintance with such outlying moorlands, marshes, and hill pastures.

A more elevated and better known moorland district in Antrim which I visited, accompanied by Mr. N. Carrothers, in July, was the Lough Naroon bogs, south-west of Dunloy. We were rather unfortunate in the matter of weather, as it poured incessantly during the few short hours we spent on this dreary looking tableland of bog and heather. Still, the botanical results of our brief exploration were unexpectedly pleasing. *Listera cordata* was noted sparingly in the Sphagnum bog. But with the exception of *Drosera anglica*, *Vaccinium Vitis-idea*, and *Empetrum nigrum*, no other rare plants already recorded from the Lough Naroon area were seen by us until we reached the rocky dyke-like protrusion of dolerite to the south-west of the Lough. It was on the lichen covered, craggy rocks at the north end of this escarpment that we found the *Vaccinium*. An abundant hazel scrub was the dominant feature of the rocks. The whole escarpment is mapped by the Ordnance Surveyors as "The Lough Rock," and its elevation is 701 feet. It is situated in the townland of Glenbuck, and was doubtless visited by botanists before. Yet it fell to our lot to note for the first time the following rare species thereon:—*Epilobium angustifolium*, *Sanicula europaea*, *Viburnum opulus*, *Antennaria dioica*, *Pyrola media*, *P. minor*, and *Melampyrum pratense*. With the exception of the Guelder Rose, all the plants were in abundance. The group likewise exhibits a typical association. In our subsequent course

south-eastward we met with a fine colony of *Gymnadenia albida* on another craggy boss, known as Rabbit Rock.

The exigencies of space forbid any detailed statement of other interesting botanical trips, but a noteworthy feature of the whole was the frequency with which the Wintergreens and our rarer species of Orchids were turned up in new stations by both Mr. Carrothers and myself.

A somewhat condensed list is given below of the more interesting records made during the season. The nomenclature adopted is, for the sake of convenience, that used in Stewart & Corry's *Flora* and the *Supplement* thereto.

CLASSIFIED LIST OF SPECIES, WITH LOCALITIES:—

<i>Thalictrum flavum</i> , Linn.	...	Massereene Park, Antrim.
<i>Ranunculus trichophyllus</i> , Chaix		Stream at Bellarena, Co. Derry.
<i>R. pseudo-fluitans</i> , Bab.	...	River Main at Glarryford; Larne Water, 3 miles above Larne.
<i>R. Peltatus</i> , Schrank	...	Lakelet on south side of railway line between Magherafelt and Moneymore, Co. Derry.
<i>Lepidium campestre</i> , R. Brown	...	Roadside, a little west of Toome Bridge, Co. Derry.
<i>L. Draba</i> , Linn.	...	Apparently well established at Comber, Co. Down.
<i>Silene anglica</i> , Linn.	...	Glasdrumman, Co. Down.
<i>Arenaria verna</i> , Linn.	...	Agnew's Hill; Knock Dhu, Co. Antrim.
<i>Geranium striatum</i> , Linn.	...	Railway bank, west of Donaghadee.
<i>Vicia Orobis</i> , DC.	...	Ballyboley; Irish Hill, Co. Antrim.
<i>V. sylvatica</i> , Linn.	...	On Pebble beach at Glasdrumman, Co. Down. Rare in Down.
<i>Dryas octopetala</i> , Linn.	...	Seen at the old stations—Benevenagh and Knock Dhu.
<i>Epilobium angustifolium</i> , Linn.		Knock Dhu cliffs; the Lough Rock, south- west of Dunloy.
<i>Circæa alpina</i> , Linn.	...	Errigal Glen, Co. Derry.
<i>Viburnum Opulus</i> , Linn.	...	The Lough Rock, Dunloy, Co. Antrim.
<i>Antennaria dioica</i> , R. Brown	...	The Lough Rock, Dunloy; Skerry Rock; Ballybracken, Ballyboley.

<i>Andromeda polifolia</i> , Linn.	...	Still maintains its hold at one place in the Cotton Moss, Donaghadee.
<i>Vaccinium vitis-idaea</i> , Linn.	...	The Lough Rock, Dunloy.
<i>Pyrola media</i> , Swartz.	...	Lough Rock, Dunloy; Ballybracken, Ballyboley, mountain heath between Squire's Hill and Ballyutogue, at 950 feet; Irish Hill.
<i>P. minor</i> , Linn.	...	The Lough Rock, Dunloy, at 700 feet; on heathy bank (left) of the Big River, above Colin Glen, Hannahstown, at 630 feet.
<i>Lathraea squamaria</i> , Linn.	...	Creibilly Demesne, Co. Antrim.
<i>Orchis pyramidalis</i> , Linn.	...	Sand Dunes, Rathmullan, Co. Down.
<i>Gymnadenia conopsea</i> , Brown	...	Skerry Rock; Ballybracken, Ballyboley; Irish Hill.
<i>G. albida</i> , L. C. Richard	...	Ballyboley; Irish Hill; Rabbit Rock, above Dunloy; Wolfhill, Sheephead Hill, between Ligoniel and Hydepark. Plentiful, in all cases, over a restricted area.
<i>Habenaria viridis</i> , Brown	...	Ballyboley; Lisnataylor, Killead; Hydepark; moorland north-west of Ballycastle.
<i>Spiranthes Romanzoffiana</i> , Cham.	...	Abundant at two stations on shore of Lough Neagh, between the Rivers Main and Bann; Massereene Deer Park, south of Antrim.
<i>Listera cordata</i> , Brown	...	Shane's Hill and Agnew's Hill, west of Larne; Moorland Bog, above Dunloy; Wolfhill and Sheephead Hill, west and north-west of Belfast.
<i>Neottia Nidus-avis</i> , L. C. Richard	Re-found in Errigal Glen, Co. Derry ; Muckamore Glen, Co. Antrim.	
<i>Sisyrinchium angustifolium</i> , Miller	Very sparingly in Shane's Castle Demesne. A doubtful native.	
<i>Poa nemoralis</i> , Linn.	...	Muckamore Abbey Woods and Glen.
<i>Botrychium lunaria</i> , Swartz	...	Killard Point, Co. Down; Ballyboley, Co. Antrim.
<i>Ceterach officinarum</i> , Willd.	...	Bridge over Braid River, east of Buckna; roadside walls at Ballyvesey; and Ballymartin, between Glengormley and Templepatrick.
<i>Lycopodium clavatum</i> , Linn.	...	Hill pasture in Ballyutogue, Ligoniel, at 970 feet.

"CLUSTER-CUPS; AND MICROSCOPIC FUNGI."

Mr. Sylvanus Wear next read a paper on "Microscopic Fungi," with special reference to the cup-fungus forms known as *Aecidii*, or Cluster-cups, which was very lucidly written, notwithstanding the strictly technical nature of the subject. He alluded to the method of dividing plants into two classes—first, plants which have definite ascending and descending axes, that is, such as develop stem, branch, and leaf; second, those which do not so develop, but which consist of a thallus—the term thallus being applied to an undifferentiated foliar structure—giving no indication of branch, stem, or leaf. This latter division consists of *Algæ* and *Fungi*, and it was with *Fungi* of a microscopic nature, and more especially those that are found upon plants, that the essayist dealt. The paper was, in the first instance, admirably illustrated by means of diagrammatic sketches, indicating briefly the life-history of some of the *Micro-fungi*; and then, after it was read, by a series of microscopic slides, showing Cluster-cups, Rusts, &c., found on plants. The value of the latter was greatly enhanced owing to the fact that many of the examples shown were taken recently from various plants in the immediate neighbourhood of the city. After speaking of *Bacteria* and Yeast, remarking about the latter that it, like *Bacteria*, is single-celled, and that it increases by budding so long as it has plenty to feed upon. Mr. Wear went on to speak in succession of Smut in wheat, Mould of bread, the Potato disease, the Hop disease, Ergot in rye, and Rust, or mildew, of wheat. The points of resemblance and the points wherein they differ were referred to when comparing the cycles, or life-histories, of the separate *fungus* in each of these cases. The havoc wrought in the potato and wheat crops was clearly explained. For example, regarding the latter, the method of procedure is something like the following. In spring or early summer a spore falls on a blade of wheat. In a few hours it germinates, sending out a germ tube groping for a breathing-pore, or stoma. Having entered the

latter it makes itself at home. Spores are formed under the epidermis, and in two or three weeks from the time of germination of the original spore they rupture the epidermis, and show themselves as one-celled orange-yellow spores, the "rust" of wheat. These are called uredospores, which do nothing but multiply their kind, and so spread the rust by many rapid cycles. Later on in the season are produced from these same rust spots, after a series of changes and transformations, what are known as resting-spores. These lie dormant till the following spring, and are not active on the wheat plant itself. They make their winter home on the leaves of other plants, notably the barberry. Hence the action taken by the State of Massachusetts over a hundred years ago in ordering the destruction of all barberry bushes to save the wheat crops. On the barberry these resting-spores undergo a double change, one of which results in the formation of Cluster-cups, which on ripening in the spring or early summer burst their envelopes and allow the active spores, with which they are then filled, to escape and betake themselves to their deadly work of "rusting" the neighbouring fields of wheat.

"THE TOMBS, TEMPLES, AND PYRAMIDS OF EGYPT."

The second meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 17th December, when an interesting lecture on "The Tombs, Temples, and Pyramids of Egypt" was delivered by Mr. Thomas Plunkett, M.R.I.A., of Enniskillen. The President (Mr. Robert Patterson, F.L.S.) occupied the chair, and there was a large attendance.

Mr. Plunkett, in the course of his lecture, which was fully illustrated by lantern slides, said he was neither an artist nor an architect, but for many years he had been deeply interested in descriptions of the marvellous monuments and stupendous works of art wrought in stone in the land of the Pharaohs at a period

thousands of years anterior to the dawn of civilisation in ancient Greece and Rome, and that determined him to make a trip to the land of monuments and see for himself the evidences of the degree of civilisation attained by the dwellers on the banks of the Nile at that remote period. On the way from Port Said to Cairo he passed through the Isthmus of Suez, crossed the way taken by the Philistines, journeyed through the Land of Goshen, where the children of Israel settled and built the treasure cities of Pithom and Rameses, mentioned in Exodus. Northward is the land of Zoan, where Moses worked wonders and where Rameses II., the Pharaoh of the Oppression, held his courts. Heleopolis was next described, the once famous city which at one time contained the best library and the wealthiest university in the world. Here it is believed that Moses was educated and Joseph the Hebrew lived, highly honoured by the King, who gave him in marriage the daughter of the chief priest. The only surviving relic of this once great city is a solitary obelisk, erected by King Userteson I. 2,433 B.C.—700 years before Joseph and his brethren came into Egypt. Heleopolis is called On in Genesis and House of the Sun in Jeremiah. A picture of the famous Rosetta stone, containing hieroglyphic, demotic, and Greek inscriptions, was then thrown on the screen, and the lecturer said the deciphering of the hieroglyphics was one of the greatest discoveries of the last century. Dr. Young, of England, lifted a corner of the veil that enshrined the then mysterious language, but the ingenious French scholar Champollian was the intellectual picklock who opened the door to the immense historical treasures hidden within it. The ponderous pile of the Great Pyramid, burnished by the setting suns of sixty centuries, was 1,800 years old when Abraham went down to sojourn in Egypt, and the Sphinx, with its strange eastward gaze, was old when the pyramids were being erected. Memphis, one of the ancient far-famed cities of Egypt, with its splendid Temple of Ptah, was built, according to Sir Norman Lockyer, 7,200 years ago. It was here the first historic king, Mena, held his court, and here, too, was the seat of

government during the first dynasty. The Apis bulls were worshipped here, and afterwards interred in the huge granite sarcophagi in the Serapheum at Sak-Kara, the necropolis of Memphis. These sarcophagi, or granite coffins, were 15ft. long, 11ft. high, and 8ft. broad, and weighed 65 tons. Some of them are elaborately sculptured with hieroglyphics. The tomb of Thi, with the interesting records on the walls of its chambers, was described, as was also the Stepped Pyramid, which is much older than the Great Pyramid, and built of brick. The rock tombs of Beni Hassan, and interesting records on their walls, were illustrated and described, as were the temples of Abydos, Dendera, Esna, and Edfu. A reference to the rock tomb of Rameses III. provided an agreeable surprise. From the paintings of the king's harpers on its walls it has come to be known as the "Harper's Tomb." One of the pictures thrown on the screen represented the Egyptian harper of remote times, and the lecturer expressed a wish that the music of the silent instrument might return out of the distant past. Immediately the strains of a harp sounded through the hall, and on a screen at the side of the platform being drawn aside Master Malachy M'Fall was revealed. His selection was heartily applauded, and the audience insisted on an encore. The lecturer then dealt with the glories of Thebes, and concluded with a description of the Holy Isle of Philae, built by Rameses II. to commemorate his victory over the Hittites. (Applause.)

A discussion followed, which was taken part in by the Chairman, Mr. John M. Dickson, and Mr. E. J. M'Kean, B.L.

A cordial vote of thanks was accorded to the lecturer, on the motion of Mr. W. H. Stephens, C.E., seconded by Mr. William Gray, M.R.I.A., and Mr. Plunkett having suitably replied, the proceedings terminated.

Archæological Section.

"KELLS ABBEY."

At a meeting of this Section, held on Wednesday evening, 8th January—Mr. John M. Dickson in the chair—a paper was read by Mr. Joseph Skillen, entitled "Kells Abbey," with a special reference to the tomb of the O'Hara's, illustrated by lantern views, and referred to the ancient importance of Connor, both as a city and as a bishop's see. Dealing with some incidents in its history, he mentioned particularly the raids of the Danes A.D. 831. In A.D. 968 the King of Ulidia sacked the city, then in possession of the Norsemen, and a great slaughter ensued. The battle between the Lord Deputy and Edward Bruce in 1315 was the last important historical event. The parish church of Connor occupies the site of the ancient cathedral, and presents no features of historical interest, being built about the year 1818, the preceding structure being burned in the wars of 1641. A hollowed stone, somewhat similar to the stone lying in Shankill Graveyard, that now serves as the corner-stone of a cottage in the neighbourhood, is said, and with some probability, to be an ancient holy water font from the Abbey Church. The ruins of the Abbey of Kells, known as Templemoyle, which was founded by St. MacNissi A.D. 480, and formerly united to the See of Connor, consists at present of a gable wall, and traces of the side walls and eastern gable. The length of the ruin is 75 feet and the breadth 29 feet 6 inches. The graveyard is in a shockingly neglected condition, being a common to the surrounding inhabitants, although it is in the custody of the Rural District Council. After dealing with the ancient tomb of the O'Hara's, which is now desecrated, the writer expressed regret at the inevitable disappearance of these ancient remains of monastic times.

"THE SCANDINAVIANS IN IRELAND."

A second lecture was delivered by Major Berry, M.S.C., entitled "The Scandinavians in Ireland," in which Major Berry, in order to arrive at the true cause of the Scandinavian invasion of Ireland, glanced briefly over the period from the introduction of Christianity prior to the invasion. These events led up to the drastic measures of Charlemagne, which in their turn led to a continuation of forces in the North to avenge their gods and liberties and stamp out the Christian form of worship. The people of Ireland at this time were "enervated and enslaved by the exactions of their clergy, the country ravaged and dependent on the wealthy monasteries for the very means of existence. The people, so long divided, were unable to combine to resist the inroads of a powerful, cruel, and barbaric enemy. The Scandinavians directed their attack against the monasteries, not so much because they were the storehouses of the riches and treasures of the country as to avenge themselves against the ministers of a religion who had destroyed their homes, murdered their kinsmen, and betrayed their most cherished sentiments. The monasteries were defensible, the monks well armed, and each establishment could produce a more or less trained and formidable body of men for its defence, consequently the annihilation of these monks was not the cold-blooded slaughter of defenceless men it is so generally represented to be. Major Berry then touched on the dates and events which led up to the attack and defeat of Ragnar and his feasts and sacrifices to Thor and the victory sacrifice, with an avowed determination to extinguish the religion of the White Christ, which gained for him the title of "Thor's Priest," and, under the name Turgeia, with a new and powerful fleet, he devastated Ireland and established himself at Armagh, and put his wife Ota in possession of Clonmacnoise, who, seated on the high altar of the Christians, issued her commands. A full account was then given of the numerous family of Ragnar, and special reference to his son Sigurd Snake Eye and their descendants, holding

control of the destinies of Ireland. This worked down to 941. The Northmen had now become Christians, or at least all were prime-signed, and it is recorded of Olaf Cuaran that after a defeat at Dublin he went to Iona, where he died about 220. In the meantime the Irish chieftains had been asserting themselves again. In 941 Brian Boru was born. He was a younger brother of Mahoon, chief of the Dalcassians, of North Munster, a tribe of the O'Neill race, who occupied a prominent place in history. Brian and Mahoon warred against the Northmen. Mahoon made terms with the Northmen of Limerick, but Brian, refusing to submit, took to the hills, woods, and fastnesses, and led a career similar to that of Alfred the Great. At one time his following was reduced to fifteen men, but in time his fame became voiced abroad, and his band swelled. In 968 he overcame the Northmen of Limerick and Munster, who were aided by the Irish against their own countrymen at the Battle of Sulcheit, in Tipperary, and all Munster submitted to him. He then built a fleet, and overcame Maalmurragh, King of Leinster, and the Danes of Dublin, at the Battle of Glanama, in 996. Four years later he took the ardship from Malachy, the King of Meath, and invaded Ulster. At the time of Brian's invasion Hugh O'Neill and the Kinel Owen were waging war against the Ultonians, and Brian broke in upon them at Crow Hill, near Glenary, and took hostages from both parties. He afterwards made the famous circuit of Ireland to collect hostages and establish himself, and then, to divert attention from internal affairs, he organised a maritime expedition, and plundered Scotland and England. Maalmurragh, King of Leinster, had a sister, Gormflaith, who successively married Olaf Cuaran, King of Dublin; Malachy II., King of Tara; and finally Brian. Brian after a time repudiated Gormflaith, and her brother Maalmurragh, having received insult when bringing tribute to Brian, went into rebellion, but was overthrown by Malachy II. when invading Meath. He then sought the aid of the Danes of Dublin under Sitric, son of Gormflaith and Olaf Cuaran. Sitric, instigated by

his mother, decided to espouse his cause, and sought help from Norway and all Scandinavian countries. He went to Earl Sigurd, of Orkney, to the southern isles and Man, where Brodir and Ospak were lying, as is related in the *Kjala Saga*, promising Sigurd and Brodir the hand of his mother, and the succession after himself. They gave their assistance, but Ospak refused, and went to Brian and told him of the conspiracy. On Good Friday, 1014, the hosts assembled, and the battle of Clontarf was fought, which destroyed the Scandinavian power in Ireland, and Brian was slain at the end of the fight by Brodir. After this battle the Scandinavians embraced Christianity, so the battle of Clontarf was the death struggle of the faith of Odin. Away in the Faroe Islands and in Caithness men saw the war-weaving sisters, Odin's choosers of the slain. Daurrud saw folk ride to a bower, twelve together, and enter, and when he got there and looked in, behold there were women, and a loom was set up. Beneath swift fingers the woof ever waxed, and it was wet with blood, and woven of the entrails of men. The warp was blood-red, weighted with the heads of slain men; as blue as a corpse was the weft, blood-stained spears formed the spindles, arrows the reels, and a sword the shuttle. Into this were the fates of men woven as the war woof was worked, and the sound of the iron-bound loom was as the rushing together of a mighty host. As they wove they sang, and they told of the sorrow of the Irish and how new nations would govern them, and they spoke in anguish of the fall of the gods, and their departure from the homes and doings of man. When they had told their tale, they plucked down the woof and tore it asunder, and each kept what she had hold of, and they came out and got on their horses, six riding to north and six to the south, on the great last ride of the Valkyries, for so men say.

A discussion followed on both lectures, in which the Chairman, Mr. D. E. Lowry, Mr. R. May, Mr. W. J. Fennell, F.R.I.B.A., and Mr. C. Cunningham took part, and the proceedings closed with a vote of thanks to both lecturers.

Geological Section.

"THE DERBYSHIRE TOADSTONES."

A meeting of above Section was held in the Museum, College Square North, on Wednesday evening, 15th January, to hear a paper read on above subject by Miss M. K. Andrews, of which the following is an abstract. In giving a short account of the Derbyshire Toadstones, Miss Andrews drew attention to the minute and accurate description of these rocks given by John Whitehurst in 1778. While the controversy between the Vulcanists and Neptunists was beginning on the Continent, Whitehurst published his "Inquiry into the original state and formation of the Earth, deduced from facts and the Laws of Nature," in which for the first time the volcanic origin of the toadstone is recognised.

He describes it as a blackish substance, very hard, containing bladder holes like the scoria of metals or Iceland lava, and asserts that there is "no room to doubt of its being as much a lava as that which flows from Hecla, Vesuvius, or Ætna."

He evidently regarded it as intrusive, for he points out that it is lava that "flowed from a volcano whose funnel or shaft did not approach the open air, but disgorged its fiery contents between the strata in all directions."

Whitehurst showed specimens to Faujas de St. Fond, the author of a description of the Volcanoes of Vivarais and Velay, but although Faujas noted the resemblance of the toadstones to true lavas, he yet refused to allow that they had any connection with volcanic action.

Whitehurst also sent specimens to Dr. Withering, who made an analysis of the toadstone, which was read before the Royal Society on May 10th, 1782.

In recent years Mr. Arnold-Bemrose has made a most exhaustive study of the extinct volcanoes of Derbyshire, and has published the results of his investigations in two valuable papers read before the Geological Society of London. In his earlier paper of 1894 "On the Microscopical Structure of the Carboniferous Dolerites and Tuffs of Derbyshire," he stated that the Toadstones were then generally admitted to be contemporaneous with the Carboniferous Limestone; shortly afterwards, however, on taking Sir Archibald Geikie over some typical parts of the district, the latter pointed out that while some of the toadstones were contemporaneous with the limestone, others were intrusive, and some represented the vents through which the volcanic material was brought to the surface.

During the past twelve years Mr. Bemrose has mapped the toadstones on the 6 inch ordnance maps, in some places on the 25 inch, and has examined many hundreds of new thin slices of rocks; the results of this laborious investigation are given in his paper on "The Toadstones of Derbyshire; their Field-Relations and Petrography," Quart. Journ., Geol. Soc., Vol. LXIII., 1907, pp. 241-281. He now divides the toadstones into two groups, one contemporaneous with the limestones and limestone shales, the other intruded at a later period, showing that Whitehurst's inference regarding intrusion was partly right.

The contemporaneous group consist of volcanic vents with lavas and tuffs, the majority of the vents being composed of volcanic agglomerate. The lavas are vesicular and amygdaloidal in structure, and often much decomposed. They contain Olivine, Augite, Felspars, Magnetite, and Oxide of iron. The intrusive sheets or sills consist mostly of ophitic olivine dolerites.

The local term "Toadstone" is supposed to be derived, either from the fancied resemblance of the amygdaloidal varieties to the back of a toad, or else to be a corruption of the German "Todtstein" (dead stone) in allusion to these rocks being barren of lead ore, as compared with the adjacent limestones.

Mr. Bemrose has divided the district over which the toadstones are seen into three main areas of volcanic activity:—

1. The North-western or Miller's Dale area.
2. The South-eastern or Matlock area.
3. The South-western or Tissington area.

Miss Andrews had not been in the Tissington area, but she proceeded to describe the upper and lower lavas of the Miller's Dale area, the bedded tuff near the village of Litton, and the intrusive sill at Tideswell Dale. She showed three microscopic sections of the latter rock, in which the transition from a fine-grained olivine dolerite to a coarsely crystalline ophitic dolerite is clearly seen.

Miss Andrews then gave a short account of the lavas and sills of the Matlock area, and described the very interesting vents at Grange Mill. These vents form two dome-shaped hills which rise from the valley to a height of 100 and 200 feet respectively. The rock is an agglomerate of a grey colour, with green lapille, and weathers into spheroids from two feet down to an inch in diameter.

Miss Andrews showed microscopic sections of this agglomerate, and of the olivine dolerites of the Bonsall and Ible sills.

The paper was illustrated by hand specimens of several of the rocks of the district.

"A HOLIDAY TRIP TO WEST KERRY."

The third meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 21st January, when two very interesting papers were delivered before a large audience. The first was by Mr. Edward J. M'Kean, B.A., B.L., on "A Holiday Trip to West Kerry," dealing with the folklore of the district, and the second was by Mr. John H. Harbison, of Queen's College, on "Hydra: its Movements and Reactions."

The usual science-gossip half-hour for informal discussion preceded the lectures, and subsequently the President (Mr. Robert

Patterson, F.L.S.) took the chair. At the outset he referred in feeling terms to the late Lord Kelvin, and drew attention to the memorial to be erected to his memory, appealing for subscriptions.

Mr. M'Kean then proceeded with his paper, in the course of which he described how he had reached with some difficulties of travel the extreme point of the Dingle Peninsula, and gave an account of the character and inhabitants of the peninsula. He described the town of Dingle, and said that it was the centre of a remarkable district, which abounded with antiquities of all ages. Dunbeg Fort was one of the most remarkable stone forts in the country, and the lecturer showed slides of this. He mentioned the collection of beehive huts in its neighbourhood, which were known as the ancient city of Fahan. He then described Smerwick Harbour, well known for the massacre of the Spaniards there in 1580 by an expedition of which Edmund Spencer and probably Sir Walter Raleigh were members. Smerwick Harbour had also on its shores Gollerus Oratory and the old Cathedral of Kilmalkeda of both of which he showed slides. Gollerus Oratory was built of cyclopean masonry, while Kilmalkeda Church was of the Romanesque style, but probably occupied as old a site, for it contained the alphabet stone which carried upon it the whole alphabet of the sixth century in Roman characters. The east window was used for creeping through to cure diseases. The district abounded in folklore, and a quaint story connected Tig-Vauria, a spot at the point of the cape, with Donaghadee. The people knew the use of many medicinal herbs, and had Gaelic names for most of them. They also used other plants for purposes not so innocent, especially for poisoning the rivers by allowing the sap of a local plant to flow into the water. There were many beliefs in spectres, which were classified as good or bad according to their shapes. There was also a curious tale of a sleeping hero connected with a spot not far from where the lecturer was. The tradition of heather beer so well told by R. L. Stevenson was also found in Kerry, with other odd superstitions.

"HYDRA :"

ITS MOVEMENTS AND REACTIONS.

Mr. Harbison, who was next called, had provided living specimens and a microscope to illustrate his remarks. He said Hydra was a small animal found in ponds and sluggish rivers attached to the leaves or stems of various aquatic plants. The animal measured when fully extended but half an inch, when it was of the thickness of an ordinary sewing needle. It might contract, however, when touched violently to a small circular knot. By one end it was attached probably by means of a sticky secretion, and the other end carried six or eight simple tentacles. In structure it was the simplest of the multicellular animals or Metazoa, consisting of a two-layered tube. Between the layers endoderm and ectoderm, unlike the sponges, there was no true third layer or mesoderm; there was merely an undifferentiated lamina or middle jelly, the mesogloëa. On the sponges Hydra showed a great advance physiologically, being much more contractile and more irritable, and in being armed with stinging cells. In the natural condition of the animal it would be seen to sway and contract, waving its tentacles about in an indefinite fashion. If placed on a watch glass for some time it would be seen to show many curious and complicated movements, and these movements performed by an animal of such simple construction were investigated several times since first Abbe Trembley drew attention to them in 1744. The usual movements in the fixed state were of the nature of compass movements, first generally towards the light, if lateral illumination be used, then from it, and then in a line nearly at right angles to its first line. Its power of locomotion was considerable, but a change of site was usually made only in adverse circumstances. It moved by its base alone in some cases; in others by a looping movement,

fixing the tentacles and head to an object or to a point of the stratum some distance from its base and dragging the latter up to the tentacles. A very peculiar "escape" movement took place on long-continued stimulation mechanically or electrically. This was a kind of slow tumbling, and of a different nature to the "escape" movement shown by certain infusorians, Paramecium or Stentor, not being the mere result of stimulus, since as many as fifty stimuli cause usually but as many mere contractions. This might point to some kind of a recognition of adverse circumstances, and was certainly remarkable in an animal which showed no aggregation of nerve units whatever. The chemical reactions resembled simple mechanical reactions, and accounted for the grasping of the tentacles on food material. The stinging cells contained a coiled lasso bathed in some poisonous fluid, which was thrown out when the animal is irritated. Chemical irritation was necessary, not, as usually thought, mere mechanical disturbance of however severe a kind. A point which had not hitherto been noticed in the movements of *Hydra* was that it did not contract *en masse*, but in fractions, one-third or one-quarter of its length at a time. As Professor Gregg Wilson pointed out, this might be due to a segmental arrangement of muscle spindles in the body walls. Here they had indications of segmentation in the very first of the Metazoa. The animals showed "light" reactions, due no doubt to the green chlorophyll corpuscles in the endoderm, this being one of the few cases where plant pigment occurred in the animal world. (Applause.) The lecturer then invited his audience to examine specimens of *Hydra* under the microscope, which was largely availed of, the curious and beautiful animals creating much interest.

A very interesting discussion followed, in which the following took part:—Miss E. Andrews, Professor Gregg Wilson; Messrs. William Gray, M.R.I.A.; Robert Welch, M.R.I.A.; and Robert May, after which the proceedings concluded.

Botanical Section.**"LOWER FORMS OF PLANT LIFE."**

A meeting of the Botanical Section of the Club took place in the Museum on Wednesday evening, 29th January, at eight o'clock, when Mr. H. C. Marshall, in the absence of the regular chairman, presided. The business of the evening was to hear an address from Mr. Alexander Milligan, on "Lower Forms of Plant Life, and the Phenomena of Reproduction." There was a large attendance.

Mr. Milligan dealt in the earlier part of his address with the historical side of the question. He pointed out that, owing to the usually bright colours of the flowers in Phanerogamic plants, and to the ease with which their sexual characters and methods of reproduction could be observed and studied, the flowering plants consequently became, and remained for nearly two centuries, the principal study of botanists. With the flowerless or Cryptogamic plants, on the other hand, botanists were long content to remain in comparative ignorance regarding their modes of propagation and reproduction. The obscure or hidden nature of the processes led to their being lumped together as Cryptogamic. The study of Cryptogams, had, however, in recent years made wonderful progress, though naturally the investigations were to a large extent confined to the laboratory, and to microscopic methods of examination. The lecturer went on to give, by means of diagrammatic illustrations sketched on a blackboard, a lucid description of the structure, mode of growth, and phenomena of reproduction in well-selected typical species of lower plant-life forms.

At the conclusion of the address the Chairman intimated that the meeting was favoured with the presence of a distinguished West of England botanist, Mr. James W. White, F.L.S., who was introduced as a visitor by Mr. W. J. Fennell, M.R.I.A. In the name of the Section the Chairman gave a hearty welcome to Mr. White. The latter, who is author of the standard "Flora of Bristol," and very prominently identified with the Bristol

Naturalists' Society, appropriately thanked the Chairman and those present for the cordial reception extended to him. It was only what was to be expected, for his experience was that no class of people were so friendly as field naturalists, and more especially the botanists. (Applause.)

Before bringing the meeting to an end the Chairman in feeling terms referred to the lamented demise of Mr. Richard Hanna, who for a great many years had been a loyal and active member of the Club. As a field botanist the late Mr. Hanna had few superiors, at least as regards local flora, and in the past he had made many most interesting and original botanical discoveries.

It was unanimously resolved that the General Committee of the Club be asked to prepare a suitable minute regarding the work of the deceased and have same embodied in the Club's Proceedings.

Archæological Section.

"FOLK LORE CONNECTED WITH THE ULMSTER RATHS."

A meeting of above Section was held in the Club's room, Museum, on Wednesday evening, 12th February, for the purpose of hearing a paper read by a talented lady member, Miss E. Andrews. Mr. Robert Patterson, F.L.S., occupied the chair, and there was a large attendance of members.

Miss Andrews referred to Rath and Souterrains being spoken of by the country people as forths and coves, and said it was in these coves the fairies dwelt, and kept their prisoners—women, children, and even men. The entrance to many of these Souterrains is in a fort, as examples in Ulster, the stone fort near Altnadua Lough, and Crook-a-broom, near Ballycastle, may be mentioned; also, although not in Ulster, the Mote at Greenmount, described by the Rev. J. B. Leslie, in his history of Kilsaran, County Louth. Above many Souterrains, such as one near Scollogstown, Co.

Down, and Cloughnabrick, near Ballycastle, there is no Rath. Danes and Pechts are also connected with Raths and Souterrains. Ballycairn fort, near Coleraine, is one of the so-called "Danes' Forts," and it is said the builders, having no wheelbarrows, carried the earth in their leather aprons. The Danes are sometimes spoken of as short, sometimes as tall, people; the latter are probably the mediæval sea rovers, and the short danes the Tuatha de Danaan. The Danes made heather beer, and the tragical ending of the father and son, the last of their race, who perished rather than reveal the secret is a tale known throughout Ireland. The same story is told in Scotland of the Picts. Both Danes and Pechts are said to have had large feet, and according to one account the Dane had such long arms he could pick anything off the ground without stooping. Long arms are a characteristic of the Lapp and of the traditional dwarf of Japan, probably an ancestor of the Aino, and Sir Harry Johnston states that a pygmy's feet are larger, and his arms proportionately longer than in well-developed Negroes, Europeans, and Asiatics. The fairy assumes a weird form in the Banshie, whose wailing is heard before the death of members of certain families, but not necessarily aristocratic families. In many respects, however, fairies are akin to mortals; they are quick to revenge an injury, and it is considered very unlucky to cultivate a rath. The Irish fairy remains a pagan, differing in this respect from the Swiss dwarf. After referring to the Sidh where, according to the "Colloquy of the Ancients" the Tuatha de Danaan dwelt, the conclusion was drawn that in the traditions of Fairies, Danes, and Pechts the memory is preserved of an early race or races of short stature, but of considerable strength, who built underground dwellings, and had some skill in music and other arts. It is possible that as larger races advanced these small people were driven southwards to the mountains of Switzerland, westwards towards the Atlantic, and northwards to Lapland, where their descendants may still be found. No doubt there is a large

supernatural element, especially in the stories of the fairies, but the same may be said of the tales of witches in the seventeenth century. The witch was believed, and sometimes believed herself, to possess superhuman powers, and to be in communication with unearthly beings. With the widespread belief in local spirits a taller race of invaders might well fear the magic of any earlier people being settled in this country, even if the latter were inferior in bodily and mental characteristics. (Applause.)

Miss Butler, a visitor from Kerry, kindly showed a number of very clever water-colour drawings of stone circles, standing stones, souterrains, &c., from different parts of Ireland, but principally from Kerry, and also two drawings of stone circles from India, very similar in character to those found at home. The drawings were examined with much interest, and a discussion followed.

The Chairman, Mrs. Hobson, Miss Butler, and Messrs. W. J. Fennell, M.R.I.A.; Robert May; E. J. M'Kean, B.L.; and John M. Dickson criticised the paper very keenly, at the same time expressing their pleasure at the able manner in which Miss Andrews had treated the subject. Miss Andrews having suitably replied, the meeting was brought to a close.

"VOLCANOES AND VOLCANIC ACTION."

The fourth meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 18th February, for the purpose of hearing a lecture on the above subject by Mr. Thomas Dewhurst, A.R.C.Sc. (Lond.), of Queen's College.

Mr. Robert Patterson, F.L.S., who occupied the chair, said since last they met in that room they had sustained a severe loss by the death of Mr. Richard Hanna, who had joined the Club in 1885, and who had been a constant attender at their meetings

prior to the sad event of his death. He had been well known and esteemed by the members who worked in the botanical section. Before calling upon Mr. Dewhurst to deliver his lecture, he would like to congratulate Mr. Nevin H. Foster, M.B.O.U., on making a remarkable discovery. He had found in his garden at Hillsborough a very rare Woodlouse—*Trichoniscus pygmæus*. It was new to Ireland, and up till quite recently it had only been found in Norway. Within the last month or two it had been discovered near Glasgow and Newcastle-on-Tyne. He thought they might all congratulate Mr. Foster on his success. The Chairman called on Mr. Dewhurst to deliver his lecture on "Volcanoes and Volcanic Action."

This was the first time Mr. Dewhurst had appeared before a Belfast audience, and the lecturer had a cordial reception. In introducing his subject he gave a definition of a Volcano, and proceeded to show the relations existing between Volcanoes and Geysers. He then said that Volcanoes which are unceasingly active, such as Stromboli, and Cotopaxi, are exceptional and experience comparatively mild eruptions. Stromboli, the "Lighthouse of the Mediterranean," has been in a state of constant activity since the earliest period of history, ejecting steam, fragmental materials, and lava. First-class eruptions are shown by Volcanoes of the Vesuvian type, which are intermittently active. The lava meets with resistance in the vent, and the steam pressure increases until the lava is forced out with great explosive violence, shattering and fissuring the cone, while various fragmental materials are shot high into the air, and rivers of white-hot molten rock flow down the sides of the volcano. Steam is discharged in enormous quantities, and often issues copiously from the flowing lava. Acid fumes may be emitted, as at Vesuvius, and, descending with the rain, produce great devastation. The lecturer then drew attention to the stupendous explosive eruption of Krakatoa, and to the brilliant sunsets of the following Winter and Spring, which were produced by the finest particles of

dust remaining suspended in the atmosphere. The size, liquidity, rate of flow, and temperature of lava streams were then considered, the temperature being determined by fusing wires of copper, iron, and silver in the lava. Some rocks which have been produced by the cooling of basic lavas show good columnar structure, as in the well-known basalt of the Giant's Causeway. The cracks have been produced by the shrinking of the lava on cooling, and the characteristic hexagonal shape of the columns may be the result of evenly-distributed tension throughout the cooling mass. Of the various fragmentary materials ejected from volcanoes mention might be made of pumice, which is full of steam cavities, volcanic bombs, which are rounded owing to having been ejected with a rotary motion, and the exceedingly fine filaments, which are known as "Peles Hair." Volcanic dust may reach the ground at red-hot heat and ignite combustible objects. This occurred during the eruption of Martinique in 1902. The portion of the lecture dealing with intrusive masses of lava was illustrated by slides showing these features at Cave Hill, Scrabo Hill, and other localities near Belfast. After alluding to submarine volcanic action, which occurs on a vast scale, as shown by numerous islands which have been produced, the lecturer concluded with an account of the distribution of volcanoes, which occur on submarine ridges and along the margins of ocean basins.

The lecture was illustrated throughout by a series of beautiful slides, the lantern being in the hands of Mr. A. R. Hogg, as usual.

The lecture, which was listened to with much pleasure, was followed with a discussion, in which the following members took part :—The Chairman, Messrs. Robert Welch, M.R.I.A. ; Thomas Anderson ; and William Gray, M.R.I.A. Mr. Dewhurst having suitably replied to the various criticisms, the proceedings terminated.

Zoological Section.

"THE MARKINGS OF NESTLING BIRDS."

The members of this Section met in the Museum, College Square North, on the 26th February, the Vice-President (Mr. Nevin H. Foster, M.B.O.U.) in the chair. Mr. Foster first showed under the microscope specimens of the new Irish Woodlouse *Trichoniscus pygmæus*, which he had lately discovered at Hillsborough. This is an addition to the Irish fauna of much interest, since, up till quite recently, this species was only known from Christiania in Norway, but lately specimens have been got from places in England and one place in Scotland. The members warmly congratulated Mr. Foster upon his important discovery. Mr. Robert Patterson, F.L.S., then read a short paper on "The Markings of Nestling Birds." He said many members of the Club had spent a vast amount of energy in amassing collections of empty egg shells, while they had been overlooking a field of investigation which promised to yield interesting results, viz., the condition of the nestling young and their markings. The problems to be solved were many, and their solution would probably be most important to the student of evolution and classification. There were two extreme types of nestlings to be met with among British birds—the active down-clad type, and the type which left the egg perfectly naked and blind, and which, therefore, was for some time quite helpless. Mr. Patterson asked the members of the Club to assist in the investigations that were going to be carried out this summer, by never missing a chance of examining newly-hatched birds. Very careful notes should be taken of the kind of bird, the nature of the nestling site, and the relative amount of light which reached the interior of the nest. Whenever possible photographs should be taken, but they must

be very sharply focussed to be of any real service. The paper was illustrated by specimens of young coots just from the nest, and by a drawing of the tongue marks on nestling birds cleverly executed by the lecturer's daughter. The following members spoke to the paper at the close:— Messrs. N. H. Foster, M.B.O.U.; R. Welch, M.R.I.A.; W. J. Fennell, M.R.I.A.; John Carson, and William Gray, M.R.I.A. The lecturer having replied, the proceedings terminated.

Archæological Section.

“NOTES ON PALÆOLITHIC DEPOSITS.”

At a meeting of this Section held on Wednesday evening, 4th March, Mrs. Hobson presiding, the following papers were read:— “Notes on Palæolithic Deposits,” by Robert Bell; “Conjectures Regarding Recent Sand Dune Finds at Dundrum,” by Robert May; and “Colours and Superficial Appearances of Flint Implements,” by James Strachan.

Mr. Bell, in his paper, said the deposits which succeed those of the great ice-age are characterised by their fossils, partly of animals no longer existing here or elsewhere or of others still represented amongst us. Their remains are found in old river gravel, associated with peculiar fossils, showing distinctly the handiwork of man, commonly called stone implements. These constitute the only remains that man's earliest skill and intellect have prepared and left us; all are primarily marked as having been shaped by what is called “chipping,” and exhibit varying designs and forms. They are in truth the fossil records of the thought and development of successive races of men. They are found often in considerable abundance amongst the drift deposits of the Thames and the valley of the Axe. They have been classified as Palæoliths of the old stone period.

"CONJECTURES REGARDING RECENT SAND DUNE FINDS
AT DUNDRUM."

Mr. May, in the course of his remarks, said in the spring of last year, when searching through one of the sand dunes, he observed about fifteen flint pebbles in a group. He thought at first that some person recently might have gathered and left them there, but as in the immediate surroundings the usual objects of interest in Neolithic times were in evidence he thought it worth while to follow it up. He examined other portions of the site, and followed up the search in a number of the other sand dunes, accompanied by a fellow-member, Mr. R. Bell, and found quite a number of similar pebbles, though more scattered. About the same number generally could be counted within a radius of three feet, and invariably surrounded with pot-boilers, broken pottery, and flint spalls. He came to the conclusion that these pebbles were used in some game during Neolithic times. It is easy to conceive that the men who displayed artistic insight in forming true artistic lines on their arrow-heads and scrapers could invent a game that they could play while resting after more arduous sport. He thought it important to bring this conjecture before the Section to induce other members to make careful observations during the coming summer on the Prehistoric sites in Counties Antrim and Down, so that his conjecture might be either verified or rejected. His other conjecture regarding the same site on which he found these pebbles was in reference to a large number of flint chips or implements simply hammered off the ends of sea-rounded flint nodules, which are so plentiful in all the sand dunes. They are knocked off with one blow, showing the conchoidal fracture and bulb of percussion, the rotundity of the nodule giving the same outline as the more delicately-worked scraper without any secondary work. This ingenious time-saving device has evidently been largely availed of for scrapers not requiring a stronger edge.

“COLOURS AND SUPERFICIAL APPEARANCES OF FLINT
IMPLEMENT.”

Mr. Strachan, in his remarks, observed that fresh flint, the material from which flint implements were made, is a dark-coloured compact variety of silica. It is amorphous in appearance, and is nearly related mineralogically to quartz. It is somewhat lighter, however, than the latter, and this fact is usually accounted for by the supposed presence in flint of a small proportion (15 to 20 per cent.) of light opaline silica. The latter is a more soluble form of silica than quartz, and certain it is that a variable proportion of the silica in flint, approximating to the above amount, is more soluble than the bulk. Flint implements sometimes preserve their fresh appearance, but more often are weathered, altered, and stained. The weathering and staining sometimes permeate and penetrate right through the material of the implement, but generally such changes are purely superficial. The colours and superficial appearances of flint implements are caused by alterations in the material of the flint, due to external influences and by the infiltration of foreign substances in solution. The general appearance of an implement cannot be depended upon as an index to its age, except in very occasional instances, and even then many points have to be weighed or considered before any reliable conclusion can be arrived at by the collector.

A spirited discussion followed the reading of these papers, in which Mrs. Hobson, Mr. W. Gray, M.R.I.A., Mr. W. A. Green, Miss Andrews, Mr. A. Milligan, Mr. Carson, and Mr. H. L. Orr took part, and expressed opinions that the Club was to be congratulated on the matters brought forward.

"REPORT AS DELEGATE TO BRITISH ASSOCIATION."

ALSO

A LECTURE ON "LEICESTER: ITS SCENERY
AND ANTIQUITIES."

The fifth meeting of the Winter Session was held in the Museum, College Square North, on Tuesday evening, 17th March, for the purpose of hearing a lecture on "Leicester and its Interesting Roman Antiquities" by Mrs. Hobson, a talented lady member of the Club. Mrs. Hobson also submitted her Report as Delegate of the Belfast Naturalists' Field Club to the Conference of the British Association. The chair was occupied by the President (Mr. Robert Patterson, F.L.S.) and there was a large attendance of members and friends.

During the science-gossip half-hour preceding the lecture, Mr. Robert Welch, M.R.I.A., exhibited a new Irish land-shell, *Vertigo mouliniana*, discovered in County Carlow, by Mr. R. A. Phillips, a member of the Cork Field Club, of which a full description with drawings appeared in the *Irish Naturalist* for May.

Mr. Patterson having introduced the lecturer to the meeting, Mrs. Hobson commenced by describing the town of Leicester, which, she said, was a busy manufacturing town, with fine streets and numerous open spaces. The town is of great historical interest, and contains the remains of Roman walls and beautiful Roman pavements. Leicester, being a favourite resort, was associated with some of the greatest names in history—Simon de Montford, John of Gaunt, Cardinal Wolsey, Prince Rupert, Lady Jane Grey, Mary Queen of Scots, and many other historical personages. Of much antiquarian interest are the beautiful old churches, containing as they do fine examples of Saxon, Norman, and Gothic work. The town could boast splendid examples of modern architecture. The lecturer then described some of the

principal objects of antiquarian interest in the town and district, and the excursions made to Chatsworth, Belvoir, Hadden Hall, Warwick, Kenilworth, Charnwood Forest, Peterborough; visits to the beautiful Cathedral and the grave of Catherine of Arrogan, the crypt, and the Saxon altar, where Hereward the Wake is said to have taken his vow of knighthood, and afterwards to the garden party at the Palace, where Lady Mary Carr-Glyn and the Bishop of Peterborough had invited a large number of guests to meet the members. (Applause.)

To illustrate her paper Mrs. Hobson showed a number of interesting lantern slides of the scenery, antiquities, buildings, &c., in and about Leicester, kindly sent over by Mr. Lowe, the audience showing their appreciation by frequent applause during the evening.

Mr. Thomas Anderson supplemented Mrs. Hobson's remarks by giving a description of the Geology of the district in and around Charnwood Forest, which occupies an area of about ten miles, and almost every variety of igneous rock occurs. The great mass is composed of volcanic tuffs and agglomerates and intrusive igneous rock and great granite masses. Mr. Anderson showed a large number of specimens of rocks to illustrate his remarks.

In submitting her Report as Delegate Mrs. Hobson stated that the seventy-seventh Conference of the British Association was held in Leicester, and commenced on 31st July, 1907, under the Presidency of Sir David Gill. The arrangements in connection with the meetings and the attention given to the delegates and others attending the Conference were all that could be desired. Private hospitality was most profuse, while the Mayor and Corporation entertained the visitors on a most lavish scale. The Mayor gave a fete in the Abbey Park (where Cardinal Wolsey is said to have died) to 3,000 guests. The paths and lakes were outlined with fairy lights, making the park a veritable fairyland. A garden party was also given by Sir Samuel and Lady Faire at

their beautiful seat, Glenfield Frith. The Leicester Literary and Philosophical Society entertained in the Museum and Loggia, the latter being designed by Mr. Colson and specially erected for the visit of the British Association. Mrs. Hobson described in detail the various meetings and arrangements. Mr. H. J. Mackinder, who gave an address on "The Desirability of Local Geographical Research in this Country," suggested that the work might be carried out with the co-operation of the various scientific societies, and pointed out the need for members of each society to correlate the work of specialists in botany, geology, archaeology, &c., and map out the whole on a geographical basis. Keen discussion followed a paper read by the Rev. Ashington Bullen, who advocated the desirability of appointing a committee for a photographic survey of ancient remains in the British Islands. Suggestions were made by the different sections for the furtherance of meteorological work, investigations on drift, collection of local terms applicable to Geology and Geography; to organise a scheme for Photographing ascertained types of local population; to draw up county lists of objects and places, and also lists of literature upon counties or areas. Mrs. Hobson strongly advocated that this work be taken up by the Belfast Naturalists' Field Club, stating that the Club possessed ample and rich material in memoirs, &c. Professor Conwentz, the Prussian State Commissioner for the Preservation of Natural Monuments addressed the Conference on the necessity of preservation of scientifically interesting and unique objects and scenery, and which are fast disappearing before the march of industrial enterprise. Mrs. Hobson mentioned that the British Association publish a catalogue every year of the most important papers dealing with original research issued by the various corresponding societies. Of these nine came from the Belfast Naturalists' Field Club in 1906—two by Mr. Robert Bell, one each by Messrs. F. C. Forth, W. H. Gallway, G. Donaldson, A. Milligan, E. J. M'Kean, B.L., J. Strachan, Professor Gregg Wilson, and J. Wright, F.G.S. In

the list of 1907 were catalogued eleven more papers by members of the Club—Madame R. Christin and Messrs. Robert Patterson, F.L.S., N. H. Foster, M.B.O.U., W. Rankin, A. W. Stelfox, W. J. C. Tomlinson, R. L. Praeger, M.R.I.A., W. H. Phillips, Robert Welch, M.R.I.A., Joseph Wright, F.G.S., and J. Strachan; a record of which any society might well feel proud.

A discussion followed, the different suggestions in the report being commented upon by Messrs. Robert Patterson, F.L.S.; Robert Welch, M.R.I.A.; William Gray, M.R.I.A.; and C. Cunningham. Mrs. Hobson received the warm congratulations of the meeting upon her masterly report, and also for her interesting lecture on Leicester, after which the proceedings terminated.

Archæological Section.

“NOTES ON EARLY CHRISTIAN ORNAMENTS IN ITALIAN CHURCHES.”

A meeting of the above Section was held on the evening of the 18th March, the President (Mr. R. Patterson, F.L.S., M.R.I.A.) in the chair. A paper on “Notes on Early Christian Ornament in Italian Churches” was read by Miss Lamb. After a short introduction on the symbols used by the early Christian Church, Miss Lamb went on to say that Mosaics and interlaced patterns were the two styles of ornament of which she wished to speak. Mosaics were of great antiquity. The Romans brought the art to perfection, not only in pavements, but also in covering walls and vaulting. It was therefore natural the Christians should use Mosaics for the decoration of their churches, and at Ravenna they found the best and earliest examples of this kind of decoration. The Baptistry, founded in 430 A.D., in the reign of the Emperor Valentinian III., has suffered little from the shocks of time. The

interior was completely encrusted with Mosaics, and it was quite impossible to give any idea of the lovely shades of colouring in these fadeless pictures. The Baptism of Christ was represented in the centre of the dome, the river god of the Jordan appeared rising out of the water, a strange mingling of Christian and Pagan subjects. Lower down the twelve Apostles were ranged round the walls, and beneath were graceful festoons of foliage and the true vine. The marble parapet of the font was ancient, and here for fifteen centuries every child born in Ravenna had been baptised. Some of the other Ravenna churches had beautiful examples of Mosaic and marble pillars with finely-carved Byzantine capitals. Ireland and Ravenna had one architectural feature in common in their round towers. It was a vexed question which were the older. The Ravenna Campaniles were of brickwork, they do not taper, and were heavy and clumsy, and much less lofty than Irish towers. The older churches in Rome all had Mosaics, which had suffered more or less from restoration, but still retained much of the original design ; the figures were doubtless stiff and conventional, but interesting to study, and full of symbolism. Traces of interlaced patterns similar to those on Irish crosses were to be found in most old Italian churches. This decoration seemed to have been much used from the sixth to the tenth century. In Rome these interesting fragments were hidden in neglected corners or lay in cloisters or were built into walls ; few were *in situ*. One of the oldest, dated 514-523, was a white marble panel in the choir screen of St. Clement's, Rome. And a doorway in the Church of St. Prasseda had beautiful white marble jambs covered with interlaced pattern. At the Church of St. Sabina very fine slabs with interlaced knot-work were lately found under the pavement. In remote parts of the country, off the beaten track, fine old churches exist which had escaped restoration, and still retained a good deal of their original interlaced decoration. In the 13th century a new style of Mosaic was developed, called *cosmati* work, much used on tombs and pulpits and twisted round

pillars. It seemed to have entirely displaced the use of interlaced patterns.

At the close the paper was favourably commented on by the President, Mr. E. J. M'Kean, B.L., Mr. Robert May, Mrs. Hobson, and Mr. T. Dewhurst, and a vote of thanks to Miss Lamb brought the proceedings to a close, thus completing the work of the Section for this Session.

Geological Section.

"BEEKITE."

The above Section of the Club held their last meeting for the present Winter Session in the Museum on Wednesday evening, 25th March—the Chairman of the Section, Mr. W. J. C. Tomlinson, presiding. Two very interesting communications were brought before the meeting dealing with certain minerals found plentifully in the immediate district. The first paper was by Mr. Robert Bell, on the newly-recognised mineral "Beekite;" the second, by Mr. James Strachan, on "The Origin and Formation of Zeolites in Basalt." It is gratifying to know that our local geologists in connection with the Field Club are becoming alive to the importance of the studies with which these papers dealt. It is an open secret that geologists and mineralogists from England and the Continent have of late been paying frequent visits to our districts, and accumulating a mass of material and information regarding these and kindred matters such as they do not find so readily available elsewhere.

Mr. Bell stated that a short time ago his attention was drawn by Mr. W. H. Wickes, of Bristol, to the occurrence of the mineral named Beekite on certain fossils which the latter had collected in the South of England. The lecturer, on re-examining his own collection of local fossils, was agreeably surprised to find on

several of his specimens a characteristic development of the mineral. It generally occurs on fossil Sponges, Corals, and Shells, mainly from the Cretaceous rocks. Seemingly it is most prevalent on specimens that have at one time been subjected to weathering influences, at least the rocks and fossils on which it occurs have a weathered appearance, but this may be due in part at least to the nature of the mineral itself and the conditions of its formation. In chemical constitution it is a form of Chalcedony, and is built up into whorls composed of annular rings. The attention of geologists was first drawn to this mineral early in the last century by the Rev. Dr. Beeke, Dean of Bristol. His friends therefore named the new substance in his honour. Dean Beeke died at Torquay in 1837, and it is to the well-known Torquay geologist, the late William Pengelly, that we are indebted for our knowledge of the occurrence and distribution of Beekite in the Torquay district. Pengelly, as far back as 1856, read a paper on "Beekites" before the meeting of the British Association at Cheltenham. Of its purely mineral character there is now no doubt. It is merely a curious deposit of Chalcedonic silica. Its occurrence was most notable in the limestone fragments in the lower New Red Sandstone of Devonshire. Our local Cretaceous deposits have now, however, been proved to yield it. Collin Glen, south-west of Belfast; Whitrock; on the slopes of Black Mountain; and Hillsport, Islandmagee, have all yielded excellent specimens of the mineral from both the Greensand and Chalk rocks. Mr. Bell concluded by exhibiting several specimens of the mineral collected locally, and also some obtained from the South of England.

Mr. James Strachan next read his paper on

"THE ORIGIN AND FORMATION OF ZEOLITES IN BASALT."

The introductory portion of this paper dealt with the description and mode of occurrence of Zeolites in basic eruptive rocks, such as Dolerite and Basalt. Six of the more common Co. Antrim Zeolites, viz:—Apophyllite, Natrolite, Analcime, Chabazite,

Stilbite, and Thomsonite were described in detail, numerous specimens being exhibited in illustration, and their mode of occurrence in the Tertiary Basalts, at various localities, was also described.

The main portion of this paper was devoted to the geogony of Zeolites in Basalt, as revealed by a study of many specimens from various localities in Co. Antrim, and the following facts were pointed out as generally typical of the district :—

1. The Zeolites occur in spaces in the Basalt varying from 1 mm. in size to as much as 10 cm. The cavities, usually called vesicles, show an evolution in their shape, from mere interstices in the ground of the rock to true cavities. Various types in this development are as follows :—interstitial spaces, small drusy spaces, drusy spaces connected by narrow interstitial spaces, true cavities divided into cells by filaments and shreds of the Basalt, irregularly-shaped cavities, and finally, more or less spherically-shaped cavities.
2. The Zeolites have been, in most cases, deposited in a definite sequence, and when a number of Zeolites are found crystallized together, such a sequence is quite evident. The most common sequence in Co. Antrim is as follows :—Natrolite (which is almost invariably the first Zeolite to be deposited), Chabazite, Analcime, Stilbite, or sometimes Apophyllite. Another sequence commences with Thomsonite, followed by Chabazite and Analcime. When Calcite occurs in a cavity with Zeolites it is generally deposited before any of the Zeolites.
3. The cavities containing Zeolites are generally lined or coated with a layer of a “green earth,” such as Saponite, which varies in thickness from a mere film to as much as 1 cm. This material resembles closely in composition and structure, and appears to be identical with, the interstitial glassy material of the Basaltic ground-mass. Thus the complete sequence sometimes observed in Zeolithic deposits is (1) Green glassy material (2) Calcite (3) Zeolites in sequence.

4. Occasionally, when the glassy material in the Basalt is very sparse, or when the layer of this material is brecciated, the first Zeolite deposited—usually Natrolite—contains inclusions of Augite, Plagioclase Felspar, and Magnetite, similar to the primary minerals of the Basalt, but usually much larger.
5. In such cases, where the Zeolite contains inclusions of primary minerals, a remarkable feature developed in that portion of the Basalt immediately surrounding the Zeolite is its completely holo-crystalline structure, which is frequently even granitic (*Fr. grenue*). The included crystals are often as much as ten times larger than the crystals of the same mineral in other portions of the rock itself.
6. When the green glassy layer is brecciated—most probably *pseudo-brecciated* by the vagaries of crystalline force—the detached portions may be observed in contact with, and often completely coating, the included crystals of Augite, Felspar, and Magnetite. When the glassy material is sparse it may be observed sticking on to the included crystals—chiefly the Felspars—in the form of minute spheres and hemi-spheres.
7. A common and peculiar structure in many of the Co. Antrim Basalts is the aggregation of Magnetites close to the green glassy layer lining the Zeolite cavities. Sometimes a string of small crystals of Magnetite may be observed quite close to the edge of the cavity and investing the latter, not exactly in a layer, but approaching such a structure.

The occurrence of Natrolite, containing inclusions of primary minerals, in Co. Antrim, yields rather important evidence tending towards the elucidation of certain problems in the geogenesis of so-called "secondary" minerals in lavas. The Zeolite, Analcime, has been proved to exist in such rocks as the *Monchiquites* and

Analcime-Basalts,¹ as a primary rock-forming substance, but the general tendency at the present day is to regard Analcime and other Zeolites as secondary decomposition products, except in such particular cases where definite evidence to the contrary is forthcoming. While investigating the minerals associated with the Carnmoney Chalcedony in 1906 I found several specimens of Zeolites showing peculiar inclusions of the mother-basalt, consisting of grains of Magnetite in one case and long thin filamentous shreds of Basalt in another. These specimens in themselves were convincing evidence in favour of a theory, accounting for the origin of Zeolites and other "secondary" minerals in lavas as primary formations of almost contemporaneous age with the primary rock-forming minerals. This view I have held since 1900, and formulated it, provisionally, into a definite working theory in 1906, which was developed still further last year.² Since then abundant evidence has turned up as the result of a careful and extensive examination of the junction between Zeolite and Basalt at many localities in Co. Antrim. The following localities, with one exception, were discovered by the writer of this paper, and in each case Natrolite is the Zeolite found to contain inclusions of primary minerals :—

1. BALLYHENRY, near Carnmoney (May, 1906). The Natrolite at this place contains inclusions of Felspar, Augite, and Magnetite.
2. WHITEHEAD, Island Magee (April, 1907; found by Mr. Andrew Duncan, B.Sc.). This rock shews drusy cavities containing Natrolite, with inclusions of Felspar and Augite; glass very sparse.

1. For references to literature on the subject of Analcime-bearing lavas *vide* Harker's "*Petrology*," pp. 139-140, 149-150, text and footnotes. 1902.

2. *Vide* the author's Papers on "The Origin of the Carnmoney Chalcedony," and "The Geogony of Some Secondary Minerals;" *Proc. B. N. F. C.* vol. V., series II., p. 420 *et seq.*, and pp. 501-2. 1906-07.

3. TILDARG, E. of Sandy Braes (April, 1907). This Basalt shews Natrolite, with inclusions of Felspar and Augite. A peculiar feature is the inclusion of nodules of glassy material connected by shreds of same to the ground of the rock.
4. BRUSLEE, near Ballyclare (March, 1908). The Natrolite here shows inclusions of Felspars and very large Augites ; glass plentiful.

The most typical of these deposits are the specimens found at Ballyhenry. The Basalt of this district is a compact, finely crystalline rock composed of Plagioclase Felspar, and Augite, with a smaller proportion of Olivine. It contains a good deal of fresh Magnetite, which is more plentiful in some parts of the rock than others. A greenish-yellow interstitial glass occurs, particularly around the Zeolites. The latter, chiefly Natrolite, Analcime, and Chabazite occur in cavities which are both irregular and spherical in shape. Natrolite is invariably the first Zeolite deposited in these cavities, following immediately upon the glassy film. In the accompanying diagrams Fig. 1 (Plate IV.) represents the normal junction between the Basalt and Zeolite, with the thin layer of green glassy material between the two. Fig. 2 represents the abnormal junction where this layer is brecciated and found coating large crystals of Felspar, Augite, and Magnetite, which latter are completely enclosed by the Natrolite in many cases. The following measurements shew the comparative lengths of the crystals in the ground of the rock, and of those in the holo-crystalline portion and inclusions.

	GROUND.	HOLO-CRYST.
Felspar	'1—'3 m.m.	1" to 2" m.m.
Augite	'1—'2 " ,	1" , 1·6 "
Magnetite	'05—'3 "	·4 " , ·8 "

The included Augites do not exhibit their crystalline outline but the Felspars are perfectly idiomorphic—in the Whitehead and Bruslee specimens however the included Augites are idiomorphic. A peculiar feature is the development of hollows filled with Natrolite within many of the included Felspars.



Fig. 2. Abnormal.

X ABOUT 10 DIAMETERS.

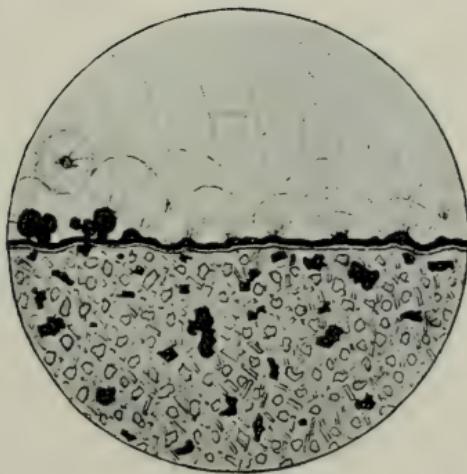


Fig. 1. Normal.

J. STRACHAN, DEL.

Junction of Basalt with Natrolite (Ballyhenry, near Carnmoney).



The interpretation of these facts would be a difficult problem to those Mineralogists who regard Zeolites as decomposition products, either of epigenetic or solfataric origin,¹ but without disregarding the latter modes of genesis, which can be traced only in isolated cases, it is quite evident, from a careful study of these Co. Antrim specimens, that the Zeolites in general are for the most part deposited during the final stages of the cooling of the lava, in a process that is purely constructive. It is probable that the presence of Zeolites is dependent upon the amount of natural water in the original magma. As the latter cools and the primary minerals of the rock crystallize, the more liquid, hydrous portion of the magma is left in the interstices of the partially crystallized mass. To a great extent this hydrous portion of the magma, which I have called the *residual magma*, makes room for itself—the contractile power of the cooling magma being largely due to the presence of water—assuming all kinds of shapes from minute interstitial druses to proper cavities more or less spherical, in which latter case is evidenced the expansive power of steam and dissolved gases. From this hydrous residual magma, which is closely related in composition to the combined average composition of the primary minerals, except for the presence of water, crystallizes the hydrous glass followed by Natrolite and Analcime and other Zeolites in sequence. The formation of the hydrous green glass may be regarded as the intermediate stage between the crystallization of the primary and the "secondary" minerals. The formation of this glassy layer separates the primary minerals from the residual magma, but, when this glassy material is sparse, or when it is brecciated, the primary minerals float into the hydrous magma, which, containing all the materials necessary, continues

i. *Vide* J. G. Goodchild's "*Natural History of Scottish Zeolites*," Page 5 (Published 1903 by Geol. Soc. of Glasgow); also Prof. Mier's "*Introduction to Mineralogy*," p. 483; also Prof. Judd's "*Student's Lyell*," pp. 458-9, p. 484, etc.; also Prof. Credner's "*Elemente der Geologie*," pp. 105-6 (1902); also other modern text-books.

the growth of partially and wholly included crystals at the expense of the glass and Zeolites, thus producing the remarkable granitic structure. The large Felspars with inclusions of Natrolite indicate the transition from primary to "secondary" mineral-growth from one magma in a beautiful manner. Such minerals as the Zeolites may thus be regarded as "secondary" in the light of secondary crystallizations in a new cycle of operations in which the influence of water comes into play, but the whole process in its various stages, from the uniformly molten magma to the hard, dry Basalt containing Zeolites, is most probably one continuous process of constructive crystallization. It is most likely that further interesting evidence in support of this thesis will be discovered in the near future by mineralogists sufficiently interested to make a search, for similar structures, in the Zeolithic deposits of the Tertiary Basalts in other localities.

Mr. Strachan's paper was amply illustrated by a fine series of hand specimens of beautiful Zeolithic minerals collected during the past few years from quarries in the Basalt in the immediate neighbourhood of Belfast, and by a number of microscopic sections.

An animated discussion ensued regarding the theories advanced, in which the Chairman, and Messrs. T. Dewhurst, H. L. Orr, and William Gray took part. The speakers all expressed their admiration of the work done by the two lecturers, and the entirely original and very valuable nature of their communications.

"THE DISPERSAL OF SEEDS."

The sixth and last meeting of the Winter Session, was held in the Museum, College Square North, on Tuesday evening, 8th April, when Mr. Arthur Deane, curator of the City Museum, kindly favoured the Club with a popular lecture on the interesting subject of "The Dispersal of Seeds." The President of the Club, Mr. Robert Patterson, F.L.S., occupied the chair, and called upon Mr. Deane to proceed.

The lecturer commenced by stating that nutrition and reproduction are the two great functions of plants, for by the exercise of the former process the plant attains to maturity, its one physical object being then the perpetuation of its species. As is generally the case in organic nature, such an end is effected by many and diverse methods, which in the vegetable kingdom are roughly classified as vegetative reproduction and sexual reproduction. Each parent plant aims to give its seedling offspring the best possible chance of life by assuring it space with a good supply of light and air. In many cases the offspring would have no chance at all if they simply dropped to the ground beneath the parent plant, and therefore divers agencies are utilised by the plant to avoid this. Again, seeds are in some cases dispersed without any special provision made for the purpose, as when they are washed along in times of flood, or being immersed in mud or adhering to the feet or feathers of migratory birds. Darwin mentions a case when in a cupful of mud from the edge of a pond he found no less than 537 plants within six months. The mechanism of the dispersal of seeds may be arranged under four heads—1, ejection by the plant; 2, transport by air; 3, transport by water; 4, transport by animals. Taking the water-borne fruits as the simplest of all cases, Mr. Deane referred to a class of plants having small seeds which are readily carried away by runnels of water—viz., those living in dry or almost soil-less situations, clinging with difficulty to surfaces of rocks, and, if not washed into crannies, speedily killed by drought. Such is the Stonecrop, with its four little gaping fruits, which only open when rain appears. After remarking on some interesting examples of this, he passed on to the different adaptations for dispersal by the plant's own means, where a large variety and complexity of conditions are met with. Some plants produced capsular fruits, thereby practising an economy of seed by only opening partially and in dry weather; then the passing breeze or wandering animals may cause the seeds to be thrown out. The

adaptations of the Balsams, plants having the generic name of *Impatiens*, are worthy of note, the only British species being *Noli-tangere*, Touch-me-not, where the fruits separate on ripening, or where the balance of force within the fruit is interfered with. They roll themselves violently up, hurling the seeds to a distance of some yards, the efficacy of this method for dispersal being evident from the widespread occurrence as weeds of the cultivated varieties in our gardens. In alluding to the methods of dispersing seeds by air, the lecturer illustrated by simple examples the contrivances by which the seeds, fruit, or entire plant, as the case may be, become buoyant and float on the wind. The Rose of Jericho was given as an example of those steppe plants which become detached from the soil during the dry fruiting season and are readily blown about until moisture is reached, when both branches and fruit-valves open out hygroscopically. Among those plants depending upon animal agency for dispersal the fruit was either adapted for outside carriage—viz., burrs and hooked structures—or inside carriage—viz., succulent and brightly-coloured fruits, the seeds of such fruits being rendered indigestible by a hardened outer coat. In the former case hooks of every degree of size are met with, from the small bristly hooks of the Enchanter's Nightshade to the thick firm claws of the Harpoon fruit of South Africa, which buries itself firmly in the hoof of any animal unfortunate enough to tread upon it, and frequently drives the animal mad with pain. It has even been known to have proved fatal to the lion. Fleshy fruits attract animals to eat them only when the seeds are ripe. When unripe they have a green colour resembling the foliage, and are destitute of scent, but on ripening assume a conspicuous colour, and emit a pleasant odour. Evergreens usually have red fruits, which stand out boldly against the dark background of foliage, and those plants whose leaves assume autumnal tints are provided with blue and black fruits. As to how far fruits are advertised by their scents, it is only necessary to think of the Strawberry,

Raspberry, and Apricot. In conclusion, the lecturer pointed out that anyone wishing to take up the fascinating study of the different contrivances among plants to disseminate their seed could not do better than read the chapters dealing with the subject in Kerner's "*Natural History of Plants*," a copy of which can be seen in the reference department of the Public Library. He also expressed his indebtedness to the kindness of Professor Gregg Wilson for the beautiful specimens displayed, which, if observed, would give a good idea of the different groups to which he had referred that evening.

Mr. Deane having explained the diagrams and the large number of specimens illustrative of his paper, an interesting discussion followed, the following members taking part:— Messrs. Robert Patterson, F.L.S.; F. Balfour-Browne, M.A.; W. J. C. Tomlinson; William Gray, M.R.I.A.; and Dr. Clarke Robinson.

Mr. Deane having suitably replied, the proceedings concluded.

ANNUAL MEETING.

The Forty-fifth Annual Meeting was held in the Museum, College Square North, on 14th April. The President, Mr. Robert Patterson, F.L.S., occupied the chair. The Annual Report was read by the Secretary, Mr. W. H. Gallway. The Treasurer, Mr. W. H. Phillips, submitted his Statement of Accounts. The Reports of the Librarian and Geological Section were read by Mr. J. L. S. Jackson; the Botanical Section Report was read by Mr. N. Carrothers. The Report of the Archæological Section was read by Mrs. Hobson, in the absence of the Hon. Secretary of Section, Mr. W. J. Fennell, F.R.I.B.A. The Report of the Zoological Section was read by Mr. Nevin H. Foster, M.B.O.U., and the Report of Sub-Committee who adjudicated on collections submitted in Competition for prizes offered by the Club, was read by Mr. W. J. C. Tomlinson.

The President formally moved the adoption of the reports and statement of accounts, and in doing so announced the interesting fact that his grandfather fulfilled an exactly similar duty on that night 44 years ago. The membership of the Club had increased from 312 in April, 1903, to 439 in April, 1908. Last year the Club was in debt £3, this year there was £16 to its credit, and the President congratulated the Club on the year's success. The adoption of the reports was seconded by Mr. F. Balfour-Browne, M.A., and supported by Mr. W. Gray, M.R.I.A., and the motion was passed.

Mr. N. H. Foster, M.B.O.U., proposed, and Mr. B. Hobson, seconded, that Mr. Robert Patterson, F.L.S., be re-elected President for the ensuing year, which was passed.

Mr. T. E. Farrington moved, and Mr. W. A. J. M'Bretney seconded, that Mr. W. H. Gallway be elected Vice-President—passed.

Mr. W. H. Phillips was re-elected Treasurer, on the motion of Miss Wheeler Ryan, seconded by Mr. W. T. Bailie.

Mr. J. L. S. Jackson was re-elected Librarian, on the motion of Mr. John Hamilton, seconded by Mr. W. R. Pim.

Mr. Robert J. Welch, M.R.I.A., and Miss Jean Agnew were appointed Hon. Secretaries, on the proposal of Mr. Joseph Skillen, seconded by Mr. G. Raymond.

The following were elected Members of Committee:—Messrs. Nevin H. Foster, M.B.O.U.; Robert Bell, N. Carrothers, W. J. Fennell, F.R.I.B.A.; W. A. Green, H. C. Marshall, H. L. Orr, W. J. C. Tomlinson, F. Balfour-Browne, M.A., and Arthur Deane.

Mr. Nevin H. Foster, M.B.O.U., moved to add to Rule 5 the following clause, viz.:—"That, in the event of a vacancy occurring among the Officers, the Committee may co-opt a Member of the Club to fill such vacancy."

The resolution was seconded by Mr. A. R. Hogg, and carried.

A hearty vote of thanks was moved by Mr. T. E. Farrington, and seconded by Mr. W. J. C. Tomlinson, to the retiring Vice-President, Mr. Nevin H. Foster, M.B.O.U., and on the motion of the President, Mr. Robert Patterson, F.L.S., seconded by Mr. W. Gray, M.R.I.A., a similar compliment was paid to the retiring Hon. Secretary, Mr. W. H. Gallway, both motions being heartily supported by the meeting and carried.

Suggestions of suitable places to be visited during the coming Summer Session having been put forward, and the following elected members—Messrs. James Lowry and James Marshall—the meeting concluded.



* RULES *

OF THE

Belfast Naturalists' Field Club,

1908-09.

I.

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

II.

That the object of this 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 first pay an entrance fee of 5/-, and be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of 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 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, Librarian, and two Secretaries, and ten Members who form a Committee, and shall hold not less than eight Meetings in the year. Five Members 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. In the event of a vacancy occurring among the Officers, the Committee may co-opt a Member to fill such vacancy during the year only.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being Members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. Any Sectional Committee may elect its own Chairman and Secretary from its Members.

VII.

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 Archaeology 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.

VIII.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

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 archaeological 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.

X.

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 each intended alteration.

XI.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

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 subject mentioned in such written requisition.

XIII.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

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. 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.

Exchanges of Proceedings.

- Aberdeen Working-men's Natural History and Scientific Society.
Transactions, No. 5, 1905-1906.
- Barrow Naturalists' Field Club.
Report, Vol. XVIII.
- Bath Natural History and Antiquarian Field Club.
Proceedings, Vol. XI., Part 2, 1907.
- Belfast—Natural History and Philosophical Society.
Report of Proceedings, 1906-1907.
- „ Ulster Journal of Archaeology.
Vol. XIII., Parts 2, 3, 4.
- Berlin—Helio Abhandlungen und Mitteilungen, 1905.
- Berwickshire Naturalists' Club.
Proceedings, Vol. XIX., Part 2, 1904.
- Brighton and Hove Natural History and Philosophical Society.
Annual Report and Abstracts of Papers, 1905.
- Bristol Naturalists' Society.
Proceedings, Vol. I., Part 3, 1906.
- Cardiff Naturalists' Society.
Report of Transactions, Vol. XXXIX., 1906.
- Costa Rico—Museode Manual de Mollusques de l' Isla del Coco.
- Dublin—Royal Irish Academy.
Proceedings, Section B, Vol. XXVI., Parts 7, 8, 9, 10.
„ „ C, Vol. XXVI., Parts 10, 11, 12, 13, 14,
15, 16.
„ „ C, Vol. XXVII., Parts 1, 2, 3, 4.
- „ Royal Society of Antiquaries of Ireland.
Journal, Vol. XXXVII., Parts 1, 2, 3, 4.
- Dumfriesshire and Galloway Natural History and Antiquarian Society.
Report, Vol. XVIII., Part 1.
- Eastbourne Natural History Society.
Transactions, Vol. IV., Part 12.
- Edinburgh Field Naturalists' and Microscopical Society.
Transactions, Vol. V., Parts 4, 5.
- „ Botanical Society.
Transactions and Proceedings, Vol. XXII., Parts 1 and 2.

Edinburgh—Geological Society.

Transactions, Vol. IX., Parts 1, 2.

**Frankfort—Bericht der Senckenbergischen Naturforschenden.
Gesellschaft, 1907.**

Glasgow Natural History Society.

Report and Proceedings, 1901 and 1902.

„ **Philosophical Society.**

Proceedings, Vol. XXXVII., 1905-1906.

Hamilton Association.

Journal and Proceedings, 1904-1905.

Hertfordshire Natural History and Field Club.

Transactions, Vol. XIII., Parts 1, 2.

Hull Scientific and Field Naturalists' Club.

Transactions, Vol. III., Parts 3 and 4.

„ **Public Library.**

Report.

Leeds Philosophical and Literary Society.

83rd Annual Report, 1902 and 1903.

Leiden—Sgravenhage Rijks Enthographich Museum.

Report, 1906-1907.

Limerick—Journal of Field Club.

Vol. III., Part 11.

Liverpool Geological Society.

Proceedings, Vol. X., Part 2.

„ **Naturalists' Field Club.**

Proceedings, 1906-1907.

„ **University Institute of Commercial Research in the
Tropics.**

London—British Association for the Advancement of Science.

Report of the York Meeting, 1906.

„ „ Leicester „ 1907.

„ **British Museum.**

Illustrations of Bloodsucking Flies, &c.

General Guide.

Guide to Gallery of Reptiles and Amphibia.

„ Great Game Animals (Ungulata).

„ Galleries of Mammals (other than Ungulates).

„ Fossil Reptiles, Amphibians.

„ Fossil Invertebrate Animals.

„ Books and Portraits.

„ History of Classification of Plants.

List of British Seed Plants and Ferns.

Memorials of Linnæus.

Guide to Exhibition of Old Natural History Books.

- London—Architectural and Topographical Society.
Architectural and Topographical Record.
- Magdeburg Abhandlungen und Berichte, 1906.
- Manchester Field Naturalists' and Archaeologists' Society.
Report and Proceedings, 1906.
- „ Microscopical Society.
Transactions and Annual Report, 1906.
- Marlborough College Natural History Society.
Report No. 55, 1906.
- Mexico—Geologico Instituto.
Del., Parts 22, 23, 24.
- Montevideo—Museo Nacional.
Annals, Series 2, Parts 2 to 11.
„ Geographia Fisica y Esferica Del Paraguay.
- New Brunswick—Natural History Society of
Bulletin, Vol. V., Part 5.
„ „ VI., „ 1.
- Norfolk and Norwich Naturalists' Society.
Transactions, Vol. VIII., Part 2, 1905-1906.
- North Staffordshire Field Club.
Report and Transactions, Vol. XL., 1906-1907.
- Nottingham Naturalists' Society.
Report, 1905-1906.
- Nova Scotian Institute of Science, St. John's, Nova Scotia.
Proceedings and Transactions, Vol. XI., Part 2, 1905-1906.
- Ottawa—Literary and Scientific Society of
Transactions, 1906-1907.
- Perthshire Natural History Society.
Vol. IV., Part 4, 1906-1907.
- Peru—Boletin del Cuerpo de Ingenieros de Minas, Nos. 47 to 54.
- Stavanger Museum.
Aarshefte fur 1906.
- Toronto—Canadian Institute.
Transactions, Vol. VIII., Part 1.
- U.S.A.—Boston Society of Natural History.
Vol. XXXI., Parts 2 to 10; Vol. XXXII., Parts 3 to 12; Vol.
XXXIII., Parts 1, 2.
- „ Brooklyn—Institute of Arts and Science.
Cold Spring Harbour, Monographs No. 6, 4th Series, Vol. I.,
1907.

- U.S.A.—California—Academy of Sciences.
Geology, Vol. I., Parts 1 to 10 ; Vol. II., Part 1.
Botany, Vol. I., Parts 1 to 10 ; Vol. II., Parts 1 to 11.
Behr Memorial,
- „ Chapel Hill N.C.—Elisha Mitchell Scientific Society.
Journal, Vol. XXIII., Parts 1, 2, 3.
- „ Chicago—Academy of Sciences.
Bulletin, IV.
- „ Chicago—Field Columbian Museum.
Report, Vol. II., No. 4 ; Vol. III., No. 1.
- „ Cincinnati—Lloyd's Library.
Bulletin and Mycological Notes, Index, Vol. I., Nos. 19 to 23,
The Tylostomca.
- „ Essex Institute.
Geology of Essex County.
- „ New York—Academy of Sciences.
Annals, Vol. XVII., Parts 1, 2.
- „ Philadelphia—Academy of Natural Sciences
Proceedings, Vol. LVIII., Parts 1, 2 ; Vol. LIX.
- „ Rochester Academy of Science.
Proceedings, PP. 203, 231 ; Brochure 3 of Vol. III.
- „ Staten Island Natural Science Association.
Proceedings, Vol. I., Parts 3, 4 ; Memorial No.
- „ St. Louis—Academy of Sciences.
Transactions, Vol. XV., Part 6 ; Vol. XVI., Parts 1, 2, 3, 4, 5,
6, 7 ; Missouri Botanical Garden, 1906.
- „ Tufts College, Medford, Mass.
Studies, Vol. II., Part 1.
- „ Washington—Government Printing Offices.
Detached Papers by various Authors (4).
- „ Washington—Smithsonian Institute.
Annual Report, 1907.
- „ Wisconsin Geological and Natural History Survey.
Bulletins, No. 13.
- Queensland—Annals of Museum, No. 7.

List of Members.

Any change in the Address of Members should be at once notified to the Secretaries by Post Card.

Hon. Members.

Jones, Prof. T. R., F.R.S., Penbryn, Chesham Bois Lane, Chesham, Bucks.

Lapworth, Professor Charles, LL.D., F.R.S., The University, Birmingham.

Plunkett, Thomas, M.R.I.A., Enniskillen.

Corresponding Member.

Holden, J. S., M.D., Sudbury, Suffolk.

Life Member.

Ewart, Sir W. Q., Bart., Glenmachan, Strandtown.

Ordinary Members.

Adams, Miss, Rosemount, Malone Road.

Adams, John J., M.D., Ashville, Antrim.

Adams, Rev. W. A., B.A., Antrim.

Agnew, Miss Jean, 5 Wellington Place.

Allibon, George H., 19 Short Strand.

Anderson, Sir Robert, J.P., Donegall Place.

Anderson, Thomas, Embleton, Osborne Park.

Andrew, J. J., L.D.S., University Square.

Andrews, Miss, 12 College Gardens.

Andrews, Miss M. K., 12 College Gardens.

Balfour Browne, F., M.A., Clarendon, Holywood.

Bailie, W. T., Marathen, Knock. Bailie, Richard, 6 Jubilee Avenue.

Barkley, James M., 24 Wellington Place.

Barrett, J. H., Holywood.

Baxter, James, Midland Railway Co.

Beattie, Rev. A. H., Portglenone.

Beck, Miss, 2 Osborne Terrace, Balmoral.

Beck, Miss Emma, Hampton Terrace, Rugby Road.

Bell, Dr. Elizabeth, 83 Great Victoria Street.

Bell, Robert, 64 Newington Avenue.

Bell, E. George, Bellevue, Lurgan.

Berry, Major R. G., M.R.I.A., Army Service Corps, Victoria Barracks.

- Best, James, 2 Wellington Place.
 Bigger, Francis J., M.R.I.A.,
 Ardrie, Antrim Road.
 Blackwood, Miss S., 90 Eglington Avenue.
 Blackwood, W. B., 30 Elmwood Avenue.
 Blair, Mrs., Fernlea, Glenburn Park.
 Blair, Edward S., Rusheen, Glenburn Park.
 Blair, Mrs. Edward S., Rusheen, Glenburn Park.
 Borland, Mrs., Derwent, Marlborough Park.
 Boyce, Joseph, 29 India Street.
 Boyd, J. St. Clair, M.D., Chatsworth, Malone Road.
 Boyd, J. St. Clair, Jun., Chatsworth, Malone Road.
 Boyd, Miss, The Laurels, Cultra, Holywood.
 Boyd, W. C., Hazelbank Villa, Ravenscroft Avenue.
 Braithwaite, W. T., 12 Botanic Avenue.
 Branagh, E. H. H., 16 Madison Avenue.
 Brandon, Hugh B., 2 Wellington Place.
 Brett, Sir Charles H., Gretton Villa South.
 Brierley, J. C. A., 7 Glandore Street.
 Brierley, Mrs., 7 Glandore Street.
 Bristow, Very Rev. Dean, St. James' Rectory.
 Bromley, A. J., 20 Madrid Street.
 Brothers, H. E., Annsville, Glenburn Park.
 Brothers, Mrs. H. E., Annsville, Glenburn Park.
 Brown, John, F.R.S., Longhurst, Dunmurry.
 Brown, Thomas, 102 Donegall Street.
 Browne, W. J., M.A., Templemore Park, Londonderry.
 Brownsworth, Sergt. D., Army Pay Corps, Belfast.
 Bruce, Mrs., Thornly, Holywood.
 Bulla, Charles, 21 Maryville Park.
 Burrows, W. B., Ballynaf Leigh House.
 Calwell, John Y., Woodlawn, Belmont.
 Campbell, D. C., Templemore Park, Londonderry.
 Campbell, Wm. M., 34 Eglington Avenue.
 Carmody, Rev. W. P., Newtownbreda.
 Carrothers, Nathaniel, 145 Stranmillis Road.
 Carson, J. C., 8 Wellington Place.
 Carson, John, Walmer Terrace, Holywood.
 Chambers, W., 3 Custom House Square.
 Cheyne, H. H., Roseneath, Bangor.
 Christen, Madame, St. Imier, Brig o' Gairn, Ballater, N.B.
 Christian, W. M., 278 Ormeau Road.
 Christy, William, 81 Enfield St.
 Clarke, Mrs. John, Lindisfarne, Annadale.
 Clarke, Thos., jun., Percy Street Flour Mills.
 Cleland, Alex. M'I., Macedon, Green Road, Knock.
 Cleland, Mrs. Annie, Macedon, Green Road, Knock.
 Cleland, James A., Bernagh West, Malone Park.
 Cleland, W. W., 56 Wellington Park.
 Cocking, Miss C. E., Martinbank, Huddersfield.
 Cocking, Miss M. A., Martinbank, Huddersfield.
 Coleman, J., 2 Rosehill Terrace, Queenstown.
 Collis, Rev. M. H. F., B.D., Antrim.
 Colton, J. M., 4 Hopefield Av.
 Colvin, Miss M., Derryvolgie House, Malone Road.
 Cotter, Robert, 3 Laurienne Terrace.
 Cotter, J. S., B.A., 25 South Parade.
 Cottney, John, Clogher, Hillsborough.
 Courvoisier, Mrs., 4 Windsor Gardens.

- Courvoisier, Miss Y., 4 Windsor Gardens.
- Cowie, Mrs., Lauriston, Knock.
- Cowie, James, Midland Railway Co.
- Craig, John C., 14 Atlantic Avenue.
- Craig, Robt., 127 Ormeau Road.
- Cunningham, Chas. M., L.D.S., D.D.S., Rostellan, Malone Road.
- Cunningham, Miss E. M., Victoria College.
- Cunningham, Saml., Glencairn.
- Cunningham, E., Reform Club.
- Curley, Francis, High Street.
- Curley, Mrs., Dunedin Terrace.
- Curragh, W. H., Rosslyn, Stranmillis Road.
- Davies, John Henry, Lenaderg, Banbridge.
- Dawson, R. A., A.R.C.A., Iniskeen, Holywood.
- Deane, Arthur, Municipal Museum, Royal Avenue.
- D'Evelyn, Alex. M., M.D., Ballymena.
- Dewhurst, Thomas, A.R.C.Sc., Queen's College.
- Dickson, John M., 34 Wellington Park.
- Dobbin, Mrs. W. C., 12 Brookvale Avenue.
- Donaldson, George, 4 Elm St.
- Donaldson, John, 18 Brookhill Avenue.
- Doran, John, J.P., Dunottar, Malone Road.
- Douey, S. H., 63 Bloomfield Avenue.
- Duncan, William, 38 Wolseley Street.
- Dunlop, P. J., Craigavad.
- Elliott, David, Ardroe, Bloomfield.
- Elliott, George H., Holywood.
- Elliott, E. J., 29 Bedford St.
- English, James, 6 Adelaide St.
- Entrican, Miss Sarah, 33 Botanic Avenue.
- Ewart, L. M. Algernon, Glenbank.
- Faren, W., 11 Mountcharles.
- Farrington, T. E., Baythorpe, Holywood.
- Faussett, Stuart S., 16 Chichester Avenue.
- Fennell, Mrs., Deramore Drive.
- Fennell, W. J., M.R.I.A., 2 Wellington Place.
- Finlay, Miss, St. Kilda's East, Old Nichol Street, Bethnal Green, London.
- Finlay, Arch. H., Holywood.
- Forth, Francis C., A.R.C.Sc.I., Technical Institute.
- Foster, Rev. G., The Parsonage, Kirkcubbin.
- Foster, Nevin H., M.B.O.U., Hillsborough.
- Foster, Mrs. N. H., Hillsborough.
- Frame, John, Alfred Street.
- Fulton, David, Arlington, Windsor Avenue.
- Gaffikin, William, Notting Hill.
- Galloway, Peter, 55 Botanic Avenue.
- Galloway, Joseph, 50 Eglantine Avenue.
- Gallway, W. H., Belgravia, Bangor.
- Gamble, Miss, Royal Terrace.
- Gamble, J. G., 42 Hopefield Avenue.
- Gardner, Miss, 1 Wellington Park.
- Gardner, Campbell, jun., Windsor Park.
- Gibson, Andrew, 14 Cliftonville Avenue.
- Gilliland, G. F., Brookhall, Londonderry.
- Glover, James, Seaview, Kirkcubbin.
- Glover, James, Belsize, Lisburn.
- Godwin, William, Queen Street.
- Gourley, Wm. Morrow, Derryboy Cottage, Crossgar.
- Graham, William, Lombard St.
- Gray, William, M.R.I.A., Glenburn Park, Cavehill Road.
- Green, Mis. Isaac, Hawthornden, Knock.
- Green, Wm. A., 4 Salisbury Terrace, Chichester Park.

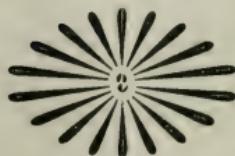
- Green, Mrs. W. A., 4 Salisbury Terrace, Chichester Park
 Green, John F., J.P., Annavilla, Warrenpoint.
 Green, Ernest, Avenue Road, Lurgan.
 Greenfield, Miss M., 8 High Street, Holywood.
 Greeves, J. Theodore, Nendrum, Knockdene Park.
 Greeves, W. Leopold, Bankmore Street.
 Greeves, Fergus M., Rydal Mount, Knock.
 Gullan, H. F., Town Hall, Belfast.
- Hadden, Dr. Robert E., Ard-valla, Portadown.
 Hamilton, Rev. T., D.D., LL.D., President, Queen's College, Belfast.
 Hamilton, John, 5 Churchview Terrace, Holywood.
 Hancock, R. W., Claremont, Holywood.
 Hancock, W. H., 22 Castle Pl.
 Hanna, Henry, M.A., M.B., B.Sc., 57 University Road.
 Hanna, J. A., Cuillare, Holywood.
 Harbison, John H., Queen's College, Belfast.
 Harbison, Mann, Rusheen, Rosetta Park.
 Harvey, Alex., 224 Springfield Road.
 Hastings, Miss M., The Manse, Magheragall, Lisburn.
 Hazelton, W. D., Springfield Road.
 Henry, T. B., Custom House Square.
 Henry, Samuel, Cookstown.
 Heron, F. A., Cultra, Holywood.
 Hildage, T. J., B.A., Glenburn Park.
 Hobson, Mrs., 6 Hopefield Av.
 Hobson, Benjamin, 6 Hopefield Avenue.
 Hogg, A. R., 13 Trinity Street.
 Holland, Miss, 12 University Square.
 Holland, Frank, 12 University Square.
- Hopkirk, F. J., Midland Railway Co.
 Jackson, J. L. S., 19 Glandore Gardens.
 Jackson, A. T., 8 Derryvolgie Avenue.
 Jaffé, Lady, Kinedar, Strandtown.
 Johnson, Rev. W. F., M.A., F.E.S., Acton Glebe, Poyntzpass.
 Johnston, Miss E., Alexandra Villas, Knock.
 Johnston, W. P., Alexandra Villas, Knock.
 Johnston, Ernest, Alexandra Villas, Knock.
 Johnston, F. W., The Cottage, Cultra.
 Johnston, John Bruce, Cooleen, Marlborough Park North.
 Jones, Miss, Allworthy Avenue.
- Kennedy, R. M., 3 Donegall Square East.
 Kidd, George, J.P., Greenhaven, Malone Park.
 Kidd, Miss, Greenhaven, Malone Park.
 Kidd, James, Antrim Road.
 Kilgour, Peter, Woodrow Villa, Bloomfield.
 Killen, Wm., 37 Lonsdale St.
 Kinnaird, Miss Marjory, Sandown Park, Knock.
 Kirker, S. K., Offices of Board of Public Works, Belfast.
 Kirkpatrick, F., 27 Oxford St.
 Knabenshue, Saml. S., American Consulate.
 Knowles, W. J., M.R.I.A., Flixton Place, S., Ballymena.
 Kyle, R. A., 13 Donegall Place.
- Lamb, Wm. W., Cliftonville Avenue.
 Lamb, Miss, Divis View, Lisburn Road.
 Larmor, H. G., Lisburn.
 Lepper, F. R., J.P., Elsinore, Crawfordsburn.
 Leslie, Jas., 9 Wilmont Terrace

- Lett, Rev. Canon, M.A.,
M.R.I.A., Aghaderg Glebe,
Loughbrickland.
- Letts, Mrs., Shirley House,
Cultra.
- Lindsay, Prof., M.D., 3 Queen's
Elms.
- Lowry, D. E., 25 Donegall Pl.
- Lowry, James, Llewellyn Av.,
Lisburn.
- MacCormac, Dr. John, Great
Victoria Street.
- MacKenzie, John, C.E., 2 Wel-
lington Place.
- MacKenzie, Chas. A., 130 Albert-
bridge Road.
- Macoun, John R., Northlands,
Deramore Park.
- MacRae, Kenneth, Balmoral.
- Maguire, Miss May, 2 Woodland
Avenue.
- Major, Rev. J. J., Doagh.
- Malcolm, Miss Susan, Croft
Road, Holywood.
- Malcomson, Walter, Cran-y-Gael,
Osborne Gardens.
- Malcomson, J. G. B., Cairnburn,
Strandtown.
- Malcomson, Herbert T., Cairn-
burn, Strandtown.
- Malcomson, Miss, Villa Mirza,
Malone Park.
- Malcomson, Joseph, Arthur St.
- Marsh, Mrs., Glenlyon, Holy-
wood.
- Marsh, Joseph C., 2 Chichester
Gardens.
- Marshall, H. C., Bangor.
- Martin, J. M' Clelland, Midland
Railway Co.
- Martin, Samuel, Rea's Buildings.
- Massaroon, Mrs., Charles St.,
Berkhamsted, Herts.
- Maxton, James, Ulster Street.
- Maxwell, Joseph, Pinner, Malone
Road.
- Maxwell, Mrs., Pinner, Malone
Road.
- May, Robert, Elgin Terrace,
Limestone Road.
- Maybin, Hugh, Intermediate
School, Lisburn.
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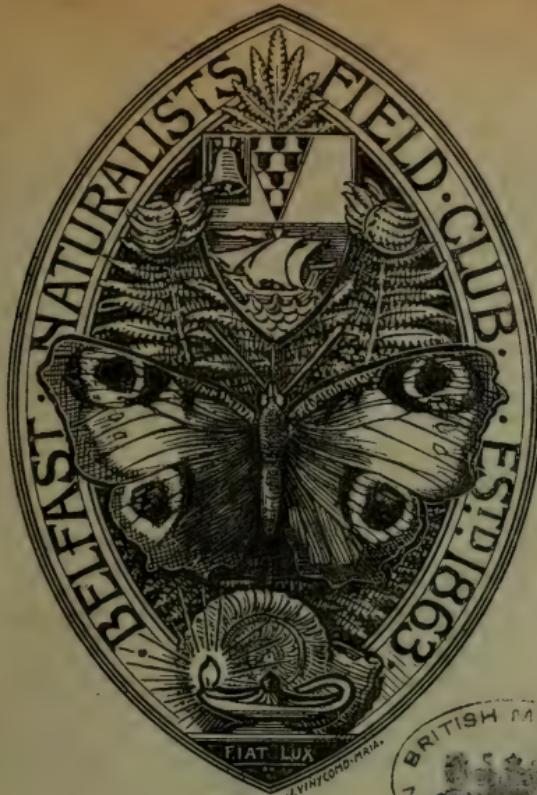


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Series II., Vol. I., Parts V. and VI., 1877-78 and '78-'79 (in one) Part VII., 1879-80, containing Appendix V., List of Post-tertiary Foraminifera of North-East of Ireland—Wright; and List of Mollusca of Boulder Clay of North-East of Ireland—Stewart	1/-
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SEP. 1909

Annual Report and Proceedings.



SERIES II.

VOLUME VI.

PART II.

1908-09.

CONTENTS.

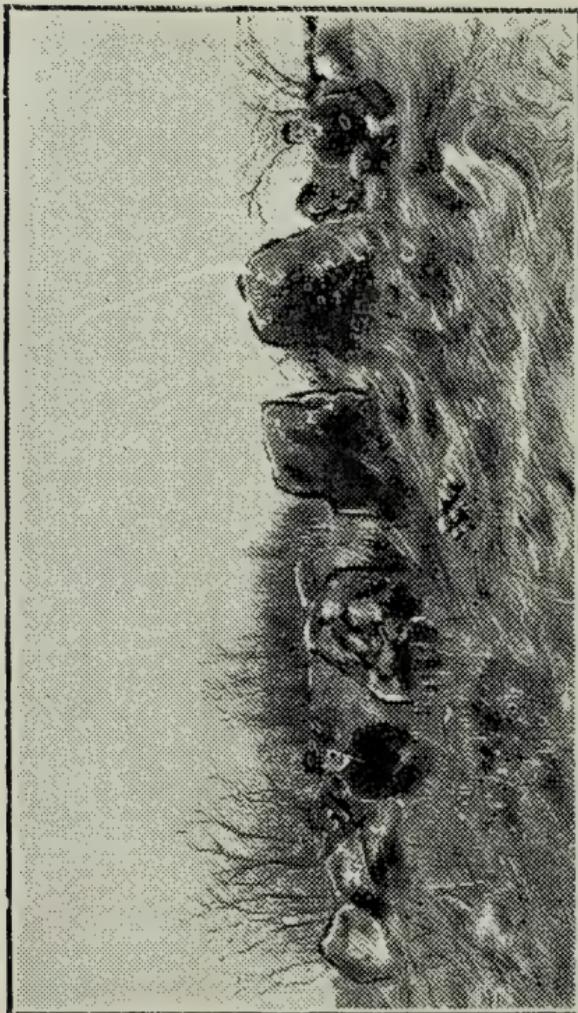


	PAGE
List of Officers	122
Annual Reports	123
Statement of Accounts	132
Excursions—Giant's Causeway, Belvoir Park, Lissanoure Castle, Lough Swilly, Lagan Canal, Carlingford, and Dundrum.	133
Conversazione	153
Presidential Address	157
Papers — Common Fungi—Rev. C. H. Waddell, M.A., B.D.	178
Summer's Dredging in Belfast Lough—W. H. Gallway	179
Report of Delegate to the British Association Mrs. Hobson	181
Geology of the Dublin District—T. Anderson	181
Fertilization of Flowers—S. Wear	185
Ancient Inhabitants of Ireland—A. Milligan	187
Life-history of the Water-beetle—F. Balfour Browne, M.A.	189
Determination of Specific Gravity—T. Dewhurst, A.R.C.Sc. (Lond.)	191
Church Island—J. Skillen	192
Method in Biological Research—F. Balfour Browne, M.A.	195
Charles Darwin Centenary—W. J. C. Tomlinson	196
Dawn of History in Ireland—Miss M. E. Dobbs	198
Opal Deposits of Sandy Braes—J. Strachan	200
Rainwash Deposit of Land Shells—R. Welch, M.R.I.A.	201
Celtic Misnomer—J. M. Dickson	203
Goosefoots, Knotweeds, etc.—Rev. C. H. Waddell, M.A., B.D.	204
Local Botanical Gleanings—W. J. C. Tomlinson	204
Rock Gardens—R. L. Praeger, B.A., B.E., M.R.I.A.	208
Gossiping Geological Speculation on Cave Hill—Wm. Gray, M.R.I.A.	211
Annual Meeting	213
Rules	215
Exchanges	218
List of Members	222
List of Officers (1909-1910)	229
List of Sectional Committees (1909-1910)	230

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ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST NATURALISTS'
FIELD CLUB,

FOR THE YEAR ENDING 31st MARCH, 1909,

(FORTY-SIXTH YEAR.)

SERIES II.

VOLUME VI.

PART II.

1908-09.



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1909.

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FORTY-SIXTH YEAR, 1908-09.

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Annual Report.

The Committee have pleasure in submitting the forty-sixth Annual Report to the Club.

During the past year 31 new members have been elected, of whom 28 have qualified by paying entrance and subscription fees. There were 31 deaths and resignations, giving a net decrease of 3.

Eight Committee meetings were held during the year, the average attendance being 11 out of a possible 16.

The Programme of the Summer Session was fully carried out, the following being a list of the Excursions :—

Giant's Causeway	...	...	...	30th May.
Belvoir Park (Half-day)	...	..	..	13th June.
Lissanoure Castle ..	...	..	..	27th June.
Lough Swilly (Long Excursion)	...	..	..	11th to 14th July.
Lagan Canal (Half-day)	...	..	..	25th July.
Carlingford ...	...	..	..	8th August.
Dundrum (Half-day)	...	..	..	29th August.

These Excursions, which were carried out under the conductorship of various members of Committee, were fairly well attended, the average number being 53.

In connection with these Excursions the Committee desire to record the indebtedness of the Club to Mr. Alec Wilson, of Belvoir Park, and the Officers of the Antrim Artillery, encamped at Dunree Head, for hospitality accorded to members, and to Mr. C. G. Macartney, D.L., for kind permission to visit the grounds of Lissanoure.

The Club opened the Winter Session as usual by a Conversazione, which was held in the People's Palace, Donegall Road, over 300 members and friends attending. Thanks are due to Mrs. Forster Green for plants and cut flowers given to decorate the tea-tables.

The following is a complete list of Lectures and Papers delivered at the Ordinary Monthly and Sectional Meetings:—

1908.

- Tuesday, November 17th—"The Economic Value of Birds to the State," The President (Robert Patterson, F.L.S., M.R.I.A.)
- Saturday, November 21st—"Common Fungi: How to Collect and Study them," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, December 9th—"A Summer's Dredging in Belfast Lough," W. H. Gallway.
- Tuesday, December 16th—"Report of Delegate to the British Association." Mrs. Hobson.
- "The Geology of the Dublin District," T. Anderson.
- Saturday, December 19th—"Fertilization of Flowers," Sylvanus Wear.

1909.

- Wednesday, January 6th—"Ancient Inhabitants of Ireland, and their Kindred," A. Milligan.
- Saturday, January 16th—"Ferns."
- Tuesday, January 19th—"The Life-history of the Water-beetle," F. Balfour-Browne, M.A., F.R.S.E., F.Z.S.
- Wednesday, January 27th—"The Determination of Specific Gravity, and the Use of Heavy Liquids," T. Dewhurst, A.R.C.Sc.
- Wednesday, February 3rd—"Church Island," J. Skillen.
- Wednesday, February 10th—"Method in Biological Research," F. Balfour-Browne, M.A., F.R.S.E., F.Z.S.
- Saturday, February 13th—"The Charles Darwin Centenary: Darwin as a Botanist," W. J. C. Tomlinson.
- Tuesday, February 16th—"The Dawn of History in Ireland," Miss M. E. Dobbs.
- Wednesday, February 24th—"Opal Deposits of Sandy Braes; their Formation and Origin," J. Strachan.
- Wednesday, March 3rd—"Rainwash Deposits of Landshells, Horn Head," R. Welch, M.R.I.A.
- Wednesday, March 10th—"The Celtic Misnomer," John M. Dickson.
- Saturday, March 13th—"The Goosefoots, Knotweeds, &c. (Incomplete), and the new classification of Engler," Rev. C. H. Waddell, M.A., B.D.
- "Local Botanical Gleanings, 1908," W. J. C. Tomlinson.
- Tuesday, March 16th—"Rock Gardens, Natural and Artificial," R. L. Praeger, B.A., B.E., M.R.I.A.
- Wednesday, March 24th—"A Gossiping Geological Speculation on Cave Hill," Wm. Gray, M.R.I.A.

The opening Address, given by the President of the Club (Mr. Robert Patterson, F.L.S., M.R.I.A.), was deemed by the Committee worthy of being printed *in extenso*, and will be found in the Proceedings.

Mrs. Hobson was nominated to represent the Club at the British Association Conference of Delegates, held in Dublin, in September. Mrs. Hobson attended, and submitted her report, which will be found in the Proceedings.

The Treasurer will submit his Statement of Accounts showing a balance of £12 15 7d in hand.

The Librarian's Report, and the Reports of the Botanical, Geological, Zoological, and Archaeological Sections, and that of the Sub-Committee appointed to adjudicate on Collections sent in for Club Prizes, will be submitted.

Finally, the Committee desire to record their thanks to the Superintendents of the several Railway Companies for facilities afforded on the different Excursions; to the Press for publishing reports of the Club's meetings; and to the Public Bodies and Kindred Societies who have favoured the Club with their publications during the past year.

(Signed)

R. WELCH,
JEAN AGNEW, } *Hon. Secs.*

Librarian's Report.

We have received the usual exchanges of Proceedings, Reports, &c., from the various Kindred Societies of Great Britain, America, the Colonies, and the Continent, and we have sent them in return, copies of our Proceedings for 1907-8.

The members of the Club take an active interest in our Library, and there is a regular demand for books, &c., which is greatly appreciated. At the same time, for the number of

members in our Club, the demand should be larger, and this would shew that more of our members are interested in the several branches of work, which are associated in the working of the various societies.

It is also gratifying to see that the return of books is regular, which in itself is of great importance and helps to make our Library a success.

(Signed)

J. L. S. JACKSON, *Hon. Librarian.*

Report of the Committee of the Botanical Section.

The Session 1908-1909, so far as the Botanical Section is concerned, has been an uneventful one.

Owing to the desire of the members to encourage, and participate in, the ordinary summer excursions of the Club, no special Sectional excursions were arranged or took place. The majority of the places visited on the regular Club excursions were botanically interesting, and our members were fully represented on most of these excursions. This was notably the case at Lissanoure Castle, the Lagan Canal, Carlingford, and Dundrum. Rare species were noted on each of these excursions, and some interesting records made. At Lissanoure especially, some valuable work was done, as the district is one about which hitherto little has been known regarding its flora. The more important plants observed on these occasions are recorded in connection with the reports of the excursions.

The monthly meetings of the Section, held in the Club-room during the winter season, were well attended. The papers read, and addresses given, were on broad lines and of a stimulating character. The Fertilization of Flowers, the Darwin Centenary from the Botanical standpoint, and the Engler System of Classification, were three of the subjects dealt with. These, with a short paper on Local Botanical Gleanings of the Session, were very

instructive communications. One meeting was exclusively devoted to an examination of the Fern collection in the Club's Herbarium, a proceeding which interested our younger members greatly.

It may here be recorded that the Herbarium has during the winter been enriched by the addition of a large number of specimens, the gifts of several friends. The result is that our collection is now fairly complete, so far at least as the local flora is concerned. Many of the plants recently added are very rare, and a few of them are the specimens collected as first records by the original finders. But besides the local plants we have also received specimens collected elsewhere, thus, for example, the most recent addition, the gift of Mr. Arthur W. Stelfox, was a series of Alpines collected in Norway last summer. Most of these specimens are very rare in the British Isles, and some of them, such as *Saxifraga cotyledon*, do not occur in Britain at all.

The thanks of the Section, and indeed of the Club as a whole, are due to Mr. Sylvanus Wear for the admirable manner in which he has overhauled the botanical collections in the Herbarium. Mr. Wear, for several months past, has devoted a great deal of time to numbering the collections in accordance with the recently published Tenth Edition of the London Catalogue. He has likewise re-mounted, labelled, and catalogued all the recent acquisitions—a labour of love to him, but one which very few of our members would have cared to undertake. His last gift to the Section is an elaborately compiled manuscript Topographical Index to the Flora of the North-East of Ireland, in which at a glance can be seen the references to the Plants recorded from the various localities in our district.

Finally, many members of the Club, who are not themselves working botanists, might advantageously assist the Section and the botanical work of the Club, if, when opportunity offers, they secured some interesting rarity for the Herbarium. Likewise, it will be taken as a favour if any new local finds are reported to the Honorary Secretary of the Section, so that our annual record of

results may be rendered fuller, and no valuable local discovery go unrecorded.

On payment of a nominal yearly subscription of one shilling to meet the Section's special expenditure, any member of the Field Club can be enrolled a member of the Botanical Section.

(Signed)

N. CARROTHERS, *Hon. Sec. of Section.*

Report of the Committee of the Geological Section.

The Committee of the Geological Section beg to submit the following report of work for the past year, 1908-9.

The work of the Section is still actively carried on, and the interest taken by its members is still as vigorous as formerly, and a few new members have been added to our list.

During the year we regret that our Excursions were not so numerous as in former years, which was principally due to prevailing bad weather. One which was carried out to the Bauxite Mines of Strайд and Irish Hill was well attended, and under the guidance of Mr. James Strachan the party passed a very pleasant and instructive evening.

The following papers were read during the Winter Session :— “The Determination of Specific Gravity and the Use of Heavy Liquids,” by Mr. T. Dewhurst, A.R.C.Sc. (London); “The Opal Deposits of Sandy Braes, their Formation and Origin,” by Mr. James Strachan; and “A Gossiping Geological Speculation on Cave Hill,” by Mr. Wm. Gray, M.R.I.A.

These meetings were well attended, and gave rise to a good deal of discussion on the part of those present; also, the instruments, specimens, and slides with which these papers were illustrated were greatly appreciated.

Any Members of the Club who are interested in geology might give their names to the Secretary of the Section, and by doing so will greatly forward the success of the Section.

(Signed)

J. L. S. JACKSON, *Hon. Secretary of Section.*

Report of the Committee of the Zoological Section.

During the year the members of this Section have been actively engaged in the study of several of our faunal groups, and much additional information has been acquired, both as to distribution and habit. Several of our members have been invited to participate in the forthcoming survey of Clare Island, and have promised their assistance.

On 19th September, the members visited the new laboratory of the Ulster Fisheries and Biology Association, in Bangor, and were conducted over the establishment by the Honorary Director, Professor Gregg Wilson, being afterwards most hospitably entertained by Miss White. Three meetings were held during the Winter Session. On 9th December, Mr. W. H. Gallway detailed the results of the summer's dredging in Bangor Bay, his best capture being a Marine Mollusc, *Pleurophyllidia loveni*, a rare species in Irish waters. A most instructive lesson was given by Mr. F. Balfour-Browne, on 10th February, on "Method in Biological Research." Mr. Balfour-Browne dealt chiefly with the method pursued in recording detailed distribution, exhibiting his record books, and fully explaining his system of entries. On 3rd March, Mr. R. Welch read a paper before the Section in conjunction with the Geological Section. The subject was "Rainwash Deposits of Land-shells, Horn Head," and, aided by numerous samples of sand-hill material, Mr. Welch demonstrated the methods of examination, and urged members to devote attention to the further study of these interesting formations with the numerous animal remains therein contained.

Many of our local faunal groups are still totally neglected, and it is hoped that more members will direct their attention to the filling up of the gaps in our knowledge of the habits and distribution of these groups of animals, and thus assist in sustaining and enhancing our Club's reputation.

NEVIN H. FOSTER, *Hon. Secretary of Section.*

Report of the Committee of the Archaeological Section.

I have to report that during the Winter Session we held four meetings which were fairly well attended, and the notices of the papers read have been handed to the Secretaries for insertion in the Annual Report of the Club.

One of these papers drew forth an interesting notice from the Society of Antiquaries of Scotland.

I have also to report that some investigations were made at Carrickfergus Castle with a view to bring to light the garrison chapel which is now covered with the foundation of the fortress.

(Signed)

W. J. FENNELL, *Hon. Secretary of Section.*

Report of Sub-Committee on Prize Competitions.

For Prize No. 1 Mr. W. J. C. Tomlinson submits a collection of Phanerogams consisting of upwards of 400 specimens belonging to 368 species; and for No. 2 Prize the same member tenders a collection of Vascular Cryptogams including 41 varieties. A noteworthy feature of the latter collection is that, with the exception of 2 Ferns, 1 Horse-tail, and 1 Club-Moss (some, at least, of these being now probably extinct in Ulster), it contains all the species locally recorded. Both these collections display great perseverance in collecting and mounting, and we consider them well worthy of these prizes.

We award Prize No. 8 to Mr. F. Balfour-Browne, who sends in a beautiful collection of Water-beetles, comprising some 106 species. The specimens are neatly mounted in the modern method with the names affixed, and the collection, which contains several species new to the North of Ireland, is accompanied by full notes as to the local distribution of this group.

For Prize No. 17 (Mr. W. J. Fennell's) Mr. William Christy submits a collection of 67 specimens comprising Axes, Hammer Stones, Scrapers, Arrowheads, Flakes, etc., which merits the award of this prize.

A collection of 30 sheets embracing 28 varieties of local Ferns is worthy of Mr. W. H. Phillips' Prize, No. 18. These were collected by Mr. W. J. C. Tomlinson, and contain all the species of Ferns now known to exist (out of cultivation) in Ulster, and we award this prize to Mr. Tomlinson.

Prize No. 20 (Professor Gregg Wilson's) is awarded to Mr. F. Balfour Browne for an article on the life-history of a Water-Beetle, *Hydrobius fuscipes*, L. This paper is of great interest and value, and is accompanied by an original set of drawings which display the anatomical details of the insect.

All the collections submitted fulfil the published conditions of competition, and in each case give evidence of careful and prolonged work. We much regret, however, that for these prizes there has been no real competition; it would be reasonable to expect that out of a Club Membership of upwards of 400, more than three members would participate.

(Signed)

ROBERT PATTERSON.

W. A. GREEN.

NEVIN H. FOSTER.

Dr. **Treasurer's Account for the Year ending March 31, 1909.** **Ct.**

To Balance from last Account	...	...	£16 17 7	By Type Writing ...	...	...	...	£0 7 3
Subscriptions	...	...	96 15 0	," Advertising, Printing, and Stationery	...	...	...	18 15 4
," Entrance Fees	...	...	7 5 0	," Printing Report, 1907-8	...	...	...	28 18 0
," Balance of Excursions	...	...	0 16 9	," Rent of Museum	...	...	...	18 0 0
," Sales of Publications	...	...	0 17 9	," Commission to Collector	...	...	...	3 13 0
," Photo blocks sold	...	...	0 12 0	," Donation to <i>Irish Naturalist</i>	...	...	...	2 0 0
," Tickets for Conversazione	...	...	15 2 0	," to Irish Field Club Union	...	...	...	2 2 0
				," Expenses of Lectures	...	...	...	2 12 0
				," Postages	...	...	...	27 13 8
				," Gas, £1 6 7. Insurance, 10/-	...	...	...	1 16 7
				," Prizes	...	...	...	3 0 0
				," Delegate's Entrance Fee to British Association Conference	...	...	...	1 0 0
				," Journal of Archaeology	...	...	...	0 5 0
				," Expenses of Conversazione	...	...	...	16 1 8
				," Balance	...	...	...	12 1 7
								£138 6 1

W. H. PHILLIPS, Honorary Treasurer.

Proceedings.

SUMMER SESSION.

GIANT'S CAUSEWAY.

The Club inaugurated its forty-sixth year with an excursion to the Giant's Causeway on Saturday, 30th May. Thirty-four members and friends met the Secretary, Mr. Robert Welch, M.R.I.A., on the platform of the Midland Railway; three more members joined at Ballymena. Portrush was reached in scheduled time, and, mounting the three electric cars in waiting, the journey to the Causeway commenced. A short distance from Portrush on the shore road the conductor pointed out the section of indurated lias which caused so much controversy in the geological world some years ago, many geologists considering the rock to belong to the basaltic group; further study of the northern rocks, however, showed that the mass was a lias slate, indurated by a fused mass of basalt, which in cooling altered into a syenitic greenstone different from the ordinary basalt of Antrim. On reaching the Causeway a brief halt was made at Kane's Royal Hotel, where the Secretary made the announcement that the President, Mr. Robert Patterson, F.L.S., offered a special prize for the best collection of mineral or rock specimens. The Vice-President, Mr. W. H. Gallway, also offered a special prize for the best collection of plants. After resting a short time, Mr Welch led the way down the pathway, and halted again to examine a good example of concretionary trap, made up of spheroidal lumps of various sizes. Mr. T. Dewhurst, of Queen's College, kindly explained the origin and formation of this peculiar

form of traprock. The party entered on the domain of the Giant's Causeway Company close by the famous Wishing Chair. Mr. William Gray, M.R.I.A., treated the party to an able and most interesting lecture on the formation of the basalt of the Causeway. The members now scattered, botanising and geologising as their individual tastes dictated. The botanists were particularly busy, and noted among the scarcer plants the Mossy Saxifrage, *Saxifraga hypnoides*, and the Swines' Cress, *Senebiera didyma*, also a rare Sandwort ; the early Purple Orchis, the Wood Violet, and the Seapink, *Armeria maritima* were plentifully distributed. The season was rather early for the shore-loving plants, however ; the Sea Milkwort, *Glaux maritima* was just coming into flower. A number of sedges were observed, including *Carex pallescens* and the late blooms of the Marsh Marigold, *Caltha palustris*. In the absence of trees and woodlands the avi-fauna of the place visited is rather scanty, and only thirty-three species of birds were noted during the day.

Owing to the dry conditions prevailing collectors in some of the invertebrate groups were handicapped. The amphipod, *Orchestia littorea*, was noted in profusion above and about high-water mark. Among terrestrial isopods only one specimen each of *Ligia oceanica* and *Oniscus asellus* (probably our commonest species) was seen ; a few specimens of *Philoscia muscorum* were noted, one of them being a beautiful bright canary colour ; but *Porcellio scaber* was found in considerable numbers. A good collection of spiders of divers species was obtained, and several species of Coleoptera and a few Lepidoptera (none of them being uncommon) were identified. After tea at the hotel, a brief business meeting was held, the Vice-President in the chair. There were no competitors for the President's prize. The Vice-President's prize for the best collection of plants was won by Mr. William Porter with sixty-eight species. The members then made their way to the electric cars, which brought the party back to Portrush in time for the 6.10 train.

IRISH HILL.

The Geological Section of the Club held an excursion to the bauxite mines at Irish Hill, Straid, on the afternoon of 6th June. A party of ten members travelled by the 1-30 p.m. train to Ballyclare, where they were met by a local member, Mr. Jas. Strachan, under whose direction the visit to the mines was paid. On arrival at Straid Hill House the geologists were welcomed by the Mining Company's Manager, Mr. Furniss, who very courteously conducted them over the principal workings. A few of the members, lamps in hand, accompanied Mr. Furniss into two of the most important of these, where the geological nature of the beds concerned were studied *in situ*, and the operations of the miner noted.

It may be remarked that the interbasaltic beds at Irish Hill are fine examples of the deposits which were formed from the weathering of basalt and rhyolite during the long period of volcanic inactivity between the eruption of the lower and upper basalts. The upper basalt at Irish Hill is almost 150 feet in thickness, and consists of three distinct flows, the two uppermost flows being compact, and the other typically amygdaloidal. Between the upper basalt and the lower is a typical group of interbasaltic beds, including lithomarge, pisolithic iron ore, aluminous iron ore, bauxite, and lignite. The lithomarge is over 40 feet thick, and the other beds, varying in thickness from 15 inches to 6 feet, overlie the former. The pisolithic iron ore passes gradually into aluminous iron ore, and the latter gradually into bauxite, with which is associated the lignite, both as underlying strata, and included lenticular beds. The iron ore represents the ultimate product of the weathering of the basalt; and the bauxite probably represents in a similar fashion the final result of the weathering of the rhyolite. The bauxite contains rolled quartz crystals in profusion, and these crystals are identical with the quartz of the rhyolite. The interbasaltic beds are, according to Sir A. Geikie, lacustrine deposits, and there is no doubt that the sedimentary

nature of the upper portions of these beds at Irish Hill gives strong evidence in support of such a theory. The exact chemical processes involved in the decomposition of the basalt and the rhyolite, producing iron ore and bauxite, *i.e.*, oxide of iron and hydrated oxide of alumina, have given rise to much conjecture. The rocks generally weather into clays (silicates of alumina) containing more or less iron as hydrate and oxide, and the removal of the silica indicates complicated chemical reactions which are only now beginning to be understood by geologists. It is most probable that the organic matter produced by the decay of the luxuriant vegetation of the interbasaltic period played an important part in bringing about the chemical alterations which resulted in the formation of bauxite.

Prior to leaving Irish Hill for the return drive to Ballyclare, Mr. W. J. C. Tomlinson, on behalf of the members, conveyed the cordial thanks of the party to Mr. Furniss for his kindness in permitting the visit, and for his invaluable guidance during the progress of the inspection. The latter suitably replied, and expressed the pleasure it gave him to receive the Field Club geologists.

After a visit to Wiley's Fort and partaking of tea together at Ballyclare, the party returned to town by the 8-5 p.m. train.

BELVOIR PARK.

The second excursion of the Summer Session took place on Saturday, 13th June, when a large party of members and friends visited Belvoir Park. About one hundred members braved the inclement weather, and, marshalled by Mr. W. J. Fennell, entered Belvoir Park by the Galwally gate, where the party was received by Mr. Alec Wilson, who guided the visitors through the picturesque grounds. The site of the old Knockbreda Church is in a wood near the garden, but no trace remains of the building, although a woodcut of the ruins is given in Hall's Ireland (1841). There is

a holy well close by, now no longer used as such, but still giving an excellent flow of fine water. A good example of a burial mound is on the Lagan bank at the foot of the garden. Worked flints turn up very frequently in the ploughed fields. The late Father O'Laverty gives several references to the history of the district under the parishes of Castlereagh and Belfast. In the midst of scenes redolent of other days it was somewhat of a shock to come upon a concern so extremely up to date as the Belvoir Park Model Dairy. Here the visitors saw cows milked by machinery and the milk cooled by refrigerators, and put into bottles and hermetically sealed, all in the most hygienic fashion.

Mr. Wilson next led the party through the gardens and conservatories. Among the plants specially noted were *Eucryphia pinnatifida*, *Chamærops excelsa*, *Pittosporum mayii*, *Arbutus andrachne*, *Dimorphanthus mandshuricus*, numerous species of bamboos, *Azara microphylla*, *Choisya ternata*, *Calceolaria polyrhiza*, *Primula sikkimensis*, *P. sieboldi*, *P. japonica*, *P. cockburniana*, *P. pulverulenta*, *Meconopsis integrifolia*, *M. wallichii*, *Ramondia pyrenaica*, *Dondia epipactis*, *Sedum spathulæfolium*, &c. Nor were the wild flowers neglected. Not even the heavy rainfall could damp the ardour of the members of the botanical section, who spent a busy afternoon. Among the finds recorded are Sandwort, *Arenaria trinervis*, Bird's Nest Orchid, *Neottia nidus-avis*, Bittercress, *Cardamine amara*, Red Campion, *Lychnis diurna*, Scale Fern, *Ceterach officinarum*, and Mountain Speedwell, *Veronica montana*. Belvoir Park forms a sanctuary for numerous birds, and the ornithologists of the party handed in a list of twenty-five species observed during the afternoon. Among the woodlice the common species *Oniscus asellus* and *Porcellio scaber* were noted, and specimens were taken of the rarer *Porcellio dilatatus* and the Rosy woodlouse, *Trichoniscus roseus*. But in this group the surprising feature was that in the green-houses the most numerous species was *Armadillidium pictum*, of which fully fifty were seen for one of any other species. It is only within the

past three months that this Isopod has been found in the British Islands, having been discovered at Hillsborough and a few days afterwards in Dublin. The heavy rain made a search for the smaller landshells impossible, though Belvoir Park has a number of damp areas in the older parts of the woods, where remnants of the old fauna of Ireland still survive. *Helix lamellata*, for instance, a rare and local species, has recently been added to the Belfast local list from a marshy spot near Gallwally Pond. In the pond itself some members took some exceedingly large specimens of *Sphaerium corneum*, and also found a shell very rare in North-East Ireland—the ear shell, *Limnaea auricularia*, with some other species not common. At five o'clock Mr. Alec Wilson entertained the party to a sumptuous tea. After tea a short business meeting was held—Mr. W. J. Fennell in the chair—when two new members were elected. A cordial vote of thanks was passed to Mr. Wilson for his kind hospitality.

LISSANOURE CASTLE.

The third excursion of the Summer Session took place on Saturday, June 27, when a visit was paid to Lissanoure Castle, Loughguile, permission to hold the meeting there having been very courteously granted by the owner, Mr. C. G. Macartney, D.L. Mr. W. J. C. Tomlinson acted as special conductor for the day, and with him travelled a party of fifty-four members and friends to Dunloy Station by the 9.15 a.m. train from Belfast. Dunloy was reached at 10.45, and the party then drove to Lissanoure. The route lay by Killagan Bridge and Knockahollet, and on reaching the latter point a short halt was made, sufficient to give the party time to visit the fine earthen fort. Those members who visited it were much impressed with the position, state of preservation, and extent of this fine rath. The Rev. J. S. Mairs, of Dunloy, very kindly met the party on the fort, and communicated a good deal of interesting information. A short drive then brought the members to Lissanoure.

The old church of Loughguile was first visited. It is now an ivy-clad ruin, rectangular in form, with a small east window, and the remains of a belfry tower at the west end.

The party, after inspecting the old church, then moved off to the old castle, which stands on elevated ground to the north of the lake. The local Rector (the Rev. Mr. Quinn) joined at this juncture, and was most agreeable and helpful to the visitors. The conductor led the party over the grounds of the old castle, and in regard to the remains themselves gave an outline of their character and history. Mr. Adam Speers, B.Sc., then, by request, gave a short address on the castle and its history.

After inspecting the old castle, the party settled down to lunch, and subsequently broke up into groups, when the members had an opportunity, for three hours or so, of pursuing their individual hobbies and studies. At four o'clock all met again at the castle, and, remounting the cars, a start was made at 4.15 for Ballymoney, which was reached at 5.40. After tea the customary brief business meeting was held, the President, Mr. Robert Patterson, F.L.S., occupying the chair, when three new members were elected. A resolution embodying the thanks of the Club to Mr. C. G. Macartney, D.L., of Lissanoure, for his kindness in granting permission to visit the castle and demesne, was also passed. This resolution was proposed by the President of Queen's College, the Rev. Dr. Hamilton, and seconded by Mr. William Swanston, F.G.S.

The 6-55 p.m. train was taken at Ballymoney, and Belfast was reached at 8-35.

From the ornithological point of view the herony on the island was of course the most interesting feature of the day. Several broods of mallards in the "flapper" stage were noted on the lakes, on which moorhens, coots, and little grebes were numerous. On one of the smaller lakes a few teal were observed, the males just entering into the "eclipse" stage of plumage usual at this season. A pair of mute swans with their

cygnets were seen on Lough Guile, and the male displayed his wonted seasonal pugnacity by attacking and driving round the lake another swan who had invaded his territory. The list of birds observed during the drive and about Lissanoure Castle included thirty-five species.

As regards the flora of the Loughguile district, nothing was known, not a single record from Lissanoure appearing in Stewart and Corry's "Flora of North-East Ireland." It is satisfactory therefore to be able to record the following species for the district :—*Ranunculus heterophyllus*, *Caltha palustris* (double flowered form), *Nymphaea alba*, *Medicago lupulina*, *Lotus pilosus*, *Rosa arvensis*, *Sherardia arvensis*, *Salix pentandra*, *Orchis incarnata*, *Habenaria bifolia*, *H. chlorantha*, *Epipactis latifolia*, *Potamogeton lucens*, *Scirpus lacustris*, *Carex dioica*, *C. binervis*, *C. vesicaria*, *C. acuta*, *C. riparia*, *Molinia caerulea*, *Poa nemoralis*, and one of the water milfoils. The Sweet-scented Orchis, *Gymnadenia conopsea*, was found in plenty on Knockahollet Fort ; and one of the rarer horsetails, *Equisetum sylvaticum*, was observed from the cars on several occasions during the drive. The Bogbean, *Menyanthes trifoliata*, occurred in great profusion in suitable places in Lissanoure. In the woods also the abundance of the fern flora was very noteworthy, specimens of the Broad Fern, *Lastrea dilatata*, and the Lady Fern, *Athyrium filix-fœmina*, measuring five feet in height. *Asplenium trichomanes* and *A. ruta-muraria* occurred sparingly on the demesne walls.

The study of our local woodlice has recently been taken up by some members of the Club, but their efforts at Lissanoure only resulted in the taking of three of the commoner species, all of which were plentiful in the demesne—namely, *Trichoniscus pusillus*, *Oniscus asellus*, and *Porcellio scaber*.

The President's prize for the best list of flowering plants and ferns noted during the excursion was won by Mr. N. Carrothers, whose list contained the names of 148 species. In this

competition the winner was closely pressed by Mr. William Porter, whose list was especially rich in species of the sedge family.

LOUGH SWILLY DISTRICT.

The place selected for this year's long excursion was that portion of County Donegal known as the Inishowen Peninsula, which lies between the Atlantic Ocean on the east and Lough Swilly on the west, and all arrangements for the trip were entrusted to the President of the Club, Mr. Robert Patterson, F.L.S., M.R.I.A. As was to be expected from his ability and experience, everything ran smoothly, and the programme was carried out without the slightest hitch.

Almost fifty members and friends took part in one of the most enjoyable excursions in the annals of the Club's many successful ventures.

The party started from the Northern Counties Station at 8-25 a.m. on the 11th July, and arrived at Buncrana in time for lunch. Immediately after lunch the drive to Dunree Head was commenced under a drizzling rain, which had increased to a heavy downpour by the time our destination was reached, but its effects were minimised by the kind hospitality of the officers of the Antrim Artillery here encamped, who not only granted a refuge in their tents, but entertained their visitors to afternoon tea. A corporal of the Royal Garrison Artillery showed the details of the gun mechanism, &c., and the members viewed with great interest the 4.7 guns, weapons pregnant with reminiscences of Ladysmith. The more active members of the party had descended to the strand of Crummie's Bay and worked up the Owenerk River, where they found the Royal fern and the Irish spurge, this being one of the two known Northern stations for the latter plant. At six o'clock the cars were again mounted, and justice was meted out to an excellent dinner served shortly after our arrival in the hotel.

On Sunday no official programme is announced, and members are free to pass the time as they wish. Many of the members explored the places of interest in the neighbourhood of Buncrana, whilst some took the opportunity of visiting the sand dunes and strand of Culdaff, on the eastern shore of the peninsula.

The programme for Monday consisted of a visit to Pollan Strand. On arrival at Ballyliffan all proceeded to the strand, which stretches northward for some two miles, backed by extensive sand dunes, which afforded ample space for the collectors. Beside the ruins of Carrickabraghy Castle a delightful *al fresco* lunch was served, and after its disposal the members scattered to follow their varied pursuits, all joining again at the southern end of the strand at four o'clock to partake of afternoon tea.

The geologists found the sand-dunes most interesting and instructive. Grotesque masses of cross-bedded calcareous sands, weathered into all sorts of fantastic shapes and forms, some forming natural arches, were noted overlying soft blown sands, earthy below and full of land shells, some lower zones being full of *Helix nemoralis*. To the archaeologists also this place proved a happy hunting-ground ; and its kitchen middens yielded a bronze pin, bone needles, stone implements, and many interesting relics of prehistoric man. Nor were the botanists and zoologists idle, for large collections of plants and animals were secured and brought home for investigation. But for the workers the day had passed all too quickly away, and all assembled again at Ballyliffin Station in good time for the 6-55 train, which conveyed them back to Buncrana. After dinner the customary business meeting was held, when the President welcomed the distinguished visitors who had participated in the proceedings. These included Rev. W. L. Carter, M.A., F.G.S., one of the sectional secretaries of the British Association ; Professor W. E. Praeger, M.Sc., of Kalamazoo, Michigan, U.S.A. ; and Mr. Hugh M'Kinney, M.E., of Australia, formerly of the Indian Civil Service. On the motion of Mr. Adam Speers, B.Sc., seconded by Miss C. Cocking,

Huddersfield, and supported by Rev. W. L. Carter, a cordial vote of thanks was accorded to Mr. Robert Patterson, to whose strenuous exertions the success of the excursion was entirely due, and Mr. Patterson thanked the members in felicitous terms.

Punctually to time, 9-15 on Tuesday morning, the procession of cars started from the hotel door, our destination being the Mentiaghs Lakes.

Shortly after scheduled time the pass between Lake Fad and Lake Namin was reached and work commenced. Some of the members ascended "The King of the Mentiaghs" (Barnan More, 1,044 feet), while others were content with the ascent of the neighbouring lower peak, "The Queen of the Mentiaghs." The botanists and zoologists, visited Lake Fad and afterwards Lake Namin, which contains two elevated and wooded islands. To one of these access proved possible by a causeway, and it yielded *Helix rotundata*, not expected at such an elevation; *Pupa anglica*, not previously recorded from East Donegal, together with many other species of molluscs, as well as dragon flies, spiders, and terrestrial isopods. In the lake was found the somewhat rare plant the Water Lobelia, and around it was observed that bird of the mountain and moorland the ring-ousel. In the time at our disposal only a hurried survey was possible, and we hastened to the lower lake, a mile distant, at the southern end of which the cars were waiting us, which were remounted, the hotel reached at two o'clock, and after luncheon a special train at 3-25 conveyed the party to Londonderry. Here conveyances were in waiting to bring the members to the Municipal Museum, Brooke Park, where they were introduced to Mr. J. P. Roulstone, J.P., chairman of the Parks and Museum Committee, and Mr. W. J. Robinson, city surveyor, representing the Corporation, by Mr. D. C. Campbell, J.P., the founder and honorary curator. Mr. Campbell then conducted the members through the museum and explained the scheme followed in arranging the exhibits.

The Derry Museum was commenced some four or five years ago. The Corporation gave for the purpose some rooms in the building in Brooke Park, and eventually agreed to take over the project. The rooms were put in order, a heating system was introduced, and a small sum was set aside for cases, &c.

The scheme proposed by Mr. D. C. Campbell was accepted, and he was appointed Honorary Curator, Mr. E. M'Court being appointed taxidermist and caretaker.

Money and specimens were generously given by the public. The National Museum, Dublin, lent many specimens, and the Ulster Marine Biological Association sent a collection of marine objects. The scheme of the Museum is as follows:—In Zoological and Botanical Sections two geographical units are adopted.

A.—General or world-wide.—In this, the aim is to view types of every family in all the different classes of animals and plants, except in the case of some of the lower Invertebrates, where the classification is more or less uncertain; in these orders and sub-orders will be represented. In large families many, and in small families few, specimens will be shewn. Distribution and some general information about the families will be given on all the labels.

B.—Local.—In this Section the aim is to shew every species of animal and plant that occurs in our North-West District, from Donegal Bay to Larne.

Practically the same scheme will be carried out in the Geological Section.

The animal and vegetable kingdoms, divided into sub-kingdoms and classes, will be shewn in an ascending scale in small wall cases within two spaces of 30 feet each, and cases and diagrams explaining and illustrating classification, protective form and colouring, &c., will also be shewn.

The scheme is intended to be thoroughly popular, but at the same time strictly educational.

So far progress has only been made in the Zoological and Geological Sections. When further funds are forthcoming the Botanical Section will be taken in hand, also the Archaeological and Ethnological Sections. Many interesting specimens in these sections have been received.

The museum reflects the greatest credit on Mr. Campbell's talent and energy, and must prove a valuable factor in the educational life of the city and district.

We then wended our way to the Northern Counties Railway Station and took places for the homeward journey in the special saloon carriage attached to the 5-40 train. Belfast was reached punctually to time, and the members dispersed to their respective homes thoroughly delighted with the recollections of one of the Club's most enjoyable and profitable excursions.

During the four days sixty species of birds were observed—the average number per day being thirty-nine—and the ornithologists' report shows that they have no reason to regret the time spent here. Large collections of insects, crustaceans, spiders, and molluscs were obtained and preserved for future examination and classification.

Working botanists with a good knowledge of plants were, unfortunately, not well represented on the excursion. The Conductor, therefore, secured from friends who were unable to join the party a number of collecting cases, and these were judiciously distributed amongst some members who undertook to assist in making collections. The net result, though not all that could have been wished for, was very creditable to the friends who took charge of vasculums and filled them with plants, many of which were of very interesting species.

The "Flora of Donegal," by Mr. H. C. Hart, is quite a new and standard book, and it was not expected that much could be added to the final results of Mr. Hart's long years of unremitting botanical labour. An examination of the plants collected during

the excursion revealed the following by no means very common species:—*Cakile maritima*, *Silene maritima*, *Lychnis diurna*, *Sagina nodosa*, *Hypericum tetrapterum*, *Malva sylvestris*, *Agrimonia eupatoria*, *Epilobium hirsutum*, *E. palustre*, *E. parviflorum*, *Eryngium maritimum*, *Conium maculatum*, *Œnanthe Lachenalis*, *Arctium Lappa*, *Carduus pratensis*, *Crepis virens*, *Symphytum officinale*, *Scrophularia aquatica*, *Veronica anagallis*, *Melampyrum pratense*, *Chenopodium bonus-henricus*, *Salix repens*, *Juniperus nana*, *Orchis latifolia*, *O. incarnata*, *Habenaria chlorantha*, *Juncus maritimus*, *Scirpus maritimus*, *Carex arenaria*, and *Psamma arenaria*. To north-east botanists still rarer species were *Sedum rhodiola*, *Lobelia Dortmanna*, collected on the Tuesday at the Mentiaghs lakes, and the Irish Spurge, *Euphorbia hiberna*, gathered on the Saturday by the river bank at Dunree Head. This is now believed to be the only Ulster station for this rare spurge. It was first discovered here in 1796 by Robert Brown, then stationed with his regiment in Derry, and only re-found in 1891, by a local botanist, Mr. J. Hunter. Two other species of phanerogams collected by one of the party are:—*Myriophyllum spicatum* and *Briza media*, both scarce and very local Donegal plants, and neither of which have, it would seem, been recorded for the Inishowen district hitherto. The collections made contained very few cryptogamic plants, and these were mostly Ferns. Only one Horse-tail, namely, *Equisetum palustre* was collected, and only one Lycopod, the Fir Club-moss, *Lycopodium selago*. The rarest fern seen was the Royal, *Osmunda regalis*, which was noted in perhaps what is now its only Inishowen station, it having fallen a prey to the rapacity of greedy collectors. Other ferns noted as occurring sparingly were:—*Asplenium trichomanes*, *A. marinum*, *A. adiantum-nigrum*, and *Polypodium vulgare*. One member recorded *Lastrea oreopteris*, which seems likely enough, as Mr. Hart found this fern at Clonmany, which is in the immediate neighbourhood of the area visited on this occasion by the Field Club.

LAGAN CANAL. (HALF DAY).

The fifth excursion of the Summer Session took place on the 25th July, when the Club visited the Lagan Canal under the able guidance of Mr. N. H. Foster, M.B.O.U.

The courteous Superintendent of the Great Northern Railway had reserved special carriages attached to the two o'clock train, and in less than half an hour Hillsborough was reached, where some local members were waiting the arrival, Lisburn and Portadown members having joined *en route*. From this stage forty members and friends took part in the proceedings. A walk of less than a mile brought the members to Newport Bridge, where the Hillsborough to Antrim road crosses the canal. Soon the collectors were busy searching and examining, and many treasures rewarded the ardent devotees.

After a walk of two and a half hours along the canal banks Lisburn Bridge was reached, and all wended their way to the Temperance Institute, Railway Street, where a welcome tea awaited the members.

After tea, a short business meeting was held—the Vice-President (Mr. W. H. Gallway) in the chair.

The members then dispersed, some taking the opportunity of visiting the Cathedral and other places of interest in Lisburn ere returning to their respective homes by the frequent trains from this town. The walk from Hillsborough to Lisburn was a most interesting one to the botanical members of the party. Perhaps there is no district near Belfast where so many water-loving species of plants are to be found in profusion. A very noticeable feature, too, of the botanical display here afforded by Nature was the zoning of the vegetation. By the hard dry margin of the tow-path one class of plants flourished; then an inner zone nearer the canal supported another distinct series. Finally, those plants which find their genial habitat in the water itself formed several zones. On the very margin were tall species of grasses, and the

Sweet Flag, *Acorus calamus*. In deeper water grew the Arrow-head, *Sagittaria sagittifolia*, and in the deepest parts the Canadian pond-weed, *Elodea canadensis*. The scarcer and more interesting plants collected during the walk included *Nuphar luteum*, *Apium nodiflorum*, *Nasturtium amphibium*, *Œnanthe phellandrium* (horsebane), *Lycopus europæus*, *Epipactis latifolia*, *Sparganium simplex*, *Butomus umbellatus*, *Carex vulpina*, and *C. remota*.

The ornithologists reported having observed 35 species of birds during the afternoon. Good collections of fresh-water molluscs were obtained, including *Planorbis carinatus*, typical specimens; *Bythinia tentaculata*, very abundant, and many with the spires eroded; *Physa fontinalis*, full-grown and fairly abundant; *Sphaerium corneum*, very large; *Limnæa peregra*, very small and scarce; *L. palustris*, very fine specimens; *L. stagnalis*, young; and *Succinia putris*, all small. A few of the common land molluscs were also noted. Fresh-water sponges were found in the canal and taken for further study, and a fine collection of diatoms, cladocera, and other microscopic species of water inhabitants was made for future investigation. Numerous captures of butterflies, moths, beetles, &c., also rewarded the energetic collectors, and the excursion yielded ample material for subsequent examination.

CARLINGFORD.

The sixth excursion of the Summer Session was held on the 8th August, when the Club visited Carlingford. The organiser and conductor of this excursion was Mr. Nevin H. Foster, M.B.O.U., and forty-eight members and their friends placed themselves under his able and experienced guidance for the day. At 9-30 a.m. the members assembled at the Great Northern terminus and were given places in reserved carriages. Shortly after scheduled time our destination was reached.

The conductor led us first to the remains of the old priory, which were inspected with much interest. "This fallen shrine

was a Dominican monastery, founded in 1305 by Richard de Burgh, Earl of Ulster, under the invocation of St. Malachy. The ruin has been used as a quarry for stone for building houses in the locality, and there are now no architectural details of interest left of this once beautiful priory." Having inspected these venerable ruins, the party left for the castle, passing under the arched gateway of the "Tholsel," said to have been one of the gateways of the ancient town.

In 1210 King John's Castle was erected. Its form is irregular and unshapely, with arched recesses at each loophole capable of holding four or five archers. It is said to have been the first building of note in Ireland "erected to further carry out the original policy of Henry II."

Here lunch was partaken of, the members enjoying the extensive view of the County Down mountains across the placid waters of Carlingford Lough.

The party now separated into groups and scattered over the country. Some re-visited the many ancient buildings of the town, others ascended the mountains, and while the botanists contented themselves on the lower slopes, the entomologists went to the very top in search of the tarns and peat-holes that contain their treasures. The geologists spent almost the entire day in the extensive quarries near the town. Many searched the lowlying land between the town and Greenore, and raided the seashore and rock-pools.

At five the party re-assembled at Clematis Cottage, where tea was partaken. A short business meeting was held outside the station, the President (Mr. Robt. Patterson) in the chair. The train was then taken for Belfast, and all arrived safely at 8.45 p.m.

The extremely dry state of the ground proved unfavourable to the collectors in some of the invertebrate groups, but in that of the terrestrial isopods, or woodlice, the following seven species were obtained:—*Ligia oceanica*, *Trichoniscus pusillus*, *Oniscus*

asellus, *Philoscia muscorum*, *Porcellio scaber*, *P. pictus*, and *Armadillidium vulgare*—five of these being recorded from County Louth for the first time.

Owing to the variety of habitats available—old limestone quarries, debris of old buildings, marsh drains, gravelly shores, &c., the conchologists looked forward to a good time. Twenty-three species in all were noted, and this included two of the xerophile or dry-habitat loving species that are scarce in North-East Ireland; also an extremely rare species, *Melampus bidentatus*. It is known from very few localities in Ireland. The form of the common *Littorina rufa* was noted to be different from those found on open seabards, and quite a number were the turreted form. The edible mussel, which is usually anchored to rocks by a byssus, or mass of strong threads, was in many cases here noticed living free on the muddy flats except for five or six little pebbles attached to it to anchor it more or less in from wave action or tidal currents. One specimen was obtained in which rude pearls were being formed in the animal's attempt to repair a serious injury.

The list of birds noted during the day was very meagre, but the President's prize for the best list was won by Mrs. Nevin H. Foster.

The botanists reported the following amongst the less-uncommon plants found during the day in the vicinity of Carlingford:—*Selaginella selaginoides*, *Polypodium phegopteris*, *Glaucium flavum*, *Eryngium maritimum*, *Senebiera coronopus*, *S. didyma*, *Malva rotundifolia*, *Chenopodium bonus-henricus*, *Atriplex farinosa*, *Pinguicula lusitanica*, *Crambe maritima*, *Fæniculum officinale*, *Parnassia palustris*, *Orobanche minor*, *Gentiana campestris*, *Sagina nodosa*, *Eleocharis uniglumis*, *Cichorium intybus*, *Juncus glaucus*, *Leontodon hirtus*, and several varieties of Lady Fern by Mr. Phillips. A beautiful incised variety of the Lady Fern, *Athyrium filix-femina*, was found by Mr. William Porter, and was very much admired by all who saw it.

DUNDRUM.

An interesting and delightful afternoon was spent on the 29th August, the place selected for the ramble being Dundrum and the picturesque district lying between it and Newcastle. The party which numbered thirty-two members and friends, travelled by the twelve o'clock Newcastle express. Mr. W. H. Gallway, the vice-president, acted as conductor, and immediately on arrival at Dundrum led the way to the well-known Castle. The ruins as they exist to-day consist of a great circular tower, about 46 feet high, and surrounded by the remains of other towers and outworks, and enclosed by a massive wall. The rock now occupied by the ruins was a military position from a remote period.

Dundrum is a happy hunting-ground for the botanist, the old walls about the town and castle being noted as the habitats of some rare species of plants, such as the very rare Rock Cress, *Arabis hirsuta*, on walls about the old Castle tower the Wall Pellitory, *Parietaria officinalis*; other rare species found during the afternoon being *Thalictrum dunense*, *Erodium moschatum*, *Echium vulgare*, *Polygonum Raitii*, *Euphorbia paralias*, the Horned Poppy, *Papaver glaucum*, the Saltwort, *Salsola kali*, and *Filago minima*. The best find of the evening, however, was getting that doubtful native, the Oyster Plant, *Mertensia maritima*, growing on the shore about midway between Murlough and Newcastle. One specimen of the Sea Holly, *Eryngium maritimum*, was noted as growing in the same locality.

Having given ample time for lunch, examination of the ruins, and collecting botanical rarities, the conductor's whistle gathered the party together for the walk to Slidderyford, *via* the county road, to examine its very perfect cromleac, standing in a potato field at the side of the road. A move was next made on to the sand dunes. Working slowly in the direction of Newcastle a sharp lookout was kept, as besides flint implements, the extensive

sand dunes afford a congenial home for many species of plants. Especially interesting was it to note the physical influence of the marram grass, *Psamma arenaria*, in binding together the loose shifting sands of the dunes.

Six species of bees were noted, one being a rare variety—*Bombus agrorum*, *B. latreillellus*, *Var disinguendis*, *B. hortorum*, *B. lapidarius*, *B. culumanas*, and *B. terrestris*. Owing to the season of the year and the wet day the list of birds observed was very small.

Newcastle was reached about 4-30, and, after a rest, all adjourned to the Railway Refreshment Rooms for tea at six o'clock.

After tea a brief business meeting was held, the President of the Club (Mr. Robert Patterson, F.L.S.,) occupying the chair. The President referred to the success of the Club's excursions during the summer, the average number present being fifty-three, and expressed his satisfaction with the scientific work done on these excursions. The meeting was concluded with a cordial vote of thanks to the Vice-President (Mr. W. H. Gallway) who acted as conductor during the day.

Before breaking up Mr. William Gray, M.R.I.A., showed the members some specimens of hydrozoa picked up on the shore, and kindly explained its life history and economy, which was both interesting and instructive, and was much appreciated.

Winter Session.

NOTE.—*The authors of the various Papers of which abstracts are given, are alone responsible for the views expressed in them.*

ANNUAL CONVERSAZIONE.

The Club inaugurated the Forty-sixth Winter Session as usual by a Conversazione in the People's Palace, on 27th October. There was a large attendance of members and their friends, including representatives from both the Dublin and Omagh Field Clubs. The varied character of the exhibits provided all with interesting matter for examination and discussion; this being especially the case where living animals such as Professor Gregg Wilson's Jerboas, and Mr. F. Balfour-Browne's Water Beetles were exhibited. Many of the exhibitors had gone to much trouble to make their collections of real educational value to those who take only a general interest in Natural History, and they gave little lecturettes on them during the evening.

Tea was served from seven till eight o'clock, Mr. Henry, of Ye Olde Castle Restaurant, carrying out the catering in a satisfactory manner. The tea tables were decorated with plants and flowers kindly sent by Mrs. Forster Green. The exhibits were as follows:—

ZOOLOGY.—Mr. F. Balfour-Browne, M.A., had a representative collection of British and Irish water beetles; Mr. N. H. Foster, M.B.O.U., showed some rare Irish woodlice, including four species not known in Ireland till the present year; Mr. J. Hamilton displayed an interesting case of insects, and the Rev. W. F. Johnston, M.A., F.E.S., had a fine exhibit of British

insects. Mr. N. Carrothers showed a clutch of nightjar's eggs found by him in County Down. Mr. James Orr exhibited a collection of the eggs of domestic fowls, showing variation in size, shape, colour, &c. Among the most popular of the exhibits was Mr. W. H. Gallway's collection of living marine animals, which were collected by him locally, and included fine specimens of *Actiniæ*, *Echinodermata*, *Crustacea*, &c.

Three really excellent collections of land and fresh water shells were shown by Mr. J. N. Milne, Mr. R. Welch, and Mr. A. W. Stelfox, the latter exhibit showing fine variation of one of our common land shells. Mr. W. F. M'Kinney's exhibit included leaf insects from Ceylon, showing protective mimicry. Mr. H. L. Orr had an interesting display of local wasps and wild bees. The President of the Club (Mr. Robert Patterson, F.L.S.) showed the eggs and young of the Common Scoter taken by him in Ireland this year and shown for the first time, and a young tern in curious intermediate plumage. Professor Symington, M.D., F.R.S., excited much interest with his skiagrams of developing teeth, as did also Professor Gregg Wilson with his illustrations of vertebrate teeth.

BOTANY.—Mr. N. Carrothers, plants from the Isle of Wight, &c.; Rev. Canon Lett, M.A., M.R.I.A., some mosses under cultivation; Mr. W. H. Phillips, choice varieties of British ferns and some growing specimens of new ferns; Mr. W. Porter, fronds of *Athyrium* raised from spores, varieties of *Blechnum Spicant* from the Mourne Mountains; Mr. R. Lloyd Praeger, B.A., M.R.I.A., varieties of ferns recently found in Ireland; Mr. W. H. Robinson, plants from French Guinea; Mr. W. J. C. Tomlinson, flowering plants collected recently in the Folkestone district; Rev. C. H. Waddell, B.D., mosses, lichens, and fungi, the latter collected fresh by Mr. W. F. M'Kinney at Carnmoney.

GEOLOGY.—The geological section included a very instructive local exhibit on the geology of Cave Hill by Mr. Wm. Gray, M.R.I.A. Among other exhibits might be mentioned—Miss M.

K. Andrews, the very rare mineral Andrewsite, from Cornwall ; Mr. R. Bell, minerals from the basaltic rocks of Antrim and Derry ; Mr. C. Bulla, fossil fish remains ; Mr. T. Dewhurst, A.R.C.Sc. (Lond.), specimens to illustrate certain physical and optical properties of minerals ; the use of heavy liquids for the separation of mineral particles ; Mr. W. J. Fennell, F.R.I.B.A., fossil plants ; Mrs. W. A. Green, prize set of Liassic fossils ; Mr. J. Strachan, photomicrographs of dendritic growths of copper oxide in paper ; series of quartz specimens showing variety of form, and specimen illustrating the opal deposits of Sandy Braes, Co. Antrim. The Secretaries exhibited for Mr. J. W. Jackson of Manchester Museum, a Fossil Trilobite, *Phacops*, and a large South American recent Isopod, resembling it in several ways, also section of Ammonite to show the narrowing of the chambers in old age.

MISCELLANEOUS.—Mr. R. A. Dawson, A.R.C.A., specimens illustrating the experimental work in pottery-making recently carried out by the late Mr. John Donaldson, for many years a member of the Field Club ; Mr. Francis C. Forth, A.R.C.Sc.I., physical and mechanical apparatus ; Mr. W. A. Green, natural history photographs mounted as *passe-partouts* ; Mrs. Hobson, rubbings from and drawings and photographs of the great burial mounds, Loughcrew, County Meath ; Mr. Robert May, Ulster rushlight-holders and iron candlesticks, a very large and complete collection, showing evolution of form ; also some allied subjects ; Mr. A. B. Morris, photographs of wild flowers, birds' nests, &c. ; Mr. George Raphael, arrowheads (a very fine collection) ; Mr. W. H. Robinson, set of "Kruger" coins ; Dr. J. Rusk, Japanese and Chinese postcards, examples of Japanese handwriting, &c. ; Mr. J. Vinycomb, M.R.I.A., framed drawings and photographs of illuminated pages ; Mr. R. Welch, M.R.I.A., photographs of places visited on Club excursions, 1908. Distinctly educative in character were the microscopic demonstrations given by various members. Miss M. K. Andrews showed a microscopic section of

a dolerite dyke, Scawt Hill ; Mr. Joseph Wright, some recent foraminifera from the coasts of Antrim and Dublin ; Mr. T. Dewhurst, microscopic sections of some rocks of economic importance ; Professor Gregg Wilson, various zoological subjects ; Mr. Sylvanus Wear, microscopic sections of wheat, brans, &c. Among so much that was excellent it was difficult to particularise, but special mention must be given to Mr. J. Maxwell's splendid exhibit of microscopic pond life, &c.

By special permission the workshops of the Cripples' Institute were open for inspection during the evening, thus giving the visitors an opportunity of observing the working of one of the finest philanthropic schemes in our city. In well-appointed workrooms the cripples were seen working under the happiest conditions at such trades as bootmaking, basket-making, and lacemaking. It would be impossible to praise too highly this magnificent effort to make easier the lives of those so cruelly handicapped by nature.

At 9-15 the entire company met again in the large central hall, where a short business meeting was held—the President (Mr. Robert Patterson, F.L.S.) in the chair. After welcoming the members, the Chairman referred to the success of the summer excursions, and made special reference to the recent meeting of the British Association in Dublin.

Immediately afterwards a lantern display was given of views mainly taken on the summer excursions of the Club by Messrs. Douey, Hadden, Hogg, Holland, Gray, Green, Marsh, Steers, Welch, and others. This concluded a most successful and enjoyable evening.

PRESIDENTIAL ADDRESS.

"THE ECONOMIC VALUE OF BIRDS TO THE STATE."

By Robert Patterson, F.L.S., M.R.I.A., M.B.O.U.

The opening address was given on Tuesday, 17th November, before a very large audience. The President said :—The subject I have taken for the opening address of the Forty-sixth Winter Session of the Club is one which has been greatly overlooked in Great Britain. The reason is not, perhaps, far to seek. We are all too apt to notice only the obvious, the striking things ; we remember the great storm ; dates are counted from "the year of the big flood," or "the big wind" ; while we forget the gentle breezes that bring the summer birds to us, or that caused the willows to be fertilized ; we forget the light rains and the soft dews that are absolutely necessary if life is to continue on the globe. To take a somewhat local instance ; we remember the noise and shouting of the blatant street-preacher, while the quiet and practical worker among the slums is unknown or overlooked. It is only quite lately, within the lifetime of the youngest of us, that we have begun to realize it is the small, trivial, apparently weak things that really count with us in our lives ; that we can no longer afford to despise our enemies because they are small, or because a single *one* could do little harm. Perhaps, in the public mind, the most striking as well as the most recent proof of this will be associated with the work of Major Ross. To take one instance near home ; the total population of Greece is only about $2\frac{1}{2}$ millions, yet in 1905, nearly one million Greeks were attacked with malaria, and nearly 6,000 died. Malaria is due to multitudes of minute animal parasites of the blood ; how do they get into the blood ? Through the bite of a gnat similar to the gnats and mosquitoes we know in this country. This important discovery was made in 1898 by Major Ross, and gnats at once

sprang into importance. Other examples could be given, but perhaps I have said enough to remind you that it is the *little* things that really count with us, and that their importance is only just beginning to be recognised.

Let us see if we can arrive at any idea as to the number of birds that live in Ireland for six months of the year—April to September. At best it can only be a rough estimate, but it shall be a low one. There are roughly 20,500,000 acres in Ireland; if we take the average number of pairs of breeding birds as three to the acre, it will, I think, be below the actual figure. I consulted both ornithologists and farmers on this point, and the estimates varied from three to twenty per acre, but by means of a careful calculation, in which I have been assisted by my friend Mr. Foster, I have come to the conclusion that three per acre is a fair number to take. In this connection, I may add that in one protected estate in Germany, of 12 or 13 acres, the average number comes to about 40 pairs per acre, but of course this is quite exceptional. On the one hand, we have to think of the numberless large colonies of birds such as Rooks, Jackdaws, Gulls, the Swallow family, etc., where the average number per acre would be immensely higher (at Rash Wood, in County Tyrone, the rookery there has been computed at 10,000 nests), and, on the other hand, we must remember the barren mountain or bog, though even on the barest mountain Curlews, Golden Plover, Snipe, Grouse, or Meadow Pipits would probably make up the low average I have taken. However, not to be accused of exaggeration, let us take the average number as three pairs to the acre. This low figure gives us the number of over 61 million pairs of breeding birds in Ireland during the summer months—more than thirteen times the present total human population. Each nest will contain on an average four young—that is under the actual average—I found a Tufted Duck's nest of 17 eggs last June)—and thus we get the enormous number of 246 million bird mouths to be fed in this country. Let us allow liberally for the loss of eggs and young that we know

goes on, and let us take 200 million of mouths as our figure. It is almost impossible to grasp such figures, yet I believe them to be under the mark, for many birds rear more than one brood in the season. The taking of birds' eggs in Ireland is not nearly so common as in England, and we know that there are many non-breeding birds to be found. This may be taken roughly as the summer land-bird population of Ireland, without counting at all on the numberless hoards of sea-colonies, which take their food from the sea alone.

Many of these summer inhabitants leave us in the autumn, but if they do, their place is taken by immense numbers of winter birds, which live with us for the other six months of the year. Unless one is a close student of migration, one has little idea of the enormous stream of birds that comes to us every autumn and winter—for if the weather in England and Scotland is very severe, we receive large numbers of their starving birds in December and January—perhaps this is another injustice to Ireland. I wonder could I give you any idea of the huge numbers that we always get in autumn, but which only sometimes come before us by means of the Migration Reports. It is well known that Mr. R. M. Barrington has devoted years of study to this subject, and has received many thousands of reports from the lightkeepers on the lightships and lighthouses round the Irish coast (58 in number). These he published in 1900 in a most valuable volume. Let me give you a few extracts. The light seems to exercise a fatal attraction for birds, which kill themselves by dashing against the glass of the lantern.

"In October, 1897, the lightkeepers at the Tuskar Rock (off Wexford) report from 500 to 600 Blackbirds and Thrushes killed *each night* from the 20th to the 23rd, and this represents only a small proportion of the great wave of Thrush migration then in progress."

"Hook Tower, Wexford, October 18th, 1893; large flocks of Starlings near Station, the flocks being 70 or 80 yards long."

" Rathlin O'Birne (Co. Donegal), October 31st, 1896 ; three very large flocks of Starlings going E. between 9 and 11 a.m., these being the largest flocks I ever saw, I should say about 2,000 were in one flock. It was like a cloud."

" Dungarvan, Waterford, November 24th, 1897 ; a flock of some thousands of Starlings going N.E."

Everyone knows the superstition about the Magpie, "one for sorrow, two for joy," etc., and most of us have seen a certain member of the Club lifting his cap to every Magpie he meets ; he would have had a busy time of it if he had been at Hook Tower, Co. Wexford, on October 18th, 1893. The lightkeeper there reports, " Magpies very numerous close to Station, probably between 150 and 200."

" Rockabill (off Dublin), November 1st, 1891. Countless numbers of Blackbirds, Thrushes, Starlings, and a few Fieldfares from 9 p.m., to 4 a.m. ; 16 Blackbirds, 9 Thrushes, 21 Starlings, and one Robin killed striking.

" Loop Head, Co. Clare, 1893 ; within half a mile of the Station, I counted over 400 dead birds along the road."

The above few examples of the autumn migration will give us an idea of the vast and countless hordes of birds that come to us every autumn. The following instances show that we receive enormous numbers from England and Scotland whenever the weather there is very severe.

An extraordinary rush at the Copeland Lighthouse, off Donaghadee, on the night of the 20th February, 1890, is thus described. " Immense swarms of birds round lantern from 10 p.m. to 4 a.m., Larks, Blackbirds, Thrushes, and Starlings. The air was filled with birds. The balcony outside was completely covered with killed birds ; they were five or six deep all round, so to walk round would be walking on dead birds. Numbers got through the cowl into the lantern. The lantern glass was so much soiled both inside and out that eight buckets of water had to be carried up the next day to wash it."

"Maidens, off Larne, February 21st and 22nd, 1890; great rushes of birds, chiefly Thrushes, Blackbirds, Redwings, Curlews, Lapwings, Starlings, Skylarks, and Yellow Hammers; 110 Skylarks, 14 Redwings, 6 Thrushes, 11 Blackbirds, 8 Starlings, 3 Yellow Hammers, and 2 Lapwings killed striking."

Further evidence as to the wonderful numbers of different species of birds that are here in some winters, can be found in Mr. R. J. Ussher's standard work on the "Birds of Ireland." He says:—"A gentleman, writing from County Donegal in December, 1882, said, 'A flock of 300 or 400 Magpies visited us the other day.' In snow, a fresh immigration of Skylarks takes place, a tide of birds flowing into Ireland in tens, hundreds, and thousands."

Sir Ralph Payne-Gallwey describes the number of Woodcock that were taken in Counties Kerry and Clare during the frost of January, 1881, when he counted 800 laid out on benches on one occasion; they were not only shot but killed with sticks and stones, and brought for sale by the peasantry in sacks.

Colonel Vernon informed Mr. Ussher that during a portion of the severe winter of 1880-81 he shot in County Kerry 1,073 Snipe, and could have killed a much larger number; the same winter a well-known Snipe shooter is said to have got as many as 1,376 Snipe in the County of Clare.

These are rather dry extracts, which perhaps I should apologise for quoting at such length, but my reason is to try to bring before you some idea of the huge and countless numbers of birds that spend the winter here with us in Ireland. Therefore, I think we may fairly say from the figures I have already given that the number of birds that are always with us works out into amazing and unsuspected multitudes.

What do these birds live on? Surely such a huge population must require a huge amount of food. Let us see if we can form some rough idea as to this.

The activities of birds are immense ; life fevers through their veins, their temperature being from 2 deg. to 14 deg. Fahr. higher than that of Mammals. To support this vitality a relatively enormous amount of food is required. Mr. Oliver G. Pike puts this in a striking and amusing manner. "If *we* had only the appetite of a bird, we should each consume, in proportion to the quantity of food they eat, the following :—for breakfast, 1 dozen eggs, a full-sized loaf of bread, and 20 pork sausages. Lunch would consist of 6 pounds of steak, half a loaf of bread, followed by 2 legs of mutton and a fair sized plum pudding. For afternoon tea we should just have a fruit cake weighing about a pound, and our dinner would consist of 2 pounds of fish, a whole fowl, 4 pounds of roast beef, with 10 potatoes, and 2 large cabbages, followed by a pudding weighing 6 pounds, and 4 pounds of fruit. Not a bad day's work for one person. Yet this, weight for weight, and bulk for bulk, is less in proportion than some birds will consume in one day."

Even a greater amount of food is needed by the young, for while in the nest the rate of growth is very remarkable. You see on the screen the first week in the life of a young blackbird, photographed each day at the same hour. The marvellous growth here shewn must mean the consumption of a large amount of food. In the case of another species, the brood was carefully weighed each day, and the increase noted. During the *first day* the average gain in weight of the nestlings was 48 per cent., and in six days their weight was very nearly three times what it was. Such growth entailed the constant attendance of the parents, who visited the nest at intervals of from two to five minutes from daybreak to dark. Or take the case of a pair of Blue Tits, which a patient lady watched for one whole day. They frequently visited their seven or eight young six times in the space of five minutes, each time bringing two or three small green caterpillars. They kept this up for 16 hours, so that this one pair of Tits destroyed over

2,000 caterpillars in that one day. And a Robin is known to have eaten 14 feet of earthworms in one day.

Take our 62 million pairs of breeding birds. Say that one-third of them have young at any one time. Let the parents visit the nest with food every five minutes for only ten hours per day; the basis we take is low enough, yet it means that over 25 hundred million meals are furnished to our infant birds *each day* during the breeding season!

With these awful figures before us, we may reasonably ask how do these birds affect us—do they cost us anything, or save us anything? Speaking in general terms and of our birds as a whole, the mortifying confession must be made, that we do not know. Take up any of our standard works on British Birds, and with the exception of one family, you will not find any *detailed* information as to their feeding habits to prove whether they are useful or not. This want of knowledge was clearly admitted by the Third International Ornithological Congress, which met at Paris in 1900, and which passed a resolution requesting the different nations to institute researches into the question of the feeding of birds. Reports of the results of the researches were to have been brought forward at the Fourth Congress, held in London in 1905; but of all the nations, Hungary was the only country that could produce any results in this field. At the Dublin meeting of the British Association for the Advancement of Science this autumn, Section D provided an object lesson in this want of proper scientific knowledge amongst us. Two of our best known bird men took entirely opposite views as to the usefulness or harmfulness of one extremely common bird. The one spoke as a farmer, the other as a bird-lover, and when they had done we were no wiser than before. In a question such as this, we must use neither the rose-tinted glasses of the sentimentalist, nor the smoked glasses of the farmer or gardener; we must rely upon the glasses of the microscope in the hands of a properly qualified investigator. He must not only

be an Ornithologist, but he must also have a knowledge of Entomology and Botany.

Three methods are employed by the economic Ornithologist in studying a bird's food :—

1. The bird may be caged in order that its likes and dislikes, as well as the quantity of food it will consume in a given time, may be ascertained.
2. The bird may be studied in nature.
3. The contents of a bird's stomach may be examined.

The first is too narrow and artificial. The second may be entirely misleading, for it is not always easy to determine by watching it what a bird really eats ; the third yields the only definite and satisfactory results, and is the one that should be employed by the State to ascertain its friends and its foes. It will be found without question, I think, that the "friends" vastly outnumber the "foes" judging by results obtained by another, and, on this question, more enlightened, country.

The examination of the stomach contents of the dead bird has been well called "The Court of Final Appeal." Let me now give you an outline of the meagre information we have in these Islands as to the result of this Court of Final Appeal. But first, let me point out that in this respect, as in so many others, our Belfast Naturalist, whom we are all so proud to own—the late William Thompson—was a pioneer.

The only careful, detailed and *prolonged* investigation into the food of three common British birds that I know of, was that carried out by Sir John Gilmour in the County of Fife in 1894, into the food of the Wood-Pigeon, the Rook, and the Starling. The report fills 92 pages and the investigation was for 12 months from March, 1894 ; the object was to ascertain the particular articles of diet consumed in the different seasons of the year by Wood-Pigeons, Rooks and Starlings, so that all doubts which existed as to whether the birds named are friends or enemies of the farmer, might be, to a certain extent, cleared up. A fairly large

and regular number of birds was obtained, the actual numbers being 265 Wood-Pigeons, 355 Rooks, 190 Starlings.

Taking Wood-Pigeons first, 19 were found to be empty, and one was not fit for examination, so that the total number on which the figures are based is 245. All the crop contents are arranged in five groups, and give the following results:—

Kind of food.	No. of times taken during the year.	Per Cent.
Cereal grains	123	33
Leaves	103	27.5
Other fruits and seeds ...	88	23
Roots	31	8.5
Flowers	29	8
Total	374	100

The number 374 means that the 245 Wood-Pigeon crops contained 374 articles of diet, grains, leaves, fruits, roots, and flowers.

Another table gives the kind of food in detail, and from it we see that "the bird is a very dainty vegetarian, and at the same time a most dangerous fellow, inasmuch as he attacks and uses the very best of all our crops, the grains of all our cereals, the leaves of all our clovers and turnips, though grass is not good enough for him, the seeds of beans, peas, tares, and clovers, our grass mixtures and so forth. But the bird must have his due, and we must express in figures the number of attacks on crops on the one hand, on weeds on the other. If the balance stands against the Wood-Pigeon to any large extent, we cannot but proclaim him for what he is.

Part of Plant used.	CROPS.		TREES.		WEEDS.	
	No. of times taken.		No. of times taken.		No. of times taken.	
Roots	29		0		2	
Leaves	79		1		23	
Flowers	0		13		16	
Cereal Grains	123		0		0	
Other fruits and seeds	23		33		32	
	254		47		73	

There is no uncertainty about the meaning here. The figures as given by himself condemn him. The root crops stand entirely against him ; amongst the leaves, the clovers accuse him most strongly, and in the case of cereal grains no extenuation whatever for his outrage is offered. Though grain be left entirely out of court, the Wood-Pigeon stands utterly condemned by the heavy black score still standing against him for root-crop and clover-leaf consumption."

The next table shows the foods most sought after, which brings out very forcibly that the Wood-Pigeon loves the tenderly-nurtured crop-plant, and for the most part disdains the humble weed. From the figures we see clearly that barley and clover must, above all else, be guarded against ravage. The following table shows at glance the food consumed each month :—

		Mar.	April	May	June	July	Aug.	Sept.	Octr.	Novr.	Decr.	Jan.	Feb.	Total
Roots	5	0	0	2	0	0	0	0	0	0	7	7	10	31
Leaves	21	1	4	10	24	7	4	0	0	0	3	19	10	103
Flowers	2	0	12	6	8	1	0	0	0	0	0	0	0	29
Cereal Grain	6	21	6	1	0	22	20	26	11	9	0	1	123	
Other fruits and seeds	5	6	8	20	13	5	5	8	14	3	1	0	88	

Thus we see that the Wood-Pigeon has very definite runs on food—in March, he goes for clover ; in April, he is after grain ; in May, he seeks the flowers of trees ; in June, he preys on various plants—on any suitable *crop* plant he can find ; in July, he makes another raid on clover ; during August, September, October, November and December, he uses grain ; in January and February, he is on root crops ; and in March he is again in full swing with the clovers

I wish there was time to give you the details of each Wood-Pigeon that was killed, which occupies 28 pages of the Report. Some of the figures are astonishing—one bird contained 53 beans; another a full *two ounces* of barley ; another 102 beech nuts and

3 beans. If the number of meals taken during seed-time be multiplied by the number of birds, and this by the weight of each meal—say two ounces of grain or 53 beans—it becomes perfectly clear that the total loss to the farmers must be enormous. It is only in June and July that the Wood-Pigeon does any service as a weed destroyer, but the result of this careful investigation shows that his consumption of clover and grain far outweighs any benefit he may effect.

Now take the Rook. 355 were shot during the year. 19 were empty, so that the conclusions are drawn from the contents of 336 Rooks—an average of 28 per month. All the contents of Rooks may be conveniently arranged in four groups.

1. Cereal grains and grain husks.
2. Insects and Grubs.
3. Roots (Potatoes).
4. Miscellaneous.

Here are the figures actually found, and for the purposes of comparison, I place alongside the corresponding per centages of Wood-Pigeon food.

FOOD-STUFF.	ROOK.		Per cent.	PIGEON. Per cent. No. of times taken.
	No. of times taken.			
Cereal grain and husk	...	290	58	33
Insects, grubs, &c.	...	116	23	0
Miscellaneous	...	60	12	0
Roots	...	36	7	8.5
Leaves	...	0	0	27.5
Flowers	...	0	0	8
Fruits and seeds, not cereals	0	0	0	23
	<hr/>	<hr/>	<hr/>	<hr/>
	502	100		100

These figures show that at least three-fourths of the Rook food (81 per cent.) is cereal grain and husk, with insect and grub; also that grain and husk are at least *twice* as frequently met with

as insects and grubs. This is the essence of the evidence extracted from the gizzards of 336 Rooks shot at intervals all the year round. Grain and husk are oftener met with in Rooks than in graminivorous Pigeons in the proportion of 58 to 33; cereal grain and husk are not only more common than cereal grains in Wood-Pigeons, but in frequency they exceed *all* the cereal grain, *all* the fruits, and *all* the seeds found in Pigeons when put together. Surely this is exceeding strange. Surely this is a hitherto untaught lesson, for the Rook has been regarded simply as an insectivore, not as a grain consumer. The great lesson to be learned here is this, that 58 per cent. of the Rook's food is grain.

The insects and grubs found in the Rooks were, many kinds of small ground-beetles, wire-worm grubs, daddy-long-legs grubs, etc., etc. The ground beetles are considered useful to agriculture; and when destroying these, the Rooks must be regarded as acting in opposition to the interests of the farmer. On the other hand, when taking grubs, the birds may be fairly looked upon in the light of farmers' friends and benefactors. We now proceed to square accounts with the Rook on the score of insects and grubs. We find in the Rooks examined that insects were taken 75 times during the year, and grubs were only taken 26 times. The insects were chiefly useful ground-beetles, and so the extent to which this was done can scarcely be considered as counterbalanced by the grub consumption.

Potato was taken by the birds in early year from the sets, and in late year from the pits; this food was 7 per cent. of the whole. The miscellaneous contents varied from artificial food stuffs (19 times) to grass leaf (one time). The only crops used by Rooks as food are barley, oat, wheat, rye, and potato.

One advantage of the Rook is that he does not interfere at all with leaf crops such as clover; however, the Wood Pigeon has it as a weed destroyer.

The following table shows the foods consumed each month:—

	Mar.	April	May	June	July	Aug.	Sept.	Octr.	Novr.	Decr.	Jany.	Feby.	Total
Insects, Grubs, &c. ...	5	3	21	22	18	23	10	6	2	1	2	3	116
Roots (potatoes) ...	1	0	11	6	0	2	0	0	0	10	6	0	36
Grain and husk ...	18	22	28	15	13	26	26	30	25	20	34	33	290
Miscellaneous ...	11	9	5	9	8	5	2	1	2	2	1	5	60
Total ...	35	34	65	52	39	56	38	37	29	33	43	41	502

Here we notice that insect food is mostly taken in May, June, July, and August, which is what one would expect. Inspection of the root group shows that a rush, never very strong, takes place only in May and December. Turning next to the line for cereal grains and husks, we are at once struck by the exceeding frequency of this kind of food. Grain and husk is indeed the heaviest item in the bill of fare for all the months excepting June and July.

The result of this investigation into the food of Rooks is to confirm me in the opinion I have long held that Rooks, in the enormous quantities in which we have them in some counties, do an immense amount of damage; and I would urge those who have the control of rookeries to see that the numbers of their inmates are kept within reasonable limits.

It may be said at once that the Starling comes out of the examination with flying colours, and must be regarded most certainly as a friend of the *farmer*—(I say nothing about the gardener because we do not know.) 190 Starlings were examined; the number of food items found in these birds is 261. The range of staple food stuffs for the bird seems extremely small; all may be grouped into:—

1. Grubs.
2. Insects, etc.
3. Cereal grain.
4. Miscellaneous.

FOOD-STUFF.	STARLING.			ROOK.		
	No. of times taken during the year.	Per cent.	No. of times taken during the year.	Per cent.		
Grub	... ... 30 {		182	70	116	23
Insect	... ... 152 {					
Grain	... ... ...	58	22	290	58	
Miscellaneous	... ... ...	21	8	60	12	
Roots	... ... ...	0	0	36	7	
			—	—	—	—
Total		261	100	502	100	

This arrangement of food stuffs is to all intents and purposes that for Rooks. The difference is that the Starling uses much less grain, but a greater amount of insect. This point is strongly brought out in the above Table which shows the number of times the food stuffs have been used.

Speaking roughly, three-fourths of the Starling's food is insect, and one-fifth grain, whereas in the case of the Rook one-fifth is insect, and more than one-half grain. These figures also show that so far as the use of plants for food is concerned, the Starling can be blamed only for his taste for grain, since this is the only crop which he takes and uses. The question of the usefulness of the Starling must depend on his relation to insects. Does he destroy useful or injurious insects? The answer has been carefully worked out. The whole of the 30 occasions on which grubs were taken must stand to his credit. Insects occurred on 152 occasions, some were useful, *but the majority were not.*

If this estimate is correct, as it certainly appears to be, there can be little hesitation regarding the Starling. He is a bird rather to be fostered than destroyed; he is a benefactor rather than a foe to the farmer. Of the Pigeon, it may be said that he is an unmitigated scoundrel; of the Rook, that he is a cunning rogue; but of the Starling, we can say with truth that he is the natural friend of the farmer.

As for Pigeons and Rooks, so for Starlings. I here give a calendar to show broadly the monthly operations of these birds:—

		Mar.	April	May	June	July	Aug.	Sept.	Octr.	Novr.	Decr.	Jany.	Feby.	Total
Grubs		2	0	6	8	0	1	1	1	0	6	3	2	30
Insects		25	25	10	14	1	2	8	3	20	6	14	24	152
Grains and husk ...		0	10	0	1	0	1	3	1	19	1	11	11	58
Miscellaneous		4	1	0	0	0	0	0	0	1	0	10	5	21

261

I have condensed the 92 pages as much as possible, but the whole report is worth careful study. It is the only piece of work of the kind that I am at this moment aware of as having been carried out in Great Britain. If, however, there is little real knowledge, there is plenty of bias, and many beautiful and useful birds are sacrificed because the wildest notions prevail as to the nature of their food. Notable among the exterminators are gamekeepers, who ruthlessly kill many of the most interesting and useful species, and gardeners, who destroy many useful birds. It is curious that both gamekeepers and gardeners, though they have such excellent opportunities of studying the ways of birds, seldom take the trouble to watch them closely, or even to open the bodies of their victims for confirmation of their surmises as to the nature of their food. Amongst both classes of men there are, of course, many honourable exceptions, but the rule holds good, and the majority are content to adopt the almost superstitious beliefs of their forefathers.

Of all our other land birds (about 50 species), we have to confess that we really know little or nothing as to their usefulness to us, with three exceptions—viz., Hawks, Owls, and House-Sparrows. It is a very curious thought that of these we *know* two to be extremely useful to us—Kestrels and Owls—therefore we shoot them down on every possible occasion; the other, we *know* to be the most injurious, therefore, we do *not* shoot it, but allow it to increase as much as it likes.

The Kestrel is one of the most useful birds we have. By far the greater portion of its food consists of mice, rats, and beetles, and the number of injurious creatures it exterminates is enormous — 178 wire worms being found in one bird. Yet this farmer's friend is continually shot down. It is true that it may sometimes take a young Pheasant, but what of that? Two facts about the Kestrels should always be borne in mind. The first is that it is only during a very brief period of the game bird's existence that any danger need be apprehended from the Kestrel, for it will not touch them except during their helpless infancy. Secondly, throughout the rest of the year the Kestrel does incalculable and unmixed good by the destruction of hosts of field mice and injurious beetles.

The value of farm produce thus saved is almost beyond estimation. It is, therefore, a short-sighted policy to exterminate such useful birds because they do a certain amount of harm, that harm being confined to a very few weeks in the year.

The Sparrow-Hawk is a much more mischievous and less useful bird. On the one hand, it is very fond of both game and poultry; on the other hand, it kills mice, Wood-Pigeons, and many injurious insects, so that it does a certain amount of good.

When the Kestrel retires to roost, the good work of destroying mice is carried on by the Owls, which come forth at dusk from barn, or ruin, or ivied tree, to prey upon these small, but expensive animals. Owls, like Hawks, return the indigestible portion of their food through the mouth, and large quantities of their castings may be found in places which they frequent. An examination of these castings should be quite sufficient to convince any reasonable being, not only of the harmlessness of owls, but also of the gigantic service which they render to game preservers and farmers.

The food of the Barn Owl consists chiefly of mice and rats, bats and various small birds (and voles, in countries where there are voles). Seeböhm gives an instance in which 20 freshly killed rats were found in a Barn Owl's nest. He also tells us that in 706

castings of this Owl, there were found the remains of 3 rats, 237 mice, 693 voles, 1,590 shrews, 16 bats, 1 mole, and 22 birds, of which 19 were sparrows, a total of 2,520 members of the mouse family. The result of an examination of 225 castings from a County Antrim glen showed that they contained 10 shrews, 22 rats, 5 house-mice, 357 field-mice, 3 bats, 5 blackbirds, and 7 sparrows, making a total of 401 injurious animals; while an instance was recorded a few weeks ago where a Barn Owl brought 27 rats and mice to its young in two nights.

Much the same may be said about the Long-eared and the Short-eared Owls. The latter is especially useful. When the South of Scotland was overrun by Voles in 1892, Short-eared Owls not only came to the locality in unusual numbers, but remained and bred all over the affected spot, and the service rendered by them to the sheep-farmers was enormous. To give three instances alone, 29 dead Voles were taken from the side of one nest, and the next day 27 from the same place. In another case, 37 dead Voles were found beside a nest containing 10 eggs. Yet all these birds I have just mentioned, known to be pre-eminently useful to us, are shot by men who seem unable to distinguish between the good and the bad. The natural result, therefore, of so much misplaced zeal has been an enormous increase in Wood-Pigeons, Sparrows, Rats, and Mice, which, now that their natural enemies, the birds of prey, have been destroyed, multiply unchecked, and yearly consume great quantities of valuable cereals and other farm and garden produce. Very few people realise how much in £ s. d. this loss means. It was stated recently by an authority, that if we take the very lowest figures, and allow that one rat per cultivated acre does one farthing's damage per day—and those who live in the country will at once reject these figures as being absurdly low—the loss in Great Britain alone will be 15 million pounds annually.

The only other bird we know really anything definite about is the House Sparrow, known in America as the English Sparrow.

No bird ever had a fairer or more impartial trial both here and in America; the verdict is guilty, with scarcely one extenuating circumstance. Again it is hard for us to realise the cost in figures, but a large farmer near Chester told his audience that Sparrows did the country £770,094 worth of damage in a year, reckoning a bushel per sown acre all over the Kingdom. That this measure is much too low will be seen by the following story:—

A farmer in the County of Essex had an early field of wheat not far from the village of Boreham. The Sparrows attacked it in the corner nearest the village and devoured a great deal there; the crop was uniform except from what the Sparrows did. The farmer measured an acre where the Sparrows had been at work, and an adjoining acre which they had not meddled with, and threshed the corn on each of the acres separately, looking after the threshing himself. He found the loss to be 16 bushels, value at the time £6.

The result of the examination of 694 stomachs of adult Sparrows, at various times and places in Great Britain for over a year, should make the farmer pause. It shows that about 80 per cent. of an adult Sparrow's food is cultivated grain of some sort, chiefly corn, the remaining 20 per cent. may be roughly divided as follows:—

Seeds of Weeds	...	...	...	10 per cent.
Green Peas	...	...	...	4 per cent.
Beetles	...	...	..	3 per cent.
Caterpillars	...	...	...	2 per cent.
Insects which fly	...	...	...	1 per cent.

In young Sparrows not more than 40 per cent. is corn, while about 40 per cent. consists of caterpillars, and 10 per cent. of small beetles. This is, however, *only up to the age of 16 days*; after that they go for corn. This is a point which should be specially remembered, because the friends of the Sparrow keep on pointing out the good that he does by feeding his children on

caterpillars. It has been proved beyond doubt that here this only lasts for the first 16 days, and even during that time, corn forms a large proportion.

47 nestling Sparrows taken in June contained—with the exception of about 6 insects—only old wheat and green peas.

The evidence from America, extending over longer periods and based upon a much larger number of stomachs, is even more damning to the English Sparrow than the above.

Dr. Judd, in his valuable Report on American Sparrows (33 species and sub-species), based on an examination of 4,273 stomachs, states of our Sparrow that "Animal matter, practically all insects, constituted 2 per cent., and vegetable matter, almost entirely seeds, 98 per cent. Insects were taken chiefly during May and June, when they composed 10 per cent. and 8 per cent. respectively of the month's food. Of the 98 per cent. constituting the vegetable food, 7 per cent. consisted of grass seed and 17 per cent. of various weeds not belonging to the grass family. But what especially differentiates the vegetable food of the English Sparrow from that of all other American Sparrows is the large proportion of grain consumed, which formed 74 per cent. of the entire food of the year, and 90 per cent. of that of the period from June to August.

The examination of the contents of the stomachs of 50 nestlings made an unfavourable showing for the species. It was found that instead of being exclusively insectivorous like the young of all the native Sparrows (so far as known), the young English Sparrows had taken 35 per cent. vegetable food, 2 per cent. being weed seed and 33 per cent. grain. The animal food was made up entirely of insects, and these were chiefly injurious.

The destruction of these harmful insects is, of course, a service to the farmer; but it must be remembered that *all* the food of the nestlings of other Sparrows consists of insects just as injurious, while one-third of the food of nestling *English* Sparrows is composed of grain.

It appears, therefore, that there is little to be said in favour of the English Sparrow. There is no escape from the conclusion that the bird is a serious pest, the extermination of which would be an unmixed blessing."

Perhaps you may consider I have dwelt too much upon the harm done by certain birds, and I would not have you go away with the idea that most small birds should be shot down. Nothing is further from my thoughts, nothing would be more costly to the country. I have been able to tell you nothing of the good, useful qualities of our numerous small birds, because in this country such detailed information does not exist; no *prolonged* scientific examination of bird stomachs has been made here yet. Therefore, while we surmise that most of our small birds do us immense good, we have no proof on scientific lines to support our belief. Again, we must go to America for details. In his notes on one of the American Sparrows, Mr. Beal shows that the stomachs of these birds in winter are crammed with the seeds of weeds, and he estimates that in the State of Iowa alone, if there are only 10 birds (Tree Sparrows) to a square mile, not less than 175 tons of weed seed are consumed by this single species in a single season, basing his calculations on the modest estimate that each bird eats one-fourth of an ounce per day for a winter season of 200 days.

Again, "during the outbreak of Rocky Mountain locusts in Nebraska in 1874-1877, Professor Samuel Aughey saw a Long-billed Marsh Wren carry 30 locusts to her young in an hour. At this rate, for seven hours a day, a brood would consume 210 locusts per day, and the passerine birds of the eastern half of Nebraska, allowing only 30 broods to the square mile, would daily destroy 162 million 771 thousand of the pests. The average locust weighs about 15 grains, and is capable each day of consuming its own weight of corn and wheat crops. The locusts eaten by the nestlings would, therefore, be able to destroy in one day 174 tons of crops which, at 10 dollars per ton would be worth 1,740 dollars *per day*. This case may serve as an illustration of

the vast good that is done every year by the destruction of insect pests fed to nestling birds. And it should be remembered that the nesting season is also that when the destruction of injurious insects is most needed. The encouragement of birds to nest on the farm and the discouragement of nest-robbing are, therefore, more than mere matters of sentiment. They return an actual cash equivalent, and have a definite bearing on the success or failure of the crops.

The farmers of America are much better off than our own in being able to obtain definite information as to the food of all their common birds. The Bureau of Biological Survey is concerned in investigations relative to destructive birds and mammals, and its trained Zoologists, etc., are at the service of the nation. The appropriation for this Bureau last year was \$62,000. Large numbers of beautifully illustrated booklets are issued (30 separate publications were issued in 1907), and these are either free or sold for a few pence. By the kindness of the Chief of the Survey, I am able to show some of these on the table, and I shall be glad if you will examine them at the close. During the year 1907, 5,822 bird stomachs were received for examination. I now show you on the screen how the farmers of America are instructed in what their birds live on. There is no need for knowledge of zoological terms here. The farmer sees at once what forms the food of the birds, and knows which to kill and which to foster. Nothing could be more admirable than this method of instruction.

In conclusion, it is gratifying to be able to announce that in view of the ignorance now existing in Great Britain as to what our birds live on, the British Association, at its recent meeting in Dublin, decided to form an Economical Ornithological Committee "to investigate the feeding habits of British Birds with a view to obtaining a precise knowledge of their economic *status*."

At the same time, I feel strongly that owing to the importance of this work, it should be taken up by the Government. The Irish and English Departments of Agriculture should combine to

produce official reports on the food of the most numerous and important of our wild birds on the lines followed by the United States. I am convinced that money spent on this would be repaid many times over to the country, and such work should not be left entirely in the hands of a semi-private committee. Were its importance fully realised by those at the head of affairs, I have little doubt that the money would be forthcoming at once. But until we can induce the Government of the day to view this matter in its proper light, the above-mentioned committee will do all it can to lay the foundation for future official work. When it gets into working order, I know I may rely on the loyal assistance of the Belfast Naturalists' Field Club.

The Address was formally discussed by N. H. Foster, M.B.O.U., Wm. Gray, M.R.I.A., and W. J. C. Tomlinson, who moved that it be a recommendation to the Committee that the paper be published *in extenso*. This was carried by acclamation, and, the President having suitably replied, the election of three new members concluded a most successful meeting.

"COMMON FUNGI—HOW TO COLLECT AND STUDY THEM."

On the 21st November the Rev. C. H. Waddell gave a Lecture to the Botanical Section in the Club Room on "Our Common Fungi, how to collect and study them." It was pointed out that they are distinguished from other plants in not possessing chlorophyll. Most of them are saprophytes living on decaying substances, some parasites on living plants. The smaller ones—micro-fungi—can be easily preserved, but the larger macro-fungi cannot be preserved for study and should be sketched in water-colours when fresh, and notes made at the time they are collected. There are about 5,000 British species, and the best known family *Agaricus* is well represented in this country. Very little attention has been paid to these plants in Ireland, workers have been few, and the Irish List might be greatly extended.

"A SUMMER'S DREDGING IN BELFAST LOUGH."

The Zoological Section held their first meeting for the Winter Session in the Museum, College Square North, on Wednesday evening, 9th December. The President (Mr. Robert Patterson, F.L.S.) occupied the chair. The Vice-President (Mr. W. H. Gallway) had arranged to lay before the meeting a summary of his work while dredging in Belfast Lough last summer. He said that the Ulster Fisheries and Biology Association having decided in the Spring of the present year to transfer their Laboratory from Larne Harbour to Bangor, he was appointed Honorary Naturalist. It was part of his duties to take out the Association's steam launch and dredge for material to supply the members who took up the study of the various groups. He had brought a large number of specimens of marine animals, alive and in spirits, which could be referred to as they were named. Mr. Gallway described the dredge, its uses, and mode of working, and then entered on a description of the various animals met with on his expeditions. As might be expected, the Annelides, or Worms, form a very numerous class, many of them being objects of great beauty. Especially is this the case with the *Sabella*, *Terebella*, and *Serpula*, and the lovely *Nereis*. A very remarkable member of this family is the Sea-mouse, *Aphrodite aculeata*. Among the Mollusca, the strange Sea-hare, *Aplysia*, attracts our attention. When handled the animal ejects a deep purple dye of an intense and beautiful shade. Another Mollusc, *Scaphander lignarius*, is peculiar in that it has a lovely orange-coloured shell on the outside of the body to protect the vital parts. The pretty *Philine*, which grows to the length of one and a quarter inch, is white, and has a delicate and pure white shell inside the body. Among the Zoophytes described were the lovely Sea-pen, *Virgularia mirabilis*, and the Dead-men's fingers, *Alcyonium digitatum*. Of Sea Anemones the loveliest were the curious *Adamsia palliata* and the *Actinoloba dianthus*. A specimen of the Plumose Anemone brought up in the dredge

measured twelve inches from base to crown, nine inches across the tentacles, and diameter of column five inches—a truly noble specimen. The Echinodermata are very numerous in the Lough ; the common Sea Urchin, *Echinus sphæra*, the five-finger Starfishes, *Uraster rubens*, the beautiful purple Sun Star, *Solaster endeca*, and several specimens of Holothuria. Of the latter two varieties were taken—*Thyone Portlockii* and *Thyone papillosa*. The pretty Rosy Feather Star, *Comatula rosacea*, is occasionally taken, but not in the young or stalked stage. The Ascidians were briefly described, both simple and compound. Very many varieties are found in the Lough. A pretty little shell, *Crenella marmorata*, burrows in the coriaceous tests of the *Ascidiae*. There are many varieties of Sponges, some beautifully coloured. Among the prettiest are *Suberites carnosa*, and *S. domuncula*, *Halichondria panicea*, *Reniera varidus*, *Axinella stuposa*, *Biemma corrigata*, and *inomata*. The Crustacea are well represented, the common *Cancer pagurus*, several kinds of *Portunus* or Swimming Crabs, numerous varieties of Spider and Hermit Crabs, *Pinnotheres* or Pea Crabs, Porcelain Crabs, *Galathea*, a very handsome species, and many kinds of Prawns and Shrimps.

The best and most interesting find, however, was a specimen of the exceedingly rare Marine Slug, *Pleurophyllidia loveni*. The animal was dredged on the 21st July, 1908, in a small bay called Smelt Mill Bay, between Mr. Eve's house and the foot of Carnalea golf links. The bottom of the bay was a mixture of sand and mud, more mud than sand. The animal was kept alive for about two months. It spawned on the 17th August, and died from starvation on the 29th September. The eggs did not come to maturity. The Radula was extracted so as to identify the species. *P. loveni* is recorded in the *Irish Naturalist* for 1893 as having been taken in Bantry Bay, therefore this specimen is the second record for Irish waters.

Miss Clara Patterson, the clever daughter of our President, kindly painted the animal's portrait, a most difficult task.

Of the fishes the only kind dredged, and they were numerous, was the pretty little Lump Sucker, *Lepadogaster bunaculatus*. Brief descriptions were given of a number of other marine creatures, such as the Doris or Sea Lemon, *Flustra foliacea*, &c. Want of time, however, prevented Mr. Gallway from touching on the numerous other forms of animal life brought up in the dredge, such as the various microscopic Zoophytes, Foraminiferæ, Diatomaceæ, Hydrozoa, Polyzoa, and other groups.

At the close of the address the members came forward to the table and examined with much interest the numerous specimens, which led to an animated conversation, after which the proceedings closed.

"REPORT OF DELEGATE TO THE BRITISH ASSOCIATION."

"THE GEOLOGY OF THE DUBLIN DISTRICT."

The second meeting of the Session was held in the Museum, College Square North, on Tuesday, 16th December—the President (Mr. Robert Patterson, F.L.S., M.R.I.A.) in the chair.

Mrs. Hobson presented her Report as Delegate to the British Association, held this year in Dublin under the presidency of Mr. Francis Darwin, Ph.D., LL.D. In the course of her remarks Mrs. Hobson said the Conference, through the kindness of the Very Rev. Dr. Delaney, met at the University College, Stephen's Green, the chairman of the Conference being Professor H. A. Miers, F.R.S., whose address on "The Educational Opportunities of Local Scientific Societies" dealt with the great work they had been doing for nearly a hundred years. Professor Miers laid great stress on the objection to lecturers using language of too technical a character, on the needless gulf existing between the expert and the amateur, and said that lecturers should be

willing to follow up an address with advice, guidance, and criticism. Professor Miers advocated that the local societies should initiate a science extension movement. The second paper was by Mrs. Hobson on the establishing of "Sanctuaries for our Local Flora and Fauna." This can best be done by owners of private demesnes, and it is suggested that field clubs and kindred societies should first consider the most likely spots—say one in each county—and then send a deputation to the owners asking them to fence them in and guard against the ravages of intruders. The paper did not advocate the shutting out of "the man in the street" and admitting solely the man who fondly imagines himself a scientist because he is making a collection of eggs, birds, plants, etc. The usual excuse for such is "for identification." It is quite possible to follow most pursuits without possessing specimens. For instance, one can study the pyramids, the Pacific tides, and the heavenly bodies; one might study the Maoris or certain tribes in South Africa without requiring to have their mummies in the home! The paper then dealt with the scientific(?) people who are scouring the country for every rare bird, plant, egg, etc., at the same time denouncing the professional bird-catcher and the woman with the wings of wild and often rare birds in her hat. One class cannot afford to throw stones at the other. The people who cry out the most only want the rarer thing—and get it. Museums are the only places justified in having collections of once-living things. In the matter of birds it is bird-watching that is of consequence. What scientific societies should be strenuous about is not the collecting of specimens, but of knowledge, and insisting that it is the study of the life-history of the living organism in the field, and not the gathering together of dead matter, that is of use. At the second Conference, Professor G. H. Carpenter, B.Sc., dealt with "Detailed Natural History Surveys for Restricted Areas: an Important Work for Local Societies." This was followed by a paper on "The Advisability of Restocking Haunts whence Fauna and Flora have disappeared,"

by Mr. Henry Davey (Brighton), who advocated that such work should be undertaken in a scientific spirit. Mr. F. A. Bellamy exhibited a method "For Permanent Recording of Natural History or other Observations by means of the Card Catalogue System," and spoke of the great value of such. The following resolution was passed :—That this Conference of delegates of corresponding societies affirms the desirability of bringing under the notice of local societies the necessity for preserving the fauna and flora of their respective districts as against wanton destruction of careless and needless collecting." It is interesting to note what part the Belfast Naturalists' Field Club took at the British Association this year. Twenty-four of their members were present, and six papers were read in the sections by the following :—Messrs. John Brown, F.R.S. (two papers); Rev. W. A. Adams, B.A.; Professor J. Symington, F.R.S.; W. J. Knowles, and Robert Welch, M.R.I.A. Each year the British Association publishes a catalogue of important papers dealing with original research, culled from the proceedings of the corresponding societies, and the Belfast Club has always an honoured place. Last year there were eleven papers selected—written by Messrs. Robert Patterson, F.L.S., M.R.I.A. (two papers); W. H. Phillips, T. E. Farrington, Andrew Duncan, B.Sc.; James Strachan, R. L. Praeger, B.A.; C. M. Cunningham, Rev. W. A. Adams, and Arthur Deane (two papers). Mrs. Hobson dealt with the various meetings and the speakers, and said she was glad to see the place that women took—nine were heard in the sections and one in another place—irrespective of those taking part in the discussions. There were three women delegates and eight accredited to section L by educational bodies. The number of papers by Irish members was most creditable, and, without making any invidious distinction, that of Professor Joly on "Uranium, Radium, and Geology," stands out as epoch-making. It is likely a Bill will be introduced into Parliament for the "Protection of Megalithic Monuments," making it punishable for even an owner to disturb one. This arose out of a discussion

in section H. Professor Ridgeway in this section advocated the study of anthropology by all would-be administrators, and said such could not rule any tribe or nation properly without understanding their history, laws, and customs. There were six excursions—the Boyne tour, Bray, Powerscourt and Dargle, Rock of Cashel and Holy Cross Abbey, Killaloe and Lough Derg, and Athlone and Clonmacnoise.

Mr. Thomas Anderson then read a paper on “The Geology of the Dublin District.” The neighbourhood of Dublin is remarkable, he said, as being the centre where several great geological systems meet. Approaching by sea, we get a glimpse of the oldest rocks in the shape of the Hill of Howth on the right and Bray Head on the left. They are of Cambrian origin, and are much contorted and uplifted. From Killiney south for seventy miles stretch the granite mountains and moorlands of Leinster. They are of early old red sandstone age, and were intruded in the silurian. Their formation took place at a time of tremendous activity and disturbance in the earth’s crust. Enormous masses of strata were pushed up and folded, and the Leinster chain is the result of this great earth movement. The pressure, operating from south-east, gradually pushed up the silurian strata into an enormous arch, and *pari passu* with this, granite magma flowed and filled the contour of the arch. There were several movements of this nature until the mountains attained a height of several thousand feet. Long ages of denudation followed, and the silurian cap covering the granite was by this means almost completely removed, revealing a great granite mass—the greatest in the British Isles. The carboniferous period is well shown in the coast section north of Dublin, where the overfolding of the limestone beds and the many problems connected therewith render that coast most attractive to geologists. Carboniferous limestone extends from Dublin to Galway, and the enormous and prolonged denudation of this area has worn down the strata to the flat aspect it now bears as the greatest central plain of Ireland. Coming down to later times, we

find that the glacial period is of surpassing interest, as at Dublin two mighty glacial movements converged. At the culmination of the glacial epoch in Britain huge ice masses, many hundreds of feet thick, were pushed forward from the Southern Highlands of Scotland and the Cumberland Mountains and completely filled up the Irish Sea. This glacier pushed forward and upward the shells and debris of the Irish Sea and carried them high up on the Dublin mountains. At a later period a great glacier which had been accumulating on the north-west moved south and east and converged on Dublin, and probably at the same time covered the entire south. The striations of this glacier are found everywhere about Dublin. Killiney Hill is marked all over with *striæ*, and the flanks of the mountains also. The boulder clay of this glacial movement is much the same throughout, mainly derived from the carboniferous floor over which it moved. On the other hand, the boulder clay of the West British glacier contains shell fragments and many kinds of northern rocks, which prove both its origin and its subsequent course to have been as indicated.

The papers were spoken to by the following members:—The President, Miss M. K. Andrews, and Messrs. N. H. Foster, M.B.O.U.; T. H. Dewhurst, and R. Welch, M.R.I.A.

“FERTILIZATION OF FLOWERS.”

The Botanical Section held their second monthly meeting for the Winter Session in the clubroom of the Museum on the afternoon of the 19th December, Mr. G. Donaldson presiding. Mr. Sylvanus Wear gave a short address on the “Fertilization of Flowers,” which was very fully illustrated by an excellently selected series of typical micro-slides. Mr. Wear pointed out that the main object of the meeting was not so much to hear a paper on this interesting topic as to enable the members to see for themselves the various stages of fertilization as exhibited in the specially prepared series of slides which he was about to

exhibit under the microscope. The terms "pollination" and "fertilization," he said, were often used rather loosely and indiscriminately. Pollination referred to the transfer of the pollen from the anther of the flower to its stigma, or to the stigma of another flower of the same species ; in this latter case it was an example of cross-pollination. Fertilization, on the other hand, had, strictly speaking, to do with the transfer of the reproductive nucleus of the individual pollen grain from the stigma of the flower upon which it had been deposited to the ovule of the same flower, and to its fusion there with the ovum, or egg-cell. It was with this latter phase of the process that the micro-slides to be shown mainly deal ; pollination would only be touched on incidentally. The lecturer then explained very clearly, by the aid of large scale, specially prepared, drawings, the structural features of the reproductive organs of dicotyledonous flowers, and more especially the ovaries. He pointed out on these diagrammatic sections the successive changes which took place between the pollination and the final stages of the fertilization. Early in the life of the anther four sacs were formed containing mother-pollen cells ; these sub-divided twice, giving rise to pollen grains. When ripe, the sacs, or containing envelopes, burst, and the grains escaped ready to hand for pollination agencies. After pollination, the cellular outgrowth from the pollen grain, known as the pollen tube, made its way along the central organ of the flower from the stigma to the ovary, and there the male nucleus and the female nucleus coalesced, and the union was complete. As soon as the fusion of the pollen and the ovum nuclei had taken place, secondary processes at once came into operation, to provide for the future of the embryo. In the latter part of his paper, the lecturer dealt with the development of the fertilized ovum into the embryo ; and of the ovule into seed. Quoting Kerner, he said that ovaries were generally believed to be built up of carpels, or carpels and receptacle in combination. Carpels were merely modified leaves, and the story of their evolution might be traced

in a series of plants from the Cycus through the Christmas rose to the pea. He then concluded by giving a concise technical description of the various typical forms of receptacles, as well as the leading classes of ovaries, and drew attention to the various carpillary forms and their relations to the associated receptacles. There was a large attendance of members present, and the examination of Mr. Wear's micro-slides, illustrating the address, was a source of much profitable interest, many fresh points being elucidated in the general conversation that accompanied the microscopical demonstration.

"THE ANCIENT INHABITANTS OF IRELAND AND THEIR KINDRED."

A well-attended meeting of the Archæological Section was held on the evening of the 6th January—the President (Mr. R. Patterson, F.L.S.) occupying the chair. A paper on "The Ancient Inhabitants of Ireland and their Kindred" was read by Mr. Alex. Milligan. The lecturer began by reviewing briefly the ethnographic aspect of Western Europe on the first arrival of the Aryan immigrants in that region. The Atlantic seaboard from Southern Spain north-westward to the shores of the Baltic had been hitherto mainly occupied by an ancient race, most commonly known as the Iberian, and which by competent authorities had in recent years been traced to North Africa as its centre of dispersion. The Iberian occupants everywhere gave way before the Celtic invaders, but as it was not at all a war of extermination the more ancient race was still largely represented in what was approximately the same soil that they occupied when they first appeared in history. After dealing with the physical characteristics of the two races, Mr. Milligan proceeded to point out that as our own islands were within the area affected by the Aryan irruption, an examination from an archæological point of view of the evidence relating to the earliest occupants of Britain and Ireland ought, if the evidence be reliable, to harmonise with the ethnographical

sketch he had presented to them. The lecturer thought the most reliable evidence of very ancient occupation of these countries by two distinct races in the relationship suggested was afforded by the long and round burial mounds of Britain, and the cromlechs and round barrows of Ireland. He then proceeded to deal with this part of his subject at some length. The evidence of the British barrows was very definite that the great ethnographical event had in these countries, at any rate, taken place towards the close of the later stone age. The evidence of the cromlechs was very interesting in connecting the Ivernian (non-Aryan) element of the Irish population with the Iberian race of the Continent. An interesting literary discovery of recent date was also dealt with, the purport of which was that many of the most difficult idioms of both the Welsh and Irish branches of the spoken Celtic could only be accounted for by the ancestors of the Welsh and Irish-speaking peoples having been influenced by long contact with a people who spoke a language of the Hamitic or African group. This would be accounted for if they assumed that the long barrow people of Britain and the dolmen builders of Ireland were of the Iberian stock. Dealing summarily with the invasions with which the Irish history books began, Mr. Milligan expressed the view that they all, without exception, referred to the arrival at various times of successive groups of Celtic people. These, no doubt, together with many of pre-Celtic stock, who by that time were merged with the predominant partners, were all represented in the eponymous genealogy of Mile, son of Bile. In this connection the lecturer dissented from the view of those moderns who regard the conflict of the Tuatha de Dannan with the Firbolg as indicating the first meeting of the Celtic and the non-Aryan peoples of Ireland, pointing out that the use of the iron spears by both parties in the alleged battle of Moytura stamped it as an event belonging to a much later period.

The conclusion of the lecture was followed by a most interesting discussion, in which Mrs. Hobson, Mr. John M.

Dickson, Mr. C. M. Cunningham, and Mr. W. J. Fennell expressed their views on the line of argument used by the lecturer.

"THE LIFE-HISTORY OF THE WATER-BEETLE."

The third meeting of the session was held in the Museum, College Square North, on 19th January—the President (Mr. R. Patterson, F.L.S., M.R.I.A.) in the chair.

Mr. Frank Balfour-Browne, M.A. (Oxon), F.R.S.E., F.Z.S., delivered a lecture "On the Life-history of the Water-beetle." He pointed out that water-beetles had not been very extensively studied, as they were, so far as was at present known, of no direct economic importance. The tendency nowadays was to devote attention to useful and harmful organisms, so that practically all the work on water-beetles dated back a great many years, and was due to the labours of such old-time naturalists as Lyonnet, Schiödte, Miger, Réaumur, De Geer, and others. Most of the work done on the group appeared to have been concentrated upon a few of the larger species, *Dytiscus* and *Hydrophilus* having been the favourite studies, but even in these genera there seemed to be plenty still to be learnt if one would but pay careful attention to them. Mr. Balfour-Browne based his lecture upon the two types mentioned, with a view to showing that, even although he had only spent a short time on these, the statements of the older observers were not always to be taken as final. He also described the life-history of a common species, *Hydrobius fuscipes*, which he had studied in detail during the past season. Dealing first with *Dytiscus*, he described the secondary differences between the sexes, and mentioned the egg-laying habits of the female, which pierced holes with her ovipositor in submerged water plants, laying a single egg in each hole. The time taken by the egg to hatch, although usually given as about three weeks, varied considerably with the time of year in which they were laid,

and Mr. Balfour-Browne mentioned that he had obtained eggs in October, although the egg-laying period is usually given as being March and April. He described the voracity of the *Dytiscus* larva, which killed even newts and small fish, and gave in detail the method by which these larvæ sucked their food through a fine tube which ran the length of each of the jaws, so that, although possibly some solid food was taken by the mouth, most of the nourishment was obtained as liquid, the larva actually injecting a dissolving fluid into the prey to enable it to obtain more. The larvæ had been described as casting their skins at more or less regular intervals of about ten days five or six times during their life, but he found that the last stage of the larva ran from six to eight weeks, while earlier stages occupied three weeks or less, and from his experience with other aquatic larvæ he believed that the last larval stage was always longer than the previous ones. Having referred to the terrestrial pupa of *Dytiscus*, Mr. Balfour-Browne went on to describe the known facts with regard to *Hydrophilus*, and he pointed out the great differences between it as a representative of the *Hydrophilidæ* and *Dytiscus* as an example of the *Dytiscidæ*. Whereas *Dytiscus* was specially adapted for swimming *Hydrophilus* was a poor swimmer, its legs and general form being specially adapted for crawling on the water-plants. He further explained the entirely different method of breathing in these two groups of beetles. Although *Hydrophilus* was only found native in the South-East of England, he had kept the species, obtained eggs, and reared the larvæ to full size at Holywood, although he had not yet got them to pupate. The larval *Hydrophilus* fed on freshwater snails, and its manner of feeding was most extraordinary. It seized the snail in its jaws, bent its head back until the snail rested on the larva's back, and then while the left jaw held the shell the right cut it through. Having compared *Dytiscus* and *Hydrophilus*, Mr. Balfour-Browne proceeded to describe *Hydrobius*, and showed that, although a close relation of *Hydrophilus*, it differed in many points from it.

This species again bore out his statement that the last larval stage was by far the longest, as its first two stages each lasted less than a fortnight, while the third (final) stage occupied from five to eight weeks. He succeeded in getting these larvæ to spin up, and after from nine to sixteen days the pupæ hatched out into beetles, the whole cycle having lasted about twelve weeks. He pointed out that there was plenty of work yet to be done on this species, and that there were hundreds of common water insects which would give both amusement and information to any amateur who chose to start a few small aquaria.

The lecture was illustrated by a number of lantern slides, mostly from drawings made by the lecturer. The paper was spoken to by the following members :—the President, and Messrs. J. Hamilton, W. J. C. Tomlinson, W. Gray, M.R.I.A., and H. L. Orr.

“THE DETERMINATION OF SPECIFIC GRAVITY, AND THE
USE OF HEAVY LIQUIDS.”

A meeting of the Geological Section was held on Wednesday evening, January 27th, in the Museum, College Square North, when Mr. Thomas Dewhurst, A.R.C.Sc. (Lond.), delivered an interesting lecture on “The Determination of Specific Gravity, and the Use of Heavy Liquids.” A definition of specific gravity was given, and emphasis was laid by Mr. Dewhurst on its value as a determinative constant of mineral species. The specific gravity of large specimens of minerals and rocks can readily be obtained with the chemical balance, Penfield’s wooden balance, or Walker’s steelyard balance. The spring balance of Jolly is specially adapted for small specimens, while the specific gravity bottle is used for sands and powders and for porous, friable, and cavernous specimens. In the case of a small mineral particle the specific gravity is determined with the aid of some heavy liquid, such as Sonstadt’s solution or Klein’s solution, the density of the

liquid being readily obtained with the Westphal balance. From a consideration of the densities of a number of minerals it was shown that the specific gravity of a mineral depends largely on the chemical nature of the substances of which it is composed, and also to some extent on the state of molecular aggregation. The densities of igneous rocks also bear out these two general conclusions, as the specific gravity increases with the amount of crystallisation that has taken place, and increases as the percentage of silica decreases. Heavy solutions are used to separate the mineral constituents of sands and rocks, the minerals being deposited in order of density as the liquid is diluted. During the course of the lecture Mr. Dewhurst exhibited many pieces of apparatus, and demonstrated the methods of obtaining specific gravity in the case of each instrument.

“CHURCH ISLAND.”

A meeting of the Archæological Section was held on the evening of the 3rd February, in the Museum, College Square North—Mr. W. J. Fennell, F.R.I.B.A., presiding—when Mr. Joseph Skillen read a paper on “Church Island,” illustrated with lantern views. He first described an ancient stone monument in the neighbourhood of Ballymena, consisting of a stone circle and kist-vaen, unmarked on the ordnance survey map. Church Island, the lecturer pointed out, was situated in Lough Beg, close to the shores of County Derry. On it stands an old church of great antiquity, graced by a modern spire erected by the Bishop of Derry, Earl of Bristol, in 1778. Many of the eccentricities of this nobleman-prelate were referred to, as was also his association with the Ulster volunteer movement. The most interesting remains, apart from the church, is a holy well which the lecturer described—the well consisting of a hollowed stone, resorted to yet by the peasantry for cures, as the rags which adorn the ancient thorns attest. During the wars in 1642 the church was held as a military

station by the English under a Captain Fisher, who has described the fabric of that day as ruinous. One interesting fact pointed out was the great splay in the two ancient windows that lighted the church, their outside diameter being eight inches, and their inside diameter four feet ten inches. Some facts about the headstones and the ancient graveyard were suitably alluded to, as was likewise the wild life associated with the island and other matters of topographical interest. Mr. Skillen made special reference to the wanton effacement of an inscription on the tomb of the O'Hara's, which, fortunately, he had taken down before the vandalism was perpetrated. The inscription on the slab was as follows :—

THIS MONUMENT

is erected in the year of our Lord 1854 by
HESTER O'HARA,

Daughter of Oliver O'Hara and his wife Honoria Macmanus
the only lineal survivor of the ancient family of the O'Hara
of the Route and Crebilly. Her ancestors have been interred
in this vault for several generations, and previously at
Loughguile, near where their ancient residence stood.

Among their ancestors have been

Her grandfather HENRY O'HARA of Claggin youngest son
of Teague O'Hara of the Route and Crebilly and Heir
presumptive to his nephew Henry Hutchinson O'Hara of
Crebilly Her Grandmother MARGARET JAMIESON

Their son HENRY O'HARA

His first wife CHARITY CHICHESTER
and his widow ANNE MAGENNIS

Their son OLIVER O'HARA and his widow
HONORIA MACMANUS

also Mary O'Hara otherwise O'NEILL
widow of

Their Grandson HENRY O'HARA buried
in Wexford

Their Grandson ALEXANDER O'HARA
and his wife EMMA JONES

Their Grandson HENRY O'HARA
and his widow LETITIA JONES

and HENRY JONES O'HARA son of the said
Henry and Letitia who died at Torquay
and whose remains were removed
hither for interment

JOHN HENRY and RAWDON O'HARA
were grandsons to Henry O'Hara of Claggin
and brothers

To HESTOR O'HARA who erects this
monument

The first of these a Lieutenant of the 68th regiment of the
line. Died in the West Indies The second was an adjutant
in the East India Service. Died in the East Indies. The
third an adjutant in the same service fell at Kolunga. Marcus
great grandson of same Henry fell

at the storming of St. Sebastian

Verily verily I say unto you the hour is coming and now is
when the dead shall hear the voice of the Son of God and
they that hear shall live.

John v. 25.

At the conclusion of Mr. Skillen's paper, Mr. Fennell gave a description of the Round Church in Carrickfergus Castle, illustrating his remarks with a number of lantern slides. He also referred to the recent discovery of a portion of an Anglo-Norman inscribed tombstone, and to the bringing back to light the great Norman columns of the nave in St. Nicholas' Church. A general discussion followed, in which most of those present joined.

"METHOD IN BIOLOGICAL RESEARCH."

At a meeting of the Zoological Section on the evening of Wednesday, 10th February, the Vice-President, Mr. W. H. Gallway, in the chair—Mr. F. Balfour-Browne, M.A., F.R.S.E., F.Z.S., delivered a short lecture on "Method in Biological Research." He pointed out that the present curriculum in biology at the Universities gave one a grounding in the general subject, taught the use of the microscope and other instruments, and also taught various laboratory methods, all useful indirectly to the naturalist, but that the special methods of such an individual had to be developed as required, and he suggested that the great advantage of any form of training was that it developed the power of being methodical. Mr. Balfour-Browne described himself as a hydro-biologist, and said that he was chiefly interested in the water-beetles, on the British species of which he hoped some day to write a monograph. He described his work as consisting of four sections, collecting, systematic work, life-history work, and distribution, and he described in detail the methods he employed so as to make use of the information on these points which he collected from every possible source. The most troublesome, yet none the less interesting, work on distribution necessitated the employment of very elaborate methods. First, a filing of every published record on the distribution of every British species; secondly, the formation of a chart which shows at a glance the

water-beetle fauna of every county in England, Scotland, or Ireland, so far as at present known, and at the same time shows the distribution of any species all over the United Kingdom; thirdly, the filling-in of a map of the United Kingdom for each species, which shows in another way its "Britannic" distribution. Mr. Balfour-Browne explained that he was greatly indebted to a number of friends, including members of the Field Club, for sending him unpublished records of their captures in various parts of the country, and also to many for sending him the specimens.

In the discussion which followed the following members took part:—Messrs. N. H. Foster, M.B.O.U., R. Welch, M.R.I.A., A. W. Stelfox, H. Lamont Orr, J. N. Milne, T. Maxwell, and W. H. Gallway.

THE DARWIN CENTENARY.

At a meeting of the Botanical Section, held in the Clubroom of the Museum, on Saturday, 13th February, a paper was read by Mr. W. J. C. Tomlinson entitled "The Charles Darwin Centenary: Darwin as a Botanist." The chair was occupied by the Rev. C. H. Waddell, M.A., B.D., and there was a large attendance of members. Mr. Tomlinson, in the course of his paper, said the one hundredth anniversary of the birth of Charles Robert Darwin took place on the previous day. As they all knew, the event took place on the 12th February, 1809—a year made memorable by the birth of many great men, but none of them greater in their respective spheres than was Charles Darwin in his. The present year, therefore, as the centenary of his birth, had given rise in many quarters of the globe to important acts of remembrance. This was perfectly natural, and was as it should be. The turning point in Darwin's career was his appointment, in the autumn of 1831, through Henslow's influence, as naturalist to the voyage of the Beagle, on her five years' exploration cruise, mainly about the

South American continent and the adjacent seas. "I have always," he afterwards wrote, "felt that I owe to the voyage the first real training or education of my mind." Geology was the science in which he was most proficient, but on the voyage he was an indefatigable collector. For instance, when exploring the Galapagos group of islands he tells that he collected specimens of every plant he saw in flower, and very fortunately kept his collections made on the different islands quite separate. It was the peculiarity of the facts regarding the geographical distribution of plants and animals which he noted on these islands that influenced him greatly afterwards in propounding his epoch-making theory. After his return to England in 1836, his marriage in 1839, and his final settlement at the small Kentish village of Down in 1842 —where he continued to reside till his death, forty years later—his life-story is that of the books which he wrote, expounding his great theory and explaining the results of his multifarious investigations. The lecturer then proceeded to explain and deal with Darwin's work in botany, prefacing his remarks on this aspect of his subject by remarking that Darwin himself was accustomed to disclaim all title to the rank of a professed botanist. It must never be lost sight of that Darwin was essentially a naturalist of the old type, such as Linnæus and Humboldt. Apart from the botanical issues raised in his famous book "On the Origin of Species," his distinctively botanical books are in themselves an immemorial reminder of his many-sided fertility, and his genius for minute original investigations, as well as for the framing of suggestive scientific hypotheses for their explanation. His "Fertilization of Orchids" was the earliest work, and it was followed by many others of like originality. The striking results of his labours are now the accepted commonplaces of every modern text-book on botany. But the indirect influence which Darwin's work and views exercised in the furthering of botanical research has been perhaps of greater magnitude than the direct results of his own investigations. Yet of these direct results Sir W. T. Thiselton Dyer, himself a

great botanist, has said—"It is not too much to say that each of Darwin's botanical investigations, taken on its merits, would alone have made the reputation of any ordinary botanist." The secondary object of some of these books is to bring into focus the details of facts and forces that made for the support of his general theory regarding the origin of species. After analysing briefly the purport of each of Darwin's botanical works, the speaker went on to tell of the methods of work pursued by the great naturalist, his constant and chronic ill-health, his sympathetic nature, and other personal traits of character. He concluded by expressing the belief that, judged by all the standards by which the work of scientists and philosophers is appraised by their successors, the name of Charles Darwin would go down for all time in the annals of posterity as that of one who beneficially revolutionised the thought of his time, and was indeed a prince among the select band of the world's greatest naturalists.

After the reading of the paper a very interesting discussion ensued, in which the Chairman, Miss Blackwood, and Messrs. J. Maxwell and H. L. Orr took part.

"THE DAWN OF HISTORY IN IRELAND."

The fourth meeting of the Winter Session was held in the Museum, on the 16th February, when Miss Margaret Dobbs read a paper on "The Dawn of History in Ireland"—Mr. W. J. Fennell, F.R.I.B.A., in the chair.

Miss Dobbs, in the course of an able paper, said civilisation was now admitted to be far more ancient than was generally supposed, science with its unwritten records throwing it back to 12,000 B.C., and their preconceived ideas of the early inhabitants of Europe must be largely modified. Ancient remains of spinning, weaving, domestic animals, pottery, and bronze castings pointed to a considerable degree of civilisation at an extremely early period, having a regular ordered social life, a settled religion, and

recognition of law and order. The evidence for ancient commerce and intercourse was amazing. Ireland was not isolated from Continental influence, though probably late in receiving it, and the evidence of Irish intercourse with the Continent went back to the stone age. One of these evidences of commerce was amber. Being obtained only in a few definite localities, such as the Baltic and the West Coast of England, its presence in the prehistoric tombs of Ireland was direct evidence of commerce at a very early date. The finding of rare stones, such as nephrite or jade, in places remote from their sources was also proof of commerce. Specimens of ancient amber and other foreign substances which must have been imported have been found in Ireland. In the bronze age Ireland was the Eldorada of the time. About 1,500 B.C., Ireland traded with Scandinavia, Brittany, and Portugal, and ornaments of Irish gold of characteristic design had been found in these countries. In this golden age Ireland advanced, and developed a civilisation of her own. To this period probably belonged the dolmens and the ancient coal mines at Ballycastle. With regard to the evidences of cannibalism having been anciently practised in Ireland, Miss Dobbs pointed out that there was evidence of this custom having prevailed all over Europe at an early age. Archæologists explained this custom as arising, not from mere greediness, but as due to deep religious feeling. The variations of Irish civilisations were best explained by the history of the Continent; the two must be studied together. The great Celtic Empire of 600 B.C. to 1 A.D., which was only now being properly understood, extended to Ireland. Its magnitude and importance was recognised when it was realised that Julius Cæsar gained his name as a military genius by crushing the power of the Celts. Of the Continental Celts there were no written Celtic records, though they had rumours of them in Roman and Greek history, and for their best knowledge of them they must go to archæology. The only written Celtic records preserved in Europe were embodied in Irish history, which, though largely mythical,

must have much truth embedded in it. Science, with its unwritten records, aided the investigation between fact and fable. They had in Ireland both the texts and unwritten records, Europe having only the unwritten records. Celtic history was the coming field of study.

The paper, which was listened to throughout with marked interest, was spoken to by the Chairman, Miss Andrews, Mrs. Hobson, Messrs. J. M. Dickson, Wm. Gray, M.R.I.A., D. Elliott, M.A., and Dr. Clarke Robinson, M.A.

“OPAL DEPOSITS OF SANDY BRAES : THEIR FORMATION
AND ORIGIN.”

At a meeting of the Geological Section held on Wednesday, evening, 24th February, in the Museum, a lecture was given by Mr. James Strachan on “The Opal Deposits of Sandy Braes : their Formation and Origin.” The chair was occupied by Mr. W. J. C. Tomlinson, and there was a representative attendance of members. Mr. Strachan, in the course of his address, said the opal deposits of Sandy Braes, County Antrim, are, like the rhyolitic lavas in which they are found, quite unique in the geology of the British Islands. The prevailing type of rock at this locality is a yellow fluidal pearlstone, with typical perlitic and flow-structures, variegated by bands and masses of a puce-brown colour, showing flow-structures on a large scale. In this lava occur cavities, varying in size from 1 to 20 centimetres, containing opal and hyalite. In places the latter passes into chalcedony. Each cavity is surrounded by a wall or layer of purple-red porphyry or pitchstone, 1 to 7 centimetres in thickness. These hollow “bombs” of porphyry, more or less completely filled with opaline minerals, are found upon the surface at Sandy Braes, where they have been weathered out from the pearlstone. By digging into the fresh rock fine specimens may be obtained *in situ*. The constituent minerals of the porphyry surrounding the

opal vary considerably from those of the pearlstone both in nature and structure, and the glassy base of the former is almost completely chalcedonic. Various types of these cavities were described in the course of the lecture, and numerous specimens were exhibited showing the different varieties of opal found in the district. One of the specimens shown was the rather rare and interesting variety known as the "hydrophane," which is white and opaque when dry, but on immersion in water it absorbed 24 per cent. of its own weight of the latter, becoming transparent and showing a play of colours like precious opal. In conclusion, the lecturer discussed briefly the probable origin of the opal deposits at Sandy Braes, comparing the cavities in the porphyry with the well-known "lithophyse" structure of some foreign lavas.

An animated discussion followed the lecture, in which the Chairman, Messrs. Thomas Dewhurst, A.R.C.Sc., James Orr, H. L. Orr, and George Donaldson took part. Mr. Strachan was highly complimented on his research work on these local deposits, and in his reply he ably defended the theoretical views he had advanced.

"LAND SHELL DEPOSIT ON SANDHILLS, HORN HEAD."

A joint meeting of the Zoological and Geological Sections was held on the evening of the 3rd March—the Vice-President, Mr. W. H. Gallway, in the chair—when a short description of some recently discovered "rainwash" deposits of land shells in the sand hills at Horn Head, County Donegal, was given by Mr. Robert Welch, M.R.I.A. The lecturer pointed out the difference between the well-known "pockets" of land shells collected by the wind, occurring on dunes, and deposits formed during heavy rains in cases where these dunes encroach on steep hillsides. In both instances these "pockets" collect in hollows, and are usually covered up with blown sand. If the sand dunes are in the process of formation, the shells form local

deposits, and are protected till the dunes undergo erosion, from any cause. In the changes which are constantly taking place in most æolian sand hills this may be the case in a few months or years, or may not occur for a very long period. Where the deposits are collected in sand which is mainly silicious, the shells are liable to solution by percolating waters, which dissolve out the calcareous substance. For this reason such deposits are rare—usually absent—in our east coast sand hills, but they are often very abundant in the calcareous sand dunes of the west coast of Ireland, the sand of which is mainly finely comminuted shells and sea-urchins, with the tests of foraminifera, &c., present sometimes in large quantities. At Horn Head land shells occur in the dunes in myriads, and, where the dunes have been formed along a hillside, having a surface of stiff clay, sudden heavy rainfalls rushing down the slope have undercut the dunes, floating out shells of all sizes and carrying them down to hollows in the sand. Here the water filters away, leaving the shells in a layer of mud to be covered up by dry blown sand during the next dry windy period, possibly only a few hours afterwards. A succession of these rainwashes separated only by a few inches of sand showed clearly in one section. Mr. Welch described the washing out of the mud, when over twenty species of shells were determined in the mass, the most interesting fact being the presence of very large numbers of the genus *Vertigo*, including the rare *V. pusilla*. Specimens were shown of the material collected by the lecturer at Horn Head.

An animated discussion followed the lecture, in which the following took part—The Chairman, Messrs. F. Balfour-Browne, M.A., A. W. Stelfox, T. H. Dewhurst, A.R.C.Sc., N. H. Foster, M.B.O.U., H. L. Orr, W. J. C. Tomlinson, J. N. Milne, George Donaldson, and C. M. Cunningham, L.D.S. Mr. Welch replied to numerous questions.

“THE CELTIC MISNOMER.”

At the final meeting of the Archæological Section for this session, held in the Museum, College Square, on Wednesday, 10th March—Mr. W. J. Fennell, F.R.I.B.A., presiding—Mr. John M. Dickson read a paper on “The Celtic Misnomer,” in which he referred to the very frequent misapplication of the term Celtic when used to describe the dark-haired inhabitants of these countries as “the Celtic fringe” of the population, &c., &c., while in fact this darker and smaller race are the aborigines of Western Europe, who had been either displaced or enslaved everywhere by the tall, fair-haired, blue-eyed Continental Celts. He quoted Cæsar and Tacitus with regard to these “Celtæ,” who had previous to their times occupied three-fourths of what is now France, which from them was called *Celtica*; while in Spain they had driven off the natives and occupied the North-Eastern corner, now the province of Catalonia, and then known as “*Hispania Celtica*.” Long before Cæsar’s time the *Celtæ* had crossed to Britain and largely occupied it, bringing with them their language (the Gaelic), a branch of the Aryan stem, as testified by the local nomenclature, and especially by the river names. He supported this evidence of authentic history by quoting from the Irish traditions, which, when studied “between the lines,” reveal the same result of the collision between the two races, the aboriginal, or “black Irish,” though “the most numerous,” having been treated as a servile or helot class by these tall fair-haired invaders, and held in subjection by them until the Gaelic supremacy was destroyed in the seventeenth century. He suggested that this misapplication of the term “Celtic” may have arisen from the assumption that because Gaelic was now common in some districts—to the west and north of these islands—the speakers must themselves be Celts, whereas this survival of Gaelic is due to their remoteness and want of intercourse with English speakers, both races having spoken Gaelic all over the country up till five centuries ago. He

repeated that all ethnologists now admit the identity of the Celts in these islands with the Celtæ of the Continent, and that no other Celts are known to history, so that to speak of "black-haired Celts" is an ethnic absurdity, and contains its own contradiction.

A very full and interesting discussion followed, in which many members took part, each speaker thanking Mr. Dickson for his valuable paper.

"LOCAL PLANT GLEANINGS, 1908."

"THE *INCOMPLETÆ* (GOOSEFOOTS, KNOTWEEDS, ETC.),
AND
THE NEW CLASSIFICATION OF ENGLER."

At a meeting of the Botanical Section, held on the 13th March, Mr. W. J. C. Tomlinson read a paper on "Local Plant Gleanings, 1908." He said—The close of another session seems to be a fitting time for bringing together the more important scattered records of the year relating to the Flora of our district. Such a summary is always found useful, if printed in an available medium such as the Annual Report of the Club affords.

Mr. S. A. Moore was fortunate in discovering *Geranium pusillum*, L., in County Down, last summer. This, I believe is the first authoritative record of the occurrence of the plant in Ulster. The finder, however, is inclined to the belief that its superficial resemblance to *G. molle* may have led to its being overlooked in some instances. He says, moreover, that there is just the possibility of its having been introduced at the station where he found it. The locality is a roadside one, some distance south-east of Bangor, and near a farmstead. Mr. Moore also found *Geranium lucidum*, L. on a ditch-bank not far from the preceding locality, and in considerable quantity. The species in question should be carefully watched in Down, as Mr. Praeger expressed the view that "Soil conditions are against the plant's presence" in

the County, and he therefore, when criticising the previous records, inclined to the view that it was "probably" introduced. Mr. Moore also records *Anchusa sempervirens*, L., from a wood near Bangor.

Another interesting Down find, which I recorded in the *Irish Naturalist* for July, was *Galium Cruciata*, Scop. This plant was discovered at Annadale by one of our members, Rev. W. P. Carmody, M.A. This makes the second station for the County. It grows on waste ground on an old roadway, and forms one large circular patch. I have been informed that a former Club member, Mr. T. J. Abraham, gathered specimens of this cross-wort from the same habitat some years ago. But, if so, he made no public note of the find, and Mr. Carmody's re-discovery was quite independent, and the first authenticated record. Another plant recorded for County Down by Mr. Carmody (*Irish Naturalist*, October, 1908,) was *Plantago media*, L. It was found in Belvoir Park by Miss Florence Wilson. This is, of course, an introduced plant, but one which seems to be spreading in Ireland. It had previously been recorded for Down by Mr. J. H. Davies, who found it at Lenaderg in 1903 (see *Irish Naturalist*, October, 1903). Mr. N. Carrothers also found *Plantago media* in the early summer, in some abundance, on waste ground at Stranmillis. This is apparently the second authentic record of the plant's existence in County Antrim; Miss M. C. Knowles having already noted it from Ballymena.

Mr. C. J. Lilly, of Larne, made one of the most interesting County Antrim finds (see *Irish Naturalist*, August, 1908,) of the year. This was the discovery of the Bear-berry, *Arctostaphylos Uva-ursi*, Spreng, on Skerrywhirry, a basaltic escarpment north-east of Glenwhirry. This is now the only station where it is known for certain to occur in north-east Ireland. At the former solitary station, on Fair Head, the plant has not been seen since 1837. Among other interesting plants of secondary importance noted by Mr. Lilly on Skerrywhirry was *Vicia Orobus*, D.C., thus

adding another Antrim station to the list, and one which constitutes an important extension of range.

The Sweet Flag, *Acorus calamus*, L., another introduced plant, has now extended its range from Moira neighbourhood to Belfast. Mr. Carrothers found it in August, in fair plenty, at the second lock on the Lagan Canal, which is in County Antrim.

Mr. Alexander Milligan noted two years ago a good colony of the Musk Mallow, *Malva moschata*, L. in an old quarry near Bangor.

Mr. John Adams, M.A., a former member of the Club, found *Helleborine longifolia* (*Epipactis palustris*, Crantz) in August, in a wet meadow at Magilligan (see *Irish Naturalist*, February, 1909). This is a first record for County Derry, and the only one made in the North-East for very many years. Another important discovery made by the same botanist (see *Journal of Botany*, January, 1909) is that the plant hitherto recorded from the neighbourhood of Antrim town as *Allium vineale*, L., is not the Crow Garlic, but the Field Garlic, *Allium oleraceum*, L. If this is correct, and it appears to be so, then Antrim is the only known station in Ireland for the latter species.

Another *Journal of Botany* record (October, 1907) was *Orchis pyramidalis*, L., from Mountstewart, County Down. The note was made by the finder, Mr. A. A. Dallman, an English botanist. On 17th July last I searched the locality, particulars of which a member of our Club, who was with Mr. Dallman, kindly gave me, but could not find a single specimen. I may say, however, that the habitat is a grassy slope, bordering on the carriage drive, and that a lawn-mower had apparently been over it prior to my visit. Mr. Dallman was in error in supposing that his record is the second for the County.

On 30th May I came across a fine colony of *Habenaria viridis*, R. Br., in full flower, on the strip of sandy warren opposite Downhill strand. Although not uncommon in County Derry, this is the first record for the County from the sand-dune area.

It was announced in the "Country-Side" in August last, that *Spiranthes Romanzoffiana*, Cham., had been found in Devon. After several months waiting and correspondence, I finally got into touch with the finder, who now tells me that a mistake has been made, and that the orchid was not what the Editor of the "Country Side" reported. So Ireland still holds the field for this species.

A visit to Sluggan Moss, County Antrim, in July, under the guidance of Mr. Robert Bell, gave me an opportunity of seeing a fine colony of *Carex limosa*, L. It does not appear to have been recorded from this locality before, although known to several of our botanists. In its vicinity grew *Vaccinium Oxycoccus*, and *V. Vitis-Idaea*.

Mr. William Porter found a new station for *Carex pendula*, Huds., in the vicinity of the Bog Meadows, Balmoral, County Antrim. He also, in the cryptogamic series, records *Lastrea spinulosa*, Persl., from the vicinity of Dungannon, County Tyrone, which, however, is outside our recognised district. As usual, Mr. Porter has been successful in securing some notable varieties of Ferns. He found three most interesting varietal forms of *Blechnum Spicant* in the neighbourhood of Newcastle, County Down. For one of these, a variegated form, he was awarded the British Pteridological Society's certificate.

Some interesting notes on the Moss Flora of the district have been made by our Chairman (Rev. C. H. Waddell, B.D.), by Mr. J. H. Davies, and by the Rev. Canon Lett, M.A., M.R.I.A. The latter reports in the *Journal of Botany* for the current month (March, 1909) the finding of a moss new to Ireland, at Saintfield, Co. Down. The exceedingly interesting moss referred to is known as *Catharinea rhystophylle*, C. Mull., and has hitherto been only known as a native of North China. Rev. C. H. Waddell records the finding of an interesting Liverwort, *Ptilidium ciliare*, Hampe, near the summit of Colin

Mountain, Belfast. This is a rare Irish plant and has only been found hitherto in Kerry and Cork.

The Rev. C. H. Waddell, M.A., B.D., then gave an interesting lecture on "The *Incompletæ* (Goosefoots, Knotweeds, &c.), and the new Classification of Engler."

An outline was given of the history of the classification of Flowering Plants, and the various systems described. That of Bentham and Hooker has been universally adopted in this country for many years. Its chief drawback is that plants which do not possess a fully developed perianth are lumped together in the group *Incompletæ* at the end of the series of Dicotyledons.

The new system of Engler which is more in accordance with later advances in Botany was described. It has been adopted generally on the Continent, and in some new works in England and America, and is likely to take the place of the more familiar classification. Engler dispenses with the group *Incompletæ* altogether, and finds places for the members of it among the other orders to which they are most nearly related.

Brief descriptions were given of the Goosefoots, Knotweeds, Willows, &c., and of the structural particulars which link them with other natural orders.

"ROCK GARDENS, NATURAL AND ARTIFICIAL."

The fifth meeting of the Winter Session was held in the Museum, College Square North, on the evening of the 16th March,—the vice-president, Mr. W. H. Gallway, in the chair. Mr. R. Lloyd Praeger, B.A., B.E., M.R.I.A., read a paper on "Rock Gardens, Natural and Artificial," to a large and representative audience. The lecturer said during recent years the cultivation of Alpines and rock plants had been growing in favour, so that now a piece of rockwork planted with these denizens of the hills was an almost necessary adjunct to any garden of a

general character. These plants were rather a class to themselves, and distinguished by several well-marked features—dwarf growth, small leaves, large and brilliant flowers, an elaborate root system. The leaves were peculiar also in being very frequently fleshy, or covered with felt or close hairs, or a waxy or limy deposit. These characters were the result of exposure to wind and drought, and of the short season during which their cycle of growth and of seed-production had to be carried on. Most Alpine plants grow in places from which the rain drains quickly away, and provision must be made for enduring the blazing sunlight of the heights; hence the exceptionally long roots and the various devices found in the leaves, keeping up the supply of water in the plant. A great mountain range like the Alps displays a series of floras as one ascends. The pine woods which succeed the tilled lands of the valleys are full of interesting species. Higher up Alpine pasture stretches upward towards the snow-line, filled with characteristic and beautiful plants—gentians, primulas, androsaces, crowfoots, and many more; while the rocks and screees and moraines are gay with saxifrages of many kinds, sempervivums, and innumerable other plants. The Arctic flora differs from the Alpine flora both in its constitution and in the conditions under which it lives. The long and intensely cold Arctic winter is succeeded by a very short summer, during which the temperature never rises much above freezing point. The transition from winter to summer and from summer to winter is exceedingly abrupt. Arctic plants do not suffer from drought in the ordinary sense, yet the coldness of the soil renders the absorption of water difficult, as a result of which we find devices for preventing loss of water among Arctic plants, just as we do among plants which grow on hot rocks. One of the most curious and interesting rock gardens to be found in the British Islands is spread over the northern portion of the county of Clare, in the west of Ireland. Here a great stretch of limestone hills extends, quite devoid of any covering of drift. This has been clothed with a flora of

singular interest and of curiously diverse origin. Plants which are usually Alpine in their range, such as the mountain avens, the spring gentian, the bear-berry, *Euphrasia salisburgensis*, *Saxifraga Sternbergii*, &c., grow in sheets right down to sea level, and with them grow other plants of quite southern origin, such as the little Mediterranean orchis *Noetinea intacta*, and the maidenhair fern. The flora here was probably a very ancient one, and presumably owed its survival to the unusual conditions which prevailed—the damp climate and the peculiar soil conditions. Alpines and rock plants are very highly specialised, and it might be thought that they would, therefore, be difficult to cultivate under the conditions prevailing in an ordinary garden. But most of them are of easy growth if care is exercised. The drainage must be exceedingly rapid, the soil light and open, the situation open and sunny. The imitation of their natural surroundings by the construction of rockwork ensures good drainage, and provides chinks, and surfaces of rock such as are beloved by many species. The construction of rock gardens was then discussed, and many slides shown of rock gardens built in various styles, the good and bad points of which were pointed out. The lecture, which was illustrated by a large number of exceedingly beautiful lantern transparencies, largely original, was listened to with marked attention and appreciation. An interesting discussion followed, in which the following took part :—The Chairman, Messrs. John Hamilton, R. M. Young, M.R.I.A.; W. J. C. Tomlinson, Wm. Gray, M.R.I.A.; R. Welch, M.R.I.A.; and Rev. Canon Lett, M.A., M.R.I.A.

"A GOSSIPING GEOLOGICAL SPECULATION ON CAVE HILL."

At a meeting, held in the Natural History Society's Museum, on Wednesday, 24th March—Mr. W. J. C. Tomlinson in the chair—Mr. William Gray, M.R.I.A., promoted a geological gossip. Mr. Gray said the structural basis of Antrim is mainly the section exposed at Cave Hill, and the rocks that occur along the north coast are the same as the rocks that occur in sections immediately below the highest point of Cave Hill. There is, however, an area of about nine or ten miles square of the north-east of Antrim where the rocks are chiefly metamorphic, and therefore older than any other rocks in Antrim or Down. Next above and reposing upon the primary metamorphic rocks come the extensive silurian beds of County Down, composed of shales, grits, and slaty beds of great variety and fine texture. Reposing upon these silurian rocks we have at Holywood, Castle Espie, and Cranfield, three varieties of fossiliferous carboniferous limestones, without sandstone, and therefore without any indication of coal; the Cranfield outcrop of blue carboniferous limestone extends to both sides of Carlingford Harbour, and is extensively worked at Carlingford for industrial purposes. The Carlingsford limestone determines the age of the Mourne granite, which has been forced up from below through the silurian rocks and through the limestone, both formations being indurated or baked by the igneous action of the granite, which has converted the silurian shales into banded hard rock of great beauty and capable of high polish. The granite for the Albert Memorial, Hyde Park, was selected from Castlewellan quarries, where there is an inexhaustible supply awaiting the development of this branch of Irish industries. The first formation of the mesozoic period we find at the Antrim side of the harbour, forming the slopes of Cave Hill, and indeed the foundation of the whole County Antrim, in the form of a series of sandstones of various colours,

alternated and capped by thick beds of saliferous clays, constituting what are known as the Triassic system, and attaining in our district a thickness of probably 2,000 feet. Our triassic rocks yield a limited supply of gypsum, in addition to sandstone, for building purposes. The saliferous marls of the triassic system are the source of an active industry in the production of salt, of which we have a rich supply around Carrickfergus. The triassic system is sometimes called the new red sandstone in contradistinction to the old red sandstone, the one being newer than the coal or carboniferous, and the other being older than the coal. After the lagoons or salt lakes of the triassic epoch, the marine condition of the lias, and the dry land of the Oolite epoch, we are next introduced to the profound deposits of the cretaceous sea, where our chalk or white limestone was deposited during the lapse of many thousand years. Since the outbursts of igneous action that elevated the granites of Mourne after the carboniferous age no igneous forces were manifested to the same extent in our district until the trappean outburst in the tertiary period, when the long-exposed surface of the chalk formation was covered by a succession of basaltic overflows, now constituting the trappean plateau of Antrim, including the world-famed Giant's Causeway geological phenomena. The basaltic material of which the Antrim plateau is composed was not ejected in a few violent outbursts, but accumulated slowly by a series of overlapping flows from fissure vents widely distributed over the area in action, the iron clay bands that are to be seen between the flows indicating periods of rest, during which the surface of the basalt was exposed to atmospheric denudation for periods of various lengths. The great iron ore band between the upper and the lower basalts of Antrim indicates a prolonged period of rest, during which rivers and lakes were formed, forests grew, and a rich vegetation clothed the landscape. All this was completely overturned by the subsequent outburst of volcanic energy that produced the upper basalts, converting the vegetation into lignite coal, the lake

mud into bauxite, and the surface decomposition of the basalt into iron ore, to stimulate man's industrial enterprises of to-day. Mr. Gray described the ryolite intrusion of Tardree, the porphyry and old red conglomerate of Cushendun, and the primary limestone of Torr Head. He referred also to the modifying effect of glacial action, and concluded the gossip by considering the possible sources from which the materials were obtained for the building up of the succession of sedimentary formations.

Mr. Gray's interesting address was followed by an equally interesting discussion, in which several members took part, including Messrs. W. J. C. Tomlinson, Balfour-Browne, G. Donaldson, R. Bell, and S. Wear.

ANNUAL MEETING.

The forty-sixth Annual Meeting was held in the Museum, College Square North, on the 6th April—the President of the Club (Mr. Robert Patterson, F.L.S., M.R.I.A.) in the chair. There was a large attendance of members.

The Secretary (Mr. Robert Welch, M.R.I.A.) read the Annual Report.

The report of the Botanical Section was read by Mr. J. L. S. Jackson ; the Zoological report by Mr. N. H. Foster, M.B.O.U. ; the Archaeological report by Mrs. Hobson ; the Librarian's report by Mr. J. L. S. Jackson ; the report of the sub-committee appointed to adjudicate on the collections sent in for Club prizes by Mr. N. H. Foster, M.B.O.U. ; and the Treasurer's Statement of Accounts by Mr. W. H. Phillips.

The various reports were adopted on the motion of the President, Mr. Robert Patterson, F.L.S., seconded by the Vice-President, Mr. W. H. Gallway, and supported by Mr. Wm. Gray, M.R.I.A.

Mr. E. J. M'Kean, B.A., Barrister-at-Law, moved, and Mr. C. J. Robertson seconded, that Mr. N. H. Foster, M.B.O.U., be elected President for the ensuing year.

The motion was passed with hearty acclamation.

Mr. Robert May moved, and Mr. George Raymond seconded, that Mr. W. H. Gallway be re-elected Vice-President for the ensuing year.

The motion was cordially adopted.

Mr. W. H. Phillips was re-elected Treasurer, on the motion of Mr. W. H. Milligan, seconded by Mr. Wm. F. M'Kinney.

On the motion of Miss M. K. Andrews, seconded by Mr. W. R. Pim, Mr. J. L. S. Jackson was re-elected Librarian.

Miss Agnew and Mr. Arthur W. Stelfox were appointed Honorary Secretaries, on the motion of Mr. Joseph Maxwell, J.P., seconded by Mr. S. Wear.

Mr. William Gray, M.R.I.A., moved, and Mrs. Hobson seconded, the election of the following ten members of Committee:—Messrs. R. Bell, F. Balfour-Browne, M.A., F.R.S.E.; N. Carrothers, W. J. Fennell, F.R.I.B.A.; W. A. Green, H.C. Marshall, H. L. Orr, Robert Patterson, F.L.S.; W. J. C. Tomlinson, and R. Welch, M.R.I.A.

Suggestions of places to be visited during the summer excursions were then heard, and a new member—Mrs. Cooke, Rugby Road—elected.

Mr. T. E. Farrington moved, and Mr. Walter Chambers seconded, a vote of thanks to the retiring President, Mr. Robert Patterson, F.L.S., both gentlemen alluding eloquently to Mr. Patterson's services to the Club during his term of office.

The motion was passed in the most enthusiastic manner, and Mr. Patterson briefly replied.

A very cordial vote of thanks was also passed to the retiring Secretary, Mr. Robert Welch, M.R.I.A., on the motion of Mr. T. Anderson, seconded by Mr. G. Donaldson.

Mr. Welch having replied, the meeting terminated.

 RULES 
OF THE
Belfast Naturalists' Field Club.

1909-10.

I.

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

II.

That the object of this 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 first pay an entrance fee of 5/-, and be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of 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 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, Librarian, and two Secretaries, and ten Members who form a Committee, and shall hold not less than eight Meetings in the year. Five Members 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. In the event of a vacancy occurring among the Officers, the Committee may co-opt a Member to fill such vacancy during the year only.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being Members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. Any Sectional Committee may elect its own Chairman and Secretary from its Members.

VII.

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 Archaeology 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.

VIII.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

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 archaeological 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.

X.

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 alterations 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 each intended alteration.

XI.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

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 subject mentioned in such written requisition.

XIII.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

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. 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.

Exchanges of Proceedings, 1908-1909.

Belfast—Natural History and Philosophical Society.

Report of Proceedings, 1907-1908.

„ Ulster Journal of Archæology.

Vol. XIV., Parts 1, 2, 3, 4. Vol. XV., Part 1.

Brighton and Hove Natural History and Philosophical Society.

Annual Report and Abstracts of Papers, 1907-1908.

Bristol Naturalists' Society.

Proceedings, Vol. I., Part 4, 1907.

Cardiff Naturalists' Society.

Report of Transactions, Vol. XL., 1907.

Dublin—Royal Irish Academy.

Proceedings, Section B, Vol. XXVII., Parts 1, 2, 3, 4, 5.

„ „ C, Vol. XXVII., Parts 5, 6, 7, 8, 9, 10,
11, 12. Appendix.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. XXXVIII., Parts 1, 2, 3, 4.

Dumfriesshire and Galloway Natural History and Antiquarian Society.

Report, Vol. XIX., 1906-1907.

Frankfort—Bericht der Senckinbergischen Naturforschenden.

Gessellschaft, 1908.

Helios Abhandlungen und Miteilungen, &c., Nos. XXIV-XXV.

Glasgow Philosophical Society.

Proceedings, Vol. XXXIX., 1907-1908.

Hamilton Association.

Journal and Proceedings, 1905-1906, 1906-1907.
Anniversary No., 1907.

Hertfordshire Natural History and Field Club.

Transactions, Vol. XIII., Parts 3, 4.

Limerick—Journal of Field Club.

Vol. III., Part 12.

Liverpool Geological Society.

Proceedings, Vol. X., Parts 3, 4.

London—Architectural and Topographical Society.

Vol. I., Parts 1, 2, 3, 4.

,, British Association for the Advancement of Science.
Report of the Dublin Meeting, 1908.

Magdeburg Abhandlungen und Berichte, 1907.

Manchester Field Naturalists' and Archæologists' Society.

Report and Proceedings, 1907.

,, Microscopical Society.
Transactions and Annual Report, 1907.

Marlborough College Natural History Society.

Report No. 56, 1907.

Miramichi Natural History Association.

No. 5.

Mexico—Geologico Instituto.

Boletin 17.

Norfolk and Norwich Naturalists' Society.

Transactions, Vol. VIII., Part 4, 1907-1908.

North Staffordshire Field Club.

Report and Transactions, Vol. XLII., 1907-1908.

Nottingham Naturalists' Society.

Report, 1906-1907.

Nova Scotian Institute of Science, St. John's, Nova Scotia.

Proceedings and Transactions, Vol. XI., Parts 3, 4.

,, , Vol. XII., Part 1.

Perthshire Natural History Society.

Vol. IV., Part 5, 1907-1908.

Peru—Boletin del Cuerpo de Ingenieros de Minas, Nos. 55 to 67.

Stavanger Museum.

Aarshefte fur 1907.

Toronto—Canadian Institute.

Transactions, Vol. VIII., Part 2.

Torquay Natural History Society.

Journal, Vol. I, No. 1, 1909.

U.S.A.—Boston Society of Natural History.

Vol. XXXIII., Parts 3, 4, 5, 6, 7, 8.

,, Chapel Hill N.C.—Elisha Mitchell Scientific Society.

Journal, Vol. XXIII., Part 4.

,, XXIV., Parts 1, 2, 3.

,, Chicago—Academy of Sciences.

Bulletin, IV., Part 2, Bulletin 6.

Official Report, No. 2. Special Publication.

,, Chicago—Field Columbian Museum.

Report, Vol. III., No. 2.

,, Cincinnati—Lloyd's Library.

Bulletin, Nos. 9, 10—Mycological Notes.

,, New York—Academy of Sciences.

Annals, Vol. XVII., Part 3.

,, XVIII., Parts 1, 2.

,, Philadelphia—Academy of Natural Sciences.

Proceedings, Vol. LVIII., Part 3; Vol. LIX., Parts 2, 3; Vol. LX., Parts 1, 2.

U.S.A.—St. Louis—Academy of Sciences.

Transactions, Vol. XV., Part 6; Vol. XVI., Part 8; Vol. XVII., Parts 1, 2; Vol. XVIII., Part 1.
Missouri Botanical Garden, 1907-1908;

,, Washington—Government Printing Offices.

Extracts from Report, 1906, Nos. 1757, 8, 9, 60, 1, 2, 6.

,, Washington—Geological Survey.

Bulletins, 328, 335, 337, 338, 340, 343, 344, 345, 346, 348, 350.
Professional Paper, No. 62.

,, Wisconsin Academy.

Vol. XV., Parts 1, 2.

Queensland—Annals of Museum, Nos. 8, 9.



List of Members.

Any change in the Address of Members should be at once notified to the Secretaries by Post Card.

Hon Members.

Jones, Prof. T. R., F.R.S., Penbryn, Chesham Bois Lane, Chesham, Bucks.

Lapworth, Professor Charles, LL.D., F.R.S., The University, Birmingham.

Plunkett, Thomas, M.R.I.A., Enniskillen.

Corresponding Member.

Holden, J. S., M.D., Sudbury, Suffolk.

Life Member.

Ewart, Sir W. Q., Bart., Glenmachan, Strandtown.

Ordinary Members.

Adams, Miss, Rosemount, Malone Road.

Adams, John J., M.D., Ashville, Antrim.

Adams, Rev. W. A., B.A., Antrim.

Agnew, Miss Jean, 5 Wellington Place.

Allibon, George H., 19 Short Strand.

Anderson, Sir Robert, J.P., Donegall Place

Anderson, Thomas, Embleton, Osborne Park.

Andrew, J. J., L.D.S., University Square.

Andrews, Miss, 12 College Gardens.

Andrews, Miss M. K., 12 College Gardens.

Bailie, W. T., Marathen, Knock.

Bailie, Richard, 6 Jubilee Avenue.

Barkley, James M., 24 Wellington Place.

Barrett, J. H., Holywood.

Baxter, James, Midland Railway Co.

Beattie, Rev. A. H., Portglenone.

Beck, Miss, 2 Osborne Terrace, Balmoral.

Beck, Miss Emma, Hampden Terrace, Rugby Road.

Bell, Dr. Elizabeth, 83 Great Victoria Street.

Bell, Robert, 64 Newington Avenue.

Bell, E. George, Bellevue, Lurgan.

Bennett, S. A., Campbell College.

Berry, Major R. G., M.R.I.A., Army Service Corps, Victoria Barracks.

Bigger, Francis J., M.R.I.A., Ardrie, Antrim Road.

Blackwood, Miss S., 6 College Gardens.

- Blackwood, W. B., 30 Elmwood Avenue.
 Blair, Mrs., Fernlea, Glenburn Park.
 Blair, Edward S., Rusheen, Glenburn Park.
 Blair, Mrs. Edward S., Rusheen, Glenburn Park.
 Borland, Mrs., Derwent, Marlborough Park.
 Boyce, Joseph, Kincora, Cregagh.
 Boyd, Miss, The Elms, Southsea.
 Boyd, W. C., Hazelbank Villa, Ravenscroft Avenue.
 Braithwaite, W. T., 12 Botanic Avenue.
 Branagh, E. H. H., 16 Madison Avenue.
 Brandon, Hugh B., 2 Wellington Place.
 Brett, Sir Charles H., Gretton Villa South.
 Brierley, J. C. A., 7 Glandore Street.
 Brierley, Mrs., 7 Glandore Street.
 Bristow, Very Rev. Dean, St. James' Rectory.
 Bromley, A. J., 20 Madrid Street.
 Brown, John, F.R.S., Longhurst, Dunmurry.
 Brown, Thomas, 102 Donegall St.
 Browne, F. Balfour, M.A., F.R.S.E., Claremont, Holywood.
 Browne, Mrs Balfour, Claremont, Holywood.
 Browne, W. J., M.A.; Templemore Park, Londonderry.
 Bruce, Mrs., Thornly, Holywood.
 Bulla, Charles, 21 Maryville Pk.
 Burrows, W. B., Ballynaf Leigh House.
- Calwell, John Y., Woodlawn, Belmont.
 Campbell, D. C., Templemore Park, Londonderry.
 Campbell, Wm. M., 34 Eglington Avenue.
 Carmody, Rev. W. P., Newtownbreda.
 Carrothers, Nathaniel, 145 Stranmillis Road.
 Carson, J. C., 8 Wellington Place.
 Carson, John, Walmer Terrace, Holywood.
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- Cheyne, H. H., Roseneath, Bangor.
 Christen, Madame, St. Imier, Brig 'o Gairn, Ballater, N.B.
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 Christy, William, 81 Enfield St.
 Clarke, Mrs. John, Lindisfarne, Annadale.
 Clarke, Thos., jun., Percy Street Flour Mills.
 Cleland, Alex. M'I., Macedon, Green Road, Knock.
 Cleland, Mrs. Annie, Macedon, Green Road, Knock.
 Cleland, James A., Bernagh West, Malone Park.
 Cleland, W. W., 56 Wellington Park.
 Cocking, Miss C. E., Martinbank, Huddersfield.
 Cocking, Miss M A., Martinbank, Huddersfield.
 Coleman, J., 2 Roshill Terrace, Queenstown.
 Collis, Rev. M. H. F., B.D., Antrim.
 Colton, J. M., 4 Hopefield Av.
 Cooke, Mrs., 2 Caledonia Terrace.
 Cottney, John, Clogher, Hillsborough.
 Courvoisier, Mrs., 3 Royal Terrace, Larne.
 Cowie, Mrs., Lauriston, Knock.
 Cowie, James, Midland Railway Co.
 Craig, John C., 14 Atlantic Avenue.
 Craig, Robt., 127 Ormeau Road.
 Culbert, J. Carroll, Connswater.
 Cunningham, Chas. M., L.D.S., D.D.S., Rostellan, Malone Road.
 Cunningham, Miss E. M., Victoria College.
 Cunningham, Saml., Glencairn.
 Cunningham, E., Reform Club.
 Curley, Francis, High Street.
 Curley, Mrs., Dunedin Terrace.
 Curragh, W. H., Rosslyn, Stranmillis Road.
- Davies, John Henry, Lenaderg, Banbridge.
 Dawson, R. A., A.R.C.A., Iniskeen, Holywood.
 Deane, Arthur, Municipal Museum, Royal Avenue.

- D'Evelyn, Alex. M., M.D.,
Ballymena.
Dewhurst, Thomas, A.R.C.Sc.,
Queen's College.
Dickson, John M., 34 Wellington
Park.
Dobbin, Mrs. W. C., 12 Brook-
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Dobbs, Miss M. E., Portnagolan,
Cushendall.
Donaldson, George, 4 Elm St.
Doran, John, J.P., Dunottar,
Malone Road.
Douey, S. H., Hastings Street.
Duncan, William, 38 Wolseley
Street.
Duncan, William, 2 Manilla Ter.
- Elliott, David, Ardroe, Bloom-
field.
Elliott, George H., Holywood.
Elliott, George, M.Inst.M.E.,
131 Limestone Road.
Elliott, E. J., 29 Bedford St.
English, James, 6 Adelaide St.
Entrican, Miss Sarah, 33 Botanic
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- Faren, W., 11 Mountcharles.
Farrington, T. E., Baythorpe,
Holywood.
Faussett, Stuart S., 16 Chiches-
ter Avenue.
Fennell, Mrs., Deramore Drive.
Fennell, W. J., M.R.I.A., 2
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Finlav, Miss, St. Kilda's East,
Old Nichol Street, Bethnal
Green, London.
Finlay, Arch. H., Holywood.
Flynn, W. J. W., 21 Tate's
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Forth, Francis C., A.R.C.Sc.I.,
Technical Institute.
Foster, Rev. G., The Parsonage,
Kirkcubbin.
Foster, Nevin H., M.B.O.U.,
Hillsborough.
Foster, Mrs. N. H., Hillsbor-
ough.
Foster, Miss, Myrtlefield Park.
Frame, John, Alfred Street.
Fulton, David, Arlington, Wind-
sor Avenue.
- Gaffikin, William, Notting Hill.
Galloway, Peter, 55 Botanic
Avenue.
Galloway, Joseph, 50 Eglantine
Avenue.
Gallway, W. H., Belgravia,
Bangor.
Gamble, Miss, Royal Terrace.
Gamble, J. G., 42 Hopefield
Avenue.
Gardner, Miss, 1 Wellington
Park.
Gardner, Campbell, jun., Wind-
sor Park.
Gibson, Andrew, 14 Cliftonville
Avenue.
Glover, James, Seaview, Kirk-
cubbin.
Glover, James, Belsize, Lisburn.
Godwin, William, Queen Street.
Gourlay, James, Derryboy Cot-
tage, Crossgar.
Graham, William, Lombard St.
Gray, William, M.R.I.A., Glen-
burn Park, Cavehill Road.
Green, Mrs. Isaac, Hawthorn-
den, Knock.
Green, Wm. A., 4 Salisbury
Terrace, Chichester Park.
Green, Mrs. W. A., 4 Salisbury
Terrace, Chichester Park.
Green, John F., J.P., Annavilla,
Warrenpoint.
Green, Ernest, Avenue Road,
Lurgan.
Greenfield, Miss M., 8 High
Street, Holywood.
Greeves, J. Theodore, Nendrum,
Knockdene Park.
Greeves, W. Leopold, Ormeau
Avenue.
Greeves, Fergus M., Rydal
Mount, Knock.
Gullan, H. F., Town Hall,
Belfast.
- Hadden, D. H., Magharee, Port-
adown.
Hadden, Dr. Robert E., Ard-
valla, Portadown.
Hamilton, Rev. T., D.D., LL.D.,
Vice-Chancellor Queen's
University, Belfast.
Hamilton, Miss, 5 Churchview
Terrace, Holywood.
Hamilton, John, 5 Churchview
Terrace, Holywood.

Hancock, R. W., Claremont, Holywood.
 Hanna, J. A., Cuillare, Holywood.
 Harvey, Alex., 127 Mulholland Terrace.
 Hastings, Miss M., The Manse, Magheragall, Lisburn.
 Hazelton, W. D., Springfield Road.
 Henry, F. W., Ye Olde Castle.
 Henry, T. B., Custom House Square.
 Henry, Samuel, Cookstown.
 Heron, F. A., Cultra, Holywood.
 Hobson, Mrs., 6 Hopefield Av.
 Hobson, Benjamin, 6 Hopefield Avenue.
 Hogg, A. R., 13 Trinity Street.
 Hogg, D. J., 3 Trinity Street.
 Holland, Miss, 33 Wellington Park.
 Holland, Frank, 33 Wellington Park.
 Hopkirk, F. G., Midland Railway Co.

Jackson, J. L. S., 19 Glandore Gardens.
 Jackson, A. T., 8 Derryvolgie Avenue.
 Jaffé, Lady, Kinedar, Strandtown.
 Johnson, Rev. W. F., M.A., F.E.S., Acton, Glebe, Poyntzpass.
 Johnston, Miss E., Sandown Park, Knock.
 Johnston, W. P., Sandown Park, Knock.
 Johnston, Ernest, Sandown Park, Knock.
 Johnston, F. W., The Cottage, Cultra.
 Johnston, Mrs., The Cottage, Cultra.
 Johnston, John Bruce, Cooleen, Marlborough Park North.

Kennedy, R. M., 3 Donegall Square East.
 Kidd, Miss, Greenhaven, Malone Park.
 Kidd, James, Antrim Road.
 Kilgour, Peter, Woodrow Villa, Bloomfield.
 Killen, Wm., 22 Waring Street.

Kinnaird, Miss Marjorie, Sandown Park, Knock.
 Kirker, S. K., Offices of Board of Public Works, Belfast.
 Kirkpatrick, F., 27 Oxford St.
 Knabenshue, Saml. S., American Consulate.
 Knowles, W. J., M.R.I.A., Filton Place S., Ballymena.
 Kyle, R. A., 13 Donegall Place.

Lamb, Miss, Divis View, Lisburn Road.
 Larmor, H. G., Lisburn.
 Lett, Rev. Canon, M.A., M.R.I.A., Aghaderg Glebe, Loughbrickland.
 Lindsay, Prof., M.D., 3 Queen's Elms.
 Lowry, D. E., 25 Donegall Pl.
 Lowry, James, Llewellyn Av., Lisburn.

MacCormac, Dr. John, Great Victoria Street.
 MacKenzie, John, C.E., 2 Wellington Place.
 Macnaghten, The Hon. Ethel, 61 Crumlin Road.
 Macoun, John R., Northlands, Deramore Park.
 Macoun, Joseph, Oakleigh, Donegall Park.
 MacRae, Kenneth, Balmoral.
 Major, Rev. J. J., Doagh.
 Malcolm, Miss Susan, Croft Road, Holywood.
 Malcomson, Walter, Cran-y-Gael, Osborne Gardens.
 Malcomson, J. G. B., Cairnburn, Strandtown.
 Malcomson, Herbert T., Cairnburn, Strandtown.
 Malcomson, Miss, Villa Mirza, Malone Park.
 Malcomson, Joseph, Arthur St.
 Marsh, Mrs., Glenlyon, Holywood.
 Marsh, Joseph C., 2 Chichester Gardens.
 Marshall, H. C., Bangor.
 Massaroon, Mrs., Charles Street, Berkhamstead, Herts.
 Maxton, James, Ulster Street.

- Maxwell, Henry, Dunalbine,
Deramore Park.
- Maxwell, Joseph, J.P., Pinner,
Malone Road.
- Maxwell, Mrs., Pinner, Malone
Road.
- May, Robert, 40 Hopefield Ave.
- Maybin, Hugh, Intermediate
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Seventh Annual Report—1869-70, containing Appendix I., List of the Irish Liassic Fossils—Tate, 1 Plate	2/6
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" Series II., Vol. II., Part I., 1880-81, containing Appendix VI., List of Foraminifera of South Donegal—Wright; Sponge Remains from Carb. Limestone, County Sligo—Wright, and Fossil Sponge-spicules, County Sligo—Carter, 1 Plate	1/6
" Series II., Vol. II., Part II., 1881-2	1/-
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" Series II., Vol. II., Part IV., 1883-84, containing Appendix VIII., Notes on Irish Coleoptera—Haliday; Cromlechs of Antrim and Down—Grey, 12 Plates; and Pre-historic Monuments near Sligo—Elcock, 4 plates	3/-
" Series II., Vol. II., Part V., 1884-85, containing Appendix IX., Ostracoda of Belfast Lough—Malcomson; Fungi of North of Ireland—Lett; Foraminifera of "Protector" Cruise, &c.—Wright; Cretaceous Foraminifera of Keady Hill—Wright; Irish Coleoptera—Patterson	3/-
" Series II., Vol. II., Part VI., 1885-86, containing Appendix X., The Ferns of Ulster—Phillips and Praeger	2/-
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Annual Report and Proceedings.

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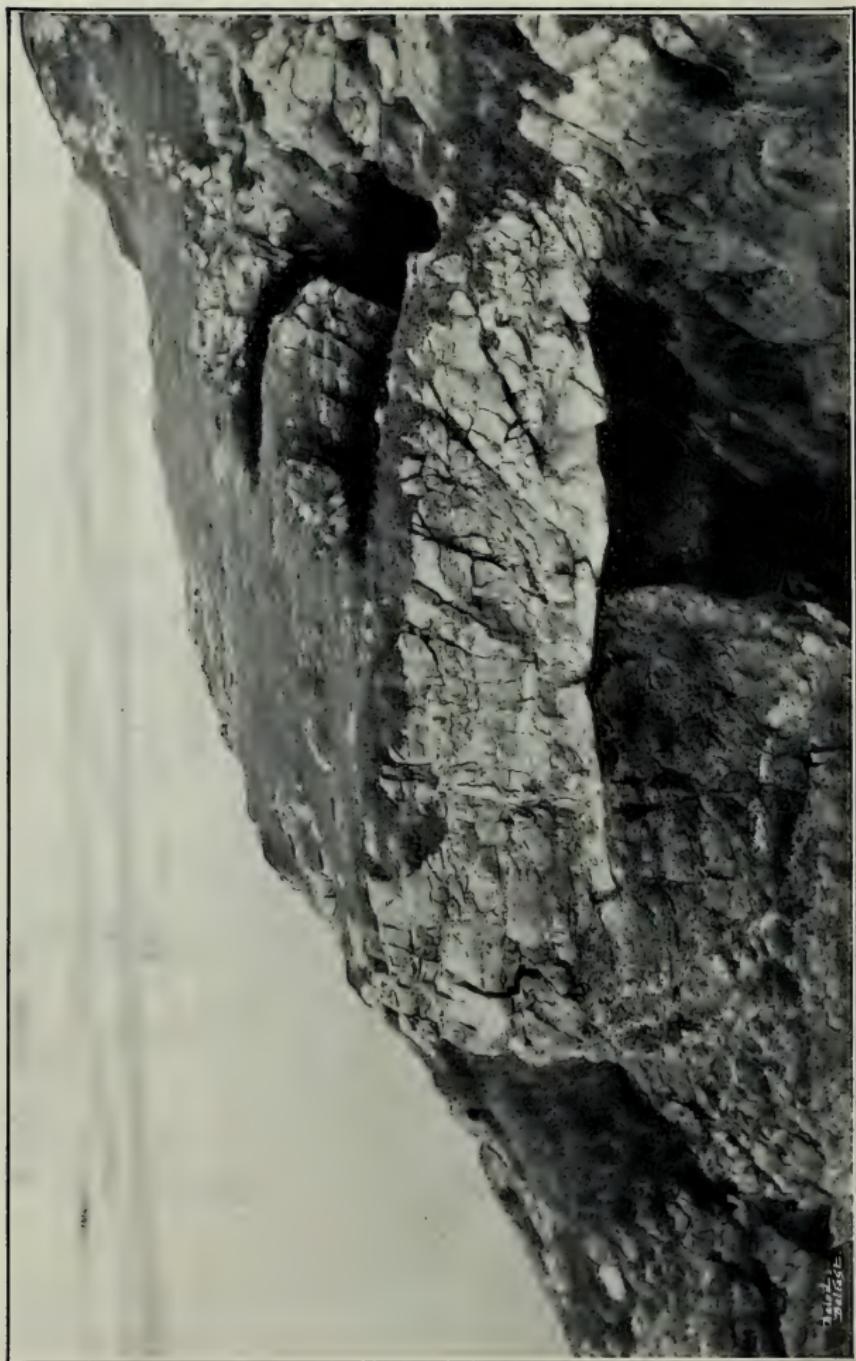
CONTENTS.

	PAGE
List of Officers	233
Annual Reports	235
Statement of Accounts	247
Excursions—Lyle Hill, Boyne Valley, Derryd Bay, Seawt Hill, Roe Valley, Bundoran, Inch Abbey, Richhill, Ballymena, Orlock Point, Cloughfin, Woodburn Glen, Moira, Squire's Hill	248
Conversazione	279
Papers—The Birds of Hillsborough—Presidential Address—N. H. Foster, M.B.O.U.	283
The Ecology of Plants—Rev. C. H. Waddell, B.D.	289
Petrological Types of Basalt in Co. Antrim—J. Strachan	290
The Toxic Effects of Fresh Water on Marine Animals, and of Sea Water on Fresh-water Species—W. J. Dakin, M.Sc.	292
Foraminifera—Joseph Wright, F.G.S.	293
Some Connemara Plants—W. J. C. Tomlinson	294
Some Origins of the Irish People—Major Berry, M.R.I.A.	296
The Study of Native Vegetation—R. Ll. Praeger, M.R.I.A.	297
Dendrites and Picture-Stones—J. Strachan	297
An Evening with the Diatomaceæ—J. Maxwell, J.P.	300
With the British Association in Canada in 1903—A. R. Dwerryhouse, D.Sc.	302
The Ferns of Ulster; How to grow, and where to find them—W. H. Phillips	305
The Geology of Weymouth and the Coast of Dorsetshire—W. J. C. Tomlinson	305
Variation due to Environment—R. Welch, M.R.I.A.	309
Report of Delegate to Corresponding Societies' Conference of British Association—F. Balfour Browne, M.A.	310
Archaeological Evidence of the Truths of Irish Records—Miss M. E. Dobbs	312
Plant Life in a Bog—Rev. C. H. Waddell, B.D.	315
The Chalcedony of Ballyboland—J. Strachan	316
Short Notes on the Plants of Cave Hill and Neighbourhood—N. Carrothers	318
The Crossing of Ferns—Reminiscences of some Pioneers of the Cult—W. H. Phillips	319
Annual Meeting	321
Rules	323
Exchanges	326
List of Members	330
List of Officers (1910-11)	337

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The Fairy Bridges, Bundoran.

Marine Erosion in Carboniferous Limestones and Shales.

PHOTO.

R. WELCH.

ANNUAL REPORT AND PROCEEDINGS
OF THE
**BELFAST NATURALISTS'
FIELD CLUB,**

FOR THE YEAR ENDING 31ST MARCH, 1910,

(FORTY-SEVENTH YEAR.)

SERIES II.

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PART III.

1909-10.



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Annual Report.

IN submitting the forty-seventh Annual Report, your Committee have again pleasure in recording the prosperity of the Club, but desire to bring before you the necessity and desirability of enlisting the services of new workers. Now that some of our principal schools in Ulster have started Natural History Societies, this should prove less difficult than in the past.

Your Committee regret that owing to the probable transfer of the collections in the Museum of the Belfast Natural History and Philosophical Society to the Belfast Corporation, this is perhaps the last season that the Club will hold its meetings in this building. A Sub-Committee has been appointed, and if your lease, which expires on the 1st May, 1910, cannot be renewed, it will be its duty to secure a suitable room for the meetings of the Club.

During the season just ended 30 new members were elected, of whom 26 have qualified by paying the necessary fees. Against this there have been nine deaths and 25 resignations, leaving the total membership of the Club on 1st April, 1910, at 395. The large number of resignations is mainly owing to former members ceasing to reside in our district.

Nine Committee meetings were held during the year, at which the average attendance was 11.

The Programme which had been arranged for the Summer Session was duly carried out, the following being a list of the Excursions :—

Boyne Valley	...	...	...	...	22nd May.
Derryadd Bay (Half-day)	...	...	...	...	12th June.
Valley of the Roe	...	...	...	...	26th June.
Bundoran (Long Excursion)	...	...	...	...	10th till 13th July.
Inch Abbey and the Quoile (Half-day)	...	...	...	...	31st July.
Richhill	...	...	...	...	14th August.
Orlock Point (Half-day)	...	...	...	...	28th August.

The Excursions were attended, on the average, by 63 members; but 102 were received by Major and Mrs. Berry at Richhill Castle.

For hospitality received during these Excursions the Committee desire to return on behalf of the Club their most sincere thanks to the Rev. Charles K. Pooler, B.D., D.Litt., and Mrs. Pooler, of Downpatrick; to Major and Mrs. Berry, of Richhill Castle; to Mr. and Mrs. Hobson, of Kilmore; and to Mr. and Mrs. Lamb, of Sandymount, Co. Armagh. For permission to visit their demesnes the best thanks of the Club are also due to Mrs. Ritter and B. H. Lane, Esq., of Limavady; and to the Rev. Mr. Jones for permission to visit the Church at Kilmore.

The Winter Session of the Club was inaugurated by the usual Conversazione, which was held for the first time in the Central Hall, Assembly Buildings, about 350 members and friends being present.

The following Lectures and Papers were delivered at the Ordinary Monthly and Sectional Meetings during the Winter Session:—

1909.

- Tuesday, 16th November—"The Birds of Hillsborough," The President (Nevin H. Foster, M.B.O.U.)
- Saturday, 20th November—"The Ecology of Plants, or the Study of Plant Communities," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 24th November—"Petrological Types of Basalt from Co. Antrim," a Microscopic Demonstration, James Strachan.
- Wednesday, 8th December—"Toxic effect of Fresh Water on Marine Animals and of Sea-Water on Fresh Water Species," W. J. Dakin, M.Sc.

1909.

- Wednesday, 15th December—"A Demonstration in Foraminifera," Joseph Wright, F.G.S.
- Saturday, 18th December—"Some mounted Connemara Plants, with Remarks on their Habitats," W. J. C. Tomlinson.
- Tuesday, 21st December—"Some Origins of the Irish People," Major Berry, M.R.I.A.

1910.

- Saturday, 15th January—"The Study of Native Vegetation," R. Ll. Praeger, B.A., B.E., M.R.I.A.
- Tuesday, 18th January—"Dendrites and Picture-Stones--the Semblance of Life in Minerals," James Strachan.
- Wednesday, 26th January—"An Evening with the *Diatomaceæ*," Joseph Maxwell, J.P.
- Tuesday, 15th February—"With the British Association in Canada, 1909," Arthur R. Dwerryhouse, D.Sc., F.G.S.
- Saturday, 19th February—"The Ferns of Ulster, How to grow and where to find them," W. H. Phillips.
- Wednesday, 23rd February—"The Geology of Weymouth and the Coast of Dorset," W. J. C. Tomlinson.
- Wednesday, 2nd March—"Environment as a Cause of Variation," with Illustrations from the Mollusca, R. Welch, M.R.I.A.
- Tuesday, 15th March—"Report as Delegate to the British Association," F. Balfour Browne, M.A., F.R.S.E., F.Z.S.
"Archæological Evidences of Truths of Irish Records," Miss Margaret E. Dobbs.
- Saturday, 19th March—"Plant Life in a Bog," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 23rd March—"The Chalcedony of Ballyboland, Co. Antrim, A Study in Mineral Genesis," James Strachan.
- Saturday, 9th April—"Short Notes on the Plants of Cave Hill and Neighbourhood," N. Carrothers.
- Tuesday, 12th April—"The Crossing of Ferns, and Reminiscences of some of the Pioneers of the Cult," W. H. Phillips.

Mr. F. Balfour Browne, M.A., F.R.S.E., F.Z.S., represented the Club at the British Association Conference of Delegates, held in London in September, and submitted his report, which will be found in the Proceedings.

The Treasurer will lay before you his Statement of Accounts, which is highly satisfactory, and shows a balance in hand of £19 19s 6d.

The Librarian's Report, those of the Botanical, Geological, Zoological, and Archæological Sections, and that of the Sub-Committee appointed to adjudicate on the collections sent in for the Club's Prizes will be submitted.

In conclusion, the Committee desire to record their thanks to the Superintendents of the various Railway Companies for facilities afforded on the different Excursions; to the Press for publishing reports of the Club's Meetings; and to the Kindred Societies and Public Bodies who have favoured the Club with their publications during the past year.

(Signed)

JEAN AGNEW, }
A. W. STELFOX, } *Hon. Secs.*

Librarian's Report.

During the past year we have to acknowledge the receipt of various Reports, Communications, &c., from the Kindred Societies of Great Britain, the Colonies, United States, and the Continent, to all of which we have sent our last Report of Proceedings.

We received several applications from Societies for our Reports, &c., and promising their Reports in return. We have also been asked to supply various Reports, of which some Societies were short. In each case we have complied with these requests as far as possible.

The Members of our Club still shew their appreciation of the Club's Library by their regular demand for, and return of, books. The books in the library are in regular circulation, and from this we are certain of the strong interest taken in the several departments of the Club's work.

(Signed)

J. L. S. JACKSON, *Librarian.*

Report of the Botanical Section.

The Committee of the Botanical Section are pleased to report that this department of the Club's work has been carried on during the past year with undiminished success. Our Members were well represented at all the regular Club Excursions, and a fair amount of work was done at each of them. Special attention was given to Richhill, as the locality was entirely new to our Members. The Valley of the Roe, Derryadd Bay, and Portavoe also proved to be very interesting botanical centres. The rarer plants observed in these districts will be found in the Reports of the Excursions.

The Geological Section had a number of Excursions during the Summer in which many of our Members participated. Some rare plants were noticed at these excursions, especially at Templepatrick, where *Draba muralis* was found in quantity, growing on a wall; and at Moira a very fine colony of *Dipsacus sylvestris* was pointed out to our Members by Mr. R. Bell, in a station he found several years ago. Many of our individual Members also accomplished good work independently, and a paper embodying the results will be published, we hope, next year.

One of our Members, Mr. S. Wear, devoted a good deal of time in the early Summer to Plant Photography, and those who had the privilege of seeing a few of his lantern-slides at our Annual Conversazione in October, were deeply impressed with the success that he had attained. Several of the views were photographs of exceedingly rare local plants taken *in situ*.

Six Monthly Meetings were held during the Winter Session, all of which were well attended by our Members. Abstract reports of these meetings will be found in the Proceedings. The Members of the Section were much indebted to Mr. Praeger for his kindness in coming specially from Dublin to give an address.

Two very interesting and useful books were purchased for the Section—Loudon's *Encyclopedia of Plants*, and Moss' *Geographical Distribution of Vegetation in Somerset (Bath and Bridgewater District)*.

The best thanks of the Committee are given to the Members and friends of the Club who kindly sent us special plants during the Session.

It is with sincere regret that we record the death during the year of one of our most accomplished local botanists, Mr. John Henry Davies (1838-1909). Mr. Davies became a member of the Field Club in the Session 1870-71, and continued his membership as long as he lived, a period of fully 38 years. As a Bryologist he stood in the front rank, and his knowledge of the flowering plants of our district was also of an unique kind. Suitable obituary references concerning him have already appeared in the pages of the *Journal of Botany* and of the *Irish Naturalist*. To the latter journal he was a constant contributor of botanical papers and notes from the date of its inception. In the work of our section he took the most lively interest, and of the work of our more junior Members he was always keenly appreciative.

(Signed)

N. CARROTHERS, *Hon. Sec. of the Section.*

Report of the Geological Section.

The Committee beg to report that the Geological Section held seven Excursions during the past year, when the following localities were visited:—Lyle Hill and Templepatrick, 15th May; Scawt Hill, 19th June; Ballymena District, 21st August; Cloughfin, 11th September; Woodburn Glen, 25th September; Moira, 9th October; and Squire's Hill, 6th November. The main object of the first two Excursions was the investigation of the Tertiary Basalts; that of the third, the Glacial deposits of the Braid Valley, and the Rhyolites in the neighbouring district; while the last four were devoted to the study of our Cretaceous rocks.

On the first Excursion, Mr. Strachan conducted the party to Lyle Hill, and drew attention to its characteristic form, due to the weathering of the Upper Basalt. At the New Mine on the N.W. side of the hill, he pointed out an exposure of inter-basaltic beds, where the succession below the Upper Basalt was—Pisolitic iron ore 12 to 15 inches, aluminous iron ore 3 to 4 feet, lithomarge 40 to 50 feet, passing into Lower Basalt. The quarry near the Railway Station at Templepatrick was visited, where Mr. M'Henry obtained evidence as to the mid-basaltic age of the Co. Antrim rhyolites, but unfortunately much of the fine section of chalk, rhyolite, and Lower Basalt, formerly exposed, is now under water.

Upon the second Excursion, Scawt Hill, an old volcanic neck, six miles north of Larne, was examined and photographed. The metamorphism of the chalk* exposed in the face of the hill is very striking; in some instances it is converted into a typical crystalline limestone, but where it adjoins an interesting basic dyke, traversing the "Neck," microscopic examination has shown it to be completely altered into a calc-silicate hornstone.†

During the Excursion to the Ballymena District, the eskers at Drumfane and Broughshane were carefully investigated. Determinations of the boulders at both places showed that they were chiefly of local origin. Out of 100 boulders, selected at random at Drumfane, it was found that 70 were basalt, 21 rhyolite, 4 chalk, 2 flint, 2 dolerite, and 1 Cushendall porphyry; and out of 100 examined at Broughshane, 76 were basalt, 4 flint, and 20 chalk. Stratification and current-bedding were very clearly defined, and a striking photograph of one of the sections at Drumfane, taken on this occasion by Mr. J. L. S. Jackson, is

* In the Survey Memoir to Sheet 20, p. 9, it is stated that "at Slieve Scawt the chalk has been carried up with the basaltic mass forming the volcanic neck."

† See Paper on "A Case of Metamorphism of Chalk," by Geo. C. Gough, A.R.C.S., B.Sc., F.G.S., *Geological Magazine*, April, 1907. The "Case" described is this occurrence at Scawt Hill, which appears to be the first recorded instance of such an alteration in ordinary white chalk.

reproduced in *Nature* for 16th September, 1909. The Cainozoic rhyolites of Cloughwater and Ballycloughan were also visited.

The Cretaceous Strata so intimately connected with the name of the late Professor Ralph Tate, F.G.S.,* the distinguished founder of our Field Club, were examined upon the last four excursions, exposures having been selected typical of three of the five divisions into which Dr. Hume† has, in accordance with local variations, marked out these strata. At Cloughfin and Woodburn, some characteristics of his "Eastern Division" were studied, and a number of fossils obtained; while at Moira the frequency of paramoudras, which form a prominent feature in the "Southern Division," was noted, the paramoudras forming a fine vertical series in the faces of two of the chalk quarries. An Excursion to Colin Glen, to examine a typical section in the "Central Division," was arranged for 23rd October, but had to be given up on account of the severity of the weather. Later, however, on 6th November, one in this Division was carried out to Squire's Hill to obtain, in response to a request from Mr. Wm. Hill, F.G.S., of Hitchin, specimens of our Cretaceous rocks. To those obtained on this Excursion, our Chairman (Mr. Tomlinson) added a number from his own private collection, and all were forwarded to Mr. Hill.

At the beginning of the season Mr. Wickes, of Bristol, asked that "Beekite" markings on shells or corals should be reported to him; and in Autumn the Committee had the pleasure of sending forward a large number of fossils, with fine examples of such markings, collected by Mr. Robert Bell.

During the Winter Session some very interesting communications were read. The Section opened on November 24th with an important lecture by Mr. James Strachan on "Petrological

*See Memoir "On the Correlation of the Cretaceous Formations of the North East of Ireland," by Ralph Tate, Esq., F.G.S., *Quarterly Journal of the Geological Society*, February, 1865. Also see Report of Excursion to Woodburn Glen in these Proceedings.

†"The Cretaceous Strata of County Antrim," by Dr. W. Fraser Hume, F.G.S., *Quarterly Journal of the Geological Society*, 15th December, 1897, p. 543.

Types of Basalt in Co. Antrim," in which he suggested a classification based primarily according to their varying basicity.

Mr. Joseph Wright gave a most instructive Demonstration on "Foraminifera" on 15th December, and Mr. Maxwell a very interesting one on "The Diatomaceæ" on 26th January. These demonstrations were fully illustrated by specimens, microscopic slides, &c. On the latter evening Mr. Robert Bell showed a specimen of *Cardinia scutula* (Brown) from *A. angulatus* zone, Lower Lias, Waterloo, Larne.

In February Mr. Tomlinson gave a full and suggestive paper on the "Geology of Weymouth and the Coast of Dorset," illustrated by lantern slides and specimens of the rocks and fossils of the district. Mr. Wear on the same evening showed two slides of Scawt Hill Volcanic neck.

The last paper of the session was given on 23rd March by Mr. Strachan on "The Chalcedony of Ballyboland, Co. Antrim," in which he gave reasons for supposing that the chalcedony and the purple basalt in which it occurs were magmatic separations, rather than solfataric alteration products.

During the winter an interesting series of lectures on practical Petrology was delivered to Members of our Field Club by Dr. A. R. Dwerryhouse, F.G.S., Lecturer on Geology in the Queen's University. These dealt with the identification of minerals by means of the microscope, and with the classification of rocks. Each lecture was followed by a demonstration class. By kind permission of the Vice-Chancellor, the lectures were given in the Geological Department of the University.

A few additions have been made to our collection of Microscopic Sections, including slides illustrative of a recent ferruginous deposit caused by iron-bacteria (*Cladothrix*) from Six-Mile-Water Valley, presented by Mr. James Strachan.

We are also indebted to Mr. Wm. Christy for a fine specimen of pseudomorphs of rock-salt from the Trias at the Forth River, Belfast.

In conclusion, the Committee record with deep regret the death of one of the Members of our Section, Mr. Thomas Anderson, who, two years ago, gave us an interesting description of the Geology in and around Charnwood Forest,* and whose valuable account of the Geology of the Dublin District† was published in our Proceedings for last year.

(Signed)

MARY K. ANDREWS, *Hon. Sec. of the Section.*

Report of the Zoological Section.

During the year there have only been two meetings of the Section. At the first meeting held on 8th December, Mr. W. J. Dakin, M.Sc., read a most interesting paper on "Toxic Effects of Fresh Water on Marine Animals, and of Sea-Water on Fresh-Water Species," in which he described experiments carried out by himself upon certain marine fishes, notably the plaice, while he was at the Biological Station at Heligoland. Mr. Dakin has already published this work in two papers in the *Bio-Chemical Journal*, Vol. III., Nos. 5 and 10, 1908.

On the 2nd March, Mr. R. Welch, M.R.I.A., gave a discourse upon "Variation due to Environment, illustrated mainly by the Mollusca," during which he showed numerous varieties of many common snails found in different localities in England and Ireland; and he showed that temperature and differing conditions of the water had definite effects upon the size of various water species, such as *Limnaea peregra*.

Several members of the Club have published Zoological papers or notes during the past year. Mr. R. Patterson has carried through a revision of the "Birds and Fishes of Carrickfergus District" for a new edition of Miskimmin's *History of*

* *Annual Report and Proceedings of the Belfast Naturalists' Field Club, 1907-08*, p. 87.

† *Ibid*, 1908-09, p. 184.

Carrickfergus. Mr. Foster has produced a paper on the "Weight of Birds' Eggs," and also a paper on the "Distribution of Woodlice in Ireland," published in the *Irish Naturalist*. Messrs. A. W. Stelfox and R. Welch have published several notes upon Irish Mollusca in the same Journal, and the Secretary of the Section has published papers on the "Life History of the Agrionid Dragonfly," and on the "Life History of *Hydrobius fuscipes* L., a common Water-Beetle."

Apart from published matter the Zoological Members of the Club have been steadily pursuing their respective lines, and several have further papers in contemplation.

(Signed)

FRANK BALFOUR BROWNE, *Hon. Sec. of the Section.*

Report of the Archaeological Section.

It is with regret that we have to report that no meetings of the Section were held owing to the difficulty in obtaining papers on Archaeological subjects, only two being offered, viz., those by Major Berry and by Miss Dobbs, which were considered of sufficient importance to put before the Club at its general Meetings. It is to be hoped the coming year will give better results.

(Signed)

W. J. FENNELL, *Hon. Sec. of the Section.*

Report of Sub-Committee on Prize Competitions.

For Prize No. 12 Mr. James Strachan submits a series of Microscopic Slides. Twelve of these illustrate dendritic growths, chiefly of copper oxide, which are purely inorganic in origin and crystalline in structure. The remaining 12 are illustrative of the life-history of an iron bacterium, *Cladothrix*, found by the competitor to exist commonly in the basaltic plateau of Co.

Antrim, where it plays an important part in the weathering of the rocks. The slides are neatly mounted, forming an instructive series, and we have much pleasure in awarding this Prize to Mr. Strachan.

Two members entered the competition for the President's Prize, No. 15, and from time to time during the year sent their collections to Mr. Foster. This Prize is awarded to Mr. A. W. Stelfox, who displayed great energy in collecting, and returned specimens of Woodlice from 17 Irish Counties. These embraced 16 species out of the 25 known to exist in Ireland, and among them were no less than 14 new County records.

For Miss M. K. Andrews' Prize, No. 16, Mr. Robert Bell submits a collection of 22 varieties of Zeolites from the Basalt of Co. Antrim and Co. Derry, including one of Gyrolite (from Carnmoney), this being the first record of this mineral in Ireland. We consider this collection well worthy of being awarded the Prize.

(Signed)

NEVIN H. FOSTER,
ROBERT PATTERSON,
W. A. GREEN.

Dr. Treasurer's Account for the Year ending 31st March, 1910.

To Balance from Last Account	...	...	...	12 1 7	By Type Writing ...	...	...	...	1 4 5
, Subscriptions ...	...	...	...	94 15 0	, Advertising, Stationery, and Printing ...	...	...	...	8 2 7
, Entrance Fees	...	...	...	6 5 0	, Printing Annual Report ...	...	...	...	23 18 0
, Balance from Excursions	...	...	...	1 3 2	, Rent of Club Room in Museum	...	...	...	18 0 0
, Sales of Publications ...	...	...	...	0 9 6	, Commission to Collector ...	...	...	...	3 11 6
, Mr. Fennell's Prize	...	...	...	1 1 0	, Donation to <i>Irish Naturalist</i> ...	...	...	...	2 0 0
					, Irish Field Club Union	...	...	...	2 2 0
					, Lantern Expenses for Lectures	...	...	...	1 19 0
					, Postages ...	...	...	...	26 2 6
					, Gas ...	...	...	...	1 6 7
					, Insurance ...	...	...	...	0 10 0
					, Prizes ...	...	...	...	5 2 0
					, B. A. Delegate's Entrance Fee ...	...	...	...	1 0 0
					, <i>Journal of Archaeology</i> ...	...	...	...	0 5 0
					, Expenses of Conversation ...	...	...	...	0 6 2
					, Books for Library ...	...	...	...	0 6 0
					, Balance ...	...	...	...	19 19 6
									<u>£115 15 3</u>
1910. To Balance	...	...	...	...	...	£19 19 6			

(Signed) W. H. PHILLIPS, Hon. Treasurer.

Proceedings.

SUMMER SESSION.

LYLE HILL.

The Geological Section held its first excursion of the season on Saturday, 15th May, to Lyle Hill and Templepatrick. There was a large attendance of members, and on arrival at Templepatrick Mr. J. Strachan acted as special conductor to Lyle Hill. The higher portion of the hill is formed of Upper Basalt, and Mr. Strachan drew attention to its shape as seen from a distance. The steep escarpment due to weathering of the Upper Basalt is characteristic of County Antrim hills, where the latter are capped by this rock, the soft underlying lithomarge having allowed the basalt to be easily broken away by weathering influences. The exposure at the new mine on the north-west side of the hill showed an outcrop of interbasaltic beds. The succession below the upper basalt was—Pisolitic iron ore, 12 to 15 inches; aluminous iron ore, 3 to 4 feet; lithomarge, 40 to 50 feet, passing into Lower Basalt. Mr. Strachan explained that the pisolithic iron ore and aluminous iron ore lie on the same horizon as the bauxite beds at Straid and the leaf beds at Ballypalady. The pisolithic iron ore is very thin and of rather a poor quality. It passes gradually down into aluminous iron ore, which contains too much silica and iron for economic working at the present time. It has been worked for alumina, but the mines have been given up for a number of years. The next section visited was at the east of the hill, and showed an exposure of Upper Basalt, a compact rock, with very few vesicles. The third section was in the plantation. It showed a mine level dipping into the interbasaltic beds. There was nothing, however, to be seen here but a small section through

the Upper Basalt, which was much decomposed. A few cavities containing analcime were seen, and one fine specimen obtained. The party then returned to Templepatrick, and the quarry close to the railway station was visited, where formerly a fine exposure of chalk, Lower Basalt, and rhyolite was visible, and it is to Mr. M'Henry, M.R.I.A., that we owe the very interesting discovery, from the study of this section, that the rhyolite is intrusive into the Lower Basalts, while from further evidence obtained at Ballypalady and Glenarm he showed it to be older than the Upper Basalts. He therefore regards the rhyolite as of mid-basaltic age, and considers it highly probable that the granite of the Mourne Mountains is contemporaneous with the rhyolite of County Antrim. The Templepatrick rhyolite is of a pale grey colour, and under the microscope shows a fine-grained ground mass, with phenocrysts of quartz, mica, and sanidine. The last object of interest visited was a very large "erratic" of basalt in a field near Templepatrick Railway Station.

BOYNE VALLEY.

The Summer Session was opened on 22nd May, when fifty members and friends visited the Boyne Valley, under the guidance of Mr. W. J. Fennell, F.R.I.B.A. The party entrained at the Great Northern Railway Station at 7.30 a.m. in specially reserved carriages, and arrived in Drogheda at 9.40. Here vehicles were waiting to convey the party up to the lovely Boyne Valley, to the scene of that battle of which Northerners so insistently remind each other at certain seasons. The party dismounted and viewed the obelisk erected to commemorate the death of Duke Schomberg, who was shot on this spot while rallying his troops. The quiet beauties of the scene made it difficult to realise the fierce struggle which took place on the banks and in mid-stream on the 1st July, 1690, when William of Orange's forces crossed the river to meet King James's men on the southern bank.

Sufficient time having been allowed for investigation and collection, the party next proceeded to Newgrange Tumulus, the largest of the sepulchral barrows, of which no fewer than seventeen are to be found at *Brugh-na-Boinne*, the great burying-ground of the Kings of Tara. Before entering the tumulus Mr. Fennell gave a rapid survey of its main features. He said the tumulus of Newgrange, for extraordinary size and elaborate ornamentation, was perhaps unsurpassed in Europe. An enormous cairn of stones, now covered with grass and trees, formed the mound, which was originally surrounded by a circle of huge standing stones, of which twelve remained. Special attention was drawn to the wonderful carvings on the stones at the entrance to the tumulus, probably amongst the very earliest examples of that ornament, from which eventually evolved the elaborate interlaced and trumpet patterns so characteristic of Celtic decorative art.

The interior of the tumulus was next inspected. Candles were lit, and science once more claimed its martyrs as a somewhat undignified procession struggled up the low narrow passage for about seventy feet, until the inner chamber was reached. Here brilliant coloured lights enabled all to inspect the details of the central chamber, with its domed roof of huge overlapping stone slabs, its three recesses, and its marvellous carvings. These consist of coils, spirals, lozenges, and, in the western recess, one peculiar design evidently intended for a fern.

The party next drove to Mellifont Abbey, where time was allowed for lunch, and Mr. Fennell then conducted the party over the ruins, giving a description of the structure. Mellifont, he said, was the first Cistercian monastery founded in Ireland. Its architecture belonged to the transition period between Norman and Early English Gothic, and showed a blending of the characteristics of both styles, the rounded Norman arch being seen in conjunction with such Early English details as bold mouldings with equally bold hollows, giving strong light and shade, filleted mouldings, "tooth" ornament, &c. Perhaps the

most interesting structure remaining was the Baptistry, an octagonal building, of which five sides with their graceful rounded arches still remained. This was most probably the monks' lavatory, as they seldom baptised, being an enclosed Order, leaving such duties to the ordinary priests.

The next stopping place was Monasterboice, celebrated for its two Celtic crosses with their interesting carved panels illustrating Biblical incidents. Some of the members climbed the round tower, which is one of the highest in Ireland, and is dated by some authorities from the ninth century. The drive was then resumed to Drogheda, where tea awaited them in the White Horse Hotel.

After tea, a short business meeting was held, the Vice-President, Mr. W. H. Gallway, in the chair—after which the members were at liberty to visit the various interesting sights of Drogheda before taking train at 6.40 for Belfast, which was reached at 9 p.m.

This Excursion was arranged primarily in the interests of those members of the Club interested in Archaeology, but members of the other sections did a considerable amount of good work. Among the zoologists, Water-Beetles received special attention. Previously only two or three species were recorded for County Meath. On Saturday forty-six species were noted, practically all of which were common ones. One noteworthy fact was that certain species which are scarce in County Down, were exceedingly common here, and effort was made to discover *Bidessus minutissimus*, which, it is expected, will ultimately be found even in the north, but no suitable spot was found along the river. The conchologists were well rewarded by finding *Vitrina hibernica* at Mellifont, Monasterboice, and between the latter place and Collon, where it was first taken by Mr. P. H. Grierson some few years ago. Only dead shells were found, except at Monasterboice, where two living specimens were picked up after a vigorous search. This species as yet has only been taken in County Louth, all the above localities being in that county.

The botanists of the party handed in lists which included *Geranium pyrenaicum*, *G. lucidum*, *Lamium album*, *Saxifraga tridactylites*, *Ceterach officinarum*, *Asplenium Trichomanes*, *Parietaria officinalis*, *Carex riparia*, *Chelidonium majus*, and *Chenopodium Bonus-Henricus*.

The ornithologists worked under special difficulties, most of their observations being made from the brakes, and in the commotion caused by the rumble of the wheels it is not easy to distinguish the notes of many of our quieter songsters. For this reason the list is smaller than it might otherwise have been, only forty-one species of birds being noted.

Prizes were offered by the President, Mr. N. H. Foster, M.B.O.U., and the Vice-President, Mr. W. H. Gallway, for the greatest number of species of wild flowers collected, and for the best set of photos taken during the day. The President's prize was won by Miss Anna M'Connell, whose collection contained 72 species, and the Vice-President's by Mr. Frank Holland.

DERRYADD BAY. (HALF DAY).

The second excursion of the Summer Session took place on Saturday, 12th June, when eighty-two members and friends visited Derryadd Bay, Lough Neagh, under the guidance of Mr. N. Carrothers, who acted as conductor in the unavoidable absence of Mr. W. A. Green. The party travelled in specially reserved carriages by the 1-50 train from the Great Northern Station to Lurgan, where brakes and cars were in waiting. All were soon driving to the pleasant level lands that lie to the south-east of Lough Neagh.

Shortly after three o'clock the party arrived at the shores of Derryadd Bay, and, leaving the vehicles, proceeded on foot along the shores of Lough Neagh. Here the party scattered, and

botanists, geologists, zoologists, and archaeologists were soon hard at work on what was comparatively new ground to many. So far back as 1865 the Club collected worked flints from the thick-bedded accumulations of gravels that occur on the shores of Lough Neagh at and around Derryadd Bay, where a considerable number of specimens were again found during the present visit.

The district visited did not prove very rich in bird life, but the ornithologists of the party reported having noted thirty-two species about the shore of Derryadd Bay. Of these, the most interesting was the yellow wagtail, *Motacilla raii*. This migratory species nests in considerable numbers around Lough Neagh, as well as near some of the large Connaught lakes, but is unknown elsewhere in Ireland. The Grasshopper-Warbler, *Locustella naevia*, was also noted near the lake in Lurgan Demesne.

The conchologists found the dry weather conditions most unfavourable for collecting land-shells, but, along the lake shore, nice specimens of *Succinea elegans* were abundant in certain damp muddy spots, where it was feeding in company with a fresh-water species—*Limnaea palustris*. The latter was the short malleated and obese form for which Lough Neagh is noted. Several *Planorbis carinatus* were also collected—that curious non-typical form found in Lough Neagh and Lough Beg and the canals and rivers connected with both. This is the form so puzzling to English conchologists, who often confuse it with *P. marginatus*. Well-known authorities consider that our Irish specimens belong to a more primitive race than the British forms, where the separation between the two species is very well defined. Some *Pisidia* were collected for future examination.

A copious supply of *Volvox globator* was noted, also a number of varieties of water-fleas and cyclops.

Several interesting plants were noted by the botanists of the party, the following being the more important:—*Ranunculus circinatus*, *Thalictrum flavum*, *Nasturtium officinale*, *Myriophyllum*

spicatum, *Apium inundatum*, *Hydrocharis Morsus-ranae*, *Potamogeton lucens*, and *Osmunda regalis*.

After a pleasant afternoon spent in these varied pursuits the party left the bay at 5-45 for the return drive to Lurgan, where tea was provided by Mrs. Owens, Shankill Buildings. After tea a short business meeting was held—the President, Mr. N. H. Foster, M.B.O.U., in the chair—when Miss Jeanie Larmor, Mrs. L. E. Johnston, and Mr. J. Carroll Culbert were elected members. The party spent the remainder of the evening in viewing the sights of Lurgan, before returning by the 8-20 train to Belfast.

SCAWT HILL.

The second excursion of the Geological Section took place on Saturday, 19th June, to Scawt Hill, an interesting volcanic neck. The members started by the 12-50 train for Larne, and a beautiful drive of six miles brought them to the foot of the hill. On the way the large dolerite erratic known as the "Wren's Egg," near Cairncastle Lodge, was noted, and further on the striking columns of dolerite at Ballygalley Head, popularly called the "Corn Stacks," recalled the bold columnar structure of Fair Head. At Ballygalley Castle a turn inland was made, and a further short drive brought the party to Scawt Hill, where, according to the Survey Memoir to Sheet 20, the chalk has been carried up with the basaltic mass forming the volcanic neck. The metamorphism of the chalk is very striking, and in examining it a few years ago one of the members of the section came unexpectedly on a basic dyke traversing the "neck" dolerite and cutting across a narrow band of chalk so weathered near the junction as to be almost indistinguishable from the dyke. Specimens were collected from different points, microscopic sections prepared, and Mr. G. C. Gough, to whom they were shown, examined them carefully, and described them in a paper communicated to the *Geological Magazine*, in April, 1907, entitled "A Case of Metamorphism of

Chalk." The rock from the "neck" was found to be a fine-grained ophitic dolerite, one of the typical igneous rocks of the district. The "dyke" proved to be particularly interesting. It is a granitoid, holo-crystalline basic rock, and may be classed as a "diabase without olivine." Its most striking feature is the beautiful pleochroism of the augite. A sample of the chalk taken two yards from the dyke showed it converted into a typical crystalline limestone, with large crystals of calcite. Adjoining and caught up in the dyke a rock was found which weathers so dark that it was difficult to tell it from the dyke itself. It proved to be the chalk completely altered into a calc-silicate hornstone. The cause of this alteration of the chalk is difficult to ascertain. Mr. Gough concludes that the dyke supplied the heat necessary, and that the metamorphism took place subsequently to the formation of the "neck," and suggests that there has been a mixture of the dyke with the chalk in different proportions. On this occasion, however, at another place, some little distance from the dyke, specimens of altered chalk were obtained, which in the hand closely resemble the calc-silicate hornstone, and it is hoped that at some future time the investigation may be continued.

VALLEY OF THE ROE.

The third excursion took place on Saturday, 26th June, to the Valley of the Roe. Fifty-two members and friends travelled by the 8-25 a.m. train from Belfast, and on reaching Limavady, were met by Mr. H. C. Marshall, one of the Conductors for the day. No time was lost in mounting the cars in waiting, and soon all were on their way to the Dog Leap, 2 miles up the River Roe. No more interesting spot could have been selected for the starting point of the Roe Valley exploration than that known as the Dog Leap, from which, indeed, the town of Limavady derives its name.

The River Roe at this place affords to the geological student one of the best sections to be seen in the district of the metamorphic rocks. The rocky channel of the river is cut into successive beds of massive micaceous and chloritic schists. The rocks are all more or less calcareous, and at one or two places further down the river partake decidedly of the character of limestone schists. Outside of the river course few exposures of the solid rocks occur. Speaking generally, the metamorphic series occupies the western side of the Roe Valley, the Triassic and Mesozoic series the eastern side, the latter capped by the massive escarpments of the Tertiary basalt plateau. Northward near Limavady town the river enters an alluvial flat, where the only eminences of consequence are terraces and drumlins of sand and gravel, evidently of glacial age. The whole party remained near the Dog Leap for over an hour. The collectors had a busy time, and the photographers took advantage of their opportunities.

The Electric Light and Power Station (the property of Mrs. Ritter) by which Limavady is lighted, is situated at the Dog Leap, and to it a visit of inspection was paid.

As is well known the Roe Valley occupies the focus, as it were, of the ancient territory of the once powerful sept of the O'Cahans. Roderic M'Manus O'Cahan, whose downfall took place in Queen Elizabeth's reign, was the last territorial prince of the house in this district; and the foundations of his ancient stronghold still remain on the east side of the Roe, a short distance north of the Dog Leap. A little bit further north, and on the east side also, a very high and projecting rock overhangs the river, which is known as O'Cahan's Rock. On emerging from the woods at the Swing Bridge, the more active members decided to visit O'Cahan's Rock and also the Holy Well, which latter is also situated in the woods on the east side of the river. Permission to visit it had been kindly granted by B. H. Lane, Esq. Shortly after three o'clock all met again at the Bridge and then passed over to the demesne of Roe Park House, where they were

courteously welcomed by Mrs. Ritter. One of the most important spots in the demesne is a bee-hive shaped grassy hill behind the house, which is said to be the same as that known to archæological and ecclesiastical students as Drumceat, where St. Columba presided over a great national assembly in the year 575 A.D., the famous Irish Saint having been invited over from Iona specially for the occasion. It is doubtful whether or not this is the historic hill. The hill itself is clearly a ridge or terrace of glacial or glacio-fluviatile origin, composed of sands and gravels.

A short business meeting of the Club took place on the top of the hill, the President, Mr. Nevin H. Foster, presiding. An enthusiastic vote of thanks was here given to Mrs. Ritter, on the motion of Mr. H. C. Marshall, seconded by Mr. W. J. C. Tomlinson, and suitably conveyed by the Chairman. Mrs. Ritter acknowledged the vote in graceful terms, and then led the way down again to the house, and exhibited some bones, a bronze pin, and some stones that had recently been excavated by her sons from an opening on the side of the hill. The opinion was expressed by those most competent to judge that the bones did not indicate animals of ancient type.

After leaving the Park the members all re-united at 4-30 p.m. in the Alexandra Arms Hotel, where the President and Mrs. Foster entertained the party to tea. Before rising from the table a cordial vote of thanks was given to Mr. and Mrs. Foster for their kindness, on the proposition of Mr. S. A. Bennett, seconded by Miss Dobbs, and the President suitably responded. The following members were elected:—Mrs. Balfour Browne, Miss Foster, Messrs. W. Joseph Stokes and Robert Martin; and the party left Limavady by the 5-40 p.m. train, and arrived in Belfast at 8-40.

Very few birds were observed. The day's list for the Limavady neighbourhood only totalled thirty. As was expected, the Dipper and Kingfisher were both observed on the river. One member reported finding three or four species of Water-Beetles

new to the county. Four common species of Woodlice were seen, and a few rarer forms were collected for further examination. Among the finds of the conchologists were—*Hyalinia excavata*, var. *vitrina*, *Limax flavus*, and *Helix aculeata*. The botanists saw many interesting plants, but had nothing new in the way of records to add to the known flora of the area visited. The golden rod, *Solidago Virgaurea*, and the wall pennywort, *Cotyledon Umbilicus*, grew profusely on the rocks at the Dog Leap; as did also a variety of mosses and hawkweeds. In the Deer Park woods the most notable species observed were *Melampyrum pratense*, *Viburnum Opulus*, and *Lastrea æmula*, all of which occurred abundantly. *Prunus Padus* and *Salix pentandra* were seen lower down the valley.

BUNDORAN (LONG EXCURSION).

The long excursion took place 10th till 13th July, when thirty-six members and friends visited Bundoran and district. The party, which was conducted by Mr. Robert Patterson, F.L.S., (in the unavoidable absence of Mr. Nevin H. Foster, M.B.O.U., who had made the arrangements) entrained at the Great Northern Station in a specially-reserved saloon carriage, and after a speedy run reached Bundoran about 2 p.m., where luncheon was waiting at the Club's headquarters—Hamilton's Hotel. After luncheon, the party proceeded by the east strand to Aughrus Head, stopping by the Rougie Rocks, where Mr. Wm. Gray, M.R.I.A., gave an interesting address on the geology of the coast, here consisting of rocks of Carboniferous age, which are highly fossiliferous, corals and crinoids being very abundant.

The walk, which was continued along the top of the cliffs to the Fairy Bridges, was a most enjoyable one. The sea and wind conditions allowed the Fairy Bridges—natural arches worn in the limestone by the action of the sea—to be seen to the best advantage; and it was reluctantly that the party proceeded on

their way to the Tullan Strand which stretches northwards to the mouth of the River Erne. The archaeologists of the party spent a busy afternoon exploring the Finner sand-dunes which back the strand, and their search was rewarded by the discovery of a very finely-worked flint arrowhead and a number of flint scrapers. At 6.30 the return journey was made to headquarters in time for dinner at 7.30.

On Sunday, no excursions appeared on the official programme, and each member was free to follow his or her own bent. Many went to various places of worship; while others were content to find their "sermons in stones," various small informal excursions being made to Loughs Melvin and Glenade.

On Monday morning, immediately after breakfast, the party were photographed by Mr. R. Welch, and then mounted cars, which were in readiness to drive to Mullaghmore. The road taken ran along the southern shore of Donegal Bay to Bundrowes Bridge, where the visitors were much interested in the Salmon Fisheries at the mouth of the River Drowes. Half a mile further on Tullaghan was reached, where, close to the roadside, the famous rude stone cross was seen. The cross, which has a long, unornamented upright shaft, with a relatively small transverse beam, apparently stands at a somewhat precarious angle on its base. A short distance from the road, and behind the cross, were seen the ruins of Duncarby Castle, of which only a few vestiges remain. The road now ran through some fine woods, luxuriantly carpeted with fern, until the main Sligo road was left, when trees became scarce and stunted, and grey stone walls formed a prominent feature of the landscape. Bunduff Lake was next reached, and a short stop was made on its banks to enable the zoologists and botanists of the party to do some collecting. After leaving Bunduff Lake, the road led over the tract of ground reclaimed from the sea by the late Lord Palmerston, who frequently resided at Classie Bawn Castle, situated on the neighbouring height of Mullaghmore. On reaching Mullaghmore, the cars were left, and

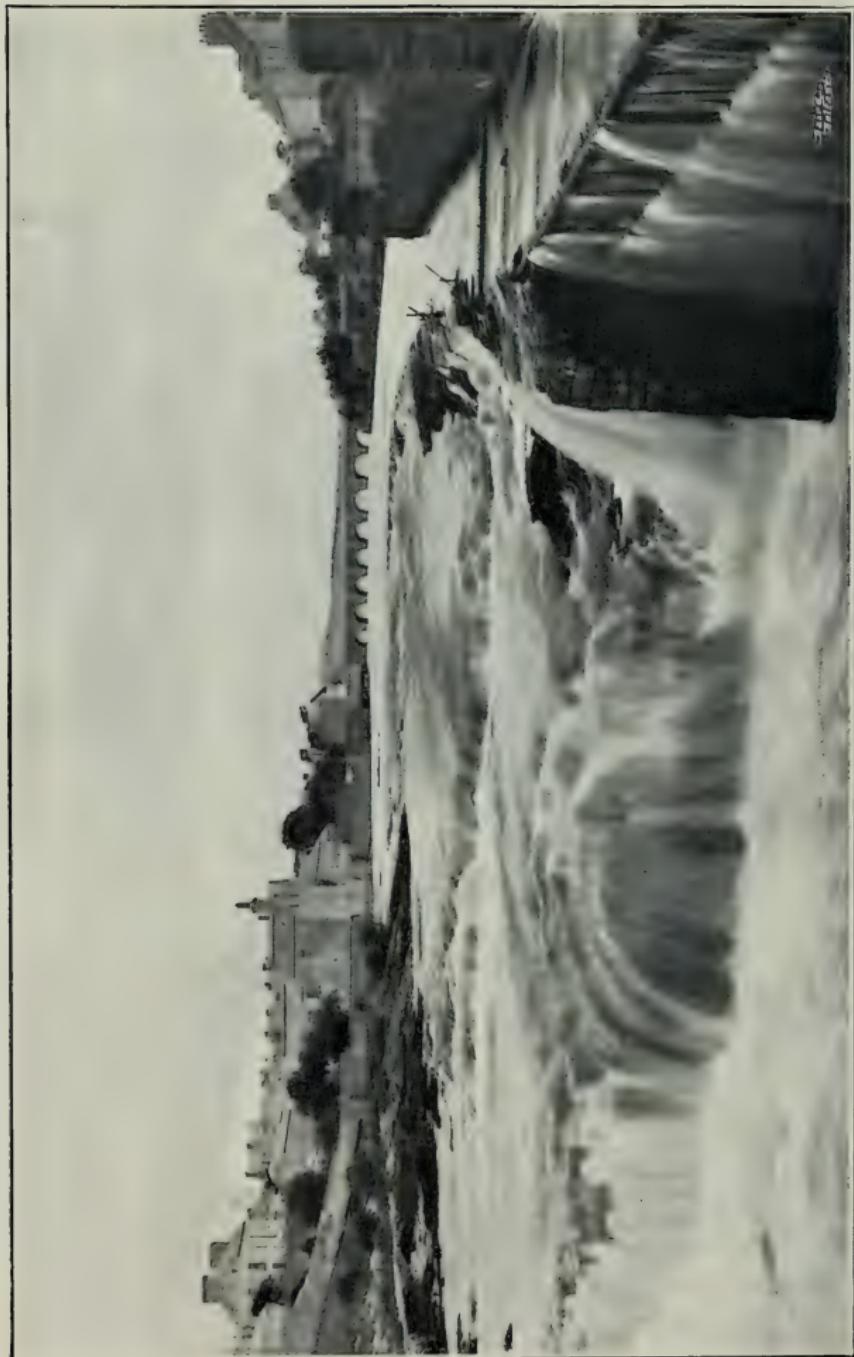
the party proceeded on foot round the rugged headland which fronts the Atlantic so boldly, keeping for the most part to the top of the cliffs, though some adventurous spirits descended the cliffs to the rocky beach below. The greater number of the party climbed to the highest point of the headland to enjoy the magnificent prospect. The walk was continued round the headland until Classie Bawn Harbour was reached, where lunch was served at 1-30 p.m. in front of the Coastguard Station. After lunch and after a group had been photographed beside the vertebra of a huge whale, the party scattered—geologists, botanists, zoologists, and archaeologists finding ample opportunities for work—and the afternoon passed all too quickly. At 5-30, afternoon tea was served before the Coastguard Station, and the return drive commenced, Bundoran being reached in time for dinner at 7-30.

After dinner, a short business meeting was held, Mr. William Gray, M.R.I.A., in the chair. Resolutions of sympathy for recent bereavement were passed to the President, Mr. N. H. Foster, M.B.O.U., and to Mrs. Thomas Anderson.

On Tuesday morning, the party drove to Ballyshannon, passing on the way Ballymacward Castle, the ancestral home of the Colleen Bawn, who left "her father's dwelling, his houses and free land" for love of Willie Reilly. When crossing the Erne at Ballyshannon a memorial tablet was seen in the east wall of the bridge to the poet, Willie Allingham, who was born at Ballyshannon. Allingham, who chronicled the beauties of his native place in pleasingly simple verse, died in 1889. Ballyshannon is a town of historic importance, and in 1597 was the scene of a disastrous defeat of the English by Red Hugh O'Donnell.

Leaving Ballyshannon with its beautiful falls and interesting salmon fisheries behind, Abbey Assaroe, founded in 1174, was soon reached. Few traces of the Abbey remain beyond fragments of its sculpture built into the churchyard wall or used to mark nameless graves, and an effort should certainly be made to collect and preserve such vestiges of the building as remain.





Falls of Assaroe, River Erne, Ballyshannon.

PHOTO.

R. WEIGLI

Near the site of the Abbey are the Falls of Assaroe (*Eas-aedh-Ruadh*, the cataract of Red Hugh). This Red Hugh, who was not the Red Hugh of Elizabeth's reign, but one of three brothers appointed by the Druids to reign over Ireland in successive terms of seven years each, was drowned at the Falls, and buried near at hand in Mullaghnashee (the Hill of the Fairies). It is possible that the tomb found in 1887 on this hill was that of this ancient king, buried two thousand years ago. After viewing the site of the Abbey and an interesting cave in its vicinity (known as the Monk's Cave), the members visited a holy well on the river bank, where Mr. William Gray gave a short lecture on Holy Wells, tracing their evolution from earliest pagan times to the present day. The cars left Assaroe at 12-30, arriving in Bundoran in time for lunch at 1-30.

The 2-40 train from Bundoran was taken, and the party arrived in Belfast at 6-4, thoroughly satisfied with their method of spending the "Twelfth." During the whole excursion the weather was uninterruptedly fine, and a considerable amount of excellent field work was done by various members.

The famous rock-pools at the west end were, of course, explored by the zoologists and botanists, and, as usual, afforded a splendid hunting ground for those interested in marine natural history. The Carboniferous limestone rocks were closely speckled with barnacles, *Balanus balanoides*, and scattered about in profusion were seen limpets, *Patella vulgata*, dog-whelks, *Purpura lapillus*, periwinkles, *Littorina littorea*, and quantities of *Trochus lineatus*. In and around the pools were great masses of the sandy tubes of a gregarious marine worm, *Sabellaria alveolata*, with other species rarely, if ever, found on our east coast, such as the living fishing line, *Lineus marinus*, specimens several hundred feet long having been found on the British coasts.

The flat bottoms of some of the larger pools were literally paved with great masses of the purple sea-urchin, *Strongylocentrotus lividus*, nestling in the hollows which they had

excavated in the rocks. This member of the Mediterranean fauna is found along the west coast of Ireland from County Donegal to County Cork, but it occurs nowhere else in the British Islands. The rocks and many of the shells were encrusted with the red coralline, *Lithothamnion polymorphum*, and between the holes of the *echini* were irregular masses of an allied form, *L. vesicalatum*, and examples of the moss-like *Corallinaria officinalis*. Many shells of the limpets which were lying about were being destroyed by the perforating green algae, *Gomontia*. Chitons, swimming crabs, nemertine and polychæte worms, and masses of compound tunicates were also observed.

Mollusca were well represented, the old woods at Glenade being full of *Helix lamellata* and *Pupa anglica*, also specimens of the *alba-lateralis* form of *Arion ater*. Under stones at Glenade *Vertigo lillieborgi* was common, this being the 4th recorded Britannic locality. The rock snail, *Helix rupestris*, was found most abundantly even at an altitude of over 1,400 feet. In Lough Melvin *Planorbis glaber* was found.

All the common species of Woodlice were observed, but in this group the best captures were *Cylisticus convexus*, taken at Abbey Assaroe, and *Haplophthalmus mengii*, from an ant's nest in Glenade, while at the same place *Trichoniscus roseus* was found plentifully under stones in a semi dried-up mountain rivulet.

The ornithologist of the party reports that sixty-eight different species of birds were observed. As foreshadowed in the programme, the Mullaghmore excursion was by far the best day, the very large number of sixty-two species of birds being noted—the largest number ever observed in a single day of the July excursions. The rarest bird seen was the Tree-Sparrow, *Passer montanus*, between Bundoran and Ballyshannon, four feeding together. It is satisfactory to know that this species, first found breeding in Co. Donegal in 1907, is still established there. The Grasshopper-Warbler is a new record for Co. Sligo, while the Corn-Bunting and Tufted Duck were apparently breeding in Co.

Leitrim, though not hitherto known to do so. That local bird, the Siskin, was seen near Bunduff Lake, while Goldfinches were noted near the same place. A curious and striking feature was the complete absence of Mistle-Thrushes, Song-Thrushes, and Skylarks, while the Blackbird was only seen at Glenade and Mullaghmore. Some immense flocks of Starlings were seen in different places.

Botanists were unfortunately not well represented on this excursion. One of the members found *Silene acaulis*, *Rubus saxatilis*, *Arabis hirsuta*, and *Saxifraga hypnoides* at high altitudes on the cliffs above Glenade. Other plants noted included *Asplenium Trichomanes*, *A. Ruta-muraria*, *A. marinum*, *Ceterach officinarum*, *Listera ovata*, *Orchis incarnata*, *O. maculata*, *Cotelydon Umbilicus*—very large and plentiful—and the ground was in many places carpeted with masses of the lovely pink *Anagallis tenella*.

The geologists spent a busy week-end studying the highly fossiliferous rocks in the district, and obtained a number of fine specimens. At the east end of the bathing strand good examples were noted on the boulder clay cliffs of the early stages of the formation of earth pillars. At the west end cliff, fine examples of calc-tufa or travertine were seen in process of formation.

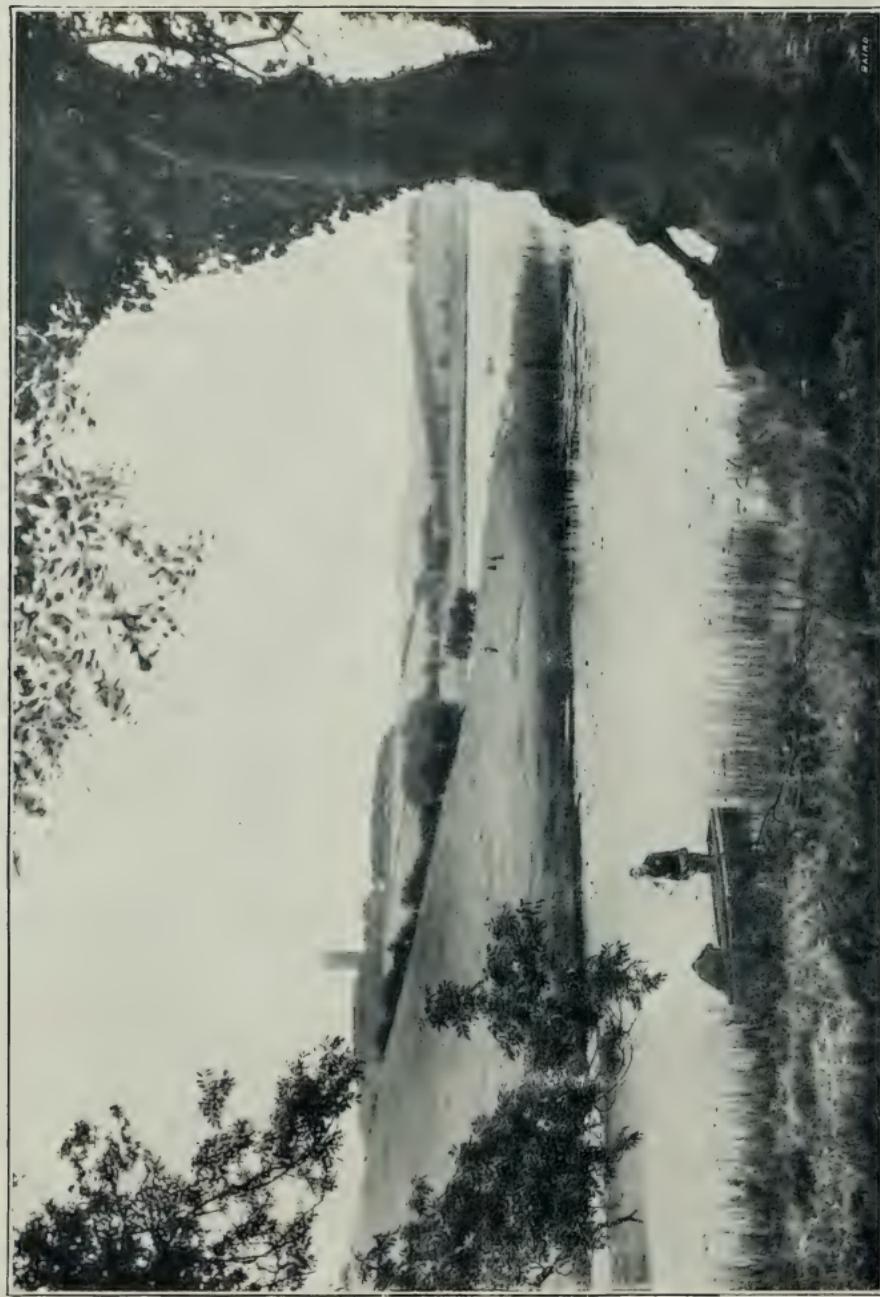
INCH ABBEY AND THE QUOILE. (HALF-DAY).

The fifth excursion took place on 31st July, when members and friends numbering seventy-four visited Inch Abbey and the Valley of the Quoile, under the guidance of Messrs. J. L. S. Jackson and W. A. Green. The party travelled in specially-reserved carriages by the 1-50 train to Downpatrick Station, where vehicles were waiting. Leaving Downpatrick behind, all were soon driving through the great green woods that line the road to Inch Abbey

Perhaps the most interesting sight on the way was the great Dun of Celthair, which, says Harris, "comprehends at least three-quarters of an English mile within the circuit of all the works. The circumference of it is 2,100 feet, the conical height 60 feet; three great artificial ramparts surround it, the most considerable of which is thirty feet broad." This great Rath, which seems to have been the royal residence and fortress of the native princes, takes its name from Celthair of the Battles, one of the Red Branch Knights who fought under Conor Mac Nessa, King of Ulster, about the beginning of the Christian era.

Inch Abbey was reached about 3-30, and the party proceeded to explore the ruins which stand on what was anciently *Inis Cumscraidi*, or the Island of Cumhsraidi, who was one of the sons of Conor Mac Nessa. Mr. Maxwell kindly had the rank undergrowth cleared away, so that no difficulty was found in examining the beautiful Cistercian Abbey, of which little now remains save traces of its former broad foundations, some mouldering, ivy-clad walls, and one gable pierced by three slender lancet windows, early English in design, and of exquisite proportions. Mr. Parkinson now gave the members an interesting *résumé* of the history of the Abbey. Its foundation about 1177, which is variously attributed to Sir John de Courcy and to his wife, Affrica, daughter of the King of Man, was an act of reparation as amends for the destruction by Sir John of the Benedictine Abbey of Erenagh, said to have been strongly fortified by the native princes against the Norman knight's predatory invasion. After listening appreciatively to Mr. Parkinson's instructive remarks, the party scattered, each pursuing his or her particular hobby, studying the plant and animal life of the river and its banks. The Rev. Charles K. Pooler, B.D., D.Litt., had very considerately placed two boats, with boatmen, at the disposal of the party, and many spent the afternoon on the beautiful waters of the Quoile.





The River Quoile at Inch Abbey, Downpatrick.

PHOTO.

W. A. GREEN.

At five o'clock the vehicles were re-entered, and the party drove to Quoile Castle. Here much interest was displayed in the great square keep, with its vaulted lower chamber, and it was with difficulty that some of the members of the party could be persuaded by the energetic conductors to return to the cars. The drive was then continued to Downpatrick, where the members and friends were most hospitably entertained to tea by Rev. Charles and Mrs. Pooler. The usual business meeting was held before tea, the President of the Club, Mr. Nevin H. Foster, M.B.O.U., in the chair. Mr. Nelson Russell was elected, and on the motion of the Rev. Thos. Hamilton, D.D., LL.D., Vice-Chancellor of Queen's University, seconded by Mr. Robert Walsh, a hearty vote of thanks was passed to Mr. and Mrs. Pooler for their hospitality to the Club.

After tea, most of the members visited the Cathedral founded by St. Patrick in 440. Pillaged and burnt many times by the Danes, it was rebuilt by Malachy O'Morgair in 1137. Some parts of this old building still remain in the present comparatively modern structure. After various vicissitudes, the ancient Abbey was burnt by Lord Deputy Grey in 1538, and after lying in ruins for 250 years was rebuilt in 1790-1826. The visitors were specially interested in the old Celtic cross which now stands at the east end of the Cathedral. The scattered fragments of the cross were collected and re-erected on its present site by several enthusiastic archæologists who are members of the Field Club.

An interested group gathered round the massive stone which now covers the grave of St. Patrick.

The field work done was considerable, though full records have not been handed in. The botanists had a specially good opportunity of studying water-loving species of plants; specially noticeable were the great masses of Purple Loosestrife, and the Water-Plantain was in fine flower. July is about the worst month of the year for the collection of Mollusca, most of the adults being dead and the young shells too small to be of service for a

collection. The water-lily leaves on the Quoile River, however, were found to be, as usual, the habitat of good species; *Ancylus lacustris*, with *Valvata cristata*, and *Physa fontinalis* were noted. These same water-lily leaves were covered on the under-side with various species of small Leeches and Planarian Worms, which were also in abundance under stones by the river side with masses of fresh water sponges, which seem very common at Inch Abbey shores. The muddy bottom yielded *Sphaerium lacustre* and a number of *Pisidia* not yet determined. *Helix hortensis* was found to be still fairly plentiful at its Downpatrick habitat.

The district visited is rich in bird life, but at this season almost all the songsters are silent, and most of our feathered friends remain in seclusion. The most interesting ornithological feature proved to be the observation of a pair of Sandwich Terns, *Sterna cantiaca*, a species which has recently been found breeding in Co. Down.

Five species of Woodlice were taken, the most interesting being the Pill-Woodlouse, *Armadillidium vulgare*. This species is common in the South of Ireland, but remained unrecorded from Ulster until quite recently, when it was discovered at Portaferry and at Killough. It was very numerous under stones on the sloping ground between Inch Abbey and the Quoile.

RICHHILL.

On Saturday, 14th August, the Club visited Richhill. The party travelled in reserved carriages by the 9.30 a.m. train from Belfast, which stopped by special arrangement at Richhill Station. Eighty-three members and friends left Belfast, and were joined at various points on the way by others, the total number of the party, which included a number of cyclists, being 102. After arriving at Richhill the party was under the guidance of Dr. Berry, of Richhill, who kindly placed his local knowledge at the service

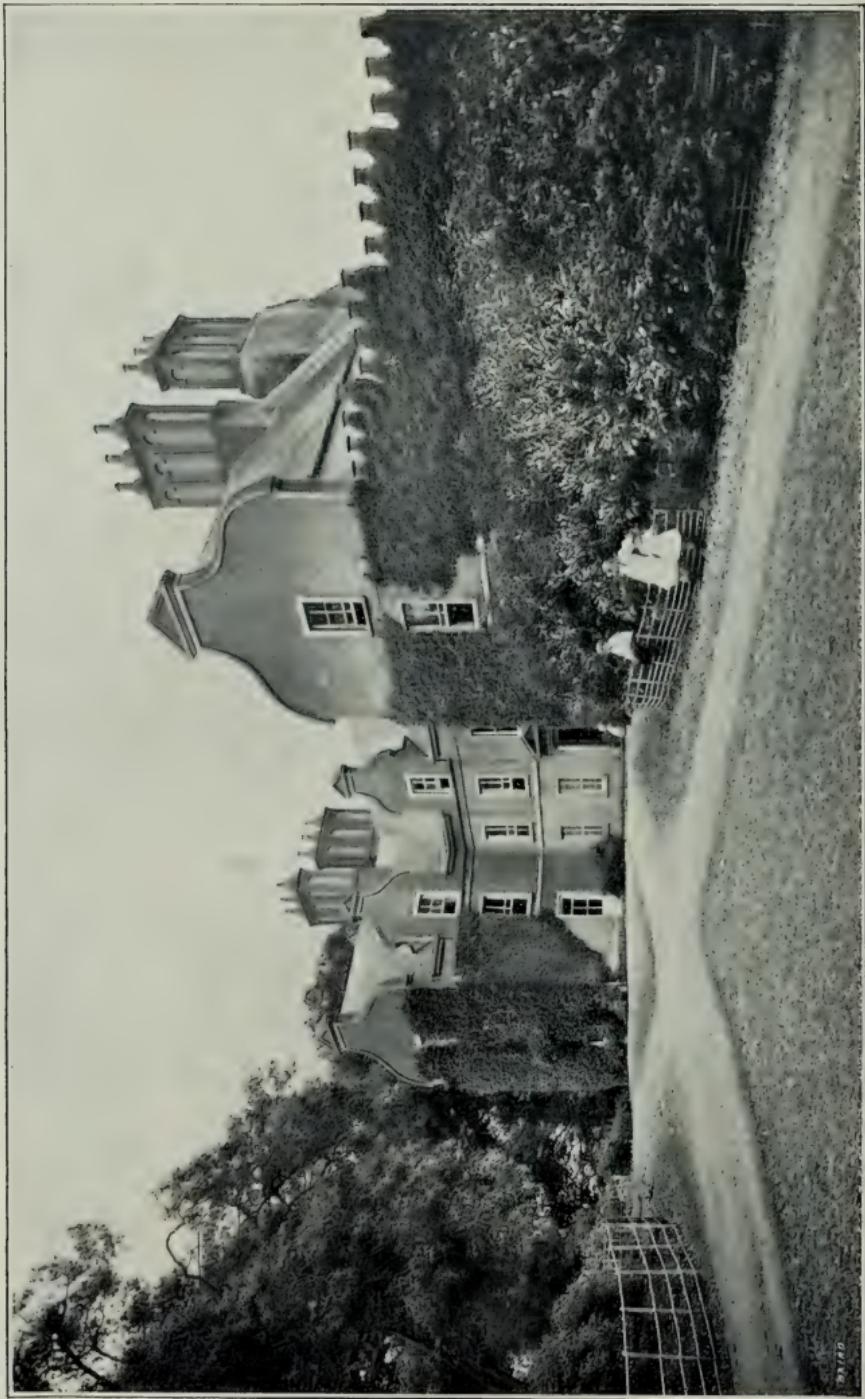
of the Club, and was untiring in his efforts to add to the success of the excursion. Waggonettes were in waiting to convey the party to Castleraw, which was reached after half-an-hour's drive. The old castle, of which little now remains, stands within a rath, the entrenchments of which are well preserved, and is said to have been founded by Rory O'Neill in the reign of Queen Elizabeth. It is, however, generally associated with the name of Sir Phelim O'Neill, one of the fiercest sons of that warlike race. Tumults of a later date were brought to the minds of the party by the view from the castle of the Diamond, which was the scene, in 1795, of a battle between the Peep-o'-Day Boys and the Defenders. After sufficient time had been given for investigation and collection, the vehicles were again mounted, and the drive was continued through the fine orchards of County Armagh to Kilmore. Here the Rev. Mr. Jones conducted the party through the church, and gave an interesting account of its foundation. One historian writes—“Kilmore, anciently called Kilmore Aedhan, derived its name from the foundation of a church in the territory of Maudneth, by Sir Mochtee, the founder of Louth, by whom it was dedicated to St. Aedhan.” Some authorities consider the church to be one of St. Patrick's foundations, but the Rev. Mr. Jones was of opinion that the foundation was of date previous to St. Patrick's time, tradition having it that St. Patrick was once a guest of the monastery adjoining, of which no trace now remains. The present church was rebuilt in 1814.

The party next visited one of the finest orchards in County Armagh, by kind permission of Mr. and Mrs. Hobson, of Kilmore, and partook of lunch in the orchard and on the lawn. Mr. Hobson imparted a considerable amount of very interesting and instructive information about fruit growing, which is the staple industry of the district.

After lunch the members drove from Kilmore to Fruitfield, where Mr. Lamb courteously conducted them over his jam factory. A delightful surprise awaited the party at the end of their

inspection, when Mrs. Lamb dispensed delicious raspberries and cream—the raspberries being freshly plucked from Mr. Lamb's own fruit farm of Sandymount. From Fruitfield the party drove to the Portadown entrance of Richhill demesne, which they entered by courtesy of Major Berry, M.R.I.A., a prominent member of the Field Club. Here the members scattered to follow their various hobbies, botanising or zoologising as their tastes inclined. The demesne is specially interesting on account of the many very fine beech and oak trees which it contains. When it was enclosed part of the primeval forest was included, some representatives of which still exist. Besides King William's stump, the remains of a grand beech, to which the King is said to have tied his horse and slept under when on his way to the Boyne, there still remain many large trees, the greatest of which is a beech 18 feet 10 inches in circumference, and an oak with a girth of 17 feet 8 inches. A fine specimen of the white beam tree, *Pyrus Aria*, one of our old native Irish trees, was seen covered with fruit.

At 4.30 p.m. the members assembled at Richhill Castle, where they were very graciously received by Mrs. Berry, and entertained to tea on the terrace. After tea a short business meeting was held—the President (Mr. N. H. Foster, M.B.O.U.) in the chair. Dr. Berry read a telegram from Major Berry, M.R.I.A., who was unavoidably absent, welcoming the Club to Richhill Castle. Mr. William Gray, M.R.I.A., proposed a vote of thanks to the various persons to whom the Club was indebted—to Mr. Lee, of Ballywilly, for guidance and information at Castleraw; to the Rev. Mr. Jones, for permission to visit Kilmore old church; to Mr. and Mrs. Hobson, of Kilmore, for hospitality accorded; to Mr. and Mrs. Lamb, for entertainment and permission to visit Fruitfield Factory; and to Major and Mrs. Berry for their kind invitation to the Club to visit Richhill, and for their generous hospitality; and to Dr. Berry for his unceasing services during the day, as conductor. The motion was seconded



Richhill Castle.

PHOTO.

R. WELCH.

by Mr. W. H. Patterson, M.R.I.A., and passed unanimously. The Chairman read an interesting short paper on Richhill Castle, written for the occasion by Major Berry, M.R.I.A., and the election of Mrs. Herbert Turtle, Miss Ina Drummond, Miss Anna Boylan, and Mr. Edward Bennett concluded the business. After the meeting was ended Mrs. Berry showed the members over Richhill Castle, which was built between 1610 and 1618 by one Francis Sacheverel. The house, situated as it is on a hill exactly facing, and but four miles distant from, Sir Phelim O'Neill's old castle (Castleraw), had some stirring times in the rebellion of 1641-1652. The members walked to Richhill Station, in time for the 6-55 train, arriving in Belfast at 8-5 p.m.

Field work was energetically carried on during the day, the botanists of the party being specially active. Some of the most interesting plants noted during the day were the following:—*Tanacetum vulgare*, *Geranium perenne*, *Juncus glaucus*, *Carex pendula*, *C. strigosa*, *Epipactis latifolia*, *Alisma Plantago*, *Mercurialis perennis*, *Allium ursinum*, *Medicago lupulina*, and *Aethusa Cynapium*. In Richhill demesne some specimens of *Digitalis purpurea*, almost six feet in height, were observed, and one specimen seen of the Broad-leaved Helleborine was two and a-half feet high, and had forty-one flowers on the spike. The search for Mollusca was disappointing work, as the weather was too dry for collecting. Only fourteen species of land and fresh-water shells were noted, mostly in the demesne, the best being *Helix pulchella* and *Hyalinia fulva*. Numerous specimens of the four common species of Woodlice were observed, but a specimen of *Porcellio lœvis* was taken in the garden—this being the second place in Ulster in which this species has been found. Only twenty-three species of birds were noted by the ornithologists of the party, the paucity of the list being accounted for partly by the heat of the day, but principally owing to the fact that at this season most of the birds are undergoing the annual moult. The President's prize for the best collection of invertebrates made during the day

was won by Mr. Robert Welch, M.R.I.A., and the Vice-President's prize for the best collection of plants was won by Miss Rea, who handed in 114 species.

BALLYMENA.

The Geological Section visited the Ballymena district on 21st August. The objects of the visit were to make an examination of some of the glacial deposits of the Braid Valley and of the exposures of rhyolite, which occur in the neighbourhood. The members travelled to Ballymena by the 12-25 p.m. train and on arrival there drove to Drumfane, two miles to the north-eastward. Here some time was spent in the examination of the fine section of esker-like sands and gravels exposed in Mr. Clyde's sand-pits. Leaving these the drive was continued to Cloughwater, where what is apparently an old volcanic neck of rhyolite emerges as a whitish mass in the middle of a peat bog. From Cloughwater a return was made by the Broughshane Road to Ballycloughan, where another rhyolitic outcrop exists. Formerly the rhyolite was extensively quarried here for building purposes, but for many years past no quarrying operations have taken place. The rock-surfaces of the section are consequently quite obscured by vegetation, and after a momentary halt the drive was continued southward to Broughshane, and the magnificent section of the esker deposits on the north side of the Ballygarvey Road visited. These deposits have for a considerable period been turned to economic account, as they prove an excellent source of sand and gravel for all the requirements of the neighbourhood. The stratification of the material both here and at Drumfane, and the delightful examples of current-bedding, are as clearly defined as in the most idealistic text-book diagrams. Rounded and water-worn stones and pebbles are very conspicuous in these accumulations. At both places it was clearly evident that the deposits were mainly derived from rocks of the district. Out of one hundred pebbles selected almost

at random at Drumfane it was found that twenty-one were rhyolite, four chalk, two flint, two dolerite, one Cushendall porphyry and seventy basalt. A hundred similar specimens examined at Broughshane yielded seventy-six of basalt, four of flint, and twenty of chalk. Clearly, then, the deposits at the latter place are more definitely local ; rhyolite seemed to be absent, whereas at the Drumfane pits it was common. One igneous rock, which has never been seen *in situ* locally, but which is not uncommon in the glacial deposits of the North-east and East of Ireland—namely, the Ailsa Craig riebeckite rock, could not be traced at either Drumfane or Broughshane.

With regard to the acid igneous rock rhyolite, it may be observed that the main outcrop occurs at Tardree Hill, north-east of the town of Antrim. The earlier geologists misnamed it trachyte, and it was supposed to be confined to the Tardree area. At the time the Ballycloughan rhyolite quarry, visited on Saturday, was in active use the stone extracted therefrom being looked upon as a sandstone of carboniferous age, and this misinterpretation led to a fruitless series of borings in search of coal in the immediate vicinity. To the few who even at that time recognised the volcanic character of the rock, the prospecting for coal at Ballycloughan was rightly characterised as a hopeless undertaking. So far as the County Antrim is concerned the exposures of rhyolite *in situ* have been traced in a more or less direct line from the village of Templepatrick in the south to Cloughwater in the north. The rock at Tardree is more granitic in texture than elsewhere. The outcrop in the bog at Cloughwater forms a low boss, shaped somewhat like an inverted saucer, and although basalts outcrop everywhere on the surface of the country around no junction of the rhyolite and basalt can be seen, owing to the engirdling deposit of peat. Whether this Cloughwater protrusion is really a volcanic neck or merely an isolated mass detached from a larger lava flow is an interesting problem. The fact that those inter-basaltic deposits of County Antrim known as bauxites are known to have

derived no inconsiderable proportion of their constituents from rocks of rhyolitic type and composition points to the conclusion that the rhyolites are of Tertiary age, and that their lavas were poured forth in the period between the outflow of the Lower and the Upper Basalts. The same facts warrant the inference that lavas of rhyolitic type were ejected on a grander scale in the district than the existing isolated patches and bosses of the rock seem to imply. Many beautiful specimens were collected by the geologists at Cloughwater on Saturday, and at all the places visited a number of photographic geological records were made.

ORLOCK POINT.

Members and visitors to the number of forty-one took part in the seventh and last excursion of the season on 28th August, to Orlock Point, a picturesque and wild bit of coast between Groomsport and Donaghadee, taking in also a visit to Portavoe Demesne, the ancient seat of the Ker family. The party, under the conductorship of the Vice-President, Mr. W. H. Gallway, travelled down to Bangor by the 1-55 train in specially reserved carriages. On reaching Bangor, Mr. H. Morrow had brakes in waiting, which were quickly mounted, and the drive commenced through Ballyholme and Groomsport until the Orlock Hill was reached. Here the party dismounted, and, making their way down to the shore, examined the sandhills to the north of Balloo Bay. Leaving here and passing along the road cut through the Silurian shale, the party came to a halt at the foot of the buildings formerly used as a coastguard station. Time being allowed for a brief examination of the district, the members separated, some to study the geology of the Point and to search the bed of black shale occurring here for graptolites; others examined the numerous rock-pools for marine life, while the botanists were fully engaged with the shore-loving plants, and wandering further afield for other rarities.

The walk was continued along the old roadway leading round the Point and out on the Donaghadee Road. The road branches off at the foot of the Orlock, following the outline of the shore, and, coming out again at Orlock Bridge, enters the demesne through My Lady's Drive, which leads to the house. Entering the Portavoe Demesne, the members kept to the main avenue until the house was reached, when they again separated, to wander about and admire the beauties of the old place. Portavoe House was burnt down some sixty years ago, the inmates escaping through an underground passage which connected the house with the lake, and which passage still exists. The house was never rebuilt. Having examined the grounds and lake, and noting a fine example of a perpendicular sundial, dated 1681, built into the gable of one of the stables, the party remounted the cars, and, driving along the back avenue, came out at what was formerly the front entrance, and so on to the old Donaghadee Road, and back to Bangor.

The different specialists were very pleased with their outing, the marine zoologists carrying away a quantity of material for future work. The geologists and photographers had their innings, while the botanists noted among the more uncommon plants *Ligusticum scoticum*, *Crithmum maritimum*, *Origanum vulgare* (pure white and also pink varieties, this plant being plentiful), *Œnunthe Lachenalii*, *Samolus Valerandi*, *Lysimachia vulgaris*, *Polygonum amphibium*, *Asplenium marinum*, &c.

Tea was served at Apperson's Temperance Hotel at 6-30, and afterwards a brief business meeting was held, Mr. W. H. Gallway occupying the chair. The Chairman referred to the number of successful excursions held during the Summer, the average attendance being sixty-three. He also drew the attention of the meeting to the facilities afforded beginners in scientific work and to the valuable and numerous prizes offered by members and the Club, and wound up by calling for papers to be read at the

forthcoming Winter Session. There being no further business to transact, the meeting broke up, the members leaving for Belfast by the different trains as best suited themselves.

CLOUGHFIN.

The Geological Section of the Club held an excursion on Saturday, 11th September, to Cloughfin, Islandmagee. Proceeding by train to Ballycarry, a very enjoyable walk brought the party to their destination. The rocks investigated belong to the Cretaceous formations, and comprise the following:—Glauconitic Sands, Yellow Sandstones, Chloritic Sands, and Chalk. These beds dip at an angle of five degrees in a south-westerly direction, and are well exposed at this locality. However, the lower beds are only accessible during low tide. Commencing with the Glauconitic Sands, these were carefully examined and yielded the following fossils:—*Exogyra conica* var. *laevigata*, Sow. *Pecten orbicularis*, Mant., *P. quinquecostatus*, Sow. *Kingena lima*, Defr., and *Belemnites ultimus*. The Yellow Sandstones are about 8 to 10 feet in thickness, and consist of a compact calcareous sandstone, with alternating bands of marl, yielding *Vermicularia concava*, Sow. The Chloritic Sands are best seen in the cliff above high-water mark, and are very fossiliferous, the prominent features being the bands of *Serpula filiformis*, and *Inoceramus crispus*. The fossils obtained from this section included *Parasmilia centralis*, Mant.; *Etheridgia mirabilis*, Tate; *Inoceramus crispus*, *Ventriculites cribrosus*, Phil.; *Camerspongia fungiformis*, Gold.; and palatal tooth of *Ptychodus latissimus*, Ag. Leaving this the party proceeded by the path to Blackhead to examine the minerals in the basaltic rock. After a careful search the following were recorded: levyne, gmelinite, and analcime; also the mineral beekite was found on a fossil of *Pecten quinquecostatus*.

WOODBURN GLEN.

The Geological Section of the Club visited Woodburn Glen on Saturday, 25th September, to investigate a section of Cretaceous rocks exposed at the Woodburn River, Mr. Robert Bell kindly acting as field conductor.

There was a large attendance of members, and the party proceeded by the 1-50 p.m. train to Trooper's Lane; whence a walk of about an hour brought them to the entrance of Woodburn Glen. To reach the section the bed of the stream had to be taken in several places, and the unusual amount of water at the present season added to the difficulties. The beds examined for fossils were Professor Tate's "Chloritic Sandstones" and "Glauconitic Sands." A large number of fossils were obtained from an exposure of the former in the east bank of the river. These included *Rhynchonella robusta*, *Ventriculites gibosus*, *Etheridgia mirabilis*, *Inoceramus crisi*, *Ostrea semiplana*, *Terebratula carnea*, *T. semiglobosa*, and *Pecten aequicostatus*. A piece of chert was also found. The "Glauconitic Sands," recognised by their deep green colour, are well exposed in the west bank of the river, but the water was so deep they were inaccessible to most of the party. One member, however, waded across, and obtained specimens of *Exogyra conica*, the most characteristic fossil of the zone. The "Yellow Sandstones" were observed above the "Glauconitic Sands," but were in an inaccessible position. A little higher up, on the west side of the river, between the greensand outcrop and the waterfall, a basalt dyke was noted traversing the chalk, which in its vicinity was converted into marble, some specimens showing a beautifully banded structure.

MOIRA.

The Geological Section of the Club had a most interesting excursion to the Moira district on 9th October. A large number of members, conducted by Mr. Robert Bell, started by the 1-50

p.m. train to Moira, and a walk of about two miles in a north-easterly direction from the station brought the party to the fine chalk quarries near the village of Maghaberry. These quarries are in Dr. Hume's "Southern Division" of the Cretaceous strata which, as he has pointed out, is characterised by the frequency of paramoudras and by the existence of a conglomeratic chalk at the base of the white limestone.

It was in this neighbourhood that Dean Buckland first met with paramoudras as stepping stones in a river, and it was from Moira that a very perfect specimen was sent to the Ashmolean Museum. Buckland rightly conjectured that these curious bodies were fossil sponges, and Professor Sollas regards them as the cretaceous representatives of the recent sponge *Poterion patera*. He has consequently named them *P. cretaceum*.

Three quarries were visited by the Geological Section on this excursion. At the first one the conductor pointed out that, although the junction was not visible, the chalk here overlay the triassic marls directly. This quarry showed about fifty feet of hard white chalk, with horizontal bands of flint, an average interval of nearly two feet separating the lower bands. At one corner of the section a vertical series of three paramoudras *in situ* was noted. Resting on the chalk, there was about thirty feet of rudely-columnar basalt, surmounted by from 8 to 12 feet of red boulder clay. The conductor pointed out an erratic of Ailsa Craig riebeckite-eurite, measuring 12 inches by 7, the largest specimen of this rock yet found in our boulder clays. Erratics of granite, probably from Slieve Gallion, and an undetermined gabbro, were also noted. At the entrance to the quarry a large dyke of decomposed basalt about 40 feet wide was observed traversing the chalk, which in its vicinity was greatly altered, and the colour of the flints changed to a deep red.

In the second quarry boulder clay varying from 2 to 20 feet in depth was found resting directly on the chalk. Many very fine specimens of paramoudras were noted; one *in situ* measured 50

inches by 18, and others forming a vertical series in the chalk cliff appeared to be quite as large, but were inaccessible. Two lying on the ground measured respectively 27 inches by 16, and 35 inches by 16. A specimen of *Belemnitella mucronata*, the most characteristic fossil of the zone, was found, and also a fragment of *Inoceramus*. Erratics of granite, gabbro, quartzite, mica-schist, and Ailsa Craig riebeckite-eurite were noted.

In the last quarry visited chalk to a depth of at least 50 feet was visible, surmounted by about 25 feet of rudely-columnar basalt, capped by boulder clay averaging 20 feet in depth. Similar erratics were found, and the great alteration in the chalk close to a basalt dyke was observed with interest.

SQUIRE'S HILL.

The Geological Section of the Club visited the chalk quarries at Squire's Hill on 6th November. There was a large attendance of members, and after leaving the tramcar at Ballysillan an enjoyable walk brought the party to the Horseshoe, in full view of the quarries.

The formations represented in the immediate district are, Mr. Tomlinson mentioned, in descending order, the Lower Basalts and Volcanic tufa, the Chalk, the Greensand, the Lower Lias, and the Trias, and, he stated, that in the upper part of Carr's Glen, just below the quarries to be visited, good sections of the Trias, Lias, and Cretaceous rocks occur in regular sequence in a deep valley of erosion. After the conclusion of the Chairman's remarks the party proceeded to the quarries, where Mr. Robert Bell kindly acted as field conductor.

The chief features of interest in the first two quarries visited were the fine exposures of hard white chalk, with bands of flint traversed by numerous vertical dykes of basalt, the chalk in the vicinity of these being much altered. In one instance a very

beautiful example of a narrow band of chalk caught up in a dyke was observed. In the third quarry the exposure of chalk was about 60 feet deep, the bands of flint were very pronounced and regular, and on the floor of the quarry there were many fine specimens of paramoudras, but they were not observed *in situ*. Neither the Glauconitic Sands nor the Yellow Sandstones were exposed in this quarry, but a good section of Chloritic Sands passing upwards into Chloritic Chalk, surmounted by hard White Chalk, was observed near the entrance, and fine specimens of all the beds were secured. As the quarries are not now worked few fossils were obtained. These included *Belemnitella mucronata*, *Terebratula carnea*, and the cast of another brachiopod from the chalk; *Inoceramus crisspi*, and *Echinocorys gibbus* from the Chloritic Chalk, and three specimens of *Ventriculites* from the Chloritic Sands.



Winter Session.

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

ANNUAL CONVERSAZIONE.

On 27th October the Club inaugurated its Forty-seventh Winter Session by a Conversazione, which was held in the Assembly Hall, Assembly Buildings, over three hundred and fifty members and friends attending. Tea was served by Mr. Fred Henry, of Ye Olde Castle Restaurant. A pleasing innovation at Field Club conversazioni was the organ recital given during the evening by Mr. Thomas H. Crowe. Programme :—March from “Carmen” (Bizet); Overture in B (Smart); Air, “Holseworthy Church Bells” (Wesley); March, “Coronation” (Meyerbeer); Overture to the “Occasional Oratorio” (Handel); Bridal March, “Lohengrin” (Wagner). A display of scientific exhibits occupied the entire body of the hall, which proved pre-eminently suited for such a purpose. Throughout the evening the various exhibitors gave informal lecturettes to those interested.

The Zoological Section was specially strong in microscopic exhibits. Mr. Maxwell’s exhibit of living microscopic pond and marine life contained examples of *Melicerta ringens*, *Stephanoceros eichornii*, *Floscularia campanulata*, *Volvox globator*, *Plumularia*, *Sertularia*, *Flustrella*, and *Pedicellina*. Of equal value and interest was the microscopic exhibit of living fresh water *Protozoa* by Professor Gregg Wilson, D.Sc., and the specially beautiful slides shown by Mr. W. J. Dakin, M.Sc., illustrating the development of the plaice, and the method by which malarial fever is

transmitted by the mosquito. Mr. Joseph Wright, F.G.S., the well known authority on Foraminifera, had a most interesting exhibit of Pleistocene Foraminifera from the island of Crete. Mr. J. Cottney showed, in a carefully thought-out exhibit, examples of Birds of equal size, showing variation in the size of their eggs, and Mr. Charles Cunningham, L.D.S., D.D.S., displayed coloured plates of Hawaiian fishes. Of special interest to students of the geographical distribution of species were the carefully prepared Maps to illustrate the recorded distribution of Woodlice in Ireland by the President, Mr. Nevin H. Foster, M.B.O.U., and the Maps showing the distribution of Irish Wasps and Bees by Mr. H. Lamont Orr, who also showed nests of Wasps and Bees. Mr. W. H. Gallway exhibited living Sea-Anemones from Belfast Lough, and Mr. W. A. Green showed a collection of very neatly mounted Marine Animals. Mr. Robert Patterson, F.L.S., M.R.I.A., had a realistically mounted case of newly-hatched Coots, illustrative of precocious young, an albino Rook and a Parrot's nest. Among the exhibits of Mollusca Mr. A. W. Stelfox, A.R.I.B.A., tabled living specimens of *Helix nemoralis*, var. *roseozonata* from County Fermanagh and *Helix hortensis* from County Derry; also Britannic species of the family *Zonitidæ*, with some of their European allies, with a special exhibit of *Vitrea cellaria*, including the two new species, *V. hibernica* and *V. scharffii*, lately described by A. S. Kennard, F.G.S. Mr. R. Welch, M.R.I.A., showed Land-shells from Bundoran and several species of the *Succinea* group; and Mr. J. N. Milne's exhibit of Irish non-marine Mollusca included a magnificent set of *Ancylus fluviatilis*, var. *albida*, from County Down.

In the Botanical Section the following were among the more important exhibits:—Mr. N. Carrothers, Plants from Yorkshire and some specimens of Ferns from New Zealand; Mr. W. H. Robinson, Plants from French Guiana; Rev. Canon Lett, M.R.I.A., freshly-gathered and mounted specimens of Mosses and an album containing a complete set of Britannic Mosses; Mr.

William W. Middleton, Photo-micrographs of sections of stems of *Rosa canina* and *Crataegus oxyacantha*, &c.; Mr. W. H. Phillips, a collection of mounted and freshly-gathered Ferns, showing the results of cross-fertilisation; Mr. W. J. C. Tomlinson, a very fine display of Connemara and other mounted Plants; Rev. C. H. Waddell, B.D., some interesting examples of Mosses; and Mr. S. Wear, Microscopic Slides, illustrating the anatomy of a leaf.

In the Geological Section the exhibits deserving special notice included Miss M. K. Andrews's Microscopic Sections of the orbicular granite of Mullaghderg, County Donegal, and of the orbicular diorite (Napoleonite) of Corsica, and Mr. Robert Bell's exhibit of Beekite from local Cretaceous deposits, as well as specimens of English Beekite kindly sent by Mr. W. H. Wickes for comparison with the local specimens. Beekite is a form of chalcedony. It is found in various localities and formations in England, and has been discovered by Mr. Bell on our Cretaceous fossils. Mr. Bell also exhibited slides showing the typical form of the mineral as found on *Exogyra columba*. Mr. J. Strachan had an exhibit of Photo-micrographs of sections of local rocks and minerals, including sections showing the inclusion of felspar in natrolite; also a collection of Agates from different localities, showing variety of form of banded chalcedony.

In the Miscellaneous Section special mention must be made of the magnificent set of Pictures illustrative of geology and botany sent by Mr. Francis C. Forth, A.R.C.Sc.I., who also sent a large collection of Lantern-slides splendidly mounted and illuminated. Mr. Charles Bulla's "Old Books Printed in Belfast," included a rare work, *The Belfast Repository* (1785); he also showed some fine prints dating from the eighteenth century. Mr. William Gray, M.R.I.A., had an interesting collection of Old Newspapers, which included the *News-Letter* (1762); Watson's *Limerick Chronicle* (1793); *Times* (1798); *Sun* (1738); *Ulster Times*

(1837); and *Dublin Evening Post* (1802). Other exhibits worthy of note were—Miss E. Andrews, Deer's antler found in sandhill near Mullaghderg, County Donegal; Mr. William Christie, prize collection of Stone Implements; Mr. W. A. Green, Geological and Archaeological Photographs by the platinotype process, and aboriginal North American Indian Stone Implements; Messrs. A. R. and D. J. Hogg, a large collection of very beautiful Photographs, mostly of special interest to Club members; Mr. W. M'Kinney, Primitive Loom from Central Africa and curious Wooden Spears from Mittagong; Mr. A. B. Morris, very pretty series of Nature Photographs; Mr. A. W. Stelfox, A.R.I.B.A., a map of an Ant Village discovered by him at Flaamsdal, Norway.

At nine o'clock the President of the Club, Mr. N. H. Foster, M.B.O.U., addressed the meeting. He alluded to the losses the Club had sustained during the year by the death or removal of several prominent members. He spoke of the valuable work the Club was doing, and appealed to the younger members to become active workers.

A lantern display, which included a very beautiful cinematograph film entitled "Wild Nature's Ways," shown by Mr. A. R. Hogg, was contributed by the following members:—Messrs. R. Welch, R. Bell, D. J. Hogg, A. R. Hogg, William Gray, W. A. Green, and S. Wear.

The following were elected to Membership:—Mrs. A. H. Muir, Mrs. R. J. Prenter, Mrs. J. B. Bryson, Prof. Gwynne Vaughan, Messrs James M'Cance, W. J. Dakin, M.Sc.; A. R. Dwerryhouse, D.Sc., F.G.S.; W. S. Mollan, George Tomlinson, J. Cooper Harding, J. Campbell, A. H. Muir, R. J. Prenter, and John B. Bryson.

"THE BIRDS OF HILLSBOROUGH."

The first meeting of the Winter Session was held in the Museum on 16th November, when the President, Mr. Nevin H. Foster, M.B.O.U., delivered his inaugural address on the above subject.

Mr. Foster, after thanking the Members for placing him in the President's chair, said that it was an understood thing that the Presidential Address should be upon some subject in which he (the President) was particularly interested, and that, as many of his observations had been directed towards a Class in the Animal Kingdom for which almost every person professed an affection, he thought it might serve to intensify that interest by his speaking on the birds of the neighbourhood in which he resided. For some years past he had kept a careful record of all the birds observed within a radius of some three or four miles from the village of Hillsborough. This area was, he considered, above the average rich in bird life, possessing as it did great variety in its topographical details, and so affording many ideal haunts for birds of various habits. The elevation of the district varied from about 100 feet above sea-level at the bank of the river Lagan in the north, to an altitude of 596 feet a couple of miles south of the village. For the most part the land was under high cultivation, but some fairly extensive areas of marsh, moor, and bogland occurred; and, although there were no extensive woods, yet trees were abundant all over the district; whilst the existence of some enclosed private demesnes tended to attract birds whose retiring habits caused them to frequent such undisturbed areas. The Lagan was the only river of any importance in the district, but several lakes and ponds and the canal furnished suitable haunts for water-frequenting birds. Since he had kept this record of the birds observed in the neighbourhood he had noted in all 96 species out of the 231 recorded from the North-East of Ireland,

the latter figure of course including the many species of sea and shore-birds which did not frequent his locality. The yearly list yielded about 77 species, with a monthly average of about 52, the Summer months giving a large preponderance over those of Winter. Of the 96 species observed he had proof of the nesting of 68 within the district. Mr. Foster then alluded to the various systematic methods of grouping birds, but, following the order obtaining in the B.O.U. *List*, he detailed all the species he had observed, and interspersed his remarks with many interesting facts respecting the peculiarities, nesting habits, &c., of the various species. Amongst the more interesting species may be mentioned the irruption of Waxwings in the Winter of 1903-4, a portrait of one of these birds, shot near Hillsborough, being thrown on the screen. The thirteenth recorded Irish specimen of that sub-Arctic bird, the Rough-legged Buzzard, was obtained in the same neighbourhood. The Canada Goose had made its appearance in the district some years ago, and though not protected in any way, it had since regularly nested there, though as yet ornithologists refused it a place on the Irish List. The Mute Swan, introduced into the country many years ago, was not, as many supposed, merely to be seen in a captive or semi-captive state on some ornamental waters, but existed here at all events in a perfectly feral condition, and to the speaker's knowledge at least eight pairs annually bred in the district; whilst on one of the lakes, a view of which was projected on the screen, it was by no means uncommon to observe in Winter as many as one hundred of these birds. In May, 1904, a bird shot in the district was brought to the lecturer for identification, which proved to be a mature female Turtle-Dove—a bird common in England during the Summer months, but only on rare occasions observed in Ireland.

The lecture was illustrated by fifty lantern slides, mainly from photographs taken in the district specially for this evening, and the lantern was manipulated by Mr. A. R. Hogg. Perhaps the most interesting of the views was a pair, in the first of which was

shown the site of a Water-Rail's nest, nothing being visible save the rank vegetation, deep down in which this bird invariably builds its nest. The second picture exhibited the same place, with the rushes parted and pulled aside, revealing the nest with its nine eggs. Other slides illustrated the "adaptation to environment" by the protective colouration of sitting birds as the Pheasant and Woodcock, which are difficult to perceive so long as they remain quiescent, as they habitually do, but when forced to leave their nests the eggs are somewhat conspicuous, particularly in case of the former. Another pair of slides showed the habit of the Little Grebe in covering its eggs when leaving the nest, which to all appearance betokened nothing but a mass of decaying vegetation floating upon the surface of the water, and entangled amongst the bulrushes growing therein.

The following is a complete list of the birds observed in the Hillsborough District by Mr. Foster:—

- Mistle-Thrush, *Turdus viscivorus*, resident, common. Local names "Jay-Thrush," "Screech-Cock."
- Song-Thrush, *T. musicus*, resident, common.
- Redwing, *T. iliacus*, regular Winter visitant.
- Fieldfare, *T. pilaris*, regular Winter visitant.
- Blackbird, *T. merula*, resident, very common.
- Wheatear, *Saxicola œnanthe*, occasional visitant.
- Whinchat, *Pratincola rubetra*, rare.
- Stonechat, *P. rubicola*, resident in small numbers.
- Redbreast, *Erithacus rubecula*, resident, common.
- Whitethroat, *Sylvia cinerea*, regular Summer visitant.
- Golden-crested Wren, *Regulus cristatus*, resident, common.
Local name "Pope's Eye."
- Chiffchaff, *Phylloscopus rufus*, regular Summer visitant.
- Willow-Wren, *P. trochilus*, regular Summer visitant.
- Sedge-Warbler, *Acrocephalus phragmitis*, regular Summer visitant.

- Grasshopper-Warbler, *Locustella nævia*, Summer visitant in small numbers.
- Hedge-Sparrow, *Accentor modularis*, resident, common.
- Dipper, *Cinclus aquaticus*, resident in small numbers.
- Long-tailed Titmouse, *Acredula caudata*, resident.
- Great Titmouse, *Parus major*, resident.
- Coal-Titmouse, *P. ater*, resident.
- Blue Titmouse, *P. cæruleus*, resident, very common.
- Wren, *Troglodytes parvulus*, resident. Local name "Chit," or "Chitty Wren."
- Tree-Creeper, *Certhia familiaris*, resident.
- Pied Wagtail, *Motacilla lugubris*, resident, much commoner in Winter.
- Grey Wagtail, *M. melanope*, resident.
- Meadow-Pipit, *Anthus pratensis*, resident. Local name "Moss-cheeper."
- Waxwing, *Ampelis garrulus*, a few seen in Winter of 1903-4.
- Spotted Flycatcher, *Musicapa grisola*, regular Summer visitant.
- Swallow, *Hirundo rustica*, regular Summer visitant.
- House-Martin, *Chelidon urbica*, regular Summer visitant in small numbers.
- Sand-Martin, *Cotile riparia*, regular Summer visitant in large numbers.
- Greenfinch, *Ligurinus chloris*, resident.
- Goldfinch, *Carduelis elegans*, resident in small numbers. Local name "Spink."
- Siskin, *C. spinus*, resident.
- House-Sparrow, *Passer domesticus*, resident, very common.
- Chaffinch, *Fringilla cœlebs*, resident, very common.
- Brambling, *F. montifringilla*, irregular Winter visitant.
- Linnet, *Linota cannabina*, resident.
- Lesser Redpoll, *L. rufescens*, resident.
- Twite, *L. flavirostris*, resident.
- Bullfinch, *Pyrrhula europaea*, resident.

- Crossbill, *Loxia curvirostra*, irregular visitant.
- Corn-Bunting, *Emberiza miliaria*, resident.
- Yellow Bunting, *E. citrinella*, resident. Local names
“Yellow Yorlan,” “Yeltie.”
- Reed-Bunting, *E. schoeniclus*, resident. Local names “Rush-Sparrow,” “Black Head.”
- Starling, *Sturnus vulgaris*, resident.
- Jay, *Garrulus glandarius*. Has been occasionally seen.
- Magpie, *Pica rustica*, resident.
- Jackdaw, *Corvus monedula*, resident.
- Rook, *C. frugilegus*, resident.
- Sky-Lark, *Alauda arvensis*, resident.
- Swift, *Cypselus apus*, regular Summer visitant.
- Kingfisher, *Alcedo ispida*, resident.
- Cuckoo, *Cuculus canorus*, regular Summer visitant.
- Barn-Owl, *Strix flammea*, resident.
- Long-Eared Owl, *Asio otus*, resident.
- Rough-legged Buzzard, *Buteo lagopus*, 13th Irish example
shot here in 1903.
- Sparrow-Hawk, *Accipiter nisus*, resident.
- Kestrel, *Falco tinnunculus*, resident.
- Cormorant, *Phalacrocorax carbo*, Winter resident.
- Heron, *Ardea cinerea*, resident. Local name “Crane,” or
“Heron-Crane.”
- Wild Goose, sp. inc., “Skeins” seen occasionally flying
overhead at too great elevation to diagnose species.
- Canada Goose, *Bernicla canadensis*, resident.
- Mute Swan, *Cygnus olor*, resident.
- Mallard, *Anas boscas*, resident, large flocks in Winter. Local
name “Wild Duck.”
- Pintail, *Dafila acuta*, once observed.
- Teal, *Nettion crecca*, resident.
- Wigeon, *Marca penelope*, Winter visitant, adult male seen
21st May, 1906.

- Pochard, *Fuligula ferina*, Winter visitant.
- Tufted Duck, *F. cristata*, Winter visitant.
- Scaup-Duck, *F. marila*, twice observed.
- Ring-Dove, *Columba palumbus*, resident. Local name "Wood Quest."
- Stock-Dove, *C. oenas*, resident in small numbers.
- Turtle-Dove, *Turtur communis*, one shot May, 1904.
- Pheasant, *Phasianus colchicus*, resident.
- Partridge, *Perdix cinerea*, now almost extinct here.
- Quail, *Coturnix communis*, Summer visitant. Local name "Wet my foot."
- Land-Rail, *Crex pratensis*, Summer visitant, one shot February, 1905. Local name "Corncrake."
- Water-Rail, *Rallus aquaticus*, resident.
- Moor-Hen, *Gallinula chloropus*, resident. Local name "Water-Hen."
- Coot, *Fulica atra*, resident. Local name "Bald Coot."
- Golden Plover, *Charadrius pluvialis*, Winter visitant. Local name "Whistling Plover."
- Lapwing, *Vanellus vulgaris*, resident. Local name "Pee-wit."
- Woodcock, *Scolopax rusticola*, resident.
- Snipe, *Gallinago cælestis*, resident.
- Jack Snipe, *G. gallinula*, Winter visitant.
- Common Sandpiper, *Totanus hypoleucus*, Summer visitant.
- Redshank, *T. calidris*, nests in the district.
- Curlew, *Numenius arquata*, frequently observed.
- Common Tern, *Sterna fluviatilis*, Summer visitant.
- Black-headed Gull, *Larus ridibundus*, large flocks in Winter, but a few usually seen throughout the year.
- Common Gull, *L. canus*, occasionally in Winter.
- Herring-Gull, *L. argentatus*, common in Winter and Spring, occasionally at other seasons.
- Lesser Black-backed Gull, *L. fuscus*, only twice noted.

Great Crested Grebe, *Podiceps cristatus*, Summer visitant.

Little Grebe, *P. fluvialis*, resident. Local name "Diver."

The address was discussed by Messrs. Robert Patterson, F.L.S., M.B.O.U.; B. Hobson, J. N. Milne, H. L. Orr, and several interesting points were raised by the speakers.

The election of Messrs. John Watson and W. A. Jenkins to Membership concluded the business of the meeting.

"THE ECOLOGY OF PLANTS."

At a meeting of the Botanical Section, held in the Museum on Saturday, 20th November, the Rev. C. H. Waddell, B.D., read a paper on the Ecology of Plants. He said that Plant Ecology was the study of Plant-life in relation to its environment. This new way of studying Botany, regarding plants as members of associations not as individuals, was sure to be productive of important and interesting results. The object of the lecture was to give a general view of the subject, and especially to suggest some lines of study which would be within the power of Members to carry out. Much had been done already in the way of making botanical maps and surveys of large districts of country. This required much time and patience, and a considerable amount of botanical knowledge to carry out to a successful result, but there were some smaller problems which could be worked out with much profit. Restricting the field of observation to the plant-life of a wood, or marsh, or even a small piece of waste ground, much might be learned about the life of plants. Many questions might be asked to which no answers could be given at first, but in time some of the answers would suggest themselves.

Some of the most striking associations were described. The chief divisions into which these fall are (1) *Hydrophytes*, water-plants; (2) *Xerophytes*, dry-soil plants; (3) *Halophytes*, saline-

plants ; (4) *Mesophytes*, intermediates. Most belong to the last class. Warming's *Handbook* on the subject, which has now been translated and published by the Clarendon Press, was recommended as the best guide to study.

"PETROLOGICAL TYPES OF BASALT IN CO. ANTRIM."

The Geological Section of the Club held its first meeting for the Winter Session in the Museum, on 24th November, the Chairman of the Section (Mr. W. J. C. Tomlinson) presiding. A very interesting communication on the petrological types of basalt in County Antrim was brought before the meeting by Mr. Strachan.

The introduction to this lecture consisted of an elementary description of the rock-forming minerals constituting the Felspar-Basalts of Tertiary age in Co. Antrim, and their appearance in thin sections under the microscope.

The lecturer then stated that various rock-names, such as "greenstone," "diabase," and "trap" had been used in describing the local basic rocks, but the two words Basalt and Dolerite were quite sufficient and definite for general purposes ; the former being used to include the fine-grained hypocrystalline rocks, while the latter was reserved for the holocrystalline and coarser-grained varieties. He then pointed out that the division of these rocks into an Upper and Lower series, and the descriptive division into amygdaloidal, compact, tabular, spheroidal, and columnar varieties, although most useful and necessary in field-work, was quite inadequate in petrological work, where divisions were determined by definite microscopical characteristics. In field-work, however, a classification of rocks could often be arrived at which agreed in the main with the petrological determinations, and the basaltic rocks of this neighbourhood were no exception to that rule. A superficial study of these rocks at once suggested a natural division into two great classes, viz. :—1st, Lavas or Flow-Rocks, and 2nd,

Intrusive Masses and Necks, a division upheld by petrological examination, for the former were Basalts and the latter Dolerites. The numerous volcanic dykes, with their varying texture and structures, provided a complete connection between the two classes, shewing a gradual and complete transition from hypocrystalline to holocrystalline types. Further classification of the basaltic rocks of Co. Antrim had been made by dividing them into "fluxional," "ophitic," and "granulitic" types, but Mr. Strachan, who has devoted considerable time to the study of the Basalt, suggested a sub-classification based primarily on the varying basicity of the rocks, as follows :—

I. BASALTS WITHOUT OLIVINE.

- (a.) *Flow Type.* The fine-grained basalt without olivine found near Spanish Bay, Giant's Causeway.
- (b.) *Intrusive Type.* The dolerite (basaltic andesite) of the neck at Carnmoney Hill, Belfast.

II. OLIVINE BASALTS.

- (a.) *Flow Type.* The common basalt of the neighbourhood, shewing "fluxional," "ophitic," and other structures. The olivine increases gradually from minute scattered grains to numerous porphyritic crystals.
- (b.) *Intrusive Type.* The common dolerite of the district, generally ophitic, but also shewing granulitic structure. Olivine variable as in the basalt ; the neck at Scawt Hill, Ballygally Head, &c.

III. BASALTS RICH IN OLIVINE.

- (a.) *Flow Type.* Composed for the greater part of olivine phenocrysts, with minimum of augite and felspar ; colourless interstitial glass ; N. side of Carnmoney Hill.

(b.) *Intrusive Type.* Dolerite rich in olivine; Slieve Mish. Typical sections of these rocks were exhibited under the microscope and numerons hand-specimens were also on the table.

In conclusion, the lecturer referred briefly to two features of the County Antrim basaltic rocks, one of which, he believed, was quite unique in petrology. First there was the fairly common occurrence of "tube-amygdaloid" at the basal portion of many of the lava-flows. This had already been recorded from the West of Scotland, from South Africa, and from India. The other feature had already been described in detail by Mr. Strachan in his paper on *The Origin of Zeolites*, read before the Geological Section of the Club two years ago, and consisted in the complete inclusion of primary minerals, such as augite and felspar, in the zeolites, thus proving conclusively the contemporaneous formation of the latter with the basalt itself. This occurred chiefly in cavities containing natrolite (and lime-natrolite) in common olivine-basalt, and was an abnormal structure quite distinct in certain characteristics from the structures found in "analcime-lavas."

"THE TOXIC EFFECTS OF FRESH WATER ON MARINE ANIMALS,
AND OF SEA WATER ON FRESH-WATER SPECIES."

A meeting of the Zoological Section was held in the Museum on 8th December, the President, Mr. Nevin H. Foster, M.B.O.U., in the chair, when a paper on above subject was read by Mr. W. J. Dakin, M.Sc. Mr. Dakin gave a lucid description of the effects of osmotic pressure, and afterwards detailed the result of some of his experiments carried out in the North and Baltic Seas. These results have already been published in the *Bio-Chemical Journal* for 1908. The paper gave rise to an animated informal discussion, in which the Chairman, Messrs. R. Welch, M.R.I.A., A. W. Stelfox, A.R.I.B.A., H. L. Orr, J. N. Milne, and Joseph Maxwell, J.P., took part.

“FORAMINIFERA.”

A meeting of the Club's Geological Section was held in the Museum, on 15th December, Mr. W. J. C. Tomlinson presiding, when Mr. Joseph Wright, F.G.S., gave a most interesting demonstration on that group with which his name is inseparably connected.

Mr. Wright began his lecture by describing the Foraminifera as belonging to the lowest type of animal life, and forming an important group of the Protozoa, characterised by their great simplicity of structure. He pointed out at the same time the important part Foraminifera play in building up the sedimentary formations of the earth by secreting carbonate of lime from the ocean, and how their work is still being carried on over large areas of the ocean floor, where, intermixed with coccoliths, they form the globigerina ooze. It owes its name to the large proportion of shells of *Globigerina bulloides* and other pelagic Foraminifera. The Foraminifera are usually very minute, though some genera, such as *Nummulites*, attain a considerable size. They are found in sea water from great depths to between high and low water mark, but often the same form is obtained of larger size in the deeper water. The body substance is composed of sarcodite, which gives out long thread like processes (*pseudopodia*); these interlace and form a net-work of filaments reaching the exterior by perforations in the shell, or by the mouth. The lecturer then described the classification according to shell texture—(1) Porcellaneous, white and glazed like porcelain; (2) Arenaceous, sand or other foreign material included in the test; (3) Subarenaceous; (4) Hyaline, clear like glass. Fossil Foraminifera, he stated, are found in nearly all sedimentary rocks from Silurian to sub-recent formations. He cited *Fusulina* and *Saccammina* as important rock builders of the Carboniferous series, *Globigerina* of the Chalk and recent ooze, and *Nummulites* of the Tertiary strata. Some forms, such as *Nodosaria*, being very persistent through long periods. The lecturer then explained “Isomorphism”

and "Dimorphism." Foraminifera are said to be isomorphous, when they are of different orders, distinct in shell structure, but exhibiting similar external outlines. He gave as examples of this group, firstly, *Cornuspira involvens*, *Ammodiscus incertus*, *Spirilina vivipara*, and secondly, *Globigerina bulloides* and *Haplophragmium globigeriniforme*. They are said to be dimorphous when they show complex forms, commencing with one form of growth, changing during development, and ending in another form. As examples he gave *Gaudryina*, *Spiroplecta*, &c.

After giving an interesting demonstration of the "floating" process, the lecturer dwelt on his success in finding these marine organisms in nearly all boulder clays, even in clay from the top of Divis, from Wolfhill, from the Wicklow Hills, from the hills of Ayr, and from a height of 1,300 feet on Moel Tryfaen. He then referred briefly to rival glacial theories and advised those present to study and judge for themselves. In doing so he paid a well-merited tribute to a distinguished fellow-member, Mr. S. A. Stewart, A.L.S.,* by whose wide knowledge and original thought our local Geology and Botany have been so largely extended. The lecture was illustrated by beautiful diagrams, and at the conclusion Mr. Wright showed a number of very interesting microscopic slides, and explained the process of mounting Foraminifera. The proceedings terminated with a very cordial vote of thanks to the lecturer, moved by Mr. Tomlinson, and carried by acclamation.

"SOME CONNEMARA PLANTS."

At the second monthly meeting of the Botanical Section, held on 16th December, Mr. W. J. C. Tomlinson exhibited some mounted Connemara Plants, and gave a brief description of their habitats. The Chairman of the Section, the Rev. C. H. Waddell, B.D., presided.

*As this Report passes through the press the sad news of Mr. Stewart's death is announced. The Members of the Club will long mourn the departure of this distinguished worker.

The plants shown were part of a collection made by the lecturer in the course of two short trips to the West of Ireland during the preceding Summer. The first was at Whitsuntide, and was confined to the district around the town of Galway, including Ballycuirke Lough. The second was in mid-July, when a week was spent at Roundstone, a classic botanical centre in South-west Galway.

Of the plants exhibited from the former district the most interesting species to our local Members were:—*Gentiana verna*, *Dryas octopetala*, *Cerastium arvense*, var. *Andrewsii*, and *Habenaria intacta*. Mr. Tomlinson has already recorded in the *Irish Naturalist* (Vol. XVIII., p. 156), the occurrence of the two last-mentioned which he found at Gentian Hill, on Galway Bay, a new locality in both cases, and an interesting extension of range.

The Roundstone plants displayed included the following:—From Cregduff Lough and neighbourhood—*Eriocaulon septangulare*, *Lobelia Dortmanna*, *Cladium Mariscus*, *Drosera anglica*, *D. intermedia*, *Dabeocia polifolia*, *Pinguicula lusitanica*, *Scutellaria minor*, and *Selaginella selaginoides*. From Dog's Bay district—*Arabis ciliata*, *Chlora perfoliata*, *Carlina vulgaris*, *Centaurea Scabiosa*, and *Sesleria cærulea*. From Urrisbeg Mountain (987 feet), which dominates the village of Roundstone on the west, were shown fine specimens of the Mediterranean Heath, *Erica mediterranea*, as also of *Juniperus nana* and *Eriophorum latifolium*. From Craigga More Lough were specimens of *Erica Mackaii* and *Taxus baccata*. Both these plants occur on the east and north-east side of the Lough. Mackay's Heath appears to be confined in the British Isles to the Roundstone neighbourhood, and Craigga More is its headquarters.

Mr. Tomlinson pointed out some peculiar features of the flora of the district, and gave many practical hints for the guidance of members intending to visit Roundstone in future. With reference to the habitat of the Mediterranean Heath, in a boggy valley on the west slope of the Urrisbeg range, he mentioned that

at the date of his visit he was shocked to find that the heath had in most places been ruthlessly uprooted, and was lying about in withered heaps. He subsequently discovered that this had been done by the small farmers of the surrounding lowland, in order to procure suitable bunches for Potato "Spraying" purposes, most of those concerned being too poor to purchase spraying machines. The strong, straight, rigid stems of *Erica mediterranea*, already clothed with new shoots for next season's growth, seemed to provide a handy substitute. It is sad to contemplate, from the botanical point of view, the upshot of this thoughtless vandalism if it be continued for a few seasons.

The lecturer concluded by commending very highly the newly-published book of Mr. Praeger's, entitled *A Tourist's Flora of the West of Ireland*; and also spoke warmly of the hospitable attentions botanists and others visiting Roundstone would receive at the comfortable little Roundstone Hotel, now kept by Mrs. Redman.

"SOME ORIGINS OF THE IRISH PEOPLE."

The second meeting of the Winter Session was held in the Museum, on Tuesday, 21st December—the President (Mr. N. H. Foster, M.B.O.U.,) in the chair, when Major Berry, M.R.I.A., read an interesting and most exhaustive paper on the above subject. Commencing at the very beginning of things, the lecturer spoke of the gradual solidifying of the earth from a gaseous state. He gave a comprehensive survey of Ireland's condition during what may be termed the turbulent geological ages, showing how it was alternately attached to and separated from the great land masses. He described archæological finds of rude stone implements, which were, in his opinion, of pre-glacial origin, and formed the earliest traces of mankind found in Ireland. He next gave an interesting *résumé* of the great races of antiquity, and their successive waves of migration westward, which displaced

or subdued the aboriginal peoples of Western Europe, and finally of Ireland itself.

Major Berry's theories of the various origins of the Irish people gave rise to a prolonged and animated discussion, in which the Chairman, Miss Andrews, Messrs. R. May, J. M. Dickson, R. Welch, M.R.I.A.; and C. M. Cunningham, L.D.S., took part.

"THE STUDY OF NATIVE VEGETATION."

At a meeting of the Botanical Section held in the Museum, on 15th January—Rev. C. H. Waddell, B.D., in the chair—Mr. R. Ll. Praeger, B.E., M.R.I.A., described the different plant formations occurring in the Dublin neighbourhood, and also the formation in the Glendalough district of Co. Wicklow, where, owing to the steep and varied nature of the ground, a large variety of types of vegetation was to be found in a limited area—Grassland, the two *Ulex* formations, natural woods of Birch and Oak, *Calluna* and *Scirpus* formations, and other types. He went on to point out how little was known of the types of vegetation prevailing in other parts of Ireland. Connemara was quoted as having been recently sampled. The local vegetation, such as that of the Belfast Hills and of the Mourne Mountains, was still quite unstudied. Afterwards he spoke of some of the botanical problems raised by the survey of Clare Island and the adjoining mainland in County Mayo which was in progress, and referred particularly to the problems connected with the migration of the flora into the Island, and to the means of dispersal of its constituent elements.

"DENDRITES AND PICTURE-STONES."

On Tuesday, 18th January, at a meeting held in the Museum—Mr. W. H. Gallway in the chair—Mr. J. Strachan read a very interesting paper on Dendrites and Picture-stones.

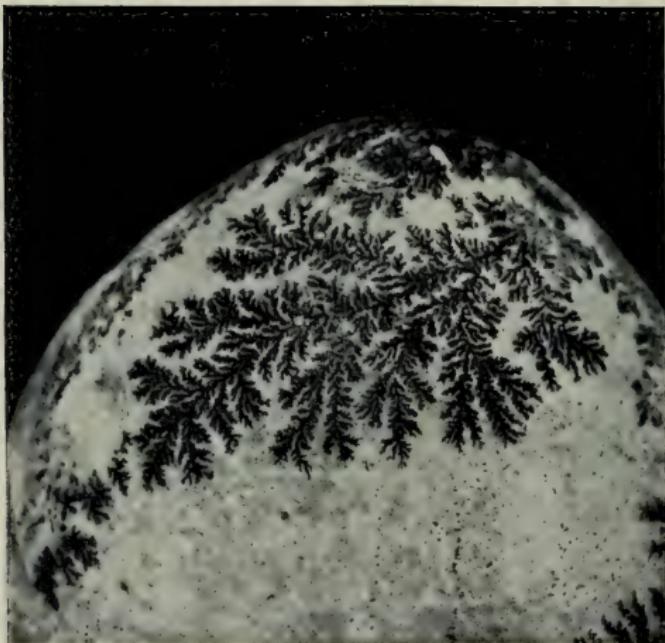
The lecturer introduced the subject by saying that the word "Dendrite" was derived from the Greek root *dendron*, meaning a tree. A Dendrite was a tree-like growth of an inorganic substance, and the occurrence of such growths in stones gave rise to the expression "picture-stones," because the Dendrites had the appearance of having been painted or printed upon the stone.

Dendritic growths of minerals were well-known to all who had even the slightest acquaintance with the subject of mineralogy, because these growths were beautiful and attracted the attention of the nature student. The semblance of life in stones was a very real phenomenon and a never-failing source of wonder and admiration to every mineralogist. Dendritic growths had often been seriously attributed to organic agencies, in times past, by experienced scientific workers, but there was now no doubt whatever that they were due to the vagaries of crystalline activity. A flower had a definite form and habit, and every mineral had also its own peculiar crystalline form and habit, and there was a remarkable resemblance between dendritic, arborescent, and mossy growths of minerals, and the lower forms of vegetable life.

In a moss-agate, for example; the exquisite green, red, and brown growths of chloritic minerals embedded in clear translucent chalcedony bore much more than a fanciful resemblance to a growth of some algae in a clear pool of water. Again, the beautiful dark-brown or black dendritic growths of oxide of manganese in the variety of agate, known as "mocha-stone," had the appearance of delicate ferns. A microscopic examination of Dendrites soon distinguished them from vegetable substances, but nevertheless did not detract from their interest; the growth of crystal upon crystal was just as wonderful in its own sphere as the growth of cell upon cell in the Vegetable Kingdom. The ultimate structure of a crystal was perhaps as great a problem as the ultimate structure of a single cell of living matter.

Dendritic growths were capable of an arbitrary division into two classes which Mr. Strachan proposed to call (1) free dendrites





**Dendritic Oxide of Manganese, on Porous Cortex
of Flint ($\times 1\frac{1}{2}$).**

From the Chalk, Squire's Hill.

PHOTO.

J. STRACHAN.

and (2) fixed dendrites. In the former class he included such crystalline arborescent growths as native copper, silver, gold, tin, and lead, and the minute dendritic and plumose crystalites found in the acid lava called pitchstone. The simplest form of a free dendrite was a snow-flake. The chlorite in moss-agate was also an example of free dendritic growth, as it was originally a free crystalline growth and subsequently determined the contour of the chalcedonic layers deposited around it. Fixed dendrites on the other hand were formed invariably after the substance in which they were found, and their form was to a great extent modified by the peculiarities of the latter. In mocha-stones, for example, the dendritic oxide of manganese entered the stone in solution through accidental cracks and thereafter the growth was limited to the minute interstices between the layers of the chalcedony. Similarly dendrites in flints, found commonly on the hills around Belfast, were limited to cracks and to the porous cortex of the stone. Dendrites were also common in limestone and other porous rocks. They also occurred in cracks in crystals and between the *laminæ* of mica.

Closely allied in structure to dendritic oxide of manganese were the dendrites of ice which adorned our windows in frosty weather. Dendrites were also found in paper where they were produced by the slow oxidation of particles of bronze derived from the paper-making machinery. These dendrites of copper oxide were at one time mistaken for fungoid growths, and until lately many erroneous ideas were current concerning them. After nearly seven years observation of them, the lecturer said he had been enabled to solve many of the problems connected with dendritic growths in paper, and his views on the subject had been brought before the Royal Microscopical Society and published in their *Journal* about two years ago.

In conclusion Mr. Strachan described some pseudo-dendritic growths which had no crystalline structure and then gave a detailed explanation of the phenomena which gave rise to

dendrites ; crystalline activity evidenced in repeated parallel and twin-grouping accounted for all the varied forms of these peculiar growths.

The lecturer said that he had produced artificial dendrites of tin, lead, copper, gold, chloride of lead, hydrated oxide of iron, and cuprous oxide. The lecture was illustrated by a series of 40 very beautiful lantern slides.

An animated discussion took place at the close of the lecture, the following members taking part :—Messrs. R. Welch, M.R.I.A. ; A. R. Dwerryhouse, D.Sc., F.G.S. ; W. J. C. Tomlinson, W. Gray, M.R.I.A. ; and John Brown, F.R.S. Mr. Strachan's reply brought the meeting to a close.

“AN EVENING WITH THE DIATOMACEÆ.”

A well-attended meeting of the Geological Section was held in the club-room in the Museum, on 26th January—Mr. W. J. C. Tomlinson presiding.

Mr. Joseph Maxwell, J.P., gave a very interesting “lecturette” on “The *Diatomaceæ*.” Mr. Maxwell defined diatoms as minute microscopic *algæ*, and in the course of his remarks referred at length to (a)—Their place in nature, whether animal or vegetable, stating the various arguments on each side—as the result of the best modern research these most interesting organisms are classed in the Vegetable Kingdom. (b)—Their abundance. They are distributed everywhere. The smallest pools and ditches contain them in greater or less numbers. They multiply in prodigious manner. They inhabit both fresh and salt water, and are to be found in every degree of latitude. Their fossil forms compose strata of great extent, and play a far more important part in building up the earth's crust than the gigantic saurians of past ages. Among noteworthy deposits may be mentioned those in Richmond Va., Algeria, Norway, Bohemia, Wales, and at Toomebridge in Ireland. (c)—Their minute size. A cubic inch would contain over 41 millions of an average size.

The length of such a common specimen as *Navicula lyra* is about 1-250th inch, and the breadth about 1-3rd of that size. (d)—Their formation and growth. Each individual diatom, called a frustule, consists of a single membranous cell, enclosing, in addition to the liquid of the cell, a nucleus, surrounded by protoplasm, some oil globules, and a brownish matter called endochrome, which is composed of chlorophyll and diatomin. This cell is enclosed in a silicious covering, generally forming a kind of box, consisting of two valves and a zone or connecting band. This characteristic provides the name for the group, from the ease with which the parts separate from each other. In a large proportion of diatoms the frustules are met with entirely free—viz., *Triceratium*, *Pleurosigma*, *Surirella*, *Coscinodiscus*, &c. In others they develop in zig-zag chains, as *Isthmia*, *Grammatophora*, *Diatoma vulgare*, &c. In others, again, they develop in long filaments, as *Melosira*, *Achanthes*, &c.; in curved filaments, like *Meridion circulare*; and in beautiful fan-shaped growths like *Liemophora flabellata*. Other varieties, again, grow by a stipe or stalk-like appendage, as in *Gomphonema* and *Mastogloia*, while some have a mucous or gelatinous investment, as in *Schizonema grevillii*. (e)—Their spontaneous movement. This has been the subject of much discussion, and has been explained in many ways. Probably the most likely cause is the action of changes resulting from the nutrition of the cell. (f)—Their collection and examination. On this part of the subject Mr. Maxwell gave many practical hints and brought for the inspection of the members his own instruments and a very varied collection of mounted and unmounted specimens. For the examination of diatoms the very finest objectives are employed, but much practical and useful work may be accomplished by moderate equipment. Many of the members had an opportunity of examining the very fine markings which have rendered the *diatomaceæ* so famous, and which have been a very important indirect cause of the modern advance in the manufacture of high-class objectives. (g)—Their practical

importance—The diatomaceous earths are largely used as polishing powders, as sand for delicate castings in iron, in the manufacture of dynamite, for boiler and pipe covering, and in many other processes in the arts and manufactures.

In the interesting discussion which followed Mr. W. J. Dakin, M.Sc., gave a short account of the distribution and seasonal variations of marine diatoms. He pointed out that some of the most important biological problems connected with the wonderful see-saw of life in the ocean concerned the *diatomaceæ*. Thus in the Irish Sea there takes place every year a sudden increase in the number of diatoms present during the month of April until the water literally teems with these organisms. In perhaps four or five days this huge increase drops off, until at the end of May only a few diatoms are to be found, and this condition prevails during the Summer months. What determines this extraordinary maximum in Spring remains a mystery, as does also the cause of their abundance in Arctic and temperate regions. The diatoms, though exceedingly small, have been shown to play an important part as the food of small crustaceans in the sea. These in turn are the food of fishes, and so indirectly the diatoms are the food of man. From the economic as well as the scientific point of view therefore the diatoms are of considerable importance, and what is required is a detailed study of their life-history and the conditions under which they flourish.

The following members also took part in the discussion—The Chairman, Mr. R. Welch, M.R.I.A., Mr. S. Wear, and Mr. Bennett.

“WITH THE BRITISH ASSOCIATION IN CANADA,
IN 1909.”

On Tuesday, 15th February, Dr. Dwerryhouse, Lecturer in Geology in the University of Belfast, gave a lecture entitled “With the British Association in Canada in 1909,” the President, Mr. N. H. Foster, M.B.O.U., in the chair.

The lecture opened with a description of the broader features of the Geology of Canada. The eastern portion of the country is formed of rocks belonging to the pre-Cambrian formations, and constituting a district rich in minerals, though of relatively little importance from the point of view of agriculture. This great plateau extends from the Atlantic coast to a line drawn from Lake of the Woods through Lakes Winnipeg and Athabaska, and Great Slave Lake and Great Bear Lake to the Arctic Ocean. The whole plateau has been heavily glaciated, and consists of innumerable *roches moutonneés*, those rounded and polished rocks which bear unmistakable testimony to the action of ice. Between the *roches moutonneés* lie tens of thousands of lakes, large and small, but for the most part shallow, frequently connected one with another by waterways navigable for canoes, and constituting the trade routes of the district, which are only now being slowly replaced by railways. The plateau is bounded on the South by the St. Lawrence, which is navigable for ocean-going steamers as far as Montreal, a distance of 1,000 miles from the head of the Gulf of St. Lawrence and 2,000 from the Atlantic sea-board; while in a northerly direction it is bounded by Hudson's Bay and the Arctic Ocean. On this plateau of ancient rocks, clothed for the most part by pine trees, are to be found the principal mining camps of Eastern Canada. Two of these are worthy of special mention, the Silver Mining Camp of Cobalt and the Nickel and Copper deposits in the neighbourhood of Sudbury, both in the province of Ontario.

The silver of the Cobalt Camp is found for the most part in the metallic condition, and so rich are the veins that a single trench 30 feet deep and 50 feet long, on a vein with an average width of only 6 inches, has yielded ore worth over £40,000, the estimated cost of winning the ore being about \$100 (say £20) per ton. The copper-nickel deposits of Sudbury are worked on a large scale, and furnish a very large proportion of the world's supply of nickel, which is used in the preparation of nickel-steel for armour-plate and other purposes.

To the west of the Archæan Plateau lie the great plains, consisting of sedimentary rocks, ranging in age from Silurian to Cretaceous, and covered in part by the deposits formed in the great temporary lakes of the Ice-Age; deposits which are more important to Canada than all her vast mineral wealth, since they form the fertile soils of the great wheat-growing provinces of Manitoba, Saskatchewan, and Alberta. The enormous recent growth of the towns on the Wheat belt is shown by the following figures:—

	Inhabitants.			
			1900.	1908.
Regina	3,000.	10,500.
Moose Jaw	1,700.	10,000.
Calgary	6,000.	22,500.
Edmonton	3,500.	21,000.
			14,200.	64,000.

A very wide area of magnificent wheat land is at present being rendered available for cultivation by the gigantic irrigation scheme of the Canadian Pacific Railway in the neighbourhood of Calgary. Here a great system of canals is in course of construction to convey the waters of the Bow River over some three million acres of land, which will thus be rendered fertile.

On leaving Calgary and travelling westward the deep narrow valleys and gorges of the Rocky Mountains are soon entered. Here the rocks are, for the most part, of Devonian age, and form majestic peaks and terraces which, in the brilliant light of the Canadian Summer, form a picture not easily forgotten. Second only in interest to the scenery of such beauty spots as Banff, Laggan, and Field are the mighty engineering triumphs of the railway, which have made it possible to visit these regions in comfort and luxury, and for the trade of a continent to be carried on from ocean to ocean.

The lecture, which was illustrated by a fine and varied series of extremely interesting lantern-slides, from photographs taken by Dr. Dwerryhouse, was followed by a discussion in which the following took part—Messrs. N. H. Foster, M.B.O.U.; Wm. Gray, M.R.I.A.; R. Welch, M.R.I.A.; W. J. C. Tomlinson, and H. L. Orr. Dr. Dwerryhouse having replied, the election of Rev. Samuel B. Crooks to Membership terminated the meeting.

“THE FERNS OF ULSTER; HOW TO GROW, AND WHERE
TO FIND THEM.”

At a meeting of the Botanical Section, held in the Museum on Saturday, 19th February, Mr. W. H. Phillips gave an interesting lecturette to the Members, in which he drew from his life-long experience many valuable hints on the finding and growing of Ferns. He particularly emphasized the tendency to produce varieties inherent especially in the genera *Polystichum*, *Athyrium*, and *Scolopendrium*, and urged Members to watch carefully for plants which exhibited any aberration from the normal form, and to grow these with a view to developing their abnormal peculiarities.

“THE GEOLOGY OF WEYMOUTH AND THE COAST OF DORSETSHIRE.”

The Club's Geological Section held a meeting in the Museum on 23rd February, Mr. William Gray, M.R.I.A., presiding, when the Chairman of the Section, Mr. W. J. C. Tomlinson, gave a lecture on the above subject.

Mr. Tomlinson said that the rocks of Dorsetshire belong to what geologists call the stratified division of the rock systems. Intrusions or extrusions of igneous character appear to be absent from the county. In the bordering County of Devon rocks of plutonic character are well developed in the Dartmoor area, and still farther west, in Cornwall, igneous rocks of variable character are a marked feature of the Land's End country. The formations

so fully represented in Dorsetshire belong principally to the Mesozoic or secondary division of the sedimentary class. Sands and clays of Tertiary age also occur; but, so far as the coast is concerned, they are much less in evidence than the strata of Mesozoic age. The dominating systems represented on the coast line are the Jurassic and Cretaceous, and as the rocks are, generally speaking, fairly fossiliferous, the cliff sections constitute a classic hunting ground for geological students. In considering the Geology of the Weymouth district and the evolution of its present physical features it is essential to bear in mind that the Jurassic and Cretaceous systems of this country were continental in their character rather than insular. On the opposite coast of France we have the counterparts of almost all the secondary rocks that occur now on the Dorset coast. The continuity has been broken up in Tertiary times. The present channel is merely a plain of marine erosion, the denudation of the connecting beds of Cretaceous and upper Jurassic deposits being no doubt facilitated by the folding, faulting, and crushing of the rocks, brought about by subterranean forces. The long ages that elapsed during the deposition of the secondary system of formations witnessed of course several oscillations of level over the area in question. The strata clearly point to an alternation of periods of marine, estuarine, freshwater, and terrestrial conditions. The evidences of disturbances are no less clearly revealed, and much of the surpassing interest of the Dorset cliffs, from both the geological and scenic points of view, is directly due to such crustal disturbances and the carving operations of natural agencies in subsequent times. In the Isle of Portland, south of Weymouth, and in the Isle of Wight we have relics in the channel which have been preserved from the universal planation of the secondary rocks between England and France. The greatest depth of water between Weymouth and the nearest French territory does not exceed 45 fathoms, and between Dover and Calais about 30 fathoms. In County Antrim we are fortunate in having some

representatives of the same system of rocks as are to be found on the Dorset coast. There is, however, a remarkable gap, indicating either a break in the Jurassic sea connection or the complete denudation of the whole upper Jurassic series from County Antrim. In a traverse from, say, the east end of Fortwilliam Park to the top of the Cave Hill chalk quarry we pass over the following upward succession :—Triassic sandstone and Keuper marls, rhætic shales, lower lias, greensand, chalk, the two last-mentioned belonging to the Cretaceous system. A similar traverse on the Dorset coast from Lyme Regis to Swanage supplies us with the following links in the chain of succession between the lower lias and the greensand. Taking them in ascending order, we have middle lias, upper lias, oolite, middle oolite, upper oolite, wealden. Again, each of the oolitic divisions is separable into distinct formations. Some of these separate formations of the oolitic series are of great thickness, and all are of an interesting character. In the series we have two great clay formations—the Oxford and the Kimmeridge clay. The other formations with which these clays are associated are mostly calcareous sands and limestones, the corallian and the Portland series of rocks being the most decidedly dominant in type and importance.

The lecturer then proceeded to give a detailed exposition of the succession of strata exhibited on the coast-line from Lyme Regis to Durlstone Head and Swanage. Nowhere in the country is the great liassic formation so admirably represented as between Lyme and Bridport. The general dip of the beds is to the east, so that a traverse of the coast brings the observer into contact with the successive divisions of the series, as the younger and higher beds are successively brought down to sea-level owing to the regular dip of the rocks. Between Bridport and Weymouth the lower, middle, and upper oolites are well developed. From Abbotsbury to Osmington, on the north side of Weymouth Bay, fine sections in all these strata can be examined. The great

Portlandian series is typically represented in the Isle of Portland, where the economic value of the building-stone series has been known for two centuries. The great beds of calcareous oolitic freestone composing this series dip at a high angle to the north, along the coast between Lulworth and Durlstone Head, and form a barrier against the assaults of the waves. Where, however, they have become breached the softer Purbeckian and Cretaceous rocks above and behind soon become eaten backward, and thus we get beautiful inlets and coves. The celebrated Purbeck marble is obtained from the Purbeckian series between Durlstone Head and Swanage. The finest scenery on the coast is to be seen east of Weymouth, and extending to and beyond St. Alban's Head. Here we have in some places great mural cliffs of chalk and greensand, and in others highly-tilted and contorted beds of the Portland and Purbeck rocks. Many of the cliffs seen in the horns of the excavated coves give complete sections of the whole series. A great anticlinal fold originating in Weymouth Bay and running to the Isle of Wight, together with the great Purbeck fault and overthrust, which runs inland from Lulworth to Ballard Head, north of Swanage, were the prime factors in bringing about the present disposition of the denuded strata of the area. The lecturer concluded a detailed reference to Portland Isle by a description of the Chesil Bank. This is a huge pebble bank or beach of enormous cross-sectional dimensions, and connecting Portland Isle with the mainland beyond Abotsbury, eleven miles away, and running thence to Bridport as a beach for nine miles more. The material of which it is composed is derived mainly from the rocks, sedimentary and igneous, that occur to the westward as far as the Land's End.

At the conclusion of the lecture some very interesting lantern slides were thrown upon the screen. These included, in addition to fine views of the beautiful scenery of the district, a comprehensive series of maps and sections, the details of which were clearly explained by the lecturer, and added much to the geological

interest of the paper. Mr. Tomlinson also exhibited a fine collection of hand specimens of the rocks and fossils of the district.

"VARIATION DUE TO ENVIRONMENT, ILLUSTRATED MAINLY
BY THE MOLLUSCA."

At a meeting of the Zoological Section on 2nd March, Mr. R. Welch, M.R.I.A., read a paper on the above subject. Mr. Welch, in introducing this subject for discussion, first referred to the special susceptibility of plants to variation due to their environment, giving examples of very marked cases due to differences in soil. He exhibited specimens of *Pyrola*, *Sysimbrium*, *Orchis*, etc., from Mr. N. Carrothers' herbarium. Passing to the Mollusca he mentioned instances of restricted areas where white-shelled forms of species usually found with dark shells are common. Altitude seems at times to affect the size and colour of shells very much, and cases were mentioned and specimens exhibited to illustrate these points. The question of variation in size, texture, and shape of certain fresh-water species living in varying volumes of water such as large and small lakes, ponds, and drains, also the effects of life in running and in still water were discussed. Examples were shown of *Limnaea stagnalis* and *Anodonta cygnea* including the very large form—9 inches in length—from a small pond near Preston.

The speaker next referred to the generally smaller sizes of shells on islands as compared with those on the mainland, but mentioned some marked exceptions, such as the very large *Helix nemoralis* from the Aran Islands and Inishmurry on the West Coast of Ireland. The large proportion of white-lipped forms of the last species that live on the north-west Donegal Coast, and the heavy forms that occur on bare areas of the sand-hills where the only plant is *Psamma arenaria* with an occasional *Senecio Jacobaea*, were spoken of and specimens exhibited.

Finally, an exceptionally varied series of the Common Dog Whelk, *Porpura lapillus*, was shown. These were sent by Mr. R. Standen to show how much the conditions on exposed or sheltered rocks, and the varying food supply, affected the size, form, and colour of the shell.

In the discussion which followed Mr. A. W. Stelfox exhibited *Helicella itala* showing marked variation from four different environments:—(a) Chalk Downs. (b) Central Plain of Ireland. (c) Sheltered, and (d) Wind-swept Sand-dunes. Mr. Maxwell, Mr. W. J. C. Tomlinson, and Mr. W. A. Green also raised some points to which Mr. Welch briefly replied.

“REPORT OF DELEGATE TO CORRESPONDING
SOCIETIES’ CONFERENCE OF BRITISH ASSOCIATION.”

“ARCHÆOLOGICAL EVIDENCE OF THE
TRUTHS OF IRISH RECORDS.”

The fifth monthly meeting of the Winter Session was held in the Museum on Tuesday, 15th March, the President, Mr. N. H. Foster, M.B.O.U., in the chair, when Mr. F. Balfour Browne, M.A., F.Z.S., presented his Report as Delegate to the Corresponding Societies’ Conference of the British Association. Mr. Browne said that owing to the fact that the Meeting of the British Association was last year held in Winnipeg, the Conference of the Delegates of the Corresponding Societies was held on 25th and 26th October at the Rooms of the Geological Society of London. The Chairman was Professor A. C. Haddon, who gave an address upon “Regional Surveys,” in which he suggested that the local Societies should take up a detailed study of their districts. He suggested that each Society should survey its area in a spirit of co-operation among its members, so that instead of “dry and lifeless” fauna and flora lists—which he considered do not teach very much—we might get something much more valuable. As instances of the

kind of paper which was valuable he mentioned among others: Dr. H. R. Mill's *A Fragment of the Geography of Ireland*; *The Geographical Distribution of Vegetation in Yorkshire*, by W. C. Smith and C. E. Moss; *Geographical Distribution of the Vegetation of the Basins of the Rivers Eden, Tees, Wear, and Tyne*, by F. J. Lewis; *The Ethnography of the Aran Islands, Co. Galway*, by himself and C. R. Browne, &c. After a vote of thanks had been passed a discussion was invited, and your representative expressed the opinion that the Chairman expected too much of the amateur; that all the examples of papers which the Chairman had mentioned were by highly trained specialists, and that the amateur in producing his lists of flora or fauna was really doing a great and worthy service in supplying material for the trained man.

A proposal was made that State aid should be granted to Societies whose funds did not allow them to issue Proceedings, that they might thereby be enabled to publish meritorious papers by their Members, or to assist the Society to pursue investigations. Your representative opposed this proposal, saying that if there was not sufficient enthusiasm in a district to keep a local Society alive, that Society had better be allowed to die out—(a case of the elimination of the unfit!), and further that a good paper could always find a publisher.

One or two delegates suggested some arrangement by which local Societies could have the burden of postage made lighter, and this led to Dr. Longstaff (Ent. Soc. of London) moving "That the Meeting hoped the British Science Guild (which had previously taken some steps in the matter) would persist in its efforts to induce the Post Office to give Scientific Societies the same postal facilities as the publishers of newspapers and traders in general." This was passed on the understanding that it would be considered by the Committee of the Corresponding Societies. Another motion was then brought forward by the Rev. J. O. Bevan "That this Conference expresses its opinion that the Government be asked to enlarge the grant already

allocated to the Royal Society." Professor Meldola criticised this, and an amendment followed and was carried to the effect "That in view of the opinions elicited during the Conference the question of the advisability of taking further action be referred for consideration by the Corresponding Societies Committee."

Miss Margaret E. Dobbs then gave a lecture on "The Archaeological Evidence of the Truths of Irish Records." She said that till about fifty years ago there was only one source of history—viz., written matter. We have now two sources—written matter or texts, and monuments. By monuments are meant all the archaeological remains from a flint scraper to a triumphal arch. It may be roughly said that monuments, as a whole, confirm ancient history and tradition, and discredit the higher criticism and its sceptical teaching. This has been strikingly the case in earlier Greek and Hebrew history, and there seems to be reason to believe it will prove the same with Irish history. There is absolutely no doubt that a very important trade route existed between the Mediterranean and the Baltic as early as 1700 B.C. It ran through central Europe in a well-defined line, and reached the Baltic by the Oder or Vistula. By this route Mycenian arts and Aegean civilisation reached Scandinavia till, as Coffey says, "In the Western Baltic Islands and coasts a high degree of civilisation existed in early bronze age, though lower in order, comparable to that of Aegean at the same period. This is shown not only by remarkable skill in metal-working, but by advanced state of arts, of dress, &c." The same influences have been traced through Scotland to East Ireland. They are not found in Gaul or South Britain, and bronze cauldrons are also a peculiarity of Scotch and Irish bronze age remains. They are unknown on the Continent. The legend of the *Tuatha-de-Danan* then seems to cover a real historic fact. A similar point occurs in connection with gold-mining in Ireland. All old histories assert gold was mined and manufactured in Ireland at a date between 1500 and

1200 B.C. They gave the name of the King who was reigning at that time, and the place where it was mined—viz., Wicklow and Dublin. S. Reinach points out in his interesting article *Croissants d'or Irlandais* that Ireland was the great gold-producing country of the bronze age, that she exported gold, that this period was long past by Roman times, and that gold has been found in Wicklow in modern times. He proves all this by sound archæological evidence. Therefore the ancient tradition was not romance or invention. The next point occurs in connection with the iron age. French archæology tells us that in East Gaul, from the 5th to 3rd centuries B.C. there was a universal custom of burying a chief lying in his chariot with all his weapons, harness, &c. The body was laid with feet towards the open end, the sword on one side, the dagger on the other, spears, shield, &c. Of the date of these burials there can be no doubt from character of pottery and weapons. The custom is never found in burials later than 300 B.C. It prevailed in England also. No case has so far been found in Ireland, but there is a remarkable story in Irish history as follows:—About 300 B.C. a Leinster chief plotted to kill his brother, the King, and seize the throne. He feigned illness, announced he was dying, and said to his wife—"Say that I am dead, and lay me in my chariot with my knife in my hand. My brother will come to mourn, will throw himself upon me, and I will stab him." The story goes that this was done; the brother comes, evidently takes the custom for granted as the ordinary burial custom, and is murdered. Note that the date given for this story coincides with date of custom in France; also that we are told the mother of these chiefs was a Gaulish princess, and that subsequently the usurper is slain by his nephew with the help of Gaulish soldiers. Note also that no other allusion to such a custom occurs in any other Irish story I know. Here we must have a distinct allusion to a custom extinct over 2,000 years ago, but handed down accurately to the 12th century by the old historians, when it was finally preserved in the *Book of*

Leinster. Again, classical writers tell us the Gauls often wore helmets with horns and other devices to frighten their enemies; and two specimens of such have been found, one in the Thames and one in Scotland. They are both utterly different, the Scotch one being the more unique. They belong to the first century of our era. In the "Tain" no less than four different warriors bear the nickname "Firkend," "man with horns," and we are expressly told that this referred to horns on the helmet. In two cases the name is "man with bronze horns," and the Scotch helmet is bronze, and the "Tain" we are told dates from the first century, so that therefore archaeology and tradition fit in here again. Our next point deals with a well-known Celtic custom—the etiquette of assigning choice joints to honoured guests. All through Irish literature the pig is the highest delicacy, and the order of helping was as follows:—The leg to kings, the haunch to queens, the steaks to literary men, the shinbone to young lords, and the head to charioteers. It is remarkable that when food was buried with the honoured dead of the Celts it was nearly always part of a pig that was buried, generally foreleg or shoulder, sometimes the head, sometimes the whole animal; sometimes goats were buried. It is possible the part of the animal buried may have indicated the rank of deceased, or at all events the respect in which he was held. This custom has been noticed in Gaul, Bavaria, Yorkshire, and Scotland. In connection with the frequent allusions to chariots in Irish literature it is worth noting that the descriptions of them in the "Tain" (first century) correspond closely with remains of chariots found on the Continent, and belonging to the Celtic period 500 B.C. to 100 A.D. Other instances of agreement might be quoted, but it is evident from the above that a thing might be told in a fabulous manner, and yet be substantially accurate in outline. Further, that, at whatever date writing was introduced into Ireland, the spoken traditions could be accurate and faithful, and that, in spite of additions, corruptions, and mistakes, Irish history is not imaginary, but based on fact. No other country in

North Europe can claim to have preserved a fact of the bronze age. Yet, if archaeology is to be believed, this can be said of Ireland, and testifies to the accuracy and marvellous memories of the literary class who preserved these traditions for her when the Romans, and after them the Franks and Saxons wiped them out of Gaul and Britain, leaving Ireland sole guardian of the ancient Celtic lore.

An animated discussion followed Miss Dobb's paper—Miss Andrews, and Messrs. N. H. Foster, M.B.O.U.; John M. Dickson, R. Welch, M.R.I.A.; J. Hamilton, C. M. Cunningham, and William Gray, M.R.I.A., taking part. Mr. Robert Ervine having been elected to membership the meeting terminated.

"PLANT LIFE IN A BOG."

At a meeting of the Botanical Section on Saturday, 19th March, Rev. C. H. Waddell, M.A., read a paper on "Plant Life in a Bog." Bog-plants have a special character of their own due to their environment, and the object of the lecturer was to describe their peculiarities and point out how they were adapted for life on a peat soil. Bog-plants, as distinguished from Marsh-plants, are *xerophytes* or "dry-soil plants." The peat contains humous acids which are not favourable to rapid growth. There is a restriction of transpiration, as is the case also in *halophytes*, which grow on saline soils. The leaves are narrow, and the leaf-pores often situated in grooves so as to prevent too great transpiration. Peat is poor in *bacteria*, and is not well aerated, and the acid soil prevents the absorption of water by the roots. The formation of peat was described, and the growth of Bog-Mosses or Sphagnum. Many of our most interesting bog-plants, such as *Andromeda*, are becoming scarce now with the disappearance of the bogs.

There are many interesting questions in the life of plants about which little is as yet known, which might be answered by careful observation, and this is the object of Plant-Ecology. Much may be learned from the study of Associations, such as are

found in bogs, marshes, or by the sea-shore. Various species of Heaths are often dominant plants on peat. Under the Heather there is again a second stratum of smaller plants, associated with it. Again, bog-pools and drains have their special associations, *Utricularia*, *Riccia*, &c., and various species of Mosses and Lichens are found in great abundance on peat.

"THE CHALCEDONY OF BALLYBOLAND, CO. ANTRIM."

The monthly meeting of the Geological Section of the Club was held in the Museum on 23rd March, Mr. H. L. Orr presiding.

An interesting communication on "The Chalcedony of Ballyboland, Co. Antrim," was brought before the meeting by Mr. James Strachan. The lecturer introduced the subject by stating that acid substances such as chalcedony, which was nearly pure silica, were not very common in the basalts of Co. Antrim. The chalcedony of Ballyboland, found in the large quarry close to the railway, mid-way between Dunloy and Ballymoney, presented some interesting features when considered geogenetically. The basalt of Ballyboland was found to be intermediate in structure between a basalt and a dolerite, and might be regarded either as a fairly coarse-grained basalt or a very fine-grained dolerite. In composition it was typically basic, consisting of a plagioclase felspar, augite, olivine, and magnetite. The felspar shewed fluxional tendencies and enwrapped the augite grains, while the olivines were large porphyritic crystals, with typical inclusions of magnetite and chlorite. Chlorite was also an interstitial mineral. The rock had a greenish-blue colour, but here and there it passed into irregularly shaped lenticular masses and streaks of a purple or puce-colour. In this puce-coloured rock the most of the chalcedony was found in long thin veins or cracks, varying in thickness from .5 to 5 cms., but having an average thickness of about 1 to 1.5 cms.

When examined closely the veins were found to have a composite structure. Close to the matrix was found a layer of chlorite, varying in thickness from a mere film to rather more than 1 cm. Upon this was deposited a layer of varying thickness, composed of the carbonates of calcium and magnesium. Finally, in the interior of the vein was found the chalcedony, which passed occasionally into common crystallised quartz. A peculiar feature was the intergrowth of the carbonates with the chalcedony, producing a pure white opaque substance, which might be truly regarded as a white jasper. In passing from the blue basalt to the purple rock touching the veins some noteworthy features were observed microscopically. A slice of the rock intermediate in position between the two revealed the presence of an orange-red serpentine contiguous with the chlorite, both in the cracks of the olivine and the interstices of the rock. The percentage of magnetite was also found to be largely increased. In the purple rock the olivines were observed to be completely replaced by chloritic and serpentinous minerals of blue-green and orange-red colours respectively; the mixture of these colours gave rise to the purple colour. The magnetite in the purple rock was found to have increased still more, and the augites were of increased size and showed a distinct tendency to ophitic structure with regard to the felspar. Chemical analyses shewed that as the veins were approached the basalt increased in (1) silica, and (2) in iron. The relative proportions of the magnetite might be roughly represented by the following figures:—Blue basalt, 1. Intermediate basalt, 1.5. Purple basalt, 2 to 3.

In conclusion, Mr. Strachan compared these structures with similar structures in other local rocks, and gave reasons for believing that the vein-stuffs of the Ballyboland basalt were not the product of solfataric alteration, but that the purple rock and the other minerals found in the veins were formations due to magmatic separations during the cooling of the molten rock. The relative position of the minerals was strictly in accordance with

the simple law formulated by the lecturer some years ago and published in his paper on the *Chalcedony of Carnmoney*.

At the conclusion of the paper, the lecturer exhibited under the microscope a series of typical micro-sections illustrating the various rock structures. Several Members took part in the discussion which followed, when many of the facts referred to were further elucidated.

“SHORT NOTES ON THE PLANTS OF THE CAVE HILL
AND NEIGHBOURHOOD.”

On Saturday, 9th April, Mr. N. Carrothers, Secretary of the Botanical Section, read a very interesting paper entitled “Short Notes on the Plants of the Cave Hill and Neighbourhood.” The paper, which was illustrated by a particularly fine collection of plants from the vicinity of Cave Hill, contained much useful information regarding the economic and medicinal values of many of the plants, as well as many quaint allusions to old-world beliefs in their magical properties.

A description of the types of vegetation, found at varying altitudes on the hill, contained many valuable hints as to local opportunities for ecological studies. Among the plants discussed were *Lathrea squamaria*, *Petasites fragrans*, *Allium ursinum*, *Habenaria albida*, *H. viridis*, *Pyrola minor*, *P. media*, *Orobanche rubra*, *Sisymbrium Thalianum*, *Lithospermum officinale*, *Orchis pyramidalis*, and *Botrychium Lunaria*.

"THE CROSSING OF FERNS. REMINISCENCES OF SOME PIONEERS OF THE CULT."

On Tuesday evening, 12th April, at the sixth monthly meeting for the Session—the President (Mr. Nevin H. Foster) in the chair—Mr. W. H. Phillips read an exceedingly interesting paper on "The Crossing of Ferns," in the course of which he said the crossing of ferns, like other new truths, had to go through all the stages of ridicule and incredulity, until the convictions of a few have forced conviction upon the majority, and the fact has received public recognition. By British fernists is claimed the credit of having established the truth in this instance. Until comparatively recent times it was generally accepted that ferns did not cross, and yet, considering the assistance which in their endless changes of structure other forms of life were known to derive from the power inherent in them of crossing naturally, it must at times have seemed strange to the more thoughtful that in a class of plants so remarkable for variation as ferns that power should be altogether absent. It was not until a foreign fern or two had done what many British ferns had long been known to do that the serious attention of botanists was drawn to this subject. The first authoritative recognition was contained in a letter to Mr. E. J. Lowe from Sir Joseph Hooker in 1884, in which he wrote—"The hybridisation of ferns is now an accepted fact." But in the general ignorance formerly prevailing with regard to the reproduction of cryptogamic plants it seemed altogether absurd that ferns could possibly cross. No bee or fly had ever been suspected of visiting a fern or moss with any such intention or result, and enough was known of the structure of a fern to preclude the idea of any external agency in fertilisation. It was not until Naegeli, Sumenski, Hoffmeister, and other Continental botanists had raised the veil which had so long hung over the secrets of the reproduction of ferns and other kindred forms that people were able to recognise that, however, different

in the process, the principle involved in the reproduction of ferns was the same as in higher forms of life. It was they who showed that it was in the *prothallus* stage that the fern practically flowered, that on the *prothallus* were developed the *antheridia* and *archegonia*, corresponding with stamens and pistils of flowers, and that under certain favourable conjunctions of heat and moisture the *antherozoids*, corresponding with the pollen of flowers, were detached, and not only so, but were endowed with motion resembling rather the consciousness of animal than the impassiveness of vegetable life, and that thus fertilisation was ensured. Concurrently with, but independently of the researches of Hoffmeister and others, independently also of each other, there were among the earliest cultivators and students of the varieties of British ferns some who undertook experiments which placed the matter entirely beyond doubt in the minds of all who had given attention to the subject. The lecturer then proceeded to give an interesting account of the work that had been done and of those pteridologists who have been foremost in the science of growing and hybridising ferns, ending modestly with a short description of his own work in this line, illustrated with a fine series of fronds showing some of his best results. In the discussion which followed several questions were put to Mr. Phillips, the President, Messrs. R. Welch, J. Hamilton, H. L. Orr, and R. Bell taking part in the debate. Mr. Phillips having replied to the various questions, the meeting terminated.

ANNUAL MEETING.

The Annual Meeting was held in the Museum, on Tuesday, 19th April—the President of the Club (Mr. Nevin H. Foster, M.B.O.U.) in the chair.

Mr. A. W. Stelfox, A.R.I.B.A., read the 47th Annual Report.

The Treasurer (Mr. W. H. Phillips) submitted the Statement of Accounts.

The report of the Botanical Section was read by Mr. N. Carrothers; the Geological Section report by Miss M. K. Andrews; the Zoological Section report by Mr. F. Balfour Browne, M.A., F.Z.S.; the report of the Archaeological Section by Mr. W. J. Fennell; and the report of the Sub-Committee appointed to adjudicate on the collections sent in for Club prizes by Mr. W. A. Green. In the absence of the Librarian (Mr. J. L. S. Jackson) the Librarian's report was read by Mr. A. W. Stelfox.

The various reports and the statement of accounts were adopted on the motion of the President, seconded by Mr. William Gray, M.R.I.A., and supported by Mr. W. J. C. Tomlinson.

Mr. W. Chambers proposed, and Mr. D. J. Hogg seconded that Mr. Robert Welch, M.R.I.A., be elected President for the coming year. The motion was very cordially adopted.

The election of Mr. W. J. C. Tomlinson as Vice-President for the ensuing year, proposed by Miss Hamilton and seconded by Mr. Duncan, was passed with hearty acclamation.

Mr. W. H. Phillips was re-elected Treasurer on the motion of Mr. Robert Patterson, F.L.S., seconded by Mr. Geo. Donaldson.

Mr. Fennell proposed, and Mr. W. R. Pim seconded that Mr. Sylvanus Wear be elected Librarian. The motion was carried unanimously.

On the motion of Mr. Joseph Maxwell, J.P., seconded by Miss S. Blackwood, Miss Jean Agnew and Mr. A. W. Stelfox were re-elected Hon. Secretaries.

On the vote of the entire Company being taken, the following ten members of Committee were declared elected :—Miss M. K. Andrews, Messrs. Robert Bell, F. Balfour Browne, M.A., F.Z.S., N. Carrothers, A. R. Dwerryhouse, D.Sc.; W. J. Fennell, F.R.I.B.A., N. H. Foster, M.B.O.U., W. A. Green, H. L. Orr, and Robert Patterson, F.L.S., M.R.I.A.

Suggestions for places to be visited by the Club on the Summer excursions were received from various Members, and passed to the Committee for consideration.

A very hearty vote of thanks was accorded the retiring President (Mr. N. H. Foster, M.B.O.U.), having been proposed by Mr. William Gray, M.R.I.A., and seconded by Mr. R. Patterson, F.L.S. Mr. Foster suitably replied.

A vote of thanks to the retiring Vice-President (Mr. W. H. Gallway), proposed by Mr. H. L. Orr and seconded by Mr. W. A. Green, terminated the meeting.



★ RULES ★ OF THE Belfast Naturalists' Field Club.

I.

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

II.

That the object of this 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 first pay an entrance fee of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of 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 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, Librarian, and two Secretaries, and ten Members who form a Committee, and shall hold not less than eight meetings in the year. Five Members 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. In the event of a vacancy occurring among the Officers, the Committee may co-opt a Member to fill such vacancy during the year only.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being Members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. Any Sectional Committee may elect its own Chairman and Secretary from its Members.

VII.

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 Archaeology of Ireland. That the place of meeting be fixed by the Committee, and that five day's notice of each Excursion be communicated to Members by the Secretaries.

VIII.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November till April inclusive.

IX.

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 archaeological 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.

X.

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 alterations 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 each intended alteration.

XI.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

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 subject mentioned in such written requisition.

XIII.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

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. 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 is incurred thereby.

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

Exchanges of Proceedings, 1909-1910.

- Aberdeen—Working Men's Natural History and Scientific Society.
Transactions, Vol. II., No. 3.
- Barrow—Naturalists' Field Club.
Annual Report, Vol. XVII.
- Belfast—Natural History and Philosophical Society.
Report of Proceedings, 1908-09.
- ,, Ulster Journal of Archæology.
Vol. XV., Parts 2, 3, 4.
- Brighton and Hove Natural History and Philosophical Society.
Annual Report and Abstracts of Papers, 1907-1908.
- Bristol Naturalists' Society.
Proceedings, Vol. II., Parts 1, 2.
- Cardiff Naturalists' Society.
Report of Transactions, Vol. XLI., 1908.
- Cornwall—Journal of the Royal Institution of—
Vol. XVII., Part 3.
- Dublin—Royal Irish Academy.
Proceedings, Section B, Vol. XXVII., Parts 10, 11.
Vol. XXVIII., Parts 1, 2, 3.
,, , C, Vol. XXVII., Parts 14, 15, 16, 17, 18.
Vol. XXVIII., Parts 1, 2.
- ,, Royal Society of Antiquaries of Ireland.
Journal, Vol. XXXIX., Parts 1, 2, 3, 4.
- Drumfriesshire and Galloway Natural History and Antiquarian Society.
Report, Vol. XIX., 1907-08.
- Edinburgh—Journal of the Royal Institution of—
Vol. XVII., Part 3.

Frankfort—Bericht der Senckenbergischen Naturforschenden.

Gessellschaft, 1909.

Helios Abhandlungen und Miteilungen, &c., Nos. XXIV-XXV.

Glasgow Philosophical Society.

Proceedings, Vol. XL., 1908-09.

Hamilton Association.

Journal and Proceedings, 1907-08.

Anniversary No. 1907.

Hertfordshire Natural History and Field Club.

Transactions, Vol. XIII., Parts 3, 4.

Leyden—Rijks Ethnographisch Museum, 1909.

Limerick—Journal of Field Club.

Vol. III., Part 12.

Liverpool Geological Society.

Proceedings, Vol. X., Part 5.

„ Botanical Society.

Proceedings, Vol. I.

London—Architectural and Topographical Society.

Vol. I., Parts 1, 2, 3, 4.

„ British Association for the Advancement of Science.

Report of Corresponding Societies' Committee.

„ British Museum.

Guide to Gallery of Fishes.

„ Elephants (Recent and Fossil).

„ Exhibited Series of Insects.

„ Museum Collection of Rocks.

„ Specimens of the Horse Family.

„ Domesticated Animals (other than Horse).

„ Whales, Porpoises, and Dolphins.

„ Specimens illustrating Races of Mankind.

„ British Basidiomycetes.

Magdeburg Abhandlungen und Berichte, 1907.

Manchester Field Naturalists' and Archæologists' Society.

Report and Proceedings, 1907.

„ Microscopical Society.

Transactions and Annual Report, 1908.

Marlborough College Natural History Society.

Report No. 56, 1907.

Miramichi Natural History Association.

No. 5.

Mexico—Geologico Instituto.

Tonio, 1, 2.

Monte Video—Annales del Muses Nacional.

Vol VII., Tonio 4.

Norfolk and Norwich Naturalists' Society.

Transactions, Vol. VIII., Part 4, 1907-08.

North Staffordshire Field Club.

Report and Transactions, Vol. XLII., 1907-08.

Nottingham Naturalists' Society.

Report, 1906-07.

Nova Scotian Institute of Science, St. John's, Nova Scotia.

Proceedings and Transactions, Vol. XI., Parts 3, 4.

 ,, Vol. XII., Part 1.

Oxfordshire, Ashmolean Natural History Society of—

Proceedings and Report, 1908.

Perthshire Natural History Society.

Vol. V., Part 1.

Peru—Boletin del Cuerpo de Ingenieros de Minas, Nos. 68 to 74.

Stavanger Museum.

Aarshefte fur 1908.

Toronto—Canadian Institute.

Transactions, Vol. VIII., Part 3.

Torquay Natural History Society.

Journal, Vol. I., No. 1, 1909.

U.S.A.—Boston Society of Natural History.

Vol. XXXIV., Parts 1, 2, 3, 4.

„ Brooklyn—Cold Spring Harbour Monographs.

No. 7.

„ Chapel Hill N.C.—Elisha Mitchell Scientific Society.

Journal, Vol. XXIII., Part 4.

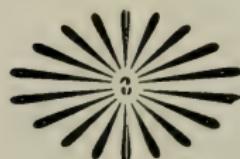
 ,, XXIV., Parts 1, 2, 3.

„ Chicago—Academy of Sciences.

Bulletin, VII., Part 1, Vol. VIII., Parts 1, 2.

Official Report, No. 2. Special Publication.

- U.S.A.—Chicago—Field Columbian Museum.
Report, Vol. III., No. 3.
- „ Cincinnati—Lloyd's Library.
Bulletin No. II.—Mycological Notes.
- „ Medford, Mass.—Tuft's College Studies.
Vol. II., Part 3.
- „ New York—Academy of Sciences.
Annals, Vol. XVIII., Part 3.
- „ Philadelphia—Academy of Natural Sciences.
Proceedings, Vol. LX., Part 3, Vol. LXI., Part 1.
- „ St Louis—Academy of Sciences.
Transactions, Vol. XV., Part 6; Vol. XVI., Part 8; Vol.
XVII., Parts 1, 2; Vol. XVIII. Part 1.
Missouri Botanical Garden, 1908-09.
- „ Washington—Government Printing Offices.
Extracts from Reports, 1907—1841, 2, 3, 4; 1905, 6, 7, 8, 9.
- „ Washington—Geological Survey.
Bulletins, 347, 9; 351, 2, 3, 4, 5, 6, 7, 8, 9; 371, 2, 6, 8.
Professional Papers, No. 58, 59, 60, 61, 63.
- „ Mineral Resources of the United States.
Vols. I., II.
- „ Wisconsin Academy.
Vol. XV., Parts 1, 2.
- Queensland—Annals of Museum, Nos. 8, 9.



List of Members.

Any change in the Address of Members should be at once notified to the Secretaries by Post Card.

Hon. Members.

Jones, Prof. T. R., F.R.S., Penbryn, [Chesham Bois Lane, Chesham, Bucks.

Lapworth, Professor Charles, LL.D., F.R.S., The University, Birmingham.

Plunkett, Thomas, M.R.I.A., Enniskillen.

Corresponding Member.

Holden, J. S., M.D., Sudbury, Suffolk.

Life Member.

Ewart, Sir W. Q., Bart., Glenmachan, Strandtown.

Ordinary Members.

Adams, Miss, Rosemount, Malone Road.

Adams, John J., M.D., Ashville, Antrim.

Adams, Rev. W. A., B.A., Antrim.

Agnew, Miss Jean, 5 Wellington Place.

Allibon, George H., 19 Short Strand.

Anguin, Miss, Limestone Road.

Anderson, Sir Robert, J.P., Donegall Place.

Anderson, Thomas (the late), Embleton, Osborne Park.

Andrew, J. J., L.D.S., University Square.

Andrews, Miss, 12 College Gardens.

Andrews, Miss M. K., 12 College Gardens.

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Baillie, W. T. Marathon, Knock.

Barkley, James M., 24 Wellington Place.

Barrett, J. H., Bangor.

Baxter, James, Midland Rly. Co.
Beattie, Rev. A. H. Portglenone.

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Bell, Robert, 64 Newington Avenue.

Bell, E. George, Bellvue, Lurgan.

Bennett, Edward, Forth River Mill.

Bennett, S. A., B.A., B.Sc., Campbell College.

Berry, Major, R. G., M.R.I.A., Army Service Corps, Victoria Barracks.

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- Blackwood, W. B., 30 Elmwood Avenue.
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 Blair, Edward S., Rusheen, Glenburn Park.
 Blair, Mrs. Edward S., Rusheen, Glenburn Park.
 Borland, Mrs., Derwent, Marlborough Park.
 Boyce, Joseph, Kincora, Cregagh.
 Boyd, Miss, The Elms, Southsea.
 Boyd, W. C., Hazelbank Villa, Ravenscroft Avenue.
 Braithwaite, W. T., 14 Botanic Avenue.
 Branagh, E. H. H., 16 Madison Avenue.
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 Brett, Sir Charles H., Gretton Villa South.
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 Browne, Mrs. Balfour, Claremont, Holywood.
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 Cleland, Mrs. Annie, Macedon, Green Road, Knock.
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 Cocking, Miss M. A., Sunnyside, 33 Somerset Rd., Huddersfield.
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 Cunningham, Saml., Glencairn.
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 Davies, John Henry (the late), Lenaderg, Banbridge.
 Dawson, R. A., A.R.C.A., Iniskeen, Holywood.

- Deane, Arthur, Municipal Museum, Royal Avenue.
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 Duncan, William, 2 Manilla Ter.
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 Galloway, Joseph, 50 Eglantine Avenue.
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 Gamble, J. G., 42 Hopefield Avenue.
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 Gardner, Campbell, jun., Windsor Park.
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 Glover, James, Belsize, Lisburn.
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 Greeves, W. Leopold, Ormeau Avenue.
 Greeves, Fergus M., Rydal Mount, Knock.
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 Hadden, Dr. Robert E., Ardalla, Portadown.
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 Hogg, D. J., 3 Trinity Street.
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 Holland, Frank, 33 Wellington Park.
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 Johnston, W. P., Sandown Park, Knock.
 Johnston, Ernest, Sandown Park, Knock.
 Johnston, F. W., The Cottage, Cultra.
 Johnston, Mrs., The Cottage, Cultra.
 Johnston, John Bruce, Cooleen, Marlborough Park North.
- Kidd, Miss, Castlerock, Co. Derry.
 Kidd, James, Antrim Road.
- Kilgour, Peter, Monifeith, Forfarshire.
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 Larmor, Miss Jeanie, Lisburn.
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 Malcomson, Herbert T., Cairnburn, Strandtown.
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- Maxwell, Joseph, J.P., Pinner, Malone Road.
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- Milligan, Miss, Drumgooland, Knockbreda Park.
- Milligan, Alex, 225 Springfield Road.
- Milligan, S. F., M.R.I.A., Bank Buildings.
- Milligan, W. H., 26 Burmah Street.
- Millin, Adam, Auburn, Deramore Drive.
- Milne, J. N., Foylemore, St. Jude's Avenue.
- Mollan, W. S., Hampton, Derryvolgie Avenue
- Montgomery, H. C., 40 Rosemary Street.
- Moore, John, 11 Shaftesbury Square.
- Moore, Miss, Corunna House, Ballynafagh.
- Moore, S. A., 24 Howard Street.
- Moore, Miss J., Spa, Ballynahinch.
- Morris, A. B., Clocnee Villa, Rossetta Park
- Morrison, A., Cherrydene, Knock.
- Morton, John, 2 Dunedin Terrace.
- Moulds Mrs., Rosemount, Malone Road.
- Muir, A. H., Craig Royston, Castle Park.
- Muir, Mrs., Craig Royston, Castle Park.
- Munce, W. B., Rosemary St.
- Murdock, James, Balmoral Cottage.
- Myddleton, Wm. W., 2 Carlisle Terrace.
- M'Bretney, W. A. J., 31 Haypark Avenue.
- M'Cance, James, 2 Easton Terr.
- M'Caughan, Joseph, J.P., Windmill Hill, Carrickfergus.
- M'Cleary, A., 7 Fisherwick Pl.
- M'Cleery, H., 20 Franklin St.
- M'Cleery, J. O., Ava House, Old Cavehill Road.
- M'Connell, James, Ballydavey, Craigavad.
- M'Connell, James, J.P., Stranmillis House.
- M'Connell, Miss, Stranmillis House.
- M'Cormack, Mrs., Craig Royston, Knock.
- M'Cormick, H. M'Neile, Craigavad.
- M'Crum, Mrs., Ballyvesey, Carnmoney.
- M'Gaw, Miss, 7 Wellington Park Terrace.
- M'Gowan, Thomas, 71 Ann St.
- M'Ilwaine, Mrs., Bangor.
- M'Ilwaine, J. E., M.D., 55 University Road.
- M'Kean, Mrs., 2 Stranmillis Gardens.
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- M'Kee, John, Solicitor, Arthur Square.
- M'Kee, Wm. S., 20 Mill Street.
- M'Kinney, Miss, Sentry Hill, Carnmoney.
- M'Kinney, W. F., Sentry Hill, Carnmoney.
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- O'Neill, Miss, Ava House, Ormeau Road.
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- Orr, James, Lindenville, Charnwood Avenue, Cavehill Road.
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- Patterson, W. Hartley, Vancouver, B.C.
- Patterson, Richard, J.P., Kilmore, Holywood.
- Patterson, Miss Clara, Kilmore, Holywood.
- Patterson, Robert, F.L.S., M.R.I.A., M.B.O.U., Glenbank, Holywood.
- Patterson, Mrs. Robert, Glenbank, Holywood.

Patterson, Miss Clara, Glenbank, Holywood.
 Patterson, Wm. H., M.R.I.A., Garranard, Strandtown.
 Patterson, J. W., Rosavo, Cultra.
 Patterson, M. S., Rosavo, Cultra.
 Phillips, Wm. H., Lemonfield, Holywood.
 Phillips, Jas. St. J., B.E., Scottish Temperance Buildings.
 Pim, John, J.P., Bonaven, Antrim Road.
 Pim, Thos. W., 21 Victoria St.
 Pim, Joshua, 6 Donegall Sq. S.
 Pim, W. R., Lisnagarvey, Lisburn.
 Pooler, Rev. Charles, B.D., M.R.I.A., English Street, Downpatrick.
 Porritt, W. J., Redhall, Ballycarry.
 Porter, F. A., Queen's Square.
 Porter, William, Beechview, Balmoral Avenue.
 Praeger, E. A., Cultra, Holywood.
 Praeger, R. Ll., B.A., B.E., M.R.I.A., National Library, Kildare Street, Dublin.
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Seventh Annual Report—1869-70, containing Appendix I., List of the Irish Liassic Fossils—Tate, 1 Plate	2/6
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ANNUAL REPORT .. AND .. PROCEEDINGS.

SERIES II.
VOLUME VI.

PART IV.
1910-11.



For Contents See Overleaf.



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CONTENTS.

	PAGE
List of Officers ...	341
Annual Reports ...	343
Statement of Accounts ...	357
Excursions—Scrabo Hill, Tardree, Castlerock, Dromore, Parkmore, Armagh, Rosapenna, Greyabbey and Ballywalter Park, Knockdhu and Sallagh Braes, Portrush, Carrickfergus, Magheralin, Kilcoan ...	358
St. John's Point ...	405
Conversazione ...	389
Papers—“Facts about the Distribution of some Animals and Plants”— Presidential Address—R. J. Welch, M.R.I.A. ...	393
“Plant Life in a Wood”—Rev. C. H. Waddell, B.D. ...	396
“Bangor”—W. J. Fennell, F.R.I.B.A. ...	397
“Zoological Work of Past Session”—Members of Zoological Section	399
“The Onyx of Spanish Bay, Giant’s Causeway”—J. Strachan ...	401
“Plants collected during the Summer Session”—Members of Botanical Section ...	404
“The People of the Dawn”—W. A. Green, F.R.S.A.I. ...	405
“The Archaeology of Surnames”—A. Milligan ...	408
“S. A. Stewart Memorial Meeting” ...	410
“Plant Life in a Marsh”—Rev. C. H. Waddell, B.D. ...	435
“The Lower Carboniferous Rocks of the North Stafford Coalfields”— S. A. Bennett, B.Sc. ...	435
“Folklore from Donegal”—Miss E. Andrews ...	437
“Glacial Overflow Channels”—A. R. Dwerryhouse, D.Sc. ...	439
“The Study of Fungi”—A. Milligan ...	440
“The Close of an Ice Age: A Comparison between Spitsbergen and Ireland in 1910”—G. A. J. Cole, F.G.S. ...	441
“Means of Dispersal of Animals and Plants”—Discussion ...	443
“A Talk on Limestone”—Wm. Gray, M.R.I.A. ...	445
“Mosses and Hepaticas”—Rev. Canon Lett, M.R.I.A. ...	448
“Plankton Studies”—W. J. Dakin, D.Sc. ...	449
“Fogous and other Cornish Antiquities”—Mrs. Hobson ...	451
“Delegate’s Report, British Association Corresponding Societies Committee”—F. Balfour Browne, M.A. ...	453
“Rare Old Chester”—J. A. S. Stendall ...	456
Annual Meeting ...	458
Rules ...	460
Exchanges ...	463
List of Members ...	467
List of Officers, 1911-1912 ...	474
Appendix I.—“Boulder-Clays from the North of Ireland, with Lists of Foraminifera”—Joseph Wright, F.G.S. ...	...
Appendix II.—“Foraminifera from the Estuarine Clays of Magheramorne and Limavady”—Joseph Wright, F.G.S.





Cliffs of Horn Head from the Sea.

HEIGHT 800 FEET.

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PHOTO.

R. J. WELCH.

ANNUAL REPORT AND PROCEEDINGS
OF THE
**BELFAST NATURALISTS'
FIELD CLUB,**

FOR THE YEAR ENDING 31ST MARCH, 1911.

(FORTY-EIGHTH YEAR.)



SERIES II.

VOLUME VI.

PART IV.

1910-11.

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1911.

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Annual Report.

Your Committee have pleasure in submitting the forty-eighth Annual Report which will show that the prosperity of the Club has been well maintained.

During the season just ended 20 new members were elected, of whom 18 have qualified by paying the necessary fees. Against this there have been 7 deaths and 22 resignations, leaving the membership of the Club on 1st April, 1911, at 386. The death of Mr. S. A. Stewart, one of the five founders of the Club, has left a breach in our ranks which for many years is not likely to be filled. A sum has been raised by your Club, and a monument, consisting of a standing stone with inlet bronze medallion, is being erected upon Mr. Stewart's grave to perpetuate his memory. A history of Mr. Stewart's life and works will be found in the Proceedings. The death of Prof. T. Rupert Jones, F.R.S., of Chesham, Bucks, one of the three Hon. Members of the Club, will be deeply regretted. Prof. Jones was formerly Professor of Geology at Sandhurst, and gave great assistance to those of our members who were studying the Foraminifera.

During the past year 8 Committee meetings were held, at which the average attendance was more than 10.

The Programme which had been arranged for the Summer Session was duly carried out, with the exception of the excursion to Massereene Park, Co. Antrim. Your Club being refused permission to visit this demesne, an excursion to Dromore, Co.

Down, was subsequently arranged. The following places were visited during the Summer Session :—

Castlerock	...	...	...	...	...	21st May.
Dromore (Half-Day)	...	...	...	...	...	11th June.
Parkmore	...	...	...	...	...	25th June.
Rosapenna and North Donegal (I.F.C.U. Triennial Conference)...						8th till 14th July.
Greyabbey and Ballywalter Park (Half-Day)	...	...	...	...	...	30th July.
Sallagh Braes	...	...	...	...	...	13th August.
Carrickfergus (Half-Day)	...	...	...	...	...	27th August.

The average attendance at these excursions was 42, and out of a party of 47 at the I.F.C.U. Conference, 32 were members of your Club. A considerable amount of field-work was accomplished on these excursions, and lists of some of the more important Plants, Mollusca and Woodlice, &c., will be found in the detailed reports. A fully illustrated report of the Rosapenna Conference appeared in the *Irish Naturalist* for September, 1910. Besides the above excursions, several organised by the various Sections of the Club were carried out, reports of which will be found in the Proceedings.

For hospitality received by members of your Club, and for permission to visit their demesnes during the Summer excursions, your Committee desire to tender their best thanks to Lady Dunleath, Miss Kidd of Castlerock, and Miss M. E. Dobbs of Glenariff.

The Winter Session of the Club was inaugurated by the usual Conversazione, which was held, as on the previous occasion, in the Assembly Buildings, 296 members and friends being present.

Although the Belfast Corporation have taken over the Museum, your Club has been granted the use of these rooms on the same terms as previously enjoyed from the Belfast Natural History and Philosophical Society.

The following Lectures and Papers were delivered at the ordinary Monthly and Sectional Meetings during the Winter Session :—

1910.

- Tuesday, 15th November—"Facts about the Geographical Distribution of some Animals and Plants," The President (Robert J. Welch, M.R.I.A.).
- Saturday, 19th November—"Plant Life in a Wood," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 23rd November—"Bangor, Co. Down," W. J. Fennell, F.R.I.B.A.
- Wednesday, 7th December—"Notes on the Work of the past Session," the Members of the Zoological Section.
- Wednesday, 14th December—"The Onyx of Spanish Bay, Giant's Causeway ; its occurrence and origin," James Strachan.
- Saturday, 17th December—"Exhibition of Plants collected during the Summer Session, with remarks on their habitats," by the Members of the Botanical Section.
- Tuesday, 20th December—"The People of the Dawn," W. A. Green, F.R.S.A.I.

1911.

- Wednesday, 4th January—"The Archaeology of Surnames," Alex. Milligan.
- Tuesday, 17th January—"Samuel Alexander Stewart Memorial Meeting," Rev. C. H. Waddell, M.A., B.D., R. Ll. Praeger, B.A., B.E., M.R.I.A., R. J. Welch, M.R.I.A., and others.
- Saturday, 21st January—"Plant Life in a Bog," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 25th January—"The Lower Carboniferous Rocks of the North Stafford Coalfields," S. A. Bennett, B.A., B.Sc.
- Wednesday, 8th February—"Folklore from Donegal and Derry," Miss Elizabeth Andrews.
- Wednesday, 15th February—"Glacial Overflow-Channels," A. R. Dwerryhouse, D.Sc., F.G.S.
- Saturday, 18th February—"The Study of Fungi," Alex. Milligan.
- Tuesday, 21st February—"The Close of an Ice Age ; a comparison between Spitsbergen and Ireland in 1910," Prof. G. A. J. Cole, F.G.S., M.R.I.A.
- Wednesday, 1st March—Discussion on "The Means of Dispersal of Animals and Plants," by Various Members.
- Wednesday, 15th March—"A Talk on Limestone," Wm. Gray, M.R.I.A.
- Saturday, 18th March—"Mosses and Liverworts," Rev. Canon Lett, M.A., M.R.I.A.

Tuesday, 21st March—"Boulder-Clays from the North of Ireland, with lists of Foraminifera," and "Foraminifera from the Estuarine Clays of Magheramorne, Co. Antrim, and Limavady, Co. Derry," Joseph Wright, F.G.S.

"Plankton Studies, with particular reference to Lough Neagh," W. J. Dakin, D.Sc.

Wednesday, 29th March—"The Fogous and other Cornish Antiquities," Mrs. Hobson.

Tuesday, 25th April—"Report as Delegate to the British Association," F. Balfour Browne, M.A., F.R.S.E., F.Z.S.

"Rare old Chester," J. A. S. Stendall.

Mr. F. Balfour Browne, M.A., F.R.S.E., F.Z.S., again represented the Club at the British Association Conference of Delegates, held in Sheffield in September, and submitted his Report, which will be found in the Proceedings.

The Treasurer will lay before you his Statement of Accounts, which is highly satisfactory, and shows a balance in favour of the Club of £16 13s 4d.

The Librarian's Report, those of the Botanical, Geological, Zoological, and Archaeological Sections, and those of the Sub-Committees appointed to adjudicate on the collections sent in for the Club's Prizes and on the disposal of the surplus Proceedings and Publications, will be submitted.

Finally your Committee desire to record their thanks to the Management of the Rosapenna Hotel for many courtesies during the I.F.C.U. Conference; to the Superintendents of the various Railway Companies for facilities afforded on the different Excursions; to the Press for publishing reports of the Club's Meetings; and to the Kindred Societies and Public Bodies who have provided the Club with their Publications during the past year.

(Signed)

JEAN AGNEW, }
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Librarian's Report.

The usual exchanges have been made, and one or two new added to the list.

By order of the Committee the following were purchased :—

The Soil Geology of Ireland.

Two Volumes of Leaflets issued by the Board of Agriculture (London).

Twenty Volumes from the Library of the late S. A. Stewart.

Miskimmon's "History of Carrickfergus" has been received from Mrs. E. J. M'Crum, who in this new edition has added much fresh material, and Madame Christen has presented her beautifully illustrated book "Rudolphe Christen." The thanks of the Club have been conveyed to these two ladies for their kindly and much appreciated gifts.

We are also indebted to Mr. R. Ll. Praeger for the manuscript of the late S. A. Stewart's paper on, "The Latest Fluctuations of the Sea-level on our own Coasts." This has been suitably bound.

The Proceedings received in exchange from other Societies have up till now, from want of room and other causes, been a sealed book to the bulk of the members. Indeed, the great majority of these Proceedings have never been cut. In order to make them more readily available, the chief articles contained in them have been indexed. This has taken much time and labour, which will not have been in vain if members desiring to read up any subject will consult the Librarian.

(Signed)

SYLVANUS WEAR, *Librarian.*

Report of the Botanical Section.

The work of the Botanical Section, during the year 1910-11, was pursued in a very quiet way. No special excursions were held, but the ordinary field meetings of the Club were largely availed of by our members.

During the Winter Session five special meetings of the Section were held, at which there was usually a good attendance of members ; some details of these meetings will be found elsewhere in the body of the report. The best thanks of the Committee are due to Rev. C. H. Waddell, B.D.; Rev. Canon Lett, M.A.; and Mr. A. Milligan, who gave us instructive and interesting papers or lectures.

In no section of the Field Club's membership was the sudden demise of the veteran botanist, S. A. Stewart, A.L.S., more sincerely mourned than in ours, he having been a member of our Special Committee since the formation of the Section, rendering at all times willing and valued service to individual workers in the pursuit of their botanical studies. We are glad to know that his splendid collection of Irish plants will shortly find a home in the Municipal Museum, where, for the purpose of reference, it will be of great service in time to come.

As is usual where so many ardent field-botanists are concerned fresh plant records still continue to be made. Perhaps the most interesting of the records made during the year was the re-discovery of *Pyrola secunda* in County Antrim, made on the occasion of the Club's excursion to the Sallagh Braes district. Then again, the addition of *Vicia sylvatica* to the flora of County Armagh, made on the special excursion to Navan Fort; and of *Draba incana* to that of County Antrim, made by one of our members when on a visit to Torr Head. Such finds as these made during the past year should stimulate our botanical members to greater zeal during the coming year.

A copy of the late Mr. H. C. Hart's "Flora of Donegal" was added during the year to the small stock of works of reference kept by our Section.

(Signed)

N. CARROTHERS, *Hon. Sec. of the Section.*

Report of the Geological Section.

Our Section shares with the rest of the Field Club the deep sorrow felt at the death of one of its most distinguished members, Mr. Samuel Alexander Stewart. Although an Associate of the Linnaean Society, and the accomplished author of the standard work "A Flora of the North-East of Ireland," Mr. Stewart also did much original work in Geology. His comprehensive memoir, "A List of the Fossils of the Estuarine Clays of the Counties of Down and Antrim," is published as an Appendix to the Eighth Annual Report of our Field Club, and his valuable paper on "The Mollusca of the Boulder-Clay of the North-East of Ireland," as an Appendix to its Proceedings for 1879-80. Space does not permit to dwell on other papers such as "The Latest Fluctuations of the Sea-level on our own Coast," or "The Boulder-Clay of the North-East of Ireland." We desire rather to record our appreciation of Mr. Stewart as a true philosopher, a lover of Nature, a valued friend, ever ready to welcome us, and out of his vast storehouse of knowledge to assist and encourage us in our difficulties. His loss to Science is great, to our Geological Section it is irreparable.

The Committee beg to report that five Excursions were held during the past year by this Section, when the following interesting localities were visited:—Scabo Hill, April 23rd; Tardree, Sandy Braes, and Carnearney, May 7th; Portrush, August 20th; Magheralin, September 3rd; and Kilcoan, Islandmagee, September 17th. The Geological Section, under the leadership of Mr. Robert Bell, also took part in a joint excursion of the various Sections of the Field Club to Armagh on July 2nd.

At Scabo Hill the remarkable basic dykes and sills that traverse the Triassic sandstone were carefully examined. At Tardree, Carnearney, and Sandy Braes, lavas of a very different type were studied. Under the guidance of Mr. Strachan, the Tertiary rhyolites for which the district is noted were examined,

and specimens of the lithoidal type of Tardree dome, of the beautiful perlitic types of Sandy Braes, and of the dark red pitchstone of Carnearney, were obtained.

On the Armagh excursion interesting dykes of basalt traversing the Carboniferous limestone at Carrickaloughran were examined, and many fossils were obtained there and at Navan; the glacial deposits of the district were also investigated.

The excursion to Portrush included a study of the V-shaped hollow in the Chalk, filled with spheroidal basalt, at the "White Rocks;" a fine section of columnar basalt, passing upwards into tabular basalt at Craig-a-hulliar quarry; and an examination of the indurated Lias at Portrush, of great historic interest in connection with the controversy between the Vulcanists and Neptunists.

At Magheralin some very fine Chalk sections were visited, and the boulder-clay of the district was examined. No excursion was more enjoyed or more fruitful in results than the last of the season to Kilcoan, Island Magee. Numerous fossils were obtained from the Chalk and Lias, and interesting glacial observations were made.

The Winter lectures were most successful. Mr. Strachan opened the Session with a valuable communication on "The Onyx of Spanish Bay, Giant's Causeway." In January Mr. S. A. Bennett, B.A., B.Sc., gave a graphic description of the Lower Carboniferous rocks of the North Stafford Coalfield, his paper being illustrated by rock specimens and fossils from the district. On the same evening Mr. Robert Bell showed a fossil coral new to this district, discovered by him in the *Angulatus* zone of the Lower Lias at Hillsport, and determined by Mr. Lang to be *Isastraea endothecata* (Duncan).

Dr. A. R. Dwerryhouse, F.G.S., gave in February an important paper on "Glacial Lakes and their Overflow Channels," illustrated with lantern slides. After citing the "Merjelen See" as an example of existing lakes whose waters are held up by a dam of glacier ice, he described examples of deserted overflow channels in

Great Britain, and stated that he was engaged in working out the distribution of these valleys in the Counties of Antrim and Down, and hoped to be able to lay the results of his work before the Club at a later date. The last lecture of the season was an extremely interesting one, on "Limestone," by Mr. William Gray, M.R.I.A., illustrated with numerous specimens.

Our Committee forwarded, at the request of Dr. Dwerryhouse, a report of their recent glacial work to the British Association "Erratic Blocks" Committee. Particulars were sent of "erratics" found in Co. Armagh, Co. Tyrone, Co. Down, Co. Antrim, and Co. Londonderry. The extension of Ailsa Craig riebeckite-eurite to Coleraine was noted, and the occurrence of granite, probably from Barnesmore Gap (Co. Donegal) in the Sandhills at Portstewart, recorded. A note of Mr. Robert Bell's discovery of *Lithostrotion Portlockii* in boulder-clay overlain with about 7 feet of peat, at Sluggan Bog, Drumsough, was also forwarded.

The Committee desire to acknowledge with thanks, a kind donation of Victorian zeolites from the Director of the National Museum, Melbourne, also a fine collection of rock specimens, fossils and flint implements from Mr. W. F. de V. Kane, D.L. This collection includes fossils from the shale and Carboniferous sandstone of Ballycastle, from the Carboniferous limestone of Co. Monaghan, and from the Oolite near Bristol; also flint scrapers and knives from Les Eyzies, South France. The thanks of the Committee are due to Mr. M'Henry, M.R.I.A., and to Professor Seymour, B.A., F.G.S., for their kindness in determining erratics; also to Madame Christen for investigating boulder-clay at Ballywalter. The following continuation of the Section's glacial work during the past year is appended. XLVIIa. Armagh*—Esker S.W. of Carrickaloughran quarry—sands and gravels, laminated and

*Previous records from Armagh district, but not from this Esker, have been made by our Section. See Table in Madame Christen's Summary of Recent Glacial Investigations. Appendix to Proceedings B.N.F.C. 1905-6, also Geological Report, Proceedings B.N.F.C. 1907-8, p. 9. In the latter an erratum occurs. For 36 per cent. read 64 per cent.

current-bedded. Erratics:—24 basalt, 6 mica schist, 4 quartzite, 1 flint. A fragment of *Balanus* was also found by Mr. Robert Bell. LIV. Ballywalter.—Low bank of boulder-clay at sea level. Subjacent rock, Silurian grit. Erratics:—3 Ailsa Craig riebeckite-eurite, 7 quartz, 2 flint, 1 Chalk, 3 basalt, 1 red sandstone, 2 quartzite, 1 bole, 1 aphanite probably from Mourne district, 10 camptonite Ards, Co. Down; 8 granite Donegal type, 7 granite Newtownards; 2 weathered sandstone, 1 Ballygowan grit. These erratics have a N. to N.W. source, except the aphanite from S.W. LV. Magheralin, Co. Down.—Old quarry at Mr. Waddell's Kiln. Unstratified red boulder-clay. Subjacent rock, Chalk. Erratics:—1 clay ironstone Lough Neagh, 34 basalt, 6 dolerite, 3 grit, 6 granite probably from Barnesmore Gap, Co. Donegal; 9 mica schist, 1 Tornamoney eurite, 11 quartzite, 4 pebbles Old Red conglomerate Cushendun, 5 quartz, 1 porphyry Cushendall, 12 crushed diorite N. Tyrone area, 7 hornblende rock N. Tyrone area, 1 elvan probably from Barnesmore Gap, 1 granite N. Tyrone, 1 Lower Carboniferous sandstone Limavady area, 1 crushed felsite N. Tyrone area, 2 diorite N. Tyrone, 7 gabbro, 2 Lower Carboniferous conglomerate Limavady area, 2 eurite N. Tyrone. These erratics were mostly from N. and N.W. Mr. Joseph Wright, F.G.S., kindly examined the boulder-clay for microzoa, and obtained from it 19 Pleistocene specimens and 2 derived Chalk foraminifera.

LVI. Kilcoan Quarry, Island Magee.—Red unstratified boulder-clay. Subjacent rock Chalk. Very few erratics; basalt largely preponderated, but two Lias, 1 Tornamoney eurite, and 1 Fair Head dolerite were also noted. A fine striated surface was observed on the Chalk at the top of the quarry. Two sets of striæ were found running S. 5° W. and E. and W. respectively.

(Signed)

MARY K. ANDREWS, Hon. Sec. of the Section.

Report of the Zoological Section.

During the Summer Session the members of this Section attended the regular Club excursions, and studied the fauna of the districts visited, but the best day's result in faunal distribution work was obtained on 2nd July, when the combined Sections visited Armagh. The work done by members on these excursions will be found in the Proceedings, while that accomplished at the Rosapenna Conference is detailed in the *Irish Naturalist* for September, 1910.

Two meetings of the Section were held during the Winter Session. At the first of these, on 7th December, several members detailed the results of their researches during the preceding year. The second meeting, on 1st March, was devoted to a discussion suggested by the President's inaugural address on the dispersal of animals and plants. This discussion proved interesting and instructive, and it is intended that further meetings will be convened during next Winter at which similar problems may be brought forward.

Since our last report, the following two important papers by members of our Section, dealing with zoological distribution, have been published:—"A List of the Land and Freshwater Mollusks of Ireland," by A. W. Stelfox, with a Bibliography by R. J. Welch (¹); and "The Woodlice of Ireland, their Distribution and Classification," by D. R. Pack Beresford and Nevin H. Foster (²). Although these papers have only been issued about two months numerous additional county records have since been obtained in both groups, and it is interesting to report that the latter include two species of Woodlice new to Ireland.

(Signed)

JOSEPH MAXWELL, *Hon. Sec. of the Section.*

(1) Proceedings of the Royal Irish Academy, vol. XXIX., Section B., No. 3.

(2) *Ibid*, No. 4.

Report of the Archæological Section.

Four meetings of the Section were held during the past Winter, when Papers were read by Mr. W. J. Fennell, Mr. Alex. Milligan, Miss Elizabeth Andrews, and Mrs. Hobson. During the Summer Session the Section was well represented at most of the excursions, and considerable activity has been shown by its members in their various branches.

(Signed)

A. W. STELFOX, *Hon. Sec. of the Section.*

Report of Sub-Committee on Prize Competitions.

The Committee appointed to adjudicate on the collections submitted for the Club's prizes report that only one collection was sent in, viz.—A collection of Fossils from the Cretaceous System in competition for prize No. 5.

Although the Club do not hold themselves bound to award a prize without reasonable competition, your Committee considered that the collection was of such an unusually comprehensive character, and contained so many rare specimens, that they feel justified in recommending that the prize be awarded to Mr. George Donaldson for this collection.

(Signed)

W. A. GREEN.
R. BELL.

Report of Sub-Committee appointed to consider the best means of reducing the surplus stock of the Club's Proceedings, Appendices, &c.

We have gone carefully into the matter, and at the present rate of sales the stock would not be reduced to workable dimensions in a hundred years.

Our suggestions are :—

- 1.—That the prices of our Proceedings, Appendices, &c., Vols. 1, 2, 3, 4 and 5 of Series II. of Proceedings be reduced to Members as follows—per complete volume, 2/6. Separate parts of above volumes to 6d per part.

(NOTE.—The Appendices not to be included in above prices.)

Vol. 1 of Appendices in Leather Binding to 5/- per vol.

Do. do. Paper Binding to 3/6 per vol.

Separate Appendices in loose sheets, of which we hold a surplus stock to half price, namely 3d and 6d each.

(NOTE.—There is no surplus of Nos. 4 and 7 and 8 of Vol. 2.).

The Flora of N.E. Ireland with Supplement to 2/6, also that of the Flora without Supplement be offered to Booksellers in lots of not less than 10 at 2/- per volume.

- 2.—That a portion of the surplus stock of Appendices in loose sheets be offered as a gift to the author or authors. Fifty copies of each number may be so disposed of.
- 3.—That sets of Proceedings in parts and Vol. 1 of Appendices in loose sheets be offered to the Municipal Public Library for its branches, on the understanding that it binds them.
- 4.—That power be given to a Sub-Committee to present copies of Vol. 1 of Appendices to such school or other libraries in the district as they may think advisable, and to try and dispose of the remaining surplus of Appendices in loose sheets to the best advantage.
- 5.—That when the numbers of the various publications have been reduced to certain limits fixed by the Committee, the prices will be raised again.

(Signed)

S. WEAR,

R. J. WELCH,

A. W. STELFOX.

Stewart Memorial.

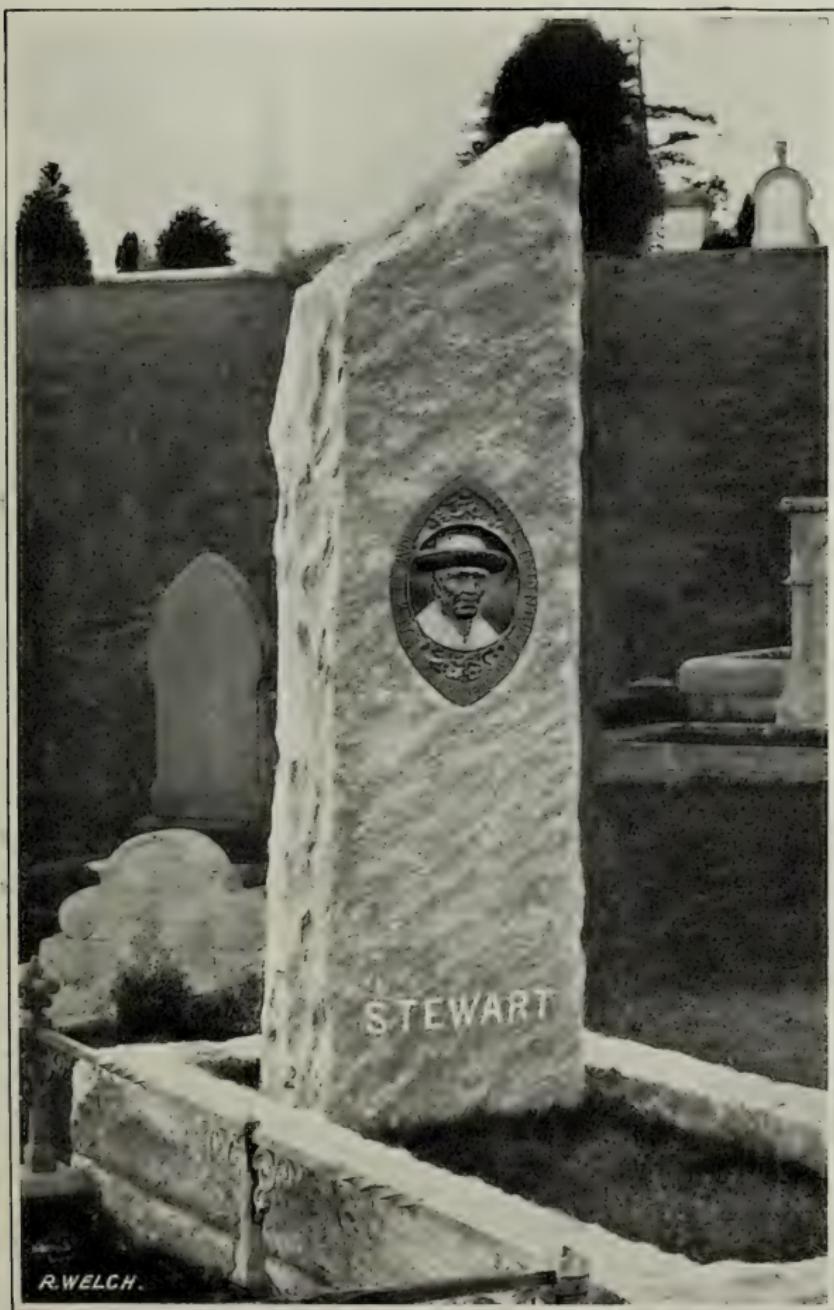
Following the lamented death of Mr. S. A. Stewart, a meeting of the Committee was summoned to consult with other prominent members of the Club. This meeting was held on 22nd June, 1910, Mr. William Swanston, F.G.S., in the chair, when a resolution was passed on the proposal of Mr. William Gray, M.R.I.A., seconded by Mr. George Donaldson, "That a suitable monument should be erected over the grave of the late Mr. Stewart."

A Sub-Committee was appointed to draft and issue a circular inviting subscriptions towards this object. Sufficient funds having been received it was resolved at Committee meeting held 17th January, 1911, that the most suitable memorial would consist of "A gallan or standing-stone of granite, with a medallion of bronze let into same, bearing a portrait of Mr. Stewart." A Sub-Committee was then appointed to carry out the wishes of the Committee. At the Committee meeting held on 10th March, 1911, this Sub-Committee reported that they had been able to secure an estimate for the erection of the monument which would come within the financial resources of the fund. The report of the Sub-Committee having been approved of, two members were entrusted with the supervision of the undertaking which was placed in the hands of Miss S. Rosamund Praeger, and Messrs. William Costigan & Co.

The following is an approximate balance sheet of the fund—

Dr.	Cr.
To Subscriptions received by Treasurer ... 56 13 6	By Cost of Grave ... 9 14 0
,, Deficit ... 11 14 6	,, Foundation for Stone 5 2 3
	,, Stone (fixed as per contract) ... 24 0 0
	,, Extra Coping ... 0 15 9
	,, Cost of Medallion (including Miss Praeger's Fee) ... 25 0 0
	,, Carriage on Medal- lion ... 0 3 9
	,, Printing, Stationery, Postages, &c. ... 3 12 3
£68 8 0	£68 8 0

The list of subscribers will be issued subsequently.



In Memoriam.
Samuel Alexander Stewart.

1826—1910.

PHOTO.

R. J. WELCH.



Dr. Treasurer's Account for the Year ending 31st March, 1911. **Cr.**

To Balance from last Account	...	...	19 19 6	By Typewriting	...	...	...	...	0 14 0
,, Subscriptions ...	..	...	90 10 0	,, Advertising, Stationery, and Printing	...	...	...	...	13 10 9
,, Entrance Fees ...	..	...	4 10 0	,, Printing Annual Report	...	...	...	...	26 6 6
,, Balance from Excursions ...	...	...	0 17 5	,, Rent of Club Room in Museum	...	...	...	...	18 0 0
,, Sales of Publications ...	...	...	2 8 6	,, Commission to Collector	...	...	...	...	3 4 2
				,, Donation to <i>Irish Naturalist</i>	...	...	...	...	2 0 0
				,, " Irish Field Club Union	...	...	...	...	2 2 0
				,, Lantern Expenses	...	...	...	...	3 5 0
				,, Postages	...	...	...	...	25 9 5
				,, Gas Account	...	...	...	...	0 10 7
				,, Insurance	...	...	...	...	0 10 0
				,, Prize	...	...	...	...	1 0 0
				,, B.A. Delegate's Entrance Fee	...	...	...	...	1 0 0
				,, <i>Journal of Archaeology</i> ...	...	...	...	...	0 5 0
				,, Expenses of Conversazione	...	...	...	...	1 2 2
				,, Books purchased for Library	...	...	...	...	2 7 6
				,, Gratuity to Porter	...	...	...	...	0 5 0
				,, Balance	...	...	...	...	16 13 4
									<u>£118 5 5</u>
									<u>£118 5 5</u>
1911,									
To Balance	...	...	...	...	...	...	...	...	£16 13 4

(Signed) W. H. PHILLIPS, Hon. Treasurer.

Proceedings.

SUMMER SESSION.

SCRABO HILL.

The Geological Section held its first excursion of the season on the 23rd April. The members left by the 2-30 p.m. train for Newtownards, and a short walk of a mile brought them to the south quarry at Scrabo Hill. It is in the quarries on this and on the eastern side of the hill that the best exposures of Triassic sandstone, more than 100 feet in height, are found. The rock is white, grey, and light purple in colour, with thin divisions of red marl or shale. These sandstones are capped by dolerite, and are also traversed by numerous intrusive sheets and dykes similar in character to the Antrim Tertiary basalts, especially to the intrusive sheet of Fair Head. The dolerite at the top overlying the sandstone has long been considered as an outlier of the plateaux lavas of the Antrim district, but it has recently been suggested that it may have been intruded as a sill, and that the overlying sandstone has been removed by denudation. On the face of the rock at the entrance to the south quarry a particularly fine example of current bedding was noted, and some time was spent at the quarry itself collecting hand specimens of sandstone, showing ripple-marks, sun-cracks, current bedding and brecciation, while later on, in another quarry, one specimen showing rain-pits was obtained. The party then moved on to study the remarkable intrusive sheets traversing the sandstone, which are exposed in the face of the quarry as dark wavy bands of basalt, the whole being intersected by a vertical dyke of later age. Specimens were secured of dyke, sills, and adjacent sandstone. In another quarry to the north-east, known as the "North Quarry," but not really to the north of the

hill, there are also very interesting examples of sills and dykes. The sills traversing the sandstone are exposed in the face of the quarry in the same striking manner as those in the one just visited, but the uppermost sills could be traced, branching from a vertical dyke, and following a horizontal course along the bedding planes of the sandstone, though occasionally for a short distance breaking through them. At the opposite side of the quarry another very interesting vertical dyke was traced at intervals, for a long distance traversing the sandstone. These remarkable sections of intrusive sheets and dykes laid open in the quarries of Scrabo Hill are perhaps the finest of their kind in the British Isles. It is to the protection of the dolerite that the sandstone of Scrabo Hill owes its preservation, the soft sandstone in the vicinity having been greatly denuded. This sandstone has been correlated with the Lower Keuper sandstone of Lancashire and Cheshire, but the question has also been raised as to whether the correlation should not be with the nearer Trias of the Isle of Man, and the point does not yet seem to be definitely determined.

TARDREE, SANDY BRAES, AND CARNEARNEY.

The Geological Section held its second excursion of the season on the 7th May, with the object of investigating the rhyolites of Tardree, Sandy Braes, and Carnearney. As the occurrence of these acid rocks forms an interesting episode in the geological history of County Antrim, it may be well to recall a few of the earlier changes of surface. When the Cretaceous ocean passed away, the sea floor was upraised, and formed Chalk downs, similar to those of the South of England. In early Tertiary times numerous fissures appeared, running from north-east to south-west. Molten basaltic lava welled up through them, and flowed over the Chalk downs in successive sheets, forming the Lower Basalt series. A period of quiescence followed; then lavas of a different type were intruded, and where they appeared at the surface in County

Antrim, gave rise to remarkable varieties of rhyolite and pitch-stone, many of which are found in the Tardree district. Von Lasaulx and Professor Cole regard the dome of Tardee mountain as a volcanic core, from which true lavas flowed, forming the plateaux to south and north.

The members started by the 9-55 a.m. train from Belfast to Ballyclare, where they were met by Mr. J. Strachan, who kindly acted as conductor. On arrival at the Sandy Braes plateau, the conductor pointed out the yellow, pink, red, and black banded and fluidal pitchstones, and the spherulitic nodules of silicified rhyolite filled with opal and chalcedony. Only a few of these nodules were, however, obtained. The perlitic types of rhyolite found on Sandy Braes are very beautiful, and similar in character to the recent rhyolites of Hungary. Under the microscope they show a glassy base with perlitic structure, and phenocrysts of quartz, sanidine, and magnetite. From Sandy Braes the drive was continued to the North Quarry on Tardree Mountain, and here in a small portion of the quarry, at the extreme north end, Mr. Strachan pointed out a red stony rhyolite, worked at present; and in the main part of the quarry, now disused, he drew attention to the apparently massive columnar structure. Shortly after leaving this, the cross-road to the north was taken, and a quarry beside it of banded lithoidal rhyolite, of a pink colour, with yellow layers and undulating flow planes, was examined and photographed.

Returning, the South Quarry on Tardree was next visited, and the apparent massive columnar structure, similar to that of the North Quarry, was noted, the rock being divided by upright parallel joints into parallel sheets, the edges giving the effect of columnar structure. Specimens of small true columns, about six inches square, were, however, obtained. The typical rock, a lithoidal rhyolite, when freshly quarried, is of a purple grey colour, which turns white on drying. Under the microscope it shows a microcrystalline—sometimes nearly cryptocrystalline—base, with phenocrysts of quartz and sanidine. Scales of tridymite have

been noted, and occasional biotite and magnetite. Skirting the base of Carnearney, the drive was continued down Donegore Hill to Parkgate. The conductor pointed out at the base of Carnearney, a very dark red pitchstone, much decomposed, and also a similar rock, but still more weathered on Upper Scolboa. After enjoying tea at Ballyclare, the party returned to Belfast by the 7-45 train.

CASTLEROCK.

On Saturday, 21st May, a party of members and friends, numbering 85, visited Castlerock and its vicinity. The party, which was conducted by Messrs. N. H. Foster, M.B.O.U., and W. J. C. Tomlinson, left the Midland Railway Terminus at 9-45 in a specially-reserved saloon carriage, and arrived at Castlerock about noon. On arrival the majority of the party elected to visit the demesne of Downhill Castle, while others visited the various collecting grounds in the vicinity.

Little work of a geological nature was done on this excursion, few of the geological section being present. Apart from the Post-Tertiary and Recent deposits, so conspicuous in the neighbourhood of Castlerock, the geology of the district is limited to two main formations—namely, the Tertiary basalts and the Upper Chalk of the Cretaceous system.

The Downhill headland is composed of the former. Just west of Downhill Station the Chalk outcrops on the shore, and half-a-mile further west, towards Umbra and Magilligan, it is a conspicuous feature in the escarpment. Large quarries are worked here, and fossils are frequently met with. The basalt of this escarpment is noted for the abundance of zeolitic minerals it contains.

During the day the botanists of the party were very busy, and reported the following, among other, finds:—*Ranunculus trichophyllus*, *Erophila vulgaris*, *Sisymbrium Thalianum*, *Cerastium*

semidecandrum, *Saxifraga tridactylites*, *Antennaria dioica*, *Myosotis collina*, *Scilla verna*, *Asplenium marinum*, *Draba muralis*, *Arenaria trinervia*, and *Arabis hirsuta*. The deep-wooded ravines at Downhill were found excellent collecting grounds for Land Mollusca. That member of the fauna, *Helix hortensis*, so local in the North of Ireland, was found to be plentiful under ivy along the top of an old wall. *Pupa anglica* occurred at the base of the cliffs, and *Helicella intersecta* on the sandhills near Magilligan. Some of the conchologists who were collecting on the strand at Downhill cliffs were delighted to find a tidal fringe of a rare pelagic Atlantic shell, *Spiralis retroversus*, which occasionally comes ashore in immense numbers on the West Coast. On the Magilligan strand numbers of *Cyprina islandica*, *Lutraria elliptica*, *Arca tetragona*, *Venus fasciata*, *Solen siliqua*, *Donax vittatus*, *Capulus hungaricus*, *Cypraea europaea*, *Nassa pygmæa*, *Turritella communis*, and *Scalaria communis* were found.

The ornithologists handed in a list of forty-three species noted during the day, chiefly in the demesne, showing that birds are not molested there. It was noticed that the Siskin has increased there as a nesting species. At five o'clock the various groups of workers met by arrangement at the Golf Hotel, Castlerock, where they were entertained to tea by Miss Kidd, a prominent member of the Club. A short business meeting was held in the hotel grounds after tea, the President (Mr. R. J. Welch, M.R.I.A.) in the chair. A vote of thanks to Miss Kidd for so hospitably entertaining the party, proposed by Mr. J. R. Macoun, and seconded by Mr. F. A. Heron, was passed by hearty acclamation. The Rev. W. S. Smith proposed, and Mr. J. Skillen seconded, a cordial vote of thanks to Mr. William Jackson, who had placed his services as guide through the Downhill demesne at the disposal of the Club during the entire day. Miss Kidd and Mr. Jackson suitably replied. Three new members—Miss M. Stewart, Miss L. Lowry, and Mr. Frank Johnston, J.P.—were elected. Shortly afterwards the party took train at 6-57, arriving in Belfast shortly after nine.

DROMORE.

On Saturday, the 11th June, a party of members and friends visited Dromore. The party, which numbered about sixty, travelled in specially-reserved carriages by the 1-45 p.m. train, and were conducted by Mr. J. M. Dickson. On arriving at Dromore, the Cathedral was visited, permission to do so having been most courteously granted by the Rev. J. W. Cooke. The old stone cross, showing traces of very beautiful Celtic interlaced ornament, was next visited. Mr. William Gray, M.R.I.A., gave an interesting account of its vicissitudes until it was finally re-erected on its present site by the exertions of a few members of the Field Club. The cross, which was mentioned as still standing in the reign of James I., either fell or was pulled down. A portion of the shaft was built into the stone stairway of the old market-house, and sometime about 1803 the town stocks were erected on its base. The remaining fragments of the cross lay beside the stocks until finally restored as it stands at present. The party were next courteously given an opportunity of seeing the remains of the old town stocks, now in charge of the Town Clerk. They took a deep interest in this remnant of former times, but were not satisfied that it was as properly cared for as it might be. Therefore, on the motion of Mr. William Gray, M.R.I.A., seconded by Mr. Foster, it was proposed that steps should be taken to have the stocks sent to the Belfast Municipal Museum, to be there taken charge of by the Municipal Library Committee, properly mounted, and displayed. This resolution was passed, and referred to the Club Committee for action. The geologists of the party next examined a glaciated surface which is exposed in a disused quarry, which has been used for road metal and clay for brick-making. The lower part of the quarry is excavated in a grit of Ordovician age, and the upper part in boulder-clay. The surface of the grit is striated, the markings running from N.N.W. to S.S.E. Passing the old castle, said to have been built about 1607, the party proceeded to visit the great Mount of Dromore. This fine

specimen of a rath is nearly 600 feet in circumference, 60 feet in height, with a diameter at the summit of 55 feet. It is surrounded by a rampart and battlement. The trench, which terminates on a precipice, has two branches embracing a square fort of lower elevation 100 feet in diameter. The Mount must have been in early times a place of great importance. The name of the townland on which it stands—Ballymaganlis—*Baile-na-ceann-lios*—means the place of the chief rath. Twenty minor forts or mounts in two lines, half-moon shaped, still exist and surround it. The party was next conducted by Mr. Dickson to the Bishop's Palace, built in 1781, and occupied by the Bishops of Dromore up to 1842. On the way to the Palace the old Holy Well of St. Colman was passed, by the side of which is a stone with a hole in it, supposed to have been made by the crozier of St. Colman. The water which collects in this hole is still used locally as a cure for warts. A burial mound which has recently been opened was next inspected. The mound, which stands near the Lagan, presents a compactly-shaped dome. On being opened a few years ago a large stone slab was found resting on low walls of rubble. Under the slab a few bones, including part of a human skull, were discovered. The body had evidently been laid on the ground, and cremation had not been practised. The botanists of the party went down the banks of the River Lagan and explored the Gillhall Demesne, with its magnificent beech and lime trees. The plants noted included *Cornus sanguinea*, *Euonymus europaeus*, *Carex acuta*, *Asplenium Trichomanes*, *Geranium Phænum*, *Allium ursinum*, *Epipactis latifolia*, *Chelidonium majus*, *Listera ovata*, and *Arenaria trinervia*. Owing to the dryness of the day collectors of invertebrates were at somewhat of a disadvantage, and only a few common species of Coleoptera, Lepidoptera, and Mollusca were noted. Of the terrestrial Isopods four species were observed, one of which was the pigmy Woodlouse *Trichoniscus pygmaeus*, which has only recently been added to the Irish fauna, the first specimen having

been found in County Down. As the afternoon drew to a close the members and friends reassembled at Mrs. Jardine's Temperance Hotel, where tea awaited them. After tea a short business meeting was held, Mr. N. H. Foster, M.B.O.U., in the chair. A cordial vote of thanks was passed to the Rev. J. W. and Miss Cooke for so kindly exhibiting to the party the various articles of interest in the Cathedral, and one new member, Mr. Rankin, was elected. The party returned to Belfast by various trains during the evening.

PARKMORE.

On Saturday, the 25th June, a party of fifty-five members and friends visited the upper end of Glenariff. The party, which was conducted by Mr. W. J. Fennell, F.R.I.B.A., travelled by the 9-15 train from the Northern Counties Railway Station in specially reserved carriages, and on reaching Parkmore drove to Glenariff Lodge, where they were received by Miss Dobbs, who acted as conductor of the party for the remainder of the day. Near its head Glenariff divides into two smaller glens. One is the well-known Parkmore Glen and the other Glenariff proper, a wild and lonely glen, through which a mountain torrent foams, in "cataract after cataract to the sea." It was up this glen that the party were led by Miss Dobbs, following the course of the stream, till Black Waterfall was reached. Here lunch was partaken of, and the walk was continued along the crest of the mountains to Deisceart, on the summit of which a halt was made. All met for tea as the guests of Miss Dobbs at Glenariff Lodge. After tea a business meeting was held on the lawn, the Vice-President (Mr. W. J. C. Tomlinson) in the chair. Mr. Tomlinson alluded to the loss the Club had sustained by the death of Mr. S. A. Stewart, F.L.S., and to the generally expressed desire that a suitable memorial should be erected. Mr. William Gray, M.R.I.A., moved a vote of thanks to Mrs., Miss, and Mr. Dobbs for their kindness in giving the Club the opportunity of exploring the glen and for their hospitality.

to the Club. The motion, which was seconded by Mr. W. J. Fennell, was passed with hearty acclamation, and was replied to by Mrs. Dobbs. Two new members—Miss Minnie Murray and Mr. J. A. S. Stendall—having been elected, the meeting terminated. The party then drove to Parkmore Station and entrained for Belfast, which was reached about 8-10 p.m.

The geologists had an opportunity of studying the mineral contents of the aluminous and iron ore beds. Basalts of both the lower and upper series were represented, as evidenced by the aluminous and iron ore beds of inter-basaltic age. The woodland species of Land Mollusca were well represented, *Hygromia fusca*, *Acanthinula lamellata*, *Limax arborum*, and *Acicula lineata* being taken in the glen below Glenariff Lodge. Freshwater species were almost absent, but *Ancylus fluviatilis* was plentiful in several of the small streams to an altitude of about 1,000 feet. On the upland bog the only species seen were *Limnaea truncatula* and a *Pisidium*. No species of Mollusca was, however, taken in the lakes which lie on the peaty area, though three species of freshwater beetles were found. One, *Deronectes griseo-striatus*, being new to Ireland, while *Agabus arcticus*, which also occurred here, was an addition to the Antrim fauna. The ground covered was of special interest to the botanists, for Glenariff has long been noted for the richness of its flora. Many plants that are distinctly rare in our districts are to be found there, and the district explored was new ground to most of our local botanists. The Vice-President's prize for the collection of fifteen of the rarest plants found on this excursion was won by Miss S. Blackwood, who handed in a fine collection. The collections handed in included the following plants:—*Lycopodium alpinum*, *L. Selago*, *L. clavatum*, *Habenaria conopsea*, *Orchis incarnata*, *Listera cordata*, *Solidago Virgaurea*, *Hieracium stenolepis*, *H. anglicum*, *Gonium boreale*, *Arenaria verna*, *Empetrum nigrum*, *Antennaria dioica*, *Drosera anglica*, *Asplenium Trichomanes*, *Selaginella selaginoides*, *Neottia Nidus-avis*, *Saxifraga hypnoides*, *Vaccinium Vitis-Idaea*, and *Polypodium Phegopteris*. The

prize for the best set of photographs illustrative of the geology of the district visited at the previous excursion offered by the Vice-President was won by Mr. D. J. Hogg.

ARMAGH.

On Saturday, the 2nd July, a party composed exclusively of members of the various Sections visited Armagh district.

The Geological Section was well represented on the excursion. Mr. Robert Bell acted as conductor. The route travelled was north-west to the Carboniferous limestone quarries at Carrickaloughran, then south-west to the Navan quarry, from which the return was made to the Cathedral city.

At Carrickaloughran, the limestone, which belongs to the lower series is no longer worked. The present interest of the quarry is a huge dyke of basalt locally called "whinstone," over 20 feet in width, which rises almost vertically through a fissure in the limestone beds, cutting the nearly horizontal bedding planes of the latter almost at right angles. The basalt is fine-grained and exceedingly hard. It possesses sub-columnar structure in the mass, and is quarried to the depth of almost 50 feet for road-metalling purposes. In the same quarry there are three other dykes of smaller dimensions. The intrusion of the basic igneous lava has produced very varied metamorphic results in the limestone rocks into which it was forced. The limestone is covered with a variable depth of rubbly drift and boulder-clay. Evidences of ice action are clearly apparent in the glaciated condition of the surface rocks. Many fossils were collected both here and at Navan.

A short distance south-west of the Carrickaloughran quarry is an extensive low-level esker-like deposit of sands and gravels. This has been extensively worked locally for building sand. Some interesting sections are exposed in the pits, from the clayey sands in one of which a member of the club, Mr. Joseph Wright, F.G.S., recently obtained a number of foraminifera. The clay bands

which yield these foraminifera are intercalated with laminated and current-bedded sands, overlying the whole being a series of gravelly and pebbly beds, all indicating water action and current-bedding. From these pebbly beds one member obtained a shell fragment of Arctic type. An examination of 100 pebbles or erratics, chosen almost at random from a small section, yielded the following result:— Carboniferous rocks, 65; basalt, 24; mica schist, 6; quartzite, 4; and flint, 1. It is clear then that though the majority of the erratics here are local, yet there is a fair proportion of “travelled” rocks in the deposit. Adjoining the sand pits is a rounded hill or drumlin of boulder-clay.

At Navan quarry the limestone is still extensively worked, but not nearly so much for the purpose of building stone as formerly. The stone is usually of a light grey colour, though some of the deeper beds have a purplish tint. Both here and at Carrickaloughran several of the beds exhibit a sandy appearance and texture. All the beds contain fossils, fish remains being most prevalent at Navan. The floor of the latter quarry, which is from 50 to 60 feet from the surface level of the top, is composed of hard crystalline masses of coral, the prevalent type being *Lithostrotion basaltiformis*.

The Botanical members of the party were well pleased with the result of their afternoon's ramble. As they were few in number they accompanied the geologists, rightly conjecturing that the rough, uncultivated ground in the vicinity of the quarries and sand-pits would prove interesting from the floristic standpoint. In this they were not disappointed. *Ranunculus trichophyllus*, was seen in a disused quarry at Carrickaloughran. On the neighbouring esker, the Pyramid Orchid, *Orchis pyramidalis*, grew in the greatest profusion. This orchid is extremely rare in the north-east, and was quite new to some of the members. It was likewise seen in dry pastures in another locality, and also near Navan fort. A rare clover occurred in abundance over the same area. This was *Trifolium medium*, a very handsome plant.

Among other orchids seen were *Habenaria chloroleuca* and *H. conopsea*. The latter was seen in two places on the terraced slopes overlooking Longnashade, a hitherto unrecorded locality. The little lough just mentioned was fringed with *Phragmites communis* and *Menyanthes trifoliata*; and in the deeper water both the White and Yellow Water-lilies were in full bloom. *Carex paniculata* and other interesting Sedges were collected in the marsh about the lakelet. The visit to the ancient royal stronghold of Emania, now known as Navan fort, yielded the best botanical find of the day, namely the Wood Vetch, *Vicia sylvatica*, not hitherto recorded from the county. Other notable plants seen were *Carduus acanthoides*, *Lamium album*, *Juncus glaucus*, and *Briza media*, in all cases so common as to be characteristic of the area visited. On the return to Armagh, by the old road between Navan and St. Patrick's Holy Well, the following were observed—Flower of Dunluce, *Geranium pratense*, Greater Celandine, Comfrey, and Greater Periwinkle, all being apparently garden escapes.

During the afternoon the members of the Zoological section worked with an ardour which not even the heavy showers of rain could damp. The ornithologists of the party reported that no rare species of birds were observed during the afternoon. Most interesting to some of the members was the sight of a family of Long-tailed Tits feeding on and flying about some willows. A nesting colony of Sand-Martins was observed in the boulder-clay at Carrickaloughran quarry. Here it was noted that the nesting holes of these birds were of much smaller diameter than usually obtains in the sand-banks generally resorted to by this species.

About forty species of land and fresh water shells were noted, including the spotted variety of the great slug, *Limax maximus*, a very large form of *Arion ater*, var. *rufa*, and many *Milax gagates*. The rare *Arianta arbustorum* known to live on Navan Fort was not seen on this visit. How far this was due to the presence of a rival snail hunter on the Fort in the shape of a Hedgehog it was difficult to say. *Valtonia pulchella* was noted at Carrickaloughran

quarries. In the lough below Navan Fort fresh-water species were abundant. Among others, very large specimens of *Acroloxus lacustris* were collected from leaves of water-lilies, and fine specimens of *Planorbis fontanus* and *P. contortus* were also noted, with both species of *Valvata* and *Limnæa stagnalis*. All the common species of Woodlice were observed, and specimens were obtained of that beautifully marked and somewhat rare species *Porcellio pictus*, which had not previously been noted in the northern portion of the county. In this group, however, the best finds of the afternoon were *Trichoniscus pygmæus* and *Armadillidium vulgare*, both these species being additions to the known fauna of County Armagh. The finding of a False Scorpion, *Chthonius rayi*, also proved a new county record.

One cause for regret during the afternoon was that the Archaeological Section of the Club was so poorly represented. The excursion was primarily arranged on their behalf so as to afford an opportunity of visiting a centre of such great archaeological interest, yet none of the rank and file of the Section were present when the site of Emain Macha, the ancient palace of the Kings of Ulster, was visited.

After a thorough examination of this site of former greatness the party made its way back to Armagh, where they found an excellent tea waiting them at the Imperial Hotel (Loudan's). After tea a visit was paid to St. Patrick's Cathedral, permission to do so having been most courteously granted by the Very Rev. the Dean. The pleasure of this visit to the Cathedral was undoubtedly greatly enhanced by the presence of the Rev. Charles Faris, M.A., Vicar Choral, who very kindly conducted the party over the Cathedral, pointing out the various objects of interest, the numerous fine marbles and brasses, the old stone cross, and the flags hung in the Cathedral. After cordial thanks to Mr. Faris for his much appreciated services, the party strolled through the more interesting parts of the town until train time. Belfast was reached shortly after midnight, all agreeing that the outing was decidedly one of the best of the season.



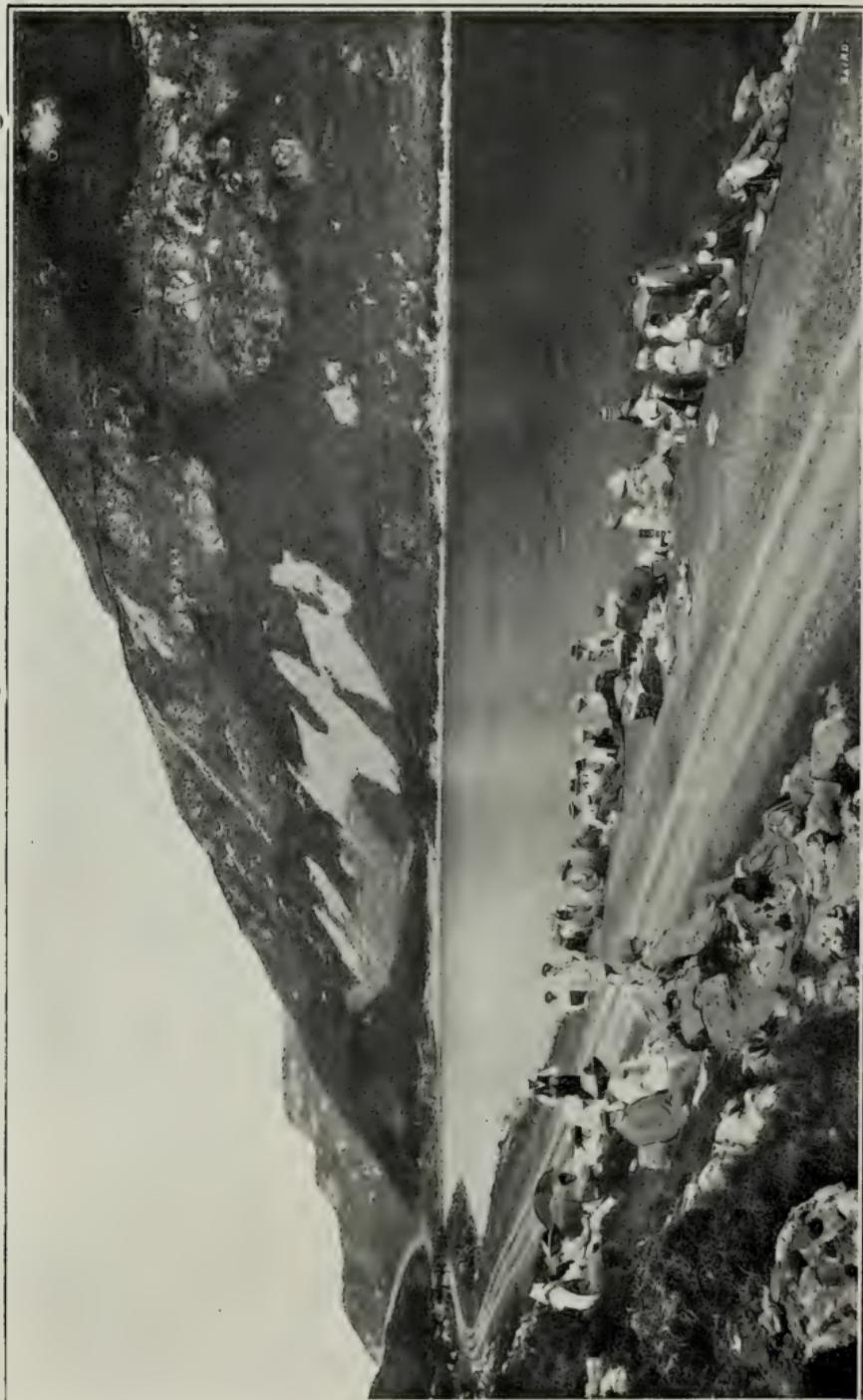


PHOTO.

Lough Salt and Loughsalt Mountain.

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R. J. WELCH.

ROSA PENNA I.F.C.U. CONFERENCE.

The Sixth Triennial Conference of the Naturalists' Field Clubs of Ireland was held at Rosapenna, County Donegal, from the 8th till the 14th July.

The party, which consisted of forty-seven members and friends of the various Clubs, comprising three from Limerick, twelve from Dublin, and thirty-two from Belfast, assembled at the Great Northern Station, Belfast, on Friday morning, the 8th inst., in time for the 7-30 train. Travelling in specially reserved carriages, the journey was quickly and pleasantly made to Letterkenny. Lunch was taken here, and the members had an opportunity of visiting the new Cathedral of St. Columba before resuming the journey to Creeslough. On reaching Creeslough, cars were found waiting, and a short drive brought the party to Doe Castle, which stands at the head of Sheephaven Bay, in a strong position, surrounded by water on three sides. Now in a ruinous condition, the date of its erection is lost, but it was apparently in existence in 1440. At one time the stronghold of the MacSwyne-na-Doe, it latterly passed through the hands of several owners, until towards the close of last century it ceased to be a residence. After the castle was inspected the whole party met under the trees in front of the castle, where a delightful tea was served. The graveyard near the castle was also visited in order to give the members an opportunity of seeing the inscribed stone slab built into the north wall. Remounting cars, the route was continued along the shores of Sheephaven, and Rosapenna Hotel, the headquarters of the Conference, was reached in time for dinner. A walk over and along the headlands to the west of the bay, a visit to one of the Muslac Caves, a brief examination of an interesting shell cove, and a glance at the famous prehistoric kitchen-middens of Rosapenna brought an enjoyable, if fatiguing, day to a close.

Saturday morning dawned fair, and cars were mounted at 9-30 a.m. On leaving the hotel, they took the road northward, up

Rosguill Peninsula towards the heights of Ganiamore. About a mile and a half from Melmore Head the road ended, and for a short distance the drive was continued across the low-lying green sward of Tranarossan. Cars were then left, and a climb round the shoulder of the hill brought the party in sight of the Murder Hole, a gap in the line of sea cliff, half-filled with drifting sands. A return was made to Tranarossan about one o'clock for lunch, and in the afternoon the more energetic members set out for Melmore Head, while others spent the time in more leisurely ways, examining the prehistoric hearths of Tranarossan. On the summit of the head is an old watch tower—one of the line of signal towers built to guard the coast at the time of the Armada, and repaired about the time of the Napoleonic scare.

In the late afternoon a return was made by the route covered in the morning, a halt being made to visit the old church of Mevagh, which dates from the eleventh century, and shows in the slender lancet, which pierces the east gable, an interesting example of an arch formed by small flat stones. On the south side of the church stands the old stone cross of Mevagh—a huge unornamented monolith. Close to the cross is the gallaun or standing-stone—pagan and Christian symbol side by side. On the standing-stone formerly rested a famous wishing-stone, now lost and replaced by a substitute, the efficacy of which was thoroughly tested by the members of the party. Rosapenna Hotel was reached in time for dinner, after which the time was pleasantly spent in discussing the finds of the day.

There was no official programme for Sunday, the 10th, and the members spent the day in various ways. A large party drove to church, others spent a long day in distant Glen Veagh, whilst many walked to Mevagh in the afternoon to inspect the ring-inscribed rocks there, and returned via Downings Bay, where tea was served.

Monday, the 11th, proved the finest of a series of fine days, and immediately after breakfast cars were mounted for a long and

most enjoyable drive to Lough Salt, which lies high up among the mountains to the south of Rosapenna. Some time was spent exploring the neighbourhood and all assembled on the shores of Lough Salt, where an excellent luncheon was served. Later cars were remounted, and the drive continued to the wild granite-strewn Gap of Barnes-beg, where tea was dispensed by the wayside. The cars then turned northward along the wooded shores of Glen Lough, lying among brown bogs, flecked with the white of the canavan, and brightened by the red-purple of bell heather—certainly one of the most lovely spots visited on the excursion. Soon afterwards the hotel was reached. In the evening a party of archaeologists continued the exploration of the kitchen-middens in front of the hotel, among the most interesting finds being a stone disc and several bones of the Great Auk.

On Tuesday morning all rose early and walked across the sands to Downings Bay. The steamer Cynthia, specially chartered to convey the party, left Downings Pier punctually at eight o'clock, and steamed down Sheephaven towards the Atlantic. In a short time Horn Head, one of the finest headlands in Europe, became visible, towering nearly a thousand feet sheer above the sea. Here the steamer slowed down in order to give the passengers a better view of the great bird colonies which inhabit the rocky ledges of the cliffs. No syren was sounded to make the birds take to flight. It being the nesting season, the sudden disturbance of the parent birds would have caused thousands of the young ones to be pushed from the narrow ledges and dashed to pieces on the rocks below. Steaming north-westward the vessel left the great cliffs of the Horn behind, and suddenly entered a bank of fog, which shut out the long-hoped-for view of the Donegal highlands from the sea. The first intimation that the party was nearing its destination was the sound of voices shrilling through the mist. Uncertain glimpses of a rocky shore were seen, and the steamer stood by till a fishing boat came through the mist and hailed her in a quaint mixture of Gaelic and English. Armed with collecting bottles and many

strange weapons surely never before seen on Tory, the invading force of field naturalists was rowed ashore in the fishing boat. Here it was found that the landing had occurred at a small cove—Port Doon—on the east of the island. The weather kept pleasantly calm and warm throughout the visit, but unfortunately the fog did not lift so that the impression gained of Tory was of a tract of stone-strewn barren land, measuring three miles by one, with a few patches of cultivation and three small marshy lakes, the whole being surrounded by steep cliff walls dropping sheer into soft billows of mist, which broke soundlessly against them. By listening intently a faint splashing of waves might be heard against the foot of the cliffs far below, but the island seemed rather some strange lost land of legend than an ordinary island of the sea.

The eastern promontory of the island which was first explored proved of interest. Immediately to the right of the landing place was the height known as Balor's Castle. Further along the peninsula and protected by a line of entrenchments thrown across a narrow neck of land were the remains of a circular prehistoric fort. These entrenchments have an interest of later date, for it was behind them that O'Donnell took his last stand in 1608 after the flight of the Earls, and here occurred a massacre, the story of which will not bear retelling. Almost at the eastern end of the island is the wishing stone, on the top of a natural pillar of rock ; its virtues were tested by some of the party, but no results have yet been recorded. Returning to the landing place, and hastily disposing of the excellent lunch found waiting there, the members proceeded westward across the island, passing East Town, which consists of some dozen cottages, comfortable and weatherproof, if uninteresting and ugly, which have been erected by the Congested Districts Board. In passing, it may be mentioned that one finds on all sides of the island the friendliest of attitudes toward the Board. Nor is this to be wondered at. A lace school for the women, better boats for the fishers, a nurse, and greatly improved dwellings are only a few of the numerous benefits which it has



Tau Cross, Tory Island, and Seaweed drying for Kelp.

PHOTO.

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R. J. WELCH.



bestowed on the islanders. The islanders themselves are a fine stock, of good physique, and often distinctly handsome. Their voices strike a stranger as somewhat peculiar, musically soft and mellow in the lower notes, but in the upper notes having all the shrill wildness of a sea-bird's cry. Even the children show a grave dignity of manner, and quite the prettiest sight of the day was the graciously gentle way in which they accepted gifts of rosaries from a staunch Presbyterian of the party.

A short walk along the one road of the island brought the party to West Town, the only port of the island. The houses of this little town are an instructive contrast, one-half of them being the ugly comfortable Districts Board cottages, the others low badly-thatched dwellings, hardly better than hovels, with great stagnant middens in front of the doors. Among this collection of dwellings stand some of the most interesting island antiquities of Ireland. Near the harbour, and mounted on a platform of rude stones, is the famous Tau Cross. The peculiar type of the cross warrants the suggestion that it may have been pre-Christian in origin, but it was undoubtedly consecrated from very early times.

Near to the cross is the Cloig-teac, or Bell Tower, the erection of which is attributed by some to St. Columba. It is interesting as being one of the smallest Round Towers known, a fact probably rendered necessary by its exposure to the great gales of the Atlantic. Immediately in front of the Round Tower a number of interesting fragments of ancient stone sculpture have been built into a square altar-like structure known to the islanders as St. John's Altar. These fragments include two stone coffin slabs, showing remains of Celtic ornamentation; a trough-like hollow stone, hardly as deep as a coffin; a curious circular stone, evidently the base of a cross; several sculptured stones, and the central portion of a cross on which is carved a human figure, which may represent either St. Columba or St. Ernan. On the altar are several rude stone vessels. Near the tower is the Abbey enclosure, or Rath Finian, which has been attributed to St.

Columba, but, according to the Four Masters, was founded by St. Ernan. It is to be regretted that the single arch described as standing in 1845 by Getty has entirely disappeared.

Further to the west on the outskirts of West Town stands the Murrisher, or Church of the Seven. Of this small building, which stands on a kind of platform, little remains except the western gable. Its walls are three feet in thickness, and internally it measures about eleven by eight feet. At the east end a rough stone altar is built, but this shows some slight evidence of more modern work than the rest of the building, which may date from the sixth century. A short distance from the Murrisher is the Nun's Grave, about which many strange traditions are told. A little soil from the grave is still carried in each fishing boat setting out from West Town as a protection from shipwreck. Near the western end of the island are a number of very ancient graves. One, from which the surrounding mound of earth had weathered, showed a stone coffin or kistvaen.

The day passed all too quickly for the band of industrious naturalists on the island. Punctually at 5.15 p.m. the last boat-load was rowed to the steamer, which lay out amid the mists. Here tea was waiting, and was thoroughly enjoyed as the steamer cautiously felt its way to the mainland. The mists gradually grew denser, and when land was at last sighted it was not possible to locate accurately the position of the vessel. The anchor was cast and all made ready for a night at sea. The experience was not, indeed, an unpleasant one. The steamer lay in perfect calm, in a land-locked bay, well out of the track of other vessels, and the night was warm, so that danger and discomfort were reduced to a minimum. Supper was served about ten o'clock. Many of the party sought sleep in such comfort as could be found below, while the blither spirits organised a delightful impromptu smoking concert on the upper deck.

In the "wee sma' oors ayont the twal" the concert ended, and nothing was heard save the faint lip-lipping of the water against

the ship's sides, and the incessant eerie crying of the sea-birds. Morning broke slowly and brought with it the last offering of the commissariat department—some lumps of loaf sugar! Just as the hungriest members of the party were discussing the advisability of serving up a certain stout individual on toast, the anchor was weighed, and a short sail through the lifting fog brought the ship to Downing's Pier. Here cars from the Hotel met the party, and soon all were sitting at breakfast discussing an adventure which had been met with the most commendable good humour by all concerned.

So far from being fatigued by their experiences were the party, that, after a lunch at midday, all set out for a drive up Mulroy Bay to Cratlagh Woods. After passing Carrigart, the beautiful coast road affords fine views of a characteristic inlet due to the submergence of a valley system. The party halted at the famous Bunlin Waterfall, and separated to pursue natural history work in the beautiful woods of Cratlagh, meeting again at the waterfall for tea. After tea, the drive was resumed over the same route to Rosapenna. Dinner finished with, some of the more interesting finds made during the week were exhibited, and a conference was held—Mr. Robert J. Welch, M.R.I.A., President B.N.F.C., in the chair.

After a few introductory remarks Mr. Welch called on Mr. R. Lloyd Praeger, B.A., M.R.I.A., Dublin, who alluded in feeling terms to the loss sustained by the Field Club Union by the death of Mr. S. A. Stewart, F.L.S. Mr. Praeger spoke of his early association with Mr. Stewart, and his keen sense of personal loss.

The Rev. Canon Lett, M.A., Loughbrickland, described his work among mosses and fungi during the excursion. In this he had been assisted by Mr. Glover, Belfast. Canon Lett made a special appeal for workers.

Mr. A. W. Stelfox, Belfast, gave a brief account of the work done among land and freshwater shells during the week. He referred, in particular, to the various species found on Tory Island,

and to locally extinct species found on Rosapenna sand-dunes. Mrs. Bernal, Tipperary, moved a vote of thanks to Mr. and Mrs. Manning, of the Rosapenna Hotel, for the unfailing kindness and courtesy accorded to the party during their stay. The vote, which was seconded by the Rev. Sydney Smith, West Hartlepool, was passed by hearty acclamation, and was suitably responded to by Mr. Manning.

Mr. R. Lloyd Praeger, B.A., spoke on the flora of the district visited, alluding to the interesting records made, and to the great variation in types of growth.

Mr. R. J. Ussher, D.L., M.R.I.A., M.B.O.U., Waterford, described an interesting find of Great Auk's bones in the kitchen-middens. He also exhibited a clutch of eggs of the Peregrine Falcon taken on Tory Island.

Mr. Ussher then moved a vote of thanks to Messrs. R. Ll. Praeger, R. J. Welch, and A. W. Stelfox, in whose hands the entire arrangements of the excursion and conference had lain. The vote, which was seconded by Mr. W. F. de Vismes Kane, D.L., M.R.I.A., was most enthusiastically passed. The three gentlemen replied. A new member—Mrs. Patchell—having been elected by the Belfast Club, the conference ended. The party broke up on the following morning, returning by different trains to their various destinations.

The scientific work done on this excursion is fully detailed in the *Irish Naturalist* for September, 1910.

GREYABBEY AND BALLYWALTER PARK.

Despite the inclement weather which prevailed on 30th July, a good party of members and friends travelled by the mid-day train from the County Down Railway Station to visit Greyabbey and Ballywalter Park. The party travelled in specially-reserved



Old Lint-Wheel or Flax-Bruiser, Mulroy Bay.

PHOTO.

S. WEAR.



Roche Moutonnée at Melmore Head.

PHOTO. (Reproduced by permission of Editors *Irish Naturalist.*) S. WEAR.



carriages, and the Manager of the County Down Railway most courteously made special arrangements to have the mid-day express stopped at Newtownards. From Newtownards the party drove to Greyabbey, passing on the way through the lovely demesne of Mountstewart. At Greyabbey all alighted and visited the old abbey ruins, on which Mr. W. J. Fennell, F.R.I.B.A., gave an interesting informal address. After inspecting the ruins thoroughly, the party adjourned to the tea house, and fortified themselves against the inclement weather before proceeding to Ballywalter Park. Fortunately the rain now ceased, and it was under very pleasant conditions that they explored the beautiful grounds and gardens, most courteously thrown open to them by Lady Dunleath. After the gardens had been visited, Lady Dunleath joined the party, and very kindly led the way to her aviaries, where a magnificent collection of rare and exotic birds is kept under ideal conditions. It speaks volumes for the perfect surroundings that on Saturday the Weaver-birds were busily making their curious nests, and a tiny Virginian Nightingale was hatched. With characteristic consideration Lady Dunleath had delayed the feeding of the birds until the Field Club arrived, so that they were seen to special advantage. The drive was continued to the Dunleath Arms, Ballywalter, where, after tea, a short business meeting was held—Mr. Fennell in the chair. It was announced that the prizes offered for the best collections from Tory Island had been won by Misses M'Connell, Dundee, and Agnew. A very cordial vote of thanks was passed to Lady Dunleath for so kindly allowing the party to visit Ballywalter Park. A vote of condolence was passed to Sir Valentine Blake, Bart., and the meeting terminated. A pleasant drive round the coast brought the party to Donaghadee in time for the 7-35 train for Belfast, which was reached in due course after a most enjoyable outing.

KNOCKDHU AND SALLAGH BRAES.

On 13th August a party of thirty-seven members and friends had one of the most enjoyable excursions of the season to Knockdhu and Sallagh Braes. The party, which was conducted by the President of the Club (Mr. Robert J. Welch, M.R.I.A.), travelled to Larne by the 9.5 a.m. train in specially reserved carriages. On reaching Larne they drove along the celebrated Antrim coast road as far as Ballygally Castle, where the road turns inland to Knockdhu. Lunch was taken on the wild slopes of Knockdhu, and then the party had five hours at their disposal to explore the magnificent amphitheatre of the Sallagh Braes. The geological features of the great amphitheatre of basaltic cliffs known as Sallagh Braes are such as are perfectly familiar to all students of local geology. This crescent-shaped escarpment is about two miles in length, and attains an almost uniform elevation of from 800 to 900 feet. Rough talus slopes extend from the base of the escarpment proper to the farm lands and boggy pastures in the lower ground to the east. The Cretaceous rocks outcrop at various places from beneath the overlying tertiary basalt. Above Killyglen, at the south end of the Braes, the Chalk is a prominent feature. The basalt plateau above and west of Sallagh is overlaid with a widespread accumulation of peat. At Knockdhu, the northern arm of the Braes, striking evidence is afforded of the effect of land-slips and subsequent weathering in producing the existing physical features of the district. The geologists of the party spent a busy day, and an interesting list of rare accessory minerals was found in the basalts, among which Faralite, Natrolite, Chabkite, Chabasite, Anacite, Analcite, and Apophyllite may be mentioned, while a fine piece of tube Amygdaloid was also found. It was to the botanists, however, that the day gave the finest opportunities. The botanical interest of Sallagh Braes lies in the vegetation of the cliffs themselves and in the gullies carved out of the face of the escarpment by stream action, and most of the

rarer plants of the Antrim basaltic escarpment are to be found there. The following list was handed in by the botanists:—*Epilobium angustifolium*, *Rubus saxatilis*, *Dryas octopetala*, *Arenaria verna*, *Sagina nodosa*, *Vaccinium Vitis-Idaea*, *Empetrum nigrum*, *Pyrola secunda*, *Selaginella selaginoides*, *Solidago Virgaurea*, *Saxifraga hypnoides*, *Hieracium sylvaticum*, *H. stenolepis*, *Juncus bufonius*, *Asplenium Adiantum-nigrum*, *A. Trichomanes*, *Cystopteris fragilis*, *Pinguicula vulgaris*, *Drosera rotundifolia*, and *Cnicus lanceolatus*, a fine colony with pure white flowers. A species of the genus *Polygala*, believed to be *P. grandiflora*, was also taken at Knockdhu. The botanical prize offered on this excursion for the rediscovery of *Pyrola secunda* by the Vice-President (Mr. W. J. C. Tomlinson) was won by Mr. A. W. Stelfox. A good collection of land shells was made during the day, among which the best finds reported were *Acanthinula lamellata*, *Hygromia fusca*, *Pyramisula rupestris*, and *Arianta arbustorum*. The first two of these are species which are almost confined to the British Islands, being only found in one or two adjacent districts of the Continent. The last is a northern and Alpine shell, and it is not surprising to find it in a locality such as the Sallagh Braes, where such a large number of plants with a similar geographical distribution are to be found. The tarn on the moor above the Braes contains five freshwater species—namely, *Limnaea peregra*, *L. palustris*, *Pisidium pusillum*, *P. nitidum*, and *P. subtruncatum*. Five species of Woodlice were taken, of which *Trichoniscus pygmæus* was the only uncommon one. Besides the above-mentioned shells Lough Duff contained several water-beetles, one of which, *Deronectes griseo-striatus*, is an Arctic species of exceeding rarity in Scotland and until recently unknown in Ireland. After an enjoyable day, spent by the majority of the party in most enthusiastic field work, cars were mounted at about five o'clock. On arrival at Larne tea was partaken at the King's Arms Hotel, after which a short business meeting was held. Mr. George Donaldson reported the finding of *Gonepterix rhamni* at Newcastle,

Co. Down. Two new members, Messrs. Tait and Downing, having been elected, the meeting ended. After a pleasant evening spent in Larne and its vicinity, the party returned to Belfast by the 8-20 p.m. train.

PORTRUSH.

The Geological Section visited the Portrush district on 20th August, for the purpose of studying a typical section in Dr. Hume's "Northern Division" of our Cretaceous area, an exposure of columnar basalt, and the indurated lias at Portrush. Mr. Tomlinson, chairman of the Section, acted as field conductor. Leaving Belfast by the 12 noon express train, the party arrived in Portrush at 1-40, and proceeded by electric tram to the "White Rocks." Here the Chalk cliffs have been worn into beautiful and varied forms—sea-stacks, arches, and caverns giving rise to very striking scenery, and also affording interesting and instructive studies in erosion. A few dark basic dykes stand out in striking contrast, and isolated blocks of basalt may be seen in the cliffs, possibly projected into the Chalk prior to its complete induration. On the coast, just covered by the sea, a member pointed out the spongarian layers, characteristic of the "Northern Division." Fascinating as the sea cliffs proved, only a limited time could be spared for their study, and the party soon followed the conductor to the large quarry by the roadside. Here he drew attention to the remarkable V-shaped cutting of about 60 feet in the upper surface of the Chalk. This hollow is filled with spheroidal basalt, and the question was discussed as to whether the lava had flowed in from above or was the old neck of a crater, but it was not possible to obtain sufficient evidence to decide the point. The Chalk quarry with its numerous bands of flint was then examined, the deep red colour of the latter noted, and also the shattered appearance of the hard and splintery Chalk. Fossils were searched for, and the following were found:—The phragmocone of a

Belemnite, also specimens of *Belemnitella mucronata*, *Ananchytes gibbus*, *A. ovatus*, the cast of a Brachiopod, a fragment of *Inoceramus Crispi*, and fragments of Sponges. The beautiful flow structure exhibited by zeolitic bands in certain blocks of basalt was noted, and the following minerals were obtained:—Chabazite, Analcine, Calcite, and fibrous Natrolite.

From the Chalk quarry the party proceeded to Craigahulliar quarry, south-east of Portrush, where a beautiful section in the upper basalt is exposed, showing a remarkably fine example of columnar basalt passing upwards into tabular basalt. The columns are slightly curved, but as perfect as those of the Giant's Causeway. At first sight the difference between the columnar and amorphous basalt gave the impression of two different flows, but on closer examination no breach of continuity could be observed, and the great difference in structure seemed to indicate only a difference in the rate of cooling of the upper portion of the sheet.

On returning to Portrush, the indurated Liassic beds were next examined, under a heavy downpour of rain. The best exposure is on the north-east side of the peninsula, nearly in front of the Midland Railway Hotel. Here the impressions of Ammonites were obtained, but the rock is so hard and splintery they are difficult to extract. The great alteration in the Liassic shales is due to the intrusion of the Tertiary basalts in a molten state, with the result that the shales became so baked and hardened as closely to resemble the invading rock.

The party returned to Belfast by the 8 p.m. train, after enjoying an excellent tea at the Whitehouse Central Hotel. One feeling of regret alone was felt, that the celebrated Portrush rocks, instead of being preserved as a natural museum, are at present invaded by rubbish, and partly effaced by advertisements.

CARRICKFERGUS.

On Saturday, the 27th August, a party of members and friends visited Carrickfergus. The party, which was conducted by the President (Mr. R. J. Welch, M.R.I.A.), travelled by the 1-50 p.m. train to Carrickfergus, and on their arrival visited the Castle, to which they were admitted by kind permission of the authorities. After inspecting the entrance and the portcullis, they ascended the tower, visiting the armoury. From the top of the tower a fine view was obtained of the lough and its encircling hills. Leaving the tower, the outposts and the tiny chapel were visited. The Castle, which was built by Hugh de Lacy, stands on a basaltic dyke on the shore. It has had an unbroken line of military occupation since its foundation, and has been the scene of many historic events. The Castle had more than an antiquarian interest for the party on the occasion of this visit. Several snails were observed climbing its walls, including *Agriolimax agrestis*, *Limax arborum*, *Helix aspersa*, and *Pupa cylindracea*; and the botanists collected fine specimens of *Parietaria officinalis*.

The party next visited the Church of St. Nicholas, through which they were most courteously conducted by Dr. Brierly. The church is an interesting example of how a great church by successive alterations may be changed to a smaller and debased structure. Fragments of its former beauties were shown to the visitors in the Norman columns which have been recently discovered built into the walls of the nave, the work of restoration having been most admirably done by Mr. S. P. Close, A.R.H.A., architect. The stones brought from Woodburn Abbey by Mr. F. J. Bigger, M.R.I.A., were also examined. After being photographed, the party proceeded to the stone on which William III. is said to have landed in 1690 to commence his operations against James II.

A very excellent tea was found waiting them on their arrival at the Y.M.C.A. Cafe, after which a short business meeting was held—the President in the chair.

Time did not permit of a visit to the estuarine deposits, in which so many fossil hazel nuts have been discovered by various members of the Club—Mr. William Gray, the late Canon Grainger and S. A. Stewart—so the remainder of the evening was spent in visiting the various points of interest in the quaint old town which was old and many-memoried when Belfast was yet a village. The return was made to Belfast in the evening after a quietly pleasant afternoon amid historic surroundings.

MAGHERALIN.

An excursion of the Geological Section took place on the 3rd September, to study the magnificent Chalk sections of Magheralin, and to examine the boulder-clay of the district. The members left Belfast by the 1-50 train for Moira, and thence proceeded to the large Chalk quarry about two miles to the southwest, near to the village of Magheralin. Before entering the main quarry, now extensively worked, a cliff about ten feet high of unstratified red boulder-clay was examined. 131 stones were counted; 14 of these were chalk and flint from the subjacent rock; the remaining 117 were erratics, including basalts, dolerites, grits, granites, mica-schists, quartzites, Tornamoney eurite, gabbros, Cushendun Old Red conglomerate, Cushendall porphyry, Lough Neagh clay-ironstone, &c., many evidently derived from N. and N.N.E., but there were also indications of a north-westerly source. An erratic of dolerite lying on the top of the Chalk measured 2ft 6in x 2ft x 1ft 3in. No specimens of Ailsa Craig riebeckite-eurite were found, but on the excursion last year to the Moira district this rock was noted at the Maghaberry quarries, one specimen measuring 12in x 7in x 6in, the largest found in our boulder-clays, except one noted by Mr. Bell a few years ago at

Islandmagee, which measured 16in x 13in x 10in. The very fine sections of "Upper Chalk" in the main quarry were next examined. The apparent depth was estimated at about 70ft, but the upper surface has undergone so much denudation that its original depth could not be judged. Surmounting the Chalk, the boulder-clay appears as an irregular band, varying from 2ft to 20ft in depth. The Chalk is hard, compact, and splintery, and contains numerous flints in horizontal layers from 2ft to 6ft apart, and from which interesting specimens of flint-breccia were obtained. Some very fine "paramoudras," characteristic of the "southern division" of our Cretaceous area, were noted in the cliffs, but they did not form such a striking vertical series as those in the Chalk quarries at Maghaberry. One very large barrel-shaped paramoudra lying on the floor of the quarry measured 35in x 33in x 33in. These curious flints are regarded as fossil sponges, the Cretaceous representative of the recent sponge *Poterion patera*, and are named *P. cretaceum*.

Disappointment was felt that the record of fossils was small, the fossiliferous bands not being worked at present. However, the characteristic zone fossil, *Belemnitella mucronata*, was obtained, also *Rhynchonella plicatilis*, *Ostrea verticularis*, and a few crushed Echinoids. At one end of the quarry a very large basic dyke was noted traversing the Chalk, which in its vicinity is considerably altered. Photographs of the quarry and of the large paramoudra referred to were secured. The party returned to Belfast by the 6-10 p.m. train, having enjoyed a very pleasant and instructive excursion under the able guidance of Mr. Robert Bell, who kindly acted as field conductor.

KILCOAN, ISLANDMAGEE.

The Geological Section had a most interesting excursion on 17th Sept. to Islandmagee to study a typical section in the eastern division of the Cretaceous strata, the Lias near Barney's Point, and

the Glacial deposits of the district. The members left Belfast by the 2-15 p.m. train for Ballycarry, and proceeded on cars to Kilcoan Quarry, on the west side of Islandmagee, about two miles north of Ballycarry. Here one of the finest sections of our Cretaceous rocks is exposed to view. The "White Limestone" with bands of flint at regular intervals attains a considerable height in the quarry, and is surmounted by several feet of red unstratified boulder-clay. In the cutting leading up to it there are, in descending order, fine exposures of "Chloritic Chalk and Sands," "Yellow Sandstone," and "Glauconitic Sands." Mr. Tomlinson, who kindly acted as field conductor, drew attention to the different strata, to the easterly dip of the beds, and to the remarkably fine glaciation of the surface of the Chalk at the top of the quarry. All were soon actively engaged searching for fossils, and good records were made. Those from the "White Limestone" included two very perfect specimens of *Trochus*, also specimens of *Terebratula*, *Porifera*, *Belemnitella mucronata*, and two specimens of the phragmocone of a belemnite. The "Chloritic Chalk and Sands" yielded *Micraster cor-anguinum*, *Pleurotomaria perspectiva*, *Ostrea carinata*, *Semiplana*, *Inoceramus Crispi*, *Spondylus spinosus*, *Rhynchonella plicatilis*, *R. limbata*, *Terebratula carneae*, *T. semiglobosa*, *Camerospangia fungiformis*, *Ventriculites radiatus*, some Pectens, including *P. quinquecostatus*, three teeth of *Lamna appendiculata* and several *Cidaris* spines. No fossils were obtained from the "Yellow Sandstone," but bands of chert were noted; the "Glauconitic Sands" are at present much overgrown, and only yielded sponge casts. At one end of the quarry the boulder-clay has been cleared off the top of the Chalk, and has exposed a fine striated surface. Dr. Dwerryhouse drew attention to two sets of striae running S. 5 degs. W., and E. and W. respectively, thus being almost at right angles to each other. So far as could be made out from the surface, the striae produced from the west were subsequent and superimposed upon those made by the ice moving from the north. The erratics in the boulder-clay were almost entirely of local origin, basalt largely preponderated,

but two boulders of Lias, one of Tornamoney eurite, and one of Fair Head dolerite were noted. Later, on the foreshore between Kilcoan Pier and Barney's Point, a large "erratic" of Tornamoney eurite was pointed out. It is interesting to note that, although not seen on Saturday, large Ammonites have been obtained from the top bed of the Chalk, varying from 12 to 24 inches in diameter.

From the quarry several of the members proceeded to the sea coast to examine the Lias a little south of Barney's Point. A large number of fossils were found, including:—*Lima gigantea*, *L. terquemi*, *Cardinia ovalis*, *C. listeri*, *Astarte gueuxii*, *Cucullaea hettangiensis*, *Ostrea liassica*, *O. acuminata*, *Cerithium semele*, *Ammonites Johnstonei*, *A. Bucklandi*, *A. angulatus*, *Cidaris Edwardsii*, *Pentacrinites basaltiformis*, spine of *Extracrinus briareus*, spines of *Cidaris Edwardsii*, and some worm-casts. It was here, from the *A. angulatus* zone, that Mr. Robert Bell a few years ago obtained interesting specimens of *Discina Holdeni*, on the shell of an *Astarte gueuxii*. The mineral "beekite," which occurs on fossils in the form of dots, rings, and whorls of chalcedony, was on Saturday found on a specimen of *Ostrea semiplana*, and also on one of *Inoceramus Crispi*. Two interesting basalt dykes were noted, one traversing the Chalk in the quarry, and one piercing the "Yellow Sandstone." The weather was perfect, and after enjoying tea in the open air, kindly provided by Mrs. W. A. Green, the party returned to Belfast by the 7-35 p.m. train, much pleased with the results of the excursion.



Winter Session.

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

ANNUAL CONVERSAZIONE.

The forty-eighth Winter Session was inaugurated by a Conversazione held in the Assembly Buildings on 28th October. The assemblage, which numbered three hundred, included the Lord Mayor and party. After tea, the company examined the scientific exhibits displayed on tables in the body of the fine hall, the various exhibitors giving informal lecturettes to those interested. By kind permission of the Lord Mayor, the insignia of the City of Belfast, including the official chain, maces, loving cup, seals, charters of James I. and George II., grant of arms, &c., were on exhibition, and proved a source of much interest.

In the Zoological Section Mr. F. Balfour Browne, M.A., F.Z.S., F.R.S.E., showed a new and ingenious method of storing a working collection of Insects. Mr. George Donaldson's exhibit of British Lepidoptera included *Gonepteryx rhamni* and living caterpillars of Fox Moth. In his collection of rare Irish Woodlice Mr. N. H. Foster, M.B.O.U., exhibited *Metoponorthus melanurus* and *Eluma purpurascens*, two survivors of the ancient Lusitanian fauna which have only been found in the British Isles in County Dublin. Mr. Foster also exhibited maps showing the progress of distributional records of Woodlice in Ireland for the past five years. Mr. W. A. Green, F.R.S.A.I., showed a finely mounted collection of Land and Freshwater Mollusca; Mr. W. F. M'Kinney, Spanish and Australian Shells, and Leaf-insects from Ceylon; and

Mr. H. Lamont Orr, Wasps' nest containing two different species of Wasps. Mr. Robert Patterson, F.L.S., M.R.I.A., M.B.O.U., exhibited a stuffed specimen of the Kea, a sheep-killing parrot from New Zealand, a Grass-snake from Yorkshire, and cases illustrating the development of Butterflies and Moths. Professor Symington, M.D., F.R.S., and Dr. Rankin showed Photographs and Skiagrams of the jaws and teeth of an orang; and Mr. R. J. Welch, M.R.I.A., exhibited Land and Freshwater Mollusca collected during the Rosapenna Conference in July, 1910.

In the Botanical Section Mr. N. Carrothers had a fine series of types of Irish Plants, native and introduced; Mr. W. F. M'Kinney, "wooden pears" from New South Wales and a "vegetable caterpillar" from New Zealand; Mr. W. H. Phillips, dried specimens of British Ferns; Rev. C. H. Waddell, M.A., B.D., some rare Plants from Antrim and Down—an exceptionally interesting collection. Mr. W. J. C. Tomlinson exhibited some mounted Plants from southern Kent and Hants. This exhibit included a number of very rare British Orchids. Mr. G. O. Sherrard (Dublin) showed Microscopic Slides exhibiting American gooseberry mildew and black scab of potatoes as instances of plant diseases caused by Fungi, and a slide of living Eel-worms illustrated animal enemies to plants.

In the Geological Section Mr. R. Bell's prize collection of Zeolites was shown in interesting conjunction with Victorian Zeolites presented to the Field Club by the Director of the National Museum at Melbourne, and exhibited by Miss M. K. Andrews, who also exhibited Rock Specimens and an exceedingly fine set of Fossils from the Ballycastle coalfields, presented to the Club by Mr. W. F. de V. Kane, D.L. Mr. George Donaldson showed Fish Teeth from South American greensand; Mr. Wm. Gray, M.R.I.A., Slabs of Marble from Counties Armagh and Down; Dr. Rusk, Clay Concretions; and Mr. Joseph Wright, F.G.S., Pleistocene Foraminifera from high altitudes in the neighbourhood of Belfast—one of the most interesring exhibits

of the evening. Dr. A. R. Dwerryhouse, F.G.S., showed a series of thin Sections to illustrate the occurrence in rocks of structures due to the solidification of entectic mixtures of their constituents—e.g., quartz and felspar, orthoclase and oligoclase; a large Photograph of the Limestone Cavern at the bottom of Gaping Ghyll, 365 feet down, situated in the flank of Ingleboro', in Yorkshire; some recently-published Geological Maps of Arran and of parts of England and Wales; and a working model of an Air-lift Pump. Mr. J. A. S. Stendall had an exhibit of Radium Nitrate, which excited much interest.

The exhibitors in the miscellaneous section included Miss Elizabeth Andrews, Pottery from Lake Village at Meare, Somersetshire; Flint Implements from Toome bar and the Bann; Flint Implements from kitchen-middens, Les Eyzies, Dordogne, presented to the Club by Mr. F. de V. Kane, D.L.; Early Edition of "Letters on Basaltes of County Antrim," by Rev. William Hamilton, F.T.C.D., printed in Belfast probably about the end of the eighteenth century; "The Giant's Causeway," by W. H. Drummond, D.D., printed in Belfast, 1811. Mr. S. H. Douey, Mr. W. A. Green, F.R.S.A.I., and Mr. R. J. Welch, Photographs illustrating Summer excursions, 1910; Mr. Francis C. Forth, A.R.C.Sc.I., Model Specimens of handrailing with drawings; Mr. W. A. Green, F.R.S.A.I., Implements from Fiji, Pegeen from Dingle Peninsula; Miss Olga Heyn, living Marmoset from South America; Mrs. Hobson, sketch of Ancient Irish Sweat-house near Ballyshannon, by Fred W. Lockwood; Mr. A. B. Morris, Nature Photographs; Professor Symington, M.D., F.R.S., Photographs of megalithic remains at Carnac and other places in Brittany; Miss L. A. Walkington, LL.D., Ancient Hanging and Standard Candlesticks; cam and moulds for dip candles; Mr. Ivan Sutherland's exhibit of Bauxite and Aluminium included the first piece of aluminium produced from Irish bauxite in 1886.

At nine o'clock a lantern display of views, mainly taken on excursions during the Summer, 1910, was given by Messrs. William

Gray, W. A. Green, D. J. Hogg, A. R. Hogg, H. L. Orr, S. H. Douey, and R. J. Welch. Special mention is due to the series of cinematograph films illustrating wild nature shown by Mr. A. R. Hogg.

The President of the Club, Mr. R. J. Welch, M.R.I.A., then addressed the meeting. He expressed pleasure due to the presence of the Lord Mayor at the Conversazione, and extended a welcome to the Delegates from the Dublin Naturalists' Field Club, Messrs. R. Ll. Praeger, B.A., B.E., M.R.I.A., and G. O. Sherrard.

The following new members having been elected—the Lord Mayor (Councillor R. J. M'Mordie, M.P.), and Messrs. Beattie, Holroyd, and Weir—one of the most successful of the Club's many successful Conversaziones terminated.

PRESIDENTIAL ADDRESS.

FACTS ABOUT THE DISTRIBUTION OF SOME
ANIMALS AND PLANTS.

The first meeting of the Winter Session was held in the Museum, on 15th November, when the President, Mr. R. J. Welch, M.R.I.A., delivered his inaugural address. Mr. Welch said:—In a Natural History Society like ours there is always a large proportion of members who take a general, rather than a special interest in the scientific research which the sectional workers may be carrying on. Yet, many of those members may be glad to hear at times a report of the progress made to date in one or more branches of science. New members, too, are constantly coming in, who may be more or less ignorant of what a Club like ours may have been doing in the past, and is still doing, to justify its existence. It is for such members that my remarks to-night are mainly intended. Of its early days and up to the year 1887 our late President, Mr. Hugh Robinson, gave a complete résumé in his Presidential Address for that year; this is published in full in our Proceedings, which also contain his masterly address a twelvemonth later on the progress which science had made during the years of the Club's existence. Since then Mr. Gray, Mr. Fennell, Mr. Patterson, and other Presidents, have given you details bringing the general history pretty well up to date. This leaves me free, therefore, to choose some fairly definite lines of research work in which many of our members have been engaged in recent years. I feel I cannot do better than select for my subject some facts connected with Geographical Distribution, with special reference to animals and plants found in our own country. I shall not confine myself, however, entirely to the latter, but show you some results obtained also abroad; and here I may mention the fact that Ireland now is the most thoroughly organised country

in the world for academic scientific research. To this is due the fact that Irish workers have been enabled in recent years to carry out such a number of carefully conducted surveys in the less known corners of the country, and are at present at work at the most complete survey of an island area that has ever been attempted anywhere. I refer to the survey of Clare Island, and the reports on some sections of the work will likely be presented to the Royal Irish Academy this Winter, though some groups will not be quite finished till next Autumn. Eight or nine members of this Club are taking an active part in this survey, and your old secretary, Mr. Praeger, is the convener of the working parties. Zoologists and Botanists making a special study of distribution now recognise that island faunas and floras—especially large islands like Ireland that have been long detached from Continental areas—are especially useful, in that they are not so subject to keen competition as on the continent itself. On the island area the primitive characters last much longer, and nowhere in recent years has this fact given rise to more discussion than in connection with certain elements of the Irish Fauna. Points have arisen from time to time over specimens sent to specialists to report on, as to whether these were species not hitherto described or merely races differing in a more or less marked way from those of Great Britain and the Continent. A number of groups are under revision in Ireland at the present time in connection with up-to-date Geographical lists. In addition to many published in recent years by the Royal Irish Academy, in the *Irish Naturalist*, or in our own Proceedings, Mr. Balfour Browne has in hands a list of the Water-Beetles; Mr. Foster, the Wood-lice; Mr. Orr, the Wasps and Wild Bees; and Mr. Stelfox, a census of the Land and Freshwater Mollusca. It is from lists such as these that specialists like Darwin or Wallace, or, in our country, Scharff or Carpenter get the detailed information necessary for the preparation of such maps of distribution as I shall show you to-night. It is, too, in such work steadily and

accurately carried out, that a Club like ours, though mainly composed of amateur workers, can best help along the greater and more complete work of the British Association, with which we have long been in close connection, or the more national Irish work of the Royal Irish Academy. In the slides which I am about to show you, I wish to call your special attention to the evidence which the distribution of many animals affords of old land connections—or land-bridges as they are sometimes called—between this country and the Continent, and especially between the Britannic area and America, the latter being a connection not accepted by many Geologists. I am afraid the Geologist too often ignores the help which the Zoologist and Botanist can give in this direction. While the modern student in these groups has usually obtained a fair knowledge of general geological facts, the average Geologist seems to take little interest in many zoological or botanical facts which have a distinct bearing on Geology. Among others, I need only point to the enormous multiplication of species in fossil nomenclature, which would be avoided if the Palaeontologist gave more attention to variation due to environment or other causes.

The President then proceeded to explain a series of very beautiful illustrative and diagrammatic slides which were thrown on the screen, commencing first with the Lusitanian or Southern types of animals and plants which seem to have entered the country in very ancient times over a land connection, now long gone, between the South of Ireland and the Spanish peninsula. Examples, such as the Arbutus, the Kerry Saxifrage, the Spotted Slug of Kerry, and the Hyæna, were given, the latter having left its remains in some of the southern caves. Next the Western or American elements of our fauna and flora were referred to, such as the Killarney Fern, the not long extinct Great Auk, and some Land-Shells. Passing to the Northern or Arctic survivals in our fauna and flora he showed the distribution of such animals as the Freshwater Pearl-Mussel, the Irish Hare, the Mountain

Avens, and among the extinct animals the Reindeer and Mammoth. The Eastern or Germanic types followed, when animals such as the "Irish Elk," the Bear, Swallowtail Butterfly, and Roman Snail were touched on. A few interesting cases of very restricted distribution, and references to the glaciation of the Brandon mountain range in Kerry closed the address.

At the conclusion of the address an animated and interesting discussion took place, in which the following took part:—Messrs. N. H. Foster, W. J. C. Tomlinson, F. Balfour Browne, H. Lamont Orr, and William Swanston.

The election of Mr. R. H. Whitehouse, M.Sc., to membership concluded the meeting.

PLANT LIFE IN A WOOD.

The first meeting for the Winter of the Botanical Section was held in the Museum on 19th November. Rev. C. H. Waddell, B.D., in continuation of the subject of the Ecology of Plants, which had been commenced the previous season, gave an account of plant life in the woodlands.

Trees were of course the dominant species, but dependent upon them and associated with them was a community of shrubs, herbaceous plants, mosses, and fungi. He shewed how the character of the association depended to a large extent upon the species of trees which formed the wood. Beech, oak, and fir woods all had their special associations. Our deciduous forest trees are *mesophytes* in contrast to pines which are *xerophytes*.

The character of the association depends upon environment, soil, light, temperature, shelter, and other factors. Perhaps light is the most important, and there is continual competition for it. Some trees such as birch require more light than others (*heliophytes*), others like beech are *sciophytes* or shade plants and can do with less, as the leaves are adapted to use all that is available. A mosaic of leaves is formed to catch the light. In beech woods the shade is so dense that little underwood can exist.

The different types of woods, oak, beech, birch, and pine were described with their special associations of humbler plants.

BANGOR.

At a meeting of the Archaeological Section, held in the Museum, on 23rd November (Mr. A. Milligan in the chair), Mr. W. J. Fennell, F.R.I.B.A., read an interesting paper on Bangor, Co. Down. In the course of his address Mr. Fennell said Bangor's earliest name was Inver-Beg (the little river mouth), which later on changed to "The Vale of the Angels," derived from its name Bean Choir, modernised into Bangor, signifying the "White Church," or "Fair Church." It was also frequently alluded to as "Bangor the Great" to distinguish it from Bangor in Britain. The first authentic record states that about 555 A.D. St. Comgall founded an abbey of regular canons at Bangor. Like many other parts of Ireland, it had to fight fearful battles for its existence against sea robbers as well as land robbers. The wealth and possessions that gathered round these mediæval institutions made them most attractive places well worth plundering, and Bangor was no exception. Her possessions even extended to the Isle of Man, over which her Abbot ruled, subject to homage to its king. Bangor ceased to be a seat of learning when the Norman invasion began. The final blow to any little Irish character that may have remained came in 1367, when it was enacted that no mere Irishman should be allowed "to make his profession in a religious house situated amongst the English." This enactment extended to the Abbey of Bangor, and after that the race to which Columbanus and Gall belonged "were excluded from the cloisters they had sanctified." In 1225 we find that Malachy, another noted Irishman, and Bishop of Down and Connor, resided here. He was afterwards called to the Primate's chair in Armagh. James I. granted the Abbey to Sir James Hamilton, from whom may be traced the families of

Bangor, Dufferin, Killyleagh, Ward, &c., whose representatives at the present day retain their connection with the County Down and some with historic Bangor. In 1689 the Duke Schomberg, having landed at Groomsport with the advance portion of William III.'s army, marched to Bangor. The tangible relics of that early exalted age of Bangor existing now are few indeed. The seal of one of its abbots is preserved by the Royal Irish Academy. Another and equally important seal is one that was attached to a famous petition, about the year 1500, to the King of England. "This seal is of interest as being the only existing reproduction of a sketch of the Abbey of Bangor as it was in the Middle Ages." (H. C. Lawlor.) Bangor has left some priceless relics in the shape of books scattered in the great libraries of Europe. The "Antiphonary Benchorensis," or "Antiphonary of Bangor," a book of anthems written in the seventh century for services in the college church at Bangor, is now in the Ambrosian Library at Milan. It was presented with other Irish books by Donegal, an Irish scholar of the ninth century and one of the founders of the University of Pavia, and possibly a graduate of Bangor, whose death is recorded in 834. This book remained at Bobbio till 1606, when it was removed by Cardinal Frederick Borromeo to the newly-founded library in the capital of Lombardy, where it can still be seen. Amongst the treasures in the library of St. John's College at Cambridge the writer was shown a psalter, commonly known as the Southampton Psalter, because it was given to the library by Thomas, Earl of Southampton, but it is strongly conjectured to have belonged to Bangor in Ireland, and has attracted much attention from Celtic scholars, by whom it is attributed to the ninth century. It will be interesting to observe if any light can be thrown on it in the revision of the catalogue of the St. John's College MSS., which has recently been undertaken by Dr. James, the present Provost of King's College. The high cross of Bangor once stood in the Market Square. No Irish town, much less one of the importance of Bangor, would have been

perfect without one. A fragment of the old shaft, worked with a panel of our national ornament, is still preserved in Lord Dufferin's chapel at Clandeboye. And the hope is entertained that other portions may yet be found sufficient to justify its restoration. The bell of Bangor is now in the possession of Colonel M'Cance, of Knocknagoney, County Down, whose great-grandfather found it in the ruins of the Abbey. Patrick's bell is a rude piece of iron work 6in. square by 5in. broad and 4in. deep, made of thin sheets of hammered iron bent into a four-sided form fastened with rivets, and brazed or bronzed. The present old Parish Church contains the only relic of the Anglo-Norman work in Bangor—a mutilated portion of a cuniform stone or burial slab, and from the shears or scissors carved on it as the emblem of womanhood we know that it was intended to mark the resting-place of a lady of high rank. In passing we might mention that the old building near the pier at Bangor was once the Custom House, but it does not appear to have been a castle, as one might suppose at first glance. It may also be of interest to note that it is said that at Rath Gael, in Bangor, the first Sunday School in Ireland was formed. With these hastily-thrown-together notes we conclude, trusting that the future of Bangor in Down may be as resplendent as its past.

At the conclusion of the paper an animated discussion took place—Mrs. Hobson, and Messrs. Milligan, May, and Cunningham taking part.

NOTES ON THE ZOOLOGICAL WORK OF THE PAST SESSION.

A meeting of the Zoological Section was held in the Museum, College Square North, on 7th December, the Chairman of the Section (Mr. Nevin H. Foster, M.B.O.U.) presiding. The evening was devoted to short notes by various members on the work of the past year.

The Chairman, in his opening remarks, stated that the number of active Club members in the various branches of

Zoology was small, and that most of them were present to speak for themselves. Owing to their remoteness from Belfast, it was impossible for Rev. W. F. Johnson and Mr. D. C. Campbell to attend the meeting, and the absence on account of ill-health of Mr. J. N. Milne was deplored, but it was to be hoped that he would soon be completely restored to health, and enabled to take his wonted part in their field investigations. Mr. Foster added that there was little of note to report in the department of Ornithology. During the past year the usual records of migration had been kept, and many local lists compiled, which in the future might prove of service. He detailed a couple of observations relating to some of our rarer species of birds made by him during the past year, the first being the finding of a nesting colony of Dunlins, and the successful search for the nest, and the second his pleasure at making the acquaintance (in life) of that interesting and comparatively rare bird in our country, the Ruff. Mr. Foster then went on to speak of the progress made in recording the distribution in Ireland of the Terrestrial Crustacean Isopods, or Woodlice. In this group twenty-five species are now known in Ireland, and of these four are common everywhere. During the past year about forty new county records had been added, which included the finding of a peculiarly marked and distinctive little white animal, *Haplophthalmus mengii*, in three additional counties —Kerry, Donegal and Londonderry.

Mr. George Donaldson spoke of the capture of *Gonepteryx rhamni*, at Newcastle, Co. Down, during the past session. This Butterfly has its headquarters in the southern and south-western counties, particularly those bordering on the Shannon, and its capture is a new record for the north-east. He afterwards showed some nice Cretaceous Fossils from the local Chalk.

Mr. F. Balfour Browne gave a short account of the habitat and habits of *Dytiscus lapponicus*, a rare northern Water-beetle, which he, personally had taken for the first time in Great Britain during last Summer. The occasion of this find was a visit to the



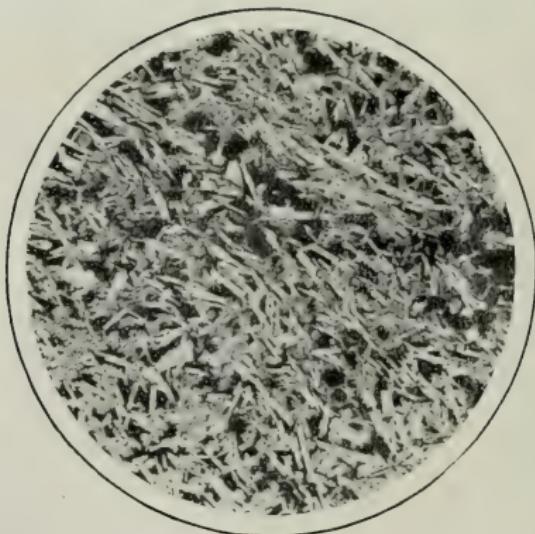


FIG. I.

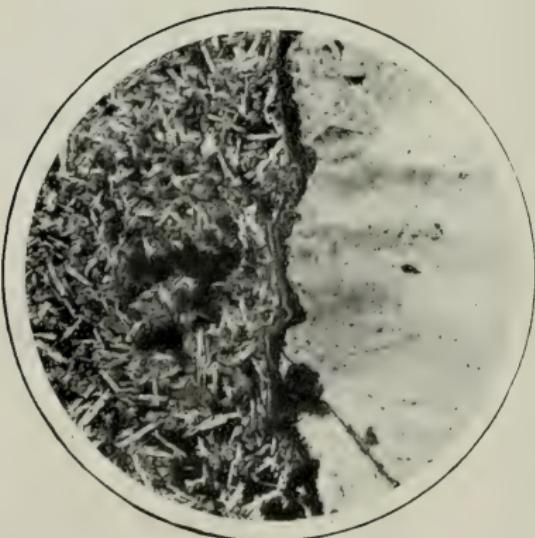


FIG. II.

Fig. I.—Basalt from Spanish Bay, Giant's Causeway—typical section; $\times 27$.

Fig. II.—Junction of Basalt (Spanish Bay) with Opal (Onyx), shewing layer of Hullite between the rock and mineral; $\times 27$.

islands of Skye and Eigg. The most interesting point about this Beetle is that it only lives in mountain loughs from which there are no outlets, and therefore contain no trout.

Mr. H. L. Orr reported the capture of *Vespa germanica* at Greyabbey, a Wasp which, though common in England, has only once been taken in Ireland previously.

Mr. Robert J. Welch spoke of the work done by various members of the Club in connection with the survey of Clare Island, in Mayo, and also on that accomplished by the Conchological members during the present year, his notes on a recent visit to the Dingle Promontory, in Kerry, being of special interest, as until this year no Land or Freshwater Shells had been recorded for this the most Western part of the Irish mainland.

Mr. Joseph Maxwell and Mr. A. W. Stelfox, having each given a few notes on their respective hobbies, the meeting closed with an informal discussion on some of the many points raised during the evening.

THE ONYX OF SPANISH BAY, GIANT'S CAUSEWAY ; ITS OCCURRENCE AND ORIGIN.

At a meeting of the Geological Section on 14th December, Mr. J. Strachan read the following paper :—Visitors to the Giant's Causeway are frequently asked to purchase rather crude collections of specimens from the local guides. Fragments of red flint (locally called "jasper"), limestone pebbles, chips of calc spar, crystals of felspar, geodes of "needlestone" and other zeolites, fossil shells, flint flakes, and even seaweed rub against each other in these curious collections. The local guides, too, have an astonishing knowledge of mineralogy, referring the most fearful and wonderful names to no less an authority than "Professor Gray of Belfast." Apart from the versicoloured fragments of flint, so common everywhere in Co. Antrim, only two of the specimens thus offered for sale are genuine Causeway productions. One of the latter is

analcite in geodes of small clear glassy crystals, and the other is the onyx which is the subject of this paper.

About three years ago I traced the specimens of onyx to their source on the cliffs above Spanish Bay, and since then I have collected numerous specimens from this locality. The exact situation, where the onyx is found *in situ*, is the large scree of broken masses of basalt, half-way between the eastern extremity and the centre of Spanish Bay. The centre of the Bay is well marked by the large dyke which cuts through the basalt and forms a natural pier for small boats. The onyx occurs in the gas-cavities of a fine-grained lava constituting the cliffs above the Bay. The under portion of the rock is greatly weathered at this point, and consequently the overhanging masses of basalt are continually giving way and falling down into the scree below. These large blocks of basalt, when broken up, yield the specimens I am about to describe.

The cavities in which the onyx occurs are of all shapes, varying from the typical spherical amygdale to mere cracks or interstices, but the most common form of cavity is of an irregular shape with a more or less flattened floor. Independent of the shape of the cavities is the fact that almost without exception they present the typical horizontal structure of onyx-opal as their content, comprising alternate layers of milky-white and clear opal. Very occasionally a cavity is found to be lined with a layer of chalcedony, inside which the onyx is then found, and sometimes leaving a hollow space in the upper portion of the cavity coated with small crystals of quartz. Sometimes the cavities are completely filled with clear opal shewing no sign of onyx structure except when carefully examined in section under the microscope. Again the cavities may be filled with a beautiful variety of milk opal, shewing a reddish-yellow opalescence, or with yellow opal of a honey colour. The milk-opal and honey-opal generally occur in vein-like cavities. Some of the specimens from Spanish Bay strongly resemble similar specimens from the Faroe Islands and

from Iceland. The outside of the onyx is generally coated with a thin film of a "green earth" closely resembling chlorophaeite, while between this and the surrounding basalt there is invariably present a thin coating or layer of a dark-brown substance identical in appearance and in many of its properties with hullite.

Calcite is rarely present and then it always occurs between this outside layer and the onyx, sometimes filling one-third to one-half of the cavity. In one specimen (exhibited) this is clearly shewn, and on approaching the junction of the onyx with the calcite we find perfect little rhombs of the latter detached and embedded in the former, as if they had crystallized therein while the opal was in a nascent state. Under a high power the onyx shews a typical microscopic structure of prismatic and spherical crystallites floating in a ground of isotropic opal.

A microscopic section of the rock proves it to be a very fine-grained basalt of the basaltic-andesite type, consisting chiefly of augite and a plagioclase felspar, shewing ophitic structure and occasionally fluxional structure. The felspar predominates and is porphyritic in places. Olivine appears to be absent and magnetite is very scarce in a typical section of the rock. The magnetite and other oxides of iron rapidly increase, however, close to and around the cavities containing the onyx. The interstices of the rock are filled with the dark-coloured earth-like hullite. Under the microscope this latter substance varies in colour from light brown (tinged with green) to dark brown. It agrees with hullite in being isotropic in uniform sections and affecting polarised light where radiated. On examining the rock with medium powers ($\frac{1}{4}$ inch objective) one cannot help being struck with the resemblance between it and the basaltic-andesite of Carnmoney Neck as seen with low powers (2 inch objective). This rock from Spanish Bay is the type of lava that we imagine must have flowed from a volcanic neck of the Carnmoney type.

As in the case of the Carnmoney rock it is quite evident that the interstitial "hullite" or brown earth in the Spanish Bay basalt

is a residual volcanic glass, because not only does it contain inclusions of felspar and magnetite (as in the Carnmoney rock), but also in this case, of grains of augite. The coating or layer of this residual glass around the onyx is quite evident in a section shewing the junction between the onyx and its matrix, and a peculiar feature is the accumulation of the residual glass on the floor of the onyx cavities, as if it had collected in a little pool in the bottom of the latter, while in a molten state.

When we come to consider the probable origin of the onyx and other minerals in these cavities, the facts lend themselves in a beautiful fashion to illustrate and strengthen the theory developed by the writer and illustrated by him in so many examples of local mineral deposits in the gas-cavities of lavas, viz., that such minerals are deposited in a regular fashion from a residual magma during the cooling and consolidation of the lava. In the case of the onyx of Spanish Bay, the residual glass with its inclusions of augite, felspar, and magnetite, the coating of the residual glass around the onyx, the thin coating of chlorophaeite, the occasional deposits of calcite following upon the outer coating, and finally the deposition of the opal with inclusions of calcite, present to the student of geogenesis a complete sequence of formation demonstrating clearly the truth of the above hypothesis.

EXHIBITION OF PLANTS COLLECTED DURING THE SUMMER SESSION,
WITH REMARKS ON THEIR HABITATS.

On Saturday, 17th December, the Botanical Section met in the Museum and enjoyed an interesting informal discussion based on exhibits of plants collected during the Summer Session by various workers of the Section. Rev. C. H. Waddell, M.A., occupied the chair.

Mr. N. Carrothers and Rev. C. H. Waddell exhibited numerous interesting specimens collected during the preceding

Summer. Miss Blackwood had a fine exhibit of plants collected by her in Brittany.

EXCURSION TO ST. JOHN'S POINT.

On 27th December thirteen working members enjoyed a pleasant day at Killough and St. John's Point, Co. Down. The Geologists examined the interesting rocky coast, whilst the Botanists observed the following rarer plants in their winter garb:—*Crithmum maritimum*, *Artemisia maritima*, *Beta maritima*, *Atriplex portulacoides*, and *Asplenium marinum*, the latter in a hitherto unrecorded habitat. The Ornithologists reported noting 33 species of birds, the most interesting of their observations being that of a flock of Turnstones, *Hæmatopus ostralegus*, following the plough in company with Lapwings and Gulls. A specimen of one of the rarer Woodlice, *Trichoniscoides albidus*, was taken, this being the second County Down record for this species. A fair list of Land-shells was made. Many of the *Hyaliniæ*, *Hygromia hispida* and *Vitrina pellucida* were common and active, and *Helix nemoralis* and *H. aspersa* were abundant in their Winter quarters. Time did not permit a visit to the marsh near Killough Station where *Planorbis carinatus*, *Sphaerium lacustre* and *Paludestrina ventrosa* may be collected. The last mentioned species lives in the brackish waters of the lake and is the most recent addition to the molluscan fauna of Down. One member reported the abnormal abundance of two slugs—*Milax sowerbyi* and *M. gagates* at Downpatrick.

THE PEOPLE OF THE DAWN.

On 20th December, at the second meeting of the Winter Session held in the Museum, a paper was read by Mr. W. A. Green, F.R.S.A. (Ireland), on "The People of the Dawn," with special reference to B.N.F.C. investigations in the North of Ireland. The President, Mr. R. J. Welch, M.R.I.A., occupied the chair.

The lecturer said,—In approaching a subject such as I propose to deal with to-night, carrying us back into the dim ages unrecorded by history or legend, many of the conclusions arrived at must of necessity be hypothetical, and any suggestion of figures entirely out of the question. The Palæolithic period, or Old Stone Age, which immediately preceded the Neolithic, is not evidenced in Ireland, but in England and on the Continent tools and weapons of this early time are often found embedded at great depths in the drift material brought down by the rivers of melted ice at the close of the Glacial period. The earliest division of the Stone Age is known as the Eolithic or Dawn from the fact of certain flints apparently wrought by man having been found in still older river drifts in England that were afterwards levelled to a plateau by subsequent ice rivers. In pointing out the great antiquity of man the lecturer first dealt with the history of the oldest nation, Assyria, with her wonderful legends of creation, and the inscribed Babylonian cylinder so suggestive of the story in Genesis possibly carries us back to 7,000 B.C., and Egypt certainly does to 5,000 B.C.; thus we find at these remote ages, not a race of savages, but nations in a state of advanced civilization. What ages must, therefore, have elapsed before these people existed as nations while they were gradually evolving from the condition of the original savage into the highly cultured races as first we find them. Definite proofs of such original inhabitants have been found in Egypt in the form of massive wrought tools made of quartzite, which point to such an enormous antiquity that, in comparison, temple and pylon and pyramid are but things of yesterday.

Reference was made to the skull recently discovered in a bed of Pliocene remains in Java by Dr. Eugene Dubois, and which, having a brain capacity larger than that of the higher anthropoids and smaller than that of a normal human being, goes far to bear out the accuracy of the belief in a parallel descent of man and the ape from a common arboreal ancestor.

A short description of the probable manner of life of Palaeolithic man was given, as suggested by such relics as have been found in caverns and drift material, with special reference to the carvings from Dordogne and La Madelaine, and the investigations in Kent's Cavern at Torquay. In describing Neolithic man the paper dealt with such records as have been brought to light in the North of Ireland, by the investigations of prominent members of the Belfast Naturalists' Field Club and by the lecturer's personal researches. The river gravels at Larne yield the oldest type of Neolithic implement in Ireland with which we are acquainted, the site occupied by the Aluminium Works having been once an extensive manufactory of flint implements. Great numbers have been found of a very rude character, but exhibiting the characteristic bulb and flaking that can only be produced by a blow, and which is never in evidence on flints that have been broken by the action of frost. These implements, it is believed, were distributed by the early commercial traveller to localities where no flint existed; tools of a similar character and age have been found extensively on Island Rea and Island Mahee, on the shores of Strangford Lough, a locality where no flint exists *in situ*. The great hollows among the sand-dunes between Dundrum and Newcastle have yielded vast numbers of beautifully chipped implements such as arrow-heads, scrapers, boring tools, and ornamented pottery, in addition to numbers of beads and bronze objects. These are all, however, of a much finer quality than the foregoing, and point to a more recent period of occupation. Whitepark Bay, Co. Antrim, has yielded an even greater number of finds, including the complete skeleton of an early man.

After referring to the shell-mounds of Dog's Bay, the Whitepark Bay Kitchen-middens, and the polished axes of the Valley of the Bann, a short description was given of the various structures that are found upon our island connected with the life habits and burial customs of early man. These included the crannoges or lake dwellings, souterrains, cromlechs, and stone circles.

The President and Messrs. Wm. Gray and R. May took part in the highly interesting debate which followed.

Two new members—Miss M. J. Lynn and Miss M. Mitchell were elected.

“ARCHÆOLOGY OF SURNAMES.”

On 4th January, Mr. Alex. Milligan read a paper, entitled “The Archæology of Surnames,” to the Archæological Section, Mr. C. M. Cunningham, L.D.S., chairman. The lecturer began by pointing out that the subject of Surnames was a very wide one, and might be dealt with in quite a variety of ways, according to the standpoint or the particular object in view. A great many very peculiar and even ludicrous names were to be found in our directories, the elucidation of which might easily occupy an evening. It would be found that in most cases these names had quite a respectable antiquity behind them and were quite rational in their original significance, their present forms being due to what might be called phonetic erosion, and the fantastic attempts made to restore them, as occasion seemed to require, by an illiterate peasantry.

Then again the study of personal names could be made a useful auxiliary to the teachings of History and Archæology in the elucidation of the ethnological problem of these islands, which, the lecturer said, was a rather complicated one. The population was made up of a number of widely differing elements, and a knowledge of the personal names, or rather name systems in vogue amongst the nations from whom these differing elements were derived, was in many cases a valuable test or touchstone for detecting or identifying even the most ancient components of a highly complex community—always excepting the pre-Celtic element in which the names or language are practically unknown.

The consideration of personal names, however, acquired a definite significance when pursued in connection with those outstanding movements in English history which were accom-

panied by important changes in the population, and the lecturer proceeded to deal from his point of view with a series of names derived from the period of Danish-Anglo-Saxon occupation, and the succeeding period in which the Norman authority and influence prevailed. Surnames, as such, did not, he said, come into use in England till the end of the eleventh century, and were a slow growth for about three centuries afterwards, but as it was the individual appellative which, as a rule, passed into use as a Surname, it would be understood that the study of the former really included that of the latter.

In dealing with the names of the earliest period, the lecturer found occasion to explain various phases of the old Teutonic name-giving system, afterwards passing on to those names of much later date, which were descriptive of a man's calling or the situation of his humble abode. The last named furnished a large proportion of our present day Surnames.

In dealing with Norman names, Mr. Milligan reminded the audience that the Normans themselves were closely related by blood to the Saxons and the Danes, therefore, as might be expected, the personal names of their leaders, which by that time had become Christian names in the modern sense of the phrase, were mostly of the same Teutonic pattern as he had already dealt with ; but as his object was rather now to illustrate the culture which the hardy Norsemen had assimilated in their Continental surroundings, and which they were the means of introducing into this country, he purposely confined himself in his concluding remarks to a review of those names derived from office, function, or occupation of that period.

A large proportion of the Surnames in common use with us to-day were, he reminded them, merely debased forms of French place-names originally introduced by the Barons as descriptive of their seats in Normandy.

The animated discussion which followed was promoted by Miss E. Andrews and Messrs. Cunningham and Moore.

STEWART MEMORIAL MEETING.

The third meeting of the Winter Session, held in the Museum on 17th January, the President, Mr. Robert J. Welch, M.R.I.A., in the chair, was devoted to the memory of the late Samuel Alexander Stewart, A.L.S., F.B.S.E. The principal speakers were the Rev. C. H. Waddell, M.A., B.D.; Mr. R. Lloyd Praeger, M.R.I.A.; and the President. The meeting having been opened by the President, Mr. Waddell read a most interesting biographical sketch of Mr. Stewart's life, in which he said:—Last century there was a succession of good naturalists in Belfast who awakened and kept alive a love of Natural Sceince; Templeton, who began his researches as early as 1793, Thompson, and Patterson. But Stewart did not owe the bent of his life to any of these. They had all passed away, except the last named, when he took up Natural Science at the age of thirty-seven, in the year 1863. He always regarded Prof. Ralph Tate as his master.

How many of those who are pursuing the study at the present day in the North of Ireland look back with gratitude and fond remembrance to the encouragement and help and kindling of a love for nature to him whose loss we now mourn? I may venture to say there is scarcely one who does not. No selfish heart was his, taken up with its own concerns, engrossed in its own advancement, but giving freely of its own, and loving nature for its own sake.

Greater and more fruitful was the influence of his life on others than in the results of his own work. One writes regretfully, “I shall never see again that clever striking face with those deep-set eyes, and listen to his shrewd dry humour.”

Stewart's ancestors came from Scotland in the seventeenth century and settled at Ballynure, Co. Antrim. They were well-to-do farmers and occupied a farm of some forty acres on the Dobbs' property, which got the name of the “graveyard farm” from its containing a burying-ground where members of the family



Samuel Alexander Stewart, A.L.S., F.B.S.E.

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PHOTO.

E. T. CHURCH.



were buried. They had their share in the land troubles which arose in that part of the country in the eighteenth century. They were weavers as well as farmers and the naturalist's grandfather was once chased for his life by thieves when returning home after selling his cloth in Belfast. Then came the political troubles of 1798 in which many families living in that district were involved. Stewart's grandfather left Ballynure in that year and went to America. He settled at Philadelphia. His son William married Sarah Funston, a member of a family which had come from England, another branch of which settled at Castlederg, Co. Tyrone. The Funstons were Methodists, the Stewarts Presbyterians and Seceders. William Stewart had a good business, weaving and selling ginghams. He owned a large house in North Front Street, Philadelphia, and here Samuel the Naturalist was born on the 5th February, 1826, and two years later his only sister Margaret Ann, now Mrs. Bayne, who survives him, and was his companion for a considerable part of his life as he never married. The boy was not robust and suffered from spitting of blood, and was thought to be consumptive, and ordered to drink milk, wear flannels, and live as much as possible in the open air; but this was not correct, though he suffered from attacks of dyspepsia more or less through life, and was crippled by rheumatism in his later years.

He attended a private school in Philadelphia, kept by a Mrs. Lowry, where he learned the rudiments of letters, but ill-health was a hindrance to progress, and schooling came to an end at the age of eleven, the only regular education he was to receive.

His school teacher sent him home one day with a written statement to give to his parents that "there was one bad boy in the school and he was called S. A. Stewart." Their mother died when the children were young, and a business panic so affected their father's trade that he gave it up and returned to Ireland in June, 1837. A period of trial now set in for the family which had been in comparative affluence, and Samuel and his sister had to endure many hardships.

On his return from America their father, William Stewart, went to live with his brother Samuel who was unmarried and carried on the business of travelling-goods dealer and trunk-maker at 56, North Street, Belfast. Circumstances were straitened at this time and hard for the motherless young people. Their father worked at a rectifying distillery, which was situated somewhere at the quays near the foot of Marlborough Street, at a wage of twelve shillings a week, while his son Samuel earned two shillings a week as errand-boy to the same firm. Thus early in life at the age of twelve Stewart began work at a time when he should have been at school, but his earnings, small as they were, would have been missed. At this time or some years later he did attend school, but only a night-school which was held for six months each Winter season at Sarum Methodist Church, York Street.

His uncle neglected the work of the shop which did not prosper. After some years his father took over the business from his brother, and started business with a capital of five pounds, putting his daughter, who was then fifteen, in charge, while he continued with his son to work at the distillery. She attributes the success which now came in business to a visit one day from a brushmaker, Dan Hall, who was so pleased with the skill and independence of "the little girl with the curling hair" who kept the shop that he advanced her thirty shillings' worth of brushes and made her his sole agent. The brushes were of good quality and sold well and the business began to improve. Later on her brother came home to work in the shop. They made trunks, bellows, and other articles, and were able to make from ten to seventeen shillings a week. Their uncle lived with them but did not take any part in the business.

How did Stewart acquire the culture and wide general information he possessed, the faculty of expressing himself so well in such good English, besides the knowledge of French, not to speak of many branches of Natural Science? He was self-educated, and must have applied himself to the task of

self-improvement with much diligence and perseverance. But there were two men to whose inspiration and enthusiasm he owed much, one influenced him as a lad to improve himself in general education, the other later on in life to become a naturalist and take up the systematic study of Natural Science.

Stewart had a companion with whom he "ran" at this time, James Neill, who lived opposite the Stewarts in North Street. He was somewhat older than Stewart, clever and intelligent, and fond of country rambles. He began life in a seneschal's (or lawyer's) office. Here he studied in spare time and acquired a good education. Every Saturday afternoon he called for Stewart, and they went for expeditions in the country, and on Sundays when Sunday School was over, and in this way they explored together all the neighbourhood and hills within reach of Belfast.

William Stewart, the father, was a strict disciplinarian and hard on his children, and regarded the boy's pursuits as waste of time, but Samuel's bad health and need of fresh air stood to him in this respect. Sometimes he had difficulty in getting away for these rambles, and his sister (who helped and shielded him from his father) would often throw him his cap out of the window so that he might escape the father's notice. "I thought," said his father, "I had reared two sensible children, but they have turned out two fools." It was not the only time that love of nature would bring upon him and his fellows of the Naturalists' Field Club the designation "Naturals." I cannot find that the lads pursued definitely any branch of natural history or made collections. There was no Field Club then, and they had no teacher. All I can learn of them is that "they loved every green thing." It was much later on in life that Stewart commenced in earnest the systematic study of rocks and plants. I think he must have had a love for them before, and may have collected and studied them, but not with perseverance and system.

Mr. Allen, his nephew, says "Mr. Neill was a beautiful penman and expert book-keeper, and a widely-read man, but not

scientifically inclined. When in the solicitor's office he conceived the idea of bettering his fellows, and, being a splendid penman, opened a night-school to teach penmanship to such of his companions as cared to avail themselves of his offer. My uncle was among these. Out of this school there arose a friendship. They could not continue the night-school during the Summer, and these two betook themselves to the country in the good weather, which was varied with swimming in the river Lagan, of which both were fond and in which they were proficient. These walks were continued for years, and after my uncle had branched away into geological and botanical pursuits in which Mr. Neill did not follow him, it was still their habit for many years to walk over the Cave Hill every Christmas Day."

James Neill, after serving his time in the solicitor's office, became book-keeper, then manager, and finally owner of the King Street Flour Mills, a business which has been successfully developed by his sons, Neill Brothers, whose "Castalia" is so well-known.

These years of youth and early manhood were years of strenuous labour as well as intellectual progress in Stewart's life. Working with his father and sister in the shop by day, devoting his evenings to study and acquiring that culture and knowledge of many subjects which was remarkable in later life, and on holidays hastening to the hills or Lagan or open country he loved so well.

He was proficient at his trade, especially skilful, I am told, in making skin-covered trunks.

Stewart was a most remarkable instance of a self-educated man, without school or college training, without means, yet in spite of many difficulties at home instead of help, he acquired an excellent general education, and learned to write such good idiomatic English (as for example in the introduction to his *Flora*) as many so-called well educated people might envy.

We come now to the second determining influence in the life of Stewart which led to his becoming a naturalist. He always regarded Ralph Tate as his master, and it was the influence of that enthusiastic teacher more than anything else which decided the future course of his life. It was in the year 1861 when he was thirty-five that he first came under Tate's influence. It is strange that it was not until middle life that he found the work which was to prove his life's work.

A member of the Field Club told me the following incident. When taking up the study of Botany he consulted Stewart who encouraged him to do so, saying "I was forty years old myself when I commenced the study, and was led to do so in this way. One day I met a man on the Knock Road who asked me if a plant he had in his hand was ground ivy, saying he had been told it was a good remedy for consumption, and that he was searching for some for a brother suffering from that complaint. I could not tell him the name," said Stewart, "but I determined then that I would make myself familiar with our native plants." The "forty years old" in this story could only have been round numbers for he had already contributed a large number of records of plants to Tate's *Flora Belfastiensis* in 1863.

The years 1860 to 1863 were fruitful not only to Stewart but to others associated with him in giving a great impetus to the study of nature in Belfast. In 1860 Prof. Jukes gave a course of lectures on Geology in the old Music Hall, May Street. Mr. George Donaldson, who as a lad often accompanied Stewart on his rambles, remembers with what interest they attended these lectures. Mr. William Swanston, a close friend of Stewart's since 1865, says, "We may safely assume that Stewart's early bent for Natural Science generally, eagerly grasped the opportunities offered by the Science and Art Department who sent lecturers to Belfast, among others Prof. Jukes who lectured on Geology. This course was followed in 1861 by Mr. Ralph Tate (afterwards Professor of

Natural Science in the University of Adelaide, South Australia), who became Resident Lecturer in Zoology, Botany and Animal Physiology. Stewart attended most of these courses and carried off honours in them. These lectures doubtless gave his studies a systematic lead which must have been of immense value to him. Owing to his zeal and thoroughness he soon became a favourite pupil of Tate's, and later a close friendship which proved to be life-long ensued."

Mr. Joseph Wright, another old friend of Stewart's, states that on a recent visit to Belfast Prof. Tate said "he had passed a great many pupils through his hands in the course of a long professional career, but he had only met with one Samuel Alexander Stewart." Mr. Wright says "he was one of the most intelligent persons in his younger days I ever came across. He had a wonderful gift of observation, even in respect of things with which he was not familiar, as I have proved when we were on expeditions together."

Here is an example : Mr. Stewart, when botanising on Ben Bulben observed some pale yellow clay in the Carboniferous rocks near the summit. He sent some to Mr. Wright who found that it contained sponge-spicules of great scientific interest.

Geology was the subject which first attracted him. Tate was both geologist and botanist. On Saturdays he used to take his pupils out for excursions, amongst others, George Donaldson, William Gray, Hugh Robinson, William M'Millan, William Swanston, and Stewart. His sister says her brother liked better to walk on these occasions than to drive or go by train. Tate used to go by rail or car, it saved time, but her brother "trotted" when he could ; she knows, for she had the washing of his socks. It was characteristic of the man.

In 1863 Tate published his *Flora Belfastiensis*. The master was considerably younger than the pupil. Tate was twenty-three and Stewart thirty-seven. To quote Stewart's own words (Introduction *Flora N-E. Ireland*, p. xxi.) "These

classes, conducted in the Museum under a teacher so able and profound, were most successful. Not only was good progress made in scientific knowledge, but the teacher succeeded in imbuing many of his pupils with some degree of his own enthusiasm. The Belfast Naturalists' Field Club, established in 1863 by Mr. Tate, in conjunction with a number of his pupils, was the direct outcome of his work." For fuller details on this subject I would refer you to Stewart's paper in the *Irish Naturalist* for 1902 entitled "The Father of Irish Field Clubs." The year 1863 was marked by the publication of the first volume of Boswell Syme's edition of *English Botany*, in 1864 appeared Dickie's *Flora of Ulster*, in 1866 the *Cybele Hibernica*.

Stewart continued to work at his trade, all the time he could spare from it being given to Geology and Botany, but the shop did not prosper, his frequent absences were against it, and in the year 1880 he was appointed assistant curator of the Belfast Museum at a very small salary, there not being funds to make it larger. In 1886 he severed his connection with the business, which was now carried on by his nephew Mr. William Stewart Bayne. It should be mentioned that the business had been moved from 56, first to 36, and finally to No. 6, North Street. In August, 1891, when Mr. William Darragh retired, Stewart succeeded him as curator at a salary of £65 with fire and light and a free house. It was all that the funds of the Natural History Society could afford, and we may be thankful that such a post was available as his business would not have provided a living for him in his advancing years.

In the "Life and Letters of Alexander Goodman More" there are many references to the Belfast naturalist. In the year 1865, when preparing his *Cybele Hibernica* for publication, More writes to him "I rejoice to think that I have had the good fortune of finding a correspondent so obliging and truth-seeking as yourself, and I can hardly sufficiently thank you for the trouble you have so kindly and often taken in assisting our work."

In 1871 he joined the Botanical Exchange Club, which was of much assistance to him in naming critical plants, and to it he contributed many of the rare plants of the district. About this time he met G. A. Hunt, the Manchester bryologist, and as far as I can learn through this acquaintance he became a Fellow of the Botanical Society of Edinburgh.

If he could have been induced to put together notes of his life and experiences during his frequent explorations, as I often urged him to do, they would have been of great interest. In some respects he was very reticent.

On one occasion George Donaldson and he were at Portmore Lake near the Tunny. They had to cross a wide muddy drain by a round slippery log, and both fell in and were covered with mud, but the friendly waters of Lough Neagh were near where they washed their clothes and spread them to dry on the shore. On another occasion in the same district they missed the last train home at Moira and had to tramp all the way to Belfast. Stewart told me of an adventure he had on Howth Head. He came to a place where he could not pass round a rock to reach the top. After several attempts he ceased exhausted. Looking out then over the sea he resolutely set himself to call up before his mind scenes from his past life till he had become quite calm again and rested. Then with one steady effort the obstruction was passed and he was safe.

The two following incidents I quote from a letter to me from Canon Lett. "When Stewart was a lad one Saturday afternoon his uncle took him for a walk to the top of Divis from which they had a view of Lough Neagh, which so filled the mind of Stewart that the next Saturday he set off on foot by himself for Lough Neagh, and arrived at Crumlin late in the evening footsore and hungry, having had no food since morning except "a piece" he had put in his pocket. When he went into a house to obtain a drink by the wayside, the woman questioned him and having found out his story kept him till morning, and then sent him home

on a cart bound for Belfast." "On another occasion when he was on a tramp through the mountains near Sawel, at the junction of the Counties of Derry and Tyrone, he dropped his copy of the pocket edition of "Babington's Flora," in which were many marks, and on which he set much value, as he had it for many years. He went back to try and find the book but failed to do so, and then found himself benighted between nine and ten o'clock. Afraid of going further astray, if he walked on in any one direction, he spent the five hours of darkness (the time was the month of July) in walking up and down the same bit to keep himself from getting chilled." This was not the only occasion on which he spent nights out on the mountains in inaccessible districts, especially among the Derry mountains, and such exposure he thought was the cause of the rheumatism from which he suffered in later life.

Stewart possessed a vein of dry humour which was very delicious sometimes, and some of the accounts he wrote home to his friends of his adventures were very humorous. One or two instances may be selected. Writing to Mr. Swanston from Rathlin he says, "I have seen Bruce's castle. Poor Bruce he was no use, he could'nt keep his crown in the family, but had to let the noble Stewarts succeed to him. His spider too is played out. The Stewart has got it also. All bosh about its lesson of perseverance. Let it try its thirteen times now to get out of my bottle. It won't do."

When Naturalists from across the water visited Belfast they used to call and see Stewart, and often he went with them to show some of the rare plants of the neighbourhood, such as *Rosa hibernica*, or going to Colin Glen or Cave Hill, or to fish up *Zannichelia polycarpa* from the sewage in the shallow drains by the harbour.

One day he accompanied a botanist from Oxford, to Tollymore Park. There was difficulty in making a bargain for a car at Newcastle, and Stewart maintained that half a crown was enough

to give. However when they reached the cross roads, a quarter of a mile from Tollymore, the driver stopped. They objected. This was not Tollymore. The stranger was very indignant and threatened to report the driver. "Do you know," said he "who I am? I am High Sheriff of Oxford." "I don't care who you are; not another yard will I go." And they had to get down and walk.

An English geologist called once to see Mr. Wright and talked to him of the land-ice theory in glaciology, which the latter vigorously opposed. He went on to the Museum to see Stewart. "I have been to see Wright, and do you know he does not believe in the land-ice theory." "Wright is right," said Stewart. "Fossils shoved up by ice on to the mountains! I would as soon believe they were shoved up there by the moon."

I quote two incidents from notes which Mr. Swanston has given me. "On one occasion Stewart was anxious to confirm or refute an old record regarding the Maiden-hair Fern in a most unlikely district. The search proved a long and tiresome one. The conditions—metamorphic rocks and boggy moorland—seemed altogether unlikely to yield this true limestone-loving fern, yet the search went on, and the fatigue of a long and toilsome day was rewarded by the finding of a few dwarf plants in a band of primitive limestone at the base of an inland cliff, and with as much satisfaction as if he had made an important new find this old record was confirmed." "Again, on the occasion of a Field Club excursion to Ballintoy, a resident member had kindly employed a number of men to open up a deposit of the Lias underlying a heavy deposit of sand that had always baffled investigation. Stewart was one of the party, but little work could then be done owing to the limited time, and the excessive number of members present, few of whom fully appreciated the value of the exposure. It was therefore promptly decided by him that the opportunity should not be lost of thoroughly examining the beds. A few days later he with a companion were early on the scene provided with a large box in which to pack the fragile specimens. Unfortunately they

had omitted to take any food supplies, intending to visit the village a mile or so off about mid-day. The work, however, proved so attractive that no move was made till after the sun had set on what happened to be the longest day in the year. With united efforts and much labour the heavy box of specimens was got over the broken ground between the workings and the road high above, but his companion on a trial declared his inability to carry it, and insisted on its being left at the first wayside house to be brought away next day on a car. All persuasions were in vain and Stewart carried the load the entire way to Ballycastle, which was reached about midnight, both naturalists being fairly exhausted."

In 1904, late in life, came the honour which Stewart valued most, when he was elected Associate of the Linnean Society, an honour which is conferred for merit alone. To use his own words—"It was a red-letter day with me when I was elected A.L.S. That the premier Natural History Association of this country should, without any solicitation on my part, have conferred on me this distinction came as a surprise, and I may say that of all the honours possible to me this is the most prized."

The members of the Natural History Society and of the Field Club seized this occasion to present him with an address and purse of 120 sovereigns. By the exertions of his friends a grant was also obtained for him from the Royal Bounty Fund, and with these two sums an annuity was purchased.

His retirement in 1907 was due to advancing years. He took a small house in Springfield Road, at the foot of the Belfast Hills, and lived there with his sister. His death, on 15th June, 1910, was the result of an accident. He was crossing Ann Street when he slipped and fell in trying to avoid a passing dray, and only survived a few hours. He was buried in the City Cemetery where a large assemblage, consisting of most of the Naturalists of the North of Ireland gathered to pay their last respects, Rev. Canon Lett and Rev. C. H. Waddell officiating at the graveside.

When one tries to sum up the impression left by his character and life perhaps the most prominent feature is this—he was a “helper of many.” First the shop at 6, North Street, then the Museum was the centre to which all those in Ulster turned for advice and help who were interested in Natural Science. Many of us look back to those days and thank him for encouragement and help always freely given. Then his accuracy was great, a fact which makes his *Flora* the valuable book it is. Mr. A. G. More once said to a friend that “it was essential to ask contributors to send specimens with their records (for the *Cybele Hibernica*) and that this method had been rigidly followed with one exception, the records of S. A. Stewart of Belfast were invariably admitted without question.”

His perseverance and enthusiasm never failed in trying to clear up doubtful points. His extreme caution and dread of jumping to a conclusion sometimes discouraged younger workers, and also led him, especially in later life, to miss results which a less sceptical spirit might have attained. He was an old-time naturalist, extremely conservative, and did not take kindly to new methods. I remember him telling me that he had ceased to take so much interest in the Willows since it had come to be accepted that most of the forms in this group were hybrids. The extreme specialisation which has of necessity taken place in all branches of Science was not to his liking. I do not think he took the same interest in the Hawkweeds—his favourite group of plants—after they had been split up into such a multiplicity of forms.

The unassuming humility of the man was apparent. Stewart had his limitations, but he has left a fine example for younger naturalists to follow. We must all feel that we are the better for having known him.

Mr. R. Lloyd Praeger said—“It falls to my lot to-night to speak of the work of Samuel Alexander Stewart in the domain, first of Botany, then of Geology. And in the first place I should

like to express my gratification that I am permitted to take part in this evening's proceedings ; I deem it a privilege to be allowed to do honour, on the present occasion, to the memory of my old friend and yours. There are in the room to-night members who knew Mr. Stewart before I was born, and who are better acquainted with his work than I am. I crave their indulgence if what I say this evening appears to them inadequate, or if it contains inaccuracies.

With the main results of Stewart's botanical work we are all acquainted. The *Flora of the North-East of Ireland* is the inseparable companion of every one who is interested in the plants of our home counties, while to those who study the Botany of Ireland as a whole, or who have visited the districts they treat, his papers on the flora of Rathlin Island, of the Fermanagh hills, of Slieveanieran, and of the Shannon estuary, are equally familiar.

To appreciate Stewart's work fully we must keep in mind the circumstances under which it was carried out. In the interesting biographical sketch which Mr. Waddell has just given us he has laid stress on the want of education in early days, and the want of time all along, which were such serious obstacles to Stewart's scientific advancement ; and he has told us how resolutely these difficulties were overcome. Of Stewart's earliest botanical work—that is, the work done before the Club was founded in 1863—we know little. He must have worked hard, because Tate's *Flora Belfastiensis*, published in the first year of the Club's existence, contains many records of his and an acknowledgment of much assistance rendered ; also, his earliest botanical paper of which more than the title remains, read before the Club in December, 1865, shows that he was already acquiring that critical knowledge of our plants which afterwards distinguished him. It deals with such species as *Ranunculus trichophyllus*, *Barbarea intermedia*, *Hieracium umbellatum*, not hitherto recognised by local botanists.

He soon began to extend his researches, and to visit, during his few and brief holidays, distant districts, which were then much

more difficult to reach than they are in our day. Thus, he gathered for the first time the rare plants of Connemara and Lough Derg in the summer of 1867 ; he searched the barren summits of the Sperrin Mountains for the long missing Cloud-berry in 1868 : and explored the coast from Galway to Dingle some years later. All the time, however, he was working steadily at the Botany of Down and Antrim. It seems uncertain when the idea of a flora of the North-East first began to take shape in his mind, but it is clear that for a long period he was amassing the material which finally appeared in a completed form in 1888.

The publication of *Cybele Hibernica* in 1866 acted as a stimulus to Irish botanical research such as we can hardly realize now-a-days ; and when, twelve or fifteen years later, A. G. More began to urge the systematic exploration of the less known districts, with a view to the eventual production of a more complete second edition, Stewart willingly enrolled himself as a volunteer ; aided by grants from the Royal Irish Academy, he investigated several of the more remote and inaccessible areas. These expeditions greatly increased his knowledge of the flora of Ireland, and of critical genera in particular. In his field-work he was indefatigable ; day after day he spent twelve or fourteen hours in the open ; he took copious notes, and collected extensively.

Meanwhile, groups other than Flowering Plants had been engaging his attention. The Mosses and Hepatics had attracted him from the beginning. He worked at them diligently, so that in 1875 was able to publish his *List of the Mosses of the North-East of Ireland*, which greatly advanced our knowledge of this group, especially when it was followed by a Supplement in 1884. Geology, as will be seen later, also occupied his attention to a large extent at this period, and his simultaneous advance in these various studies speaks volumes for his industry and ability.

Late in the seventies the collaboration in the preparation of the *Flora of the North-East of Ireland* of Mr. T. H. Corry was secured, and as regards both the completion of the field work and

the publication of the book, prospects looked favourable, but the tragic death of Mr. Corry in 1883 deprived Stewart of a willing and valuable colleague.

To understand the labour involved in the preparation of the book referred to we must carry ourselves back to the period 1870-1880, during which much of the field work was carried out, mainly on Saturday afternoons and Sundays. There were not at that time the facilities for exploring the country which now exist. The bicycle was then known only to the venturesome athlete. No swift tram-cars conveyed the botanist to the confines of the town. Trains were few and tardy. This slow travelling rendered many places practically inaccessible without the spending of nights in hotels, which the author of the "Flora" could ill afford. Then again, books were not accessible as they are now. Stewart, though the shyest of men, made up for this by getting into correspondence with the leading systematic botanists of the day and claiming their assistance which was willingly given. Babington, Backhouse, Arthur Bennett, Holt, More and others were in constant communication with him, and he plied them with questions and specimens of critical plants. As the "Flora" advanced towards completion there came Corry's death, and the whole work of preparing the book for the press devolved upon Stewart who, despite lack of time and of all that goes to make writing an easy or pleasant occupation, carried his task to a successful conclusion.

It was just thirty years ago, in 1881, that I made Mr. Stewart's acquaintance. When I joined the Club in 1884, and set about collecting plants for the prizes which are still offered, he was untiring in his encouragement and assistance. By the time the "Flora" was published he and I were doing most of our collecting and exploring in company, and in the greater part of the work which he carried out since that date I was privileged to take part. Two Summers we spent together in a careful examination of the flora of the Mourne Mountains for a report to the Royal Irish Academy, and many days were devoted to exploring unworked

corners of the district, or to attempt to verify old records, for the purposes of the Supplement to the Flora which appeared in 1895. I deem it a privilege to have been his frequent companion during those years. Long after Stewart was compelled by advancing years to abandon long expeditions and laborious mountain walks his stimulus was present ; it was the thought of his satisfaction that led to attempts, renewed time after time, to refind plants long missing ; and the thought of the interest and pleasure which a new discovery would give him doubled one's own interest in finding a rare plant. To the end he remained the mainspring of all botanical work in the Club, and his death will long be deplored by us who were his pupils.

We must now turn to Stewart's work as a geologist. In its main features the story of his geological career resembles that which has been already sketched in relation to Botany. He worked in his earlier years simultaneously at both studies. Indeed, Geology would appear to have furnished his earliest great scientific interest, and the writings of Hugh Miller to have been his incentive. From this we may infer that it was the older rocks which first engaged his attention, not those newer deposits in connection with which his name is best known to geologists. Before the Field Club was formed he found in Ralph Tate an inspiring geological teacher ; with him he worked at the secondary rocks which form so unique a feature in the building up of Co. Antrim. Though he did not publish any paper relating to the Palæozoic or Mesozoic strata, no one knew the local sections and fossil localities better than he ; and whether one wished to collect Graptolites at Coalpit Bay, Permian Mollusca at Cultra, Ammonites at Barney's Point or Waterloo, Fishes from the Rhætic beds, or Pectens from the Chalk, no better guide could be found than Stewart. This was no doubt largely the result of Tate's sound teaching and energetic field-work during the first years of the Club's existence.

Stewart's imagination was early caught by the problems connected with that difficult epoch of geological history, the

Glacial period; in 1869 we find him vigorously combating Du Noyer's contention that the Lusitanian element in the Irish fauna and flora migrated from the Peninsula over a post-glacial plain, and supporting Forbes's theory of the pre-glacial age of those interesting plants and animals. Just at this time extensive excavations were being made by the Belfast Harbour Commissioners in the recent deposits underlying the town, in connection with the formation of the Spencer Basin. Fine sections were laid bare of beds of blue clay whose rich fauna had already attracted the attention of Magee, Grainger, and Hyndman. Stewart was prompt to avail himself of so favourable an opportunity for investigating these deposits, so seldom well exposed; and the result was two important papers published by the Club. — The first of these, entitled "The Latest Fluctuations of the Sea-Level on our own Coast," must rank as his most valuable contribution to Geology. Others had merely collected the numerous fossils of these clays: it was Stewart who noted the occurrence of changes in the character of the fauna at different depths in the deposits, and showed that they bore witness to a remarkable series of recent land-movements, which he traced out and demonstrated with much ability. The merit of this paper can scarcely be judged from the brief abstract of it, which, with characteristic modesty, Stewart handed in for publication in the Proceedings of the Club. Fifteen years later, when I was working at the same deposits, Stewart gave me his original manuscript, and the editors of the *Irish Naturalist* propose to publish it in the next issue of that journal as a tribute to his memory. The second of the two papers which resulted from the excavation of Spencer Basin was his "List of the Fossils of the Estuarine Clays of Down and Antrim," in which a full account is given of the fauna of these beds at all the places in the district so far explored. Before leaving the question of the estuarine clays, I may add that another opportunity for examining them occurred when the Alexandra Dock was in course of construction in 1886-7. Stewart was then himself

deeply immersed in the final work connected with his *Flora*; but it was owing to his strong encouragement and unstinted assistance that I undertook their examination, and was enabled to make a further contribution to the history of these important local deposits. Had Stewart been still in his prime I cannot but think that the fine opportunity for further research which occurred during the construction of the great dock now just completed would not have been lost.

In 1881 he produced another important paper on local Geology. For years he had neglected no chance of examining the Glacial drifts, and searching especially for the scattered fossils which they contain. He now brought together the published and unpublished material into one paper, "The Mollusca of the Boulder-Clay of the North-East of Ireland," a paper which, despite much energetic work on the local Glacial deposits during the last twenty years, has not been superseded.

But it is not by his published papers alone that the work of S. A. Stewart must be judged. His constant usefulness and helpfulness, his cheerful encouragement did much for the advancement of Natural Science in Belfast. Stewart was undoubtedly a product of this Club, and its most remarkable product. Without the comradeship, the community of tastes, the friendly rivalry, which he found amongst its members, it is probable that he would never have achieved the position which he held among us. And on the other hand, I believe that he exercised a profound influence on the fortunes of this Society. For forty years he gave us his services on the Committee, refusing the offices of greater dignity, but perhaps less direct usefulness, which were offered him. He was a court of appeal in almost every branch of Science. His fine simple character, too, had its effect; and in several features by which this Club has been distinguished from some more pretentious organizations in other places—in its love of practical work, its *esprit de corps*, its absence of dilletantism—I fancy one may trace the influence of our old fellow-member.

And so, although it may be by his papers alone that the name of S. A. Stewart will be known to future generations of Field Club workers, it will not be so with us who had the privilege of knowing the man himself. To us, his character and career appeal in stronger terms. We will remember him for his unfailing helpfulness even to the beginner; for his courage in supporting what he believed to be the truth; for his humility in matters of opinion where some were inclined to dogmatize. "Behold, we know not anything," was his habitual mental attitude. Admirable also was his loyalty to his friends, both old and young. He had known the Club from the beginning. He maintained a correspondence with many early members whose names were to us names only. He entered a dignified protest, which scarcely concealed his indignation, when the Club, forgetful of its past history, neglected the opportunity afforded by the visit to Belfast of Ralph Tate in 1896, to do honour to its founder; an opportunity now gone for ever, for Tate's long and distinguished career closed five years later.

To us Field Club members S. A. Stewart has set an example in carefulness in scientific investigation, caution in arriving at conclusions, modesty in regard to our own work, respect for the opinions of others, and especially the kindly encouragement of those who are younger or more ignorant than ourselves. If I may use the words written by Robert Louis Stevenson concerning Yoshida, the humble founder of Japanese liberty, I would say that it is exhilarating for us to have lived in the same days with this great-hearted gentleman. May we prove worthy of following his example.

Mr. R. J. Welch said—It is now over thirty years since I first met Mr. S. A. Stewart at excursions of the Club, where I knew him as a keen botanist. I soon found however that he had an extremely good knowledge of local Zoology as well, and I got into the habit of taking in to him to be named my first attempts at

making a collection of land and fresh-water shells of the Belfast hills and Lagan valley. I need hardly say that I received at the same time some good lessons in scientific method, and warnings as to the great care necessary in recording the exact locality from which any specimen was obtained. The name of the species, I had pointed out to me, was not so important as the locality for the former could be obtained at any time, while the latter if not attached to the specimen rendered it almost useless for scientific purposes. Later I found that he knew his marine shells even better than the terrestrial species, and I had his assistance in determining troublesome species up till the time he retired from the curatorship of the Museum. In the early days of the Club—the late sixties and early seventies especially—he seems to have collected or noted the presence of land and fresh-water shells in many localities of our district, and in old note-books of his which he gave to Mr. Praeger many years ago, I find such records as “took 8 specimens of *Helix lameilata* on one spot, Colin Glen, 24/5/69, 7 in August, and 10 on 17/9/69.” Earlier than that he seems to have been collecting records keenly, for, in June, 1866, in another of the books he notes the Swan Mussel, *Anodonta cygnea*, “common in the Lagan Canal near its junction with Lough Neagh.” This is the only record we have of its presence in the Canal beyond Moira. Under same date he notes 7 other species, more or less abundant in the Canal or lake adjacent. In September of same year he gives a short but good list from the Lagan between the 4th and 5th locks, mentioning that *Ancylus lacustris* was common in that reach on various water plants, but most abundant on the leaves of *Butomus umbellatus*. Again, in June, 1868, he notes *Pupa anglica* with some common species abundant under stones on shore of Lough Mourne; and there are other notes referring to species at Warrenpoint, Belfast hills and other localities. All through these note-books, too, I find constant references to articles on subjects which struck him in reading various magazines, as, for instance, “*Bos longifrons* is only found associated with

Megaceros of the extinct mammals, and it co-existed with man." This from "The Intellectual Observer." Stewart adds "Therefore I infer that *Megaceros* was likely contemporaneous with Man." (There seems evidence in the Ballynamintra Cave deposits that this was so, but Dr. Scharff does not consider the evidence conclusive in the case of the Clare Caves ; though he does so for the Bear, which lived long after the "Irish Elk" and Reindeer had gone.) From "Science Gossip" he has memos on "Sociable Mites infesting various Plants," "Gall Insects and Oak-Buttons," "Death of Native Birds in New Zealand caused by the introduction of Bees," and on "Parasites," "Courtship of Birds," and other subjects from "The Student."

There are many additional notes from the "Annals of Natural History," "Proceedings of the Royal Irish Academy," and other scientific journals, mainly connected with Marine Zoology, in which he seems to have been rather more interested than in the land fauna. About 1868 he was engaged in dredging on the Antrim and Down coasts, on the 20th June from Bangor to Donaghadee in 6 to 8 fathoms, later in Belfast Lough in from 8 to 15 fathoms, and in September for two days at Glenarm with Dr. Holden. He lists chiefly Shells, Star-fish, Urchins, and Zoophytes, the latter mainly from Belfast Lough, where he seems to have determined 17 species. This work proved very useful in the compilation of the lists published in our Guide, prepared for the 1874 Belfast Meeting of the British Association. I am glad to say some of Mr. Stewart's collaborators in that work are with us to-night, still active in our Club work, though thirty-seven years have passed since then.

His finding of *Helix personata*, a foreign land-shell, on the sand-hills at Newcastle, Co. Down, in 1870, gave rise to much discussion in some scientific journals afterwards.

His good knowledge of Mollusca and of local marine life generally, must have been of service to him in determining the species for his "List of the Fossils of the Estuarine Clays of Down

and Antrim," and also "The Mollusca of the Boulder-Clay of the North-East of Ireland." Both these scholarly contributions to the literature on our ancient fauna are published in our first volume of Appendices.*

Taylor, in his monograph of "The Land and Fresh-water Mollusca of the British Isles," has many local records from material sent him by Stewart, and I have no doubt that he helped many other similar workers also, who required information on Irish zoological matters.

So far as our own Club is concerned he had its interests keenly at heart to the last, and I am sure many here to-night will join with me in grateful acknowledgment of help and sympathy cheerfully rendered in our scientific pursuits by our late friend and fellow-member.

Mr. George Donaldson said—On the establishment of the Science and Art Department of the Committee of Council on Education, classes were formed in Belfast, under the late Prof. R. Tate, in which Mr. Stewart was one of the first pupils. At the first examination, held in May, 1862, he passed 1st Class in Geology and 1st Class in Mineralogy, and obtained the Bronze Medal of the Department in these subjects. In that year the Belfast students obtained five out of the six medals awarded by the Department for the United Kingdom.

The next year, the subjects taken in the classes were Vegetable Physiology, Economic and Systematic Botany, and at the examination, held in May, 1863, he again obtained a double first place, 1st Class in Vegetable Physiology, and Economic Botany, 1st Class in Systematic Botany, and in honours the Silver Medal of the Department.

*Systematic Lists of the Flora, Fauna, Palaeontology and Archaeology of the North of Ireland, by Members of the Belfast Naturalists' Field Club, Vol. I.

The next year, the subjects were Physiology and Zoology, and at the examinations, in May, 1864, Mr. Stewart once more obtained a double first, 1st Class in Animal Physiology, 1st Class in Zoology, and again the Bronze Medal of the Department.

Mr. William Gray, M.R.I.A., said that during his forty-seven years acquaintance with Mr. Stewart he had been afforded many opportunities of studying his characteristics. One of Mr. Stewart's greatest assets was his tenacity of purpose, and the persistency with which he carried out his own ideas. The speaker narrated several stories relative to Mr. Stewart's life and to his work, one of which is perhaps worth recording. "During one of the riots of the 'seventies,' Stewart, probably quite unconscious of the disturbed state of the town, spent his afternoon upon the hills in search of fossils and other geological treasures. He was returning home in the evening when a constable, on the look-out for law-breakers, observed the bulgy appearance of his pockets and promptly accosted him. Having briefly examined his pockets, the guardian of the peace was amply satisfied that here indeed was a ringleader of the rioters, and he forthwith constrained Stewart to accompany him to the nearest police station. There, however, Stewart's identity was quickly established, and he was at once set free to carry home his hard-earned booty." Mr. Gray expressed the hope that the papers read that evening would be printed *in extenso* in the Club's Proceedings.

Mr. William Swanston, F.G.S., and Mr. John Hamilton having both spoken, Mr. John Brown, F.R.S., referred to his contact with Mr. Stewart in connection with the Museum of the Belfast Natural History and Philosophical Society, and testified to the great care and interest evinced by him in his work as Curator of that establishment.

S. A. S.

A simple life well lived,
The four score years well past,
And wearied frame and active brain
Are both at rest at last.

No idle dreamer he,
No seeker after gold,
But Earth's untrodden ways he took,
Their secrets to unfold.

The mountain and the moor,
The torrent and the rill,
The lonely glen, the wayside track
Held language for him still.

A child of Nature, given
A heart all Nature's own,
What wonder if her rarest, best,
To him were not unknown.

And now his honoured dust,
By loving hands is laid
Within the shadow of the hills,
Where oft he mused and strayed.

A simple life, and yet
A memory, to be
The witness of how grand a thing
A simple life can be.

W. PORTER.

June, 1910.

PLANT LIFE IN A MARSH.

At a meeting of the Botanical Section, held on 21st January, Rev. C. H. Waddell, B.D., gave an interesting address on above subject. He said—Marsh plants form a fairly well-defined association. They are called *Halophytes*, and are distinguished on the one hand from Bog-plants, which grow on peat and have a xerophytic character, and on the other from true Water-plants (*Hydrophytes*), which draw their support from the water in which they float. The roots grow in water-logged soil and the stems and flowers rise above the water.

Marsh plants have been divided into two main groups, those of *Reed-swamps*, characterised by the dominance of *Phragmites*, *Typha*, *Scirpus lacustris*, and other slender tall-growing species, and *Bush-swamps*, where Woody Plants such as Willows and Alders grow.

Besides the tall-growing species, many lowlier forms are found in marshes, such as Sundew, Grass of Parnassus, Marsh Violet, Charas, and Mosses of many kinds.

The Reeds which fringe lakes and ponds with their associated plants gradually fill up the water and add to the land.

THE LOWER CARBONIFEROUS ROCKS OF THE NORTH STAFFORD
COALFIELD.

The Geological Section of the Club held its second meeting of the Winter Session in the Museum on 25th January. Mr. W. J. C. Tomlinson, Chairman of the Section, presided.

Before calling upon Mr. Bennett to deliver his lecture, the Chairman asked Mr. Robert Bell to make a short communication regarding a fossil Coral new to this district. Mr. Bell said that some years ago he discovered a specimen of Coral that was new to him in the Ammonites-angulatus zone of the Lower Lias at Hillsport. He showed it to his friend the late Mr. Stewart, who pronounced it to be a new specimen. It has recently been sent

to the Natural History Museum, South Kensington, and has been determined by Mr. Lang to be *Isastraea endothecata* (Duncan). This Coral has never been recorded from Ireland before, and is a noteworthy addition to our list of the Liassic fauna.

Mr. S. A. Bennett, B.A., B.Sc., then proceeded to deliver an extremely interesting lecture on "The Lower Carboniferous Rocks of the North Stafford Coalfield," in which he said—The Geology of this part of England is determined almost entirely by the Pennine system of folding, due to earth movements which took place in pre-Triassic times. The sub-carboniferous floor has never been reached in the North Stafford Coalfield, consequently this interesting subject can only be approached in the light of our knowledge of the strata underlying the neighbouring coalfields of Leicester, South Stafford, and North Wales. On the west the whole of the Carboniferous series is cut off by the great bed rock fault, which runs, roughly speaking, in a N.N.E. and S.S.W. direction, bringing successively higher strata of the Trias against successively lower strata of the Carboniferous system as we proceed north. The difference in lithological character of the four members of the series—the massive limestone, the Pendleside shales, the millstone grits, and the actual coal measures—clearly indicates a transition from deep water to shallow water or land surface conditions, and the succession of life in these rocks leads to the same conclusion. The periclinal dome of Carboniferous limestone at Astbury, on the western border of the coalfield, is exceedingly interesting, containing as it does beds of igneous origin, these being the only examples of contemporaneous volcanic action on the western side of the Pennine axis. In addition to different species of Corals—specimens of which were shown—the following Brachiopods occur: *Orthis resupinata*, *Productus longispinus*, *P. semireticulatus*, and *Spirifera glabra*, all of which have been noted from the Castle Espie limestone in Co. Down. The passage beds into the Pendleside series contain the important zone fossil *Prolecanites compressus* and the

lowest coal seam in the district. Following these are about 2,000 feet of typical Pendleside rocks, a gannister quarry in this series, situated about 500 feet below the base of the millstone grit, being rich in well-preserved fossils. Among the most interesting shown by the lecturer were the following survivals from the massive limestone:—*Amplexi zaphrentis*, *Flemingia* sp. and *Phillipsia derbiensis*, the two latter being new to the Pendleside. *Lingula scotica*, a rare Brachiopod, and *Schizodus wheeleri*, a Lamellibranch, which is known to occur in the upper coal measures of Nebraska and the millstone grit of Scotland, were also shown, the latter being another addition to the Pendleside fauna.

The lecture was not only illustrated with rock specimens and fossils from the district, but also with beautiful photographs of the scenery. In the interesting discussion which followed Dr. Dwerryhouse pointed out that the gannister beds were the exhausted soils of the Carboniferous land surface, and emphasised the equivalence in point of time of the Pendlesides and Yoredales of the North of England. The Chairman and Mr. Sylvanus Wear also joined in the discussion.

The proceedings terminated with a cordial vote of thanks to the lecturer.

DONEGAL FOLKLORE.

A meeting of the Archaeological Section of the Club was held on 8th February, when Miss Elizabeth Andrews read a paper on "Folklore from Donegal." Miss Andrews stated that the stories current among the peasantry are varied, especially in Donegal, where we hear of giants and fairies, of tall Finns and short Finns, of short, stout Firbolgs or Firwolgs, of Danes who made heather ale, and sometimes of Pechts, with their large feet. According to one legend, fairies were angels who had remained neutral during the great war in heaven. They are sometimes represented as kindly, but often as mischievous. Stories were given showing the intercourse between the human race and fairies, and the vindictive

character of the latter when annoyed. In Tory Island, it is said, fairies can make themselves large or small ; their hair may be red, white, or black ; but they dress in black, a very unusual colour for the small people to appear in. It may perhaps be explained by remembering that Tory Island, or Toirinis, was a stronghold of the Fomorians, whom Keating describes as "sea-rovers of the race of Cam, who fared from Africa." The inference was drawn that the fairies of Tory Island represent a dark race. The tale of King Balor was given, and his dread of being slain by his daughter's son. In the end he is killed by his grandson, who to avenge his father's death thrusts a poker out of the smith's forge into the basilisk eye of his grandfather. Water streamed from the wounded eye and formed the biggest lough in the world, three times as deep as Lough Foyle. Miss Andrews gave the story as told to her in a cottage on Tory Island during the visit of the Field Club Union in last July, and compared it with the narrative given by Dr. O'Donovan in a note to his "Annals of the Four Masters." She stated that the Firbolgs, or Firwolgs, are remembered in Donegal as short, stout people, who cultivated the land near the sea. The Danes, whom she is inclined to identify with the Tuatha de Danann, are the great builders of forts and cashels. Firbolgs, Danes, Finns, and Pechts are all strictly human, and if the fairy has been more spiritualised, many of the traditions show how closely he is allied to ancient and modern Pygmies. Reference was made to the skeletons of Dwarfs found in Switzerland and other parts of Europe ; to the Pygmies of Central Africa, whose photographs had been shown to the Field Club by Sir Harry Johnston ; and to the Dwarfs of New Guinea, described by members of the B.O.U. expedition, who are now investigating that island under many difficulties. It was stated that many traces may be found of the belief that men and women can change themselves into animals. A man who killed a young seal was startled when the mother, weeping, cried out in Irish, "My child, my child." John Sweeny, an inspector of national

schools, writing about thirty-five years ago, gives a graphic description of a fisherman from Arranmore, who was driven by a storm to the coast of the Scotch Highlands. He entered a house, and was surprised when the owner accosted him by name. The Highlander bared his head, and, pointing to a scar, reminded his guest of an encounter he once had with a seal, adding "I was that seal." In conclusion, Miss Andrews urged the pressing need of collecting these old tales, which the antiquary of the future, with fuller knowledge of the past, may be better able than we are to decipher, but if the stories be allowed to perish one link with the past will be irretrievably lost.

A discussion followed, in which Mrs. Hobson, Messrs. Milligan, Mollan, and others took part.

GLACIAL LAKES AND THEIR OVERFLOW CHANNELS.

The usual monthly meeting of the Geological Section was held in the Club-room in the Museum, on 15th February, the Chairman of the Section (Mr. W. J. C. Tomlinson) presiding. The main business of the evening was a paper on "Glacial Lakes and their Overflow Channels," by Dr. A. R. Dwerryhouse, F.G.S. The lecturer introduced the subject by referring to certain existing lakes whose waters are held up by a dam of glacier ice, and as an example cited the Merjelen See, on the flanks of the great Aletsch glacier, in Switzerland. In this case the glacier occupying the main valley has advanced across the mouth of a tributary stream so as to pond up its waters and produce a lake. This lake, until its level was artificially lowered by the Swiss Government, drained by way of the col at the head of its valley into the adjoining valley, and by so doing cut a channel in the rocks of the col, which remains as a permanent witness of the former level of the water. He then described certain well-known examples of such deserted overflow channels in Great Britain, referring particularly to those described by Professor

P. F. Kendall, of Leeds, from the Cleveland Hills in North Yorkshire, and those of Teesdale, Weardale, and the Tyne Valley, which the speaker had made the subject of a paper read before the Geological Society of London in 1902. The North of Ireland, it was stated, contained fine examples of these overflow channels, produced during the Glacial Period, several of which had been described by the officers of the Geological Survey in the memoir entitled "The Geology of the Country Around Belfast," 1904. In conclusion, Dr. Dwerryhouse stated that he was engaged in working out the distribution of these valleys in the Counties of Antrim and Down, and hoped to be able to lay the results of his work before the Club at a later date. The paper was illustrated by a series of lantern slides, and an interesting discussion arose which was joined in by the following members:—Messrs. R. J. Welch, M.R.I.A.; William Gray, M.R.I.A.; A. W. Stelfox, Robert Bell, S. A. Bennett, B.Sc., and the Chairman.

THE STUDY OF FUNGI.

A meeting of the Botanical Section was held on 18th February, when Mr. George Donaldson presided and Mr. Alexander Milligan read a paper on "The Study of Fungi." After dealing with the empirical definition of Fungi as plants devoid of chlorophyll and wanting also the organised tissues found in the higher plants, Mr. Milligan proceeded to deal with the evidence which indicates that the Fungi are derived from the Algae or Sea-weed family. According to this evidence many of the lower forms show much similarity in structure; but what was more interesting and of greater evidential value was the practical identity of the reproductive systems to be found in many primitive genera of both groups, which the lecturer then briefly outlined. These lower forms of Fungi, which differ from corresponding algal forms in little else than the absence of chlorophyll, are known as *Phycomyctes*, next, in an ascending order, being the *Ascomyctes* and the *Basidiomycetes*. The last named group was made up of

the *Hymenomycetes* and the *Gasteromycetes*, and these included most of the forms popularly known as Fungi, such as Mushrooms, Puff-balls, Boleti, and the numerous forms of Tube-Fungi. In conclusion, the lecturer dealt with the question of classification, which he said was still very imperfect, and he described some of the salient morphological features upon which it was based.

The reading of the paper was followed by a lengthy conversational discussion, in which nearly all present took part.

THE CLOSE OF AN ICE-AGE: A COMPARISON BETWEEN IRELAND AND SPITSBERGEN IN 1910.

The fourth monthly meeting of the Winter Session of the Club was held in the Museum on 21st February, when Professor Grenville A. J. Cole, M.R.I.A., F.G.S., Delegate from the Irish Field Club Union, gave an interesting lecture, entitled "The Close of an Ice-Age : a Comparison between Spitsbergen and Ireland in 1910." The President, Mr. Robert J. Welch, M.R.I.A., occupied the chair and presided over one of the best-attended meetings of the Club for some time.

Professor Cole said—The boulder-clays that cover so much of Ireland, whether as sheets or as the rounded hills styled drumlins, are known to be full of scratched stones, which betray their glacial origin. Louis Agassiz convinced geologists of this some sixty years ago by his comparison of these deposits with those in Switzerland ; but he insisted that they pointed to the occurrence of a world-wide ice-age. They were laid down by ice-sheets rather than by local glaciers, and the gravels associated with them were washed from them during the melting of continental ice. The widely spread glacial striations on the rock-floor of Ireland similarly support the view that broad masses of ice occupied the plains and passed over many of the hills.

The waning of an ice-age may still be studied in the Antarctic and Arctic regions, and Spitsbergen, lying about latitude $78\frac{1}{2}^{\circ}$

north, offers a remarkably accessible region where glaciers of the old Irish type remain. This island, as it happened, was not easily reached in 1910, when an unusual amount of drift ice from the pole prevented the entry of large steamers to its fjords. Baron de Geer, however, Professor of Geology at the University of Stockholm, had organised an expedition of some seventy geologists, in connection with the International Geological Congress in Stockholm, and he carried this expedition through, with exceptional skill and seamanship, in a light Baltic steamer of 890 tons. The reader of the paper to the Belfast Field Club had the advantage of representing the Royal College of Science for Ireland on this excursion.

One of the points specially noted was the existence of ice-sheets several miles wide in Spitsbergen under almost arid conditions, the precipitation being believed to be only about seven inches *per annum*. The weathering of the plateau-edge, which forms the characteristic feature of the coast of the great Ice Fjord, reminds one everywhere of the dry lands of Arizona. Snow gathers in the notches, and enlarges them by melting in the sun and freezing again at night, a crumbling surface being thus produced, from which in time the snow and rocks slide down. Gradually "cirques" arise, by this local excavation of the plateau, and these compare very interestingly with the grand rock-hollows, Coumshingaun and a hundred others, among the Irish hills, which have also been eaten out by frost, while local glaciers occupied their floors. The ice presents itself in Spitsbergen as local glaciers, but also as broad sheets occupying the lowlands, leaving serrated hills above, and moving forward actively over the raised beaches and tundras to the sea. At its melting margins it reveals the immense burden of rock carried throughout its mass, and some of the sheets are almost black with included "boulder-clay." Since 1896, the Sefström Glacier has invaded Cora Island and has again shrunk back, appearing now with a face four miles broad along the coast. A relic of the ice remains on the island, associated with a red boulder-clay which is full of marine shells. The valves

of these often remain united as in life. This modern instance has a most interesting bearing upon the deposition of shelly clays and gravels in Ireland, which are associated similarly with scratched stones. Cora Island in Spitsbergen serves, in fact, as a model that enables us to realise the invasion of the ice from the Irish Sea over our own tundras in glacial times. The fauna and flora along the coast of Spitsbergen, though the only tree is a Willow about half an inch in height, show that glacial conditions by no means imply the extinction of living things.

The paper was illustrated by views of Irish glacial deposits, several being by the President, Mr. R. J. Welch, and by numerous Spitsbergen landscapes, photographed by the author in 1910.

Mr. William Gray, M.R.I.A., proposed a formal vote of thanks to Professor Cole, and commented on the admirable manner in which the lecturer had made use of the knowledge gained in Spitsbergen in explaining some of the most difficult problems of Irish Geology. Mr. W. A. Traill, in seconding the vote, pointed out the great necessity of travel to a geologist when dealing with questions of such magnitude as the Ice Age. The vote having been put to the meeting by the President, and passed by acclamation, Professor Cole briefly replied.

Rev. W. C. Steele, B.D., and Mr. Francis K. Fenton were elected members before the conclusion of the meeting.

DISCUSSION ON THE MEANS OF DISPERSAL OF PLANTS AND
ANIMALS.

Under the auspices of the Zoological Section a meeting was held on 1st March, the Chairman of the Section, Mr. Nevin H. Foster, M.B.O.U., presiding. The Chairman said that the meeting had been convened for the purpose of discussing the Presidential Address, which dealt with the dispersal of plants and animals, and the manner by which Ireland had been stocked. On this night the discussion was limited to the means of dispersal. Mr. R. Ll. Praeger, B.E., M.R.I.A., dealt with the dispersal of

plants, and pointed out the probable methods of seeds being scattered. Winds, currents, and animals forming, in his opinion, the chief methods of transportation. Nevertheless, he believed that most plants had obtained their present geographical range by means of slow progression over a continuous land surface, rather than by accidental means. He did not consider that whirlwinds and ocean currents had much influenced our island floras.

Mr. A. W. Stelfox, A.R.I.B.A., said that most of Mr. Praeger's remarks would apply equally to land and fresh-water Shells, and that the habits of these animals appeared to minimise the effects of accidental dispersal. The distribution of the fresh-water species was much more likely to be influenced by changes in watersheds. Thus, a species might penetrate to the source of a river, say a lake, and by means of physical changes this lake might afterwards be captured by a river running in a different direction to that into which the lake had formerly discharged its waters, thereby opening up a new and unoccupied region to the species.

Mr. F. Balfour Browne, M.A., F.R.S.E., remarked that when Water-beetles had been found on oceanic islands they had evidently been derived from all points of the compass, which pointed to their introduction by accidental means.

Dr. A. R. Dwerryhouse, F.G.S., thought that Mr. Praeger had minimised the effect of winds as a means of transportation. He pointed out that sand from the Sahara had been known to have been carried to Italy. He agreed with Mr. Stelfox as to the possible influence of changes of watershed affecting the distribution of a fresh-water fauna, and pointed out that such physical changes were constantly happening at the present day.

Professor Gwynne-Vaughan, M.A., agreed with the two last speakers, and considered that accidental dispersal was quite sufficient to account for the present distribution of our flora.

Mr. N. H. Foster said that it appeared that the present distribution of some of the invertebrate groups could not be accounted for otherwise than by means of former land connections.

Mr. R. J. Welch, M.R.I.A., pointed out that whilst the discussion had been very interesting, it did not help definitely to solve the problems of dispersal, but that many interesting points had been raised which should stimulate further research.

Messrs. C. M. Cunningham, L.D.S., and H. L. Orr also spoke.

A TALK ON LIMESTONE.

A meeting of the Geological Section was held on 15th March, at which Mr. William Gray submitted a communication on "Limestone," one of the materials of which the crust of the globe is composed; and of which there are two main classes—the igneous and the sedimentary. The former originated by volcanic agency and the other by marine or mechanical agency resulting in sedimentary or stratified deposits. Limestone belongs to the mechanical group and has been accumulated mainly by marine agency. It occurs in every geological age and has a wide range of geographical distribution, and is nowhere relatively more abundant or varied than in Ireland.

Although limestone occurs mainly as a marine or stratified rock it is not entirely absent from igneous rocks: it occurs in the mineral mica, which is one of the minerals of which granite is composed. The term limestone explains itself—a stone formed of lime—for which purpose it is combined with carbonic acid; 56 of lime and 44 of carbonic acid.

The primary crystal of limestone is a rhomb having a curious property called cleavage, by which it splits up in definite lines, assuming the same definite form no matter what the size of the specimen may be. The combinations of similar crystals are capable of producing as many as 700 compound forms of great variety and beauty, yet if any one is selected and crushed to the finest powder and examined under the microscope the cleavage planes of the fragments will show the cleavage planes of the original rhomboid crystal. It was the discovery of this cleavage property early in the last century that originated Crystallography and raised it to the

rank of an exact science. Lime forms other compounds as well as Carbonate of Lime, each having its own special form of crystal, such as Phosphate of Lime, Sulphate of Lime, Fluoride of Lime, Thomsonite, Aragonite, &c. Limestone yields readily to chemical action, and is thereby removed and re-crystallised under various conditions, even in the hollow spaces of basaltic rocks.

On the north shore of Lough Neagh, at Cranfield, there is a holy well reputed for having the power of curing sore eyes. The well occurs in the fissure of a basaltic rock below some overhanging trees. Some veins of carbonate of lime, like candied sugar, occur in the rock, so that when the well is cleaned out crystals of the lime are found in the bottom of the well. They are collected and valued as charms for the benefit of defective eyesight.

In many places in County Antrim the effect of surface-water carrying lime in suspension may be seen by the deposit left encrusting the surface after evaporation. At the calcareous wells of Matlock and Knaresborough this process is employed to manufacture petrifications for visitors, such as baskets and birds' nests as the example on the table. In many limestone districts the dissolving power of surface-water has been employed by Nature to excavate great caverns beneath the surface, while the chambers thus formed are fantastically decorated by the same means, producing strange architectural effects and combinations of beauty and grandeur of surpassing interest. In Antrim, Donegal, Fermanagh, Galway and other counties there are examples of this kind, but perhaps the most extensive and elaborately decorated series of natural caves in Ireland are those of Mitchelstown, on the borders of Tipperary and Cork. They cover an area of 24,000 feet, including passages up to 200 feet long, and chambers 100 feet in diameter and 35 feet high, richly decorated with drapery, and columns of the purest crystalline marble.

The caverns of Europe supply the earliest evidence of Primitive Man, and in them are associated a long succession of extinct wild animals, whose remains are carefully deposited in the order of

their succession and sealed up beneath stalagmitic floors for the exploration of modern scientists. The typical example of this kind in Britain is that of Kept's Cavern, in Devonshire, explored under the direction of the British Association, whose agents discovered in addition to the evidence of Primitive Man—(a) a group of wild animals now utterly extinct from the world, (b) a group existing elsewhere but entirely removed from Britain, and (c) a group of animals that live to the present in Britain. Mr. Gray described and exhibited examples of the calcareous beds under which the fossil animal remains occur.

In dealing with the limestone formation of geological times Mr. Gray took our Antrim Chalk resting upon the Greensand formation as typical of all other limestone formations, which are always more or less associated with sandstone deposits, both being marine or sedimentary. With this difference—the sandstones represent the shore or mechanical deposits and the limestone represents the deep sea deposit, or the deposit of vital origin, like all our fossil limestones of every period, possibly including some of our primary or metamorphic limestones whose organic remains may have been obliterated by metamorphic action. Mr. Gray exhibited examples of this kind from our Antrim Chalk and Lias, the alteration having been produced by basaltic contact.

Mr. Gray referred to the nature and extent of all our limestone formations in Antrim and Down, of which we have a greater variety than usual in one limited locality, including Chalk, Lias, Permian, Carboniferous and Primitive Limestones, of which illustrative examples were exhibited and their peculiarities fully explained.

The limestones absent from our locality, including the Oolitic, Triassic, and Devonian were also described in their order, and illustrated by suitable examples, together with a varied series of the principal marbles of Ireland, the examination of which added considerably to the interest of the meeting.

SOME DIFFERENCES BETWEEN MOSSES AND HEPATICS.

At a meeting of the Botanical Section, on 18th March, Rev. Canon H. W. Lett, M.A., M.R.I.A., gave a most interesting address, of which the following is an abstract.

Mosses and Hepatics belong to the Cryptogams, and are nearly related to each other, the chief points of differences are these :—

MOSSES.

HEPATICS.

STEM.

Cylindrical, firm, covered with leaves, mostly erect.

In the Thalloid group there is none, the whole plant being a flat creeping scale. In the Foliose group the stem is weak, fragile, and creeping, except when growing in thick tufts.

LEAVES.

Mostly narrow and sharp-pointed, closely set all round the stem, except in a few species, texture thin and firm, often with a nerve up the middle, never forked or lobed, margin frequently minutely serratulate.

Mostly pinnate, flattened, often with a third row smaller in size at back of stem, delicate and brittle, very varied in shape and size—round, oval, squarish, linear, forked, variously lobed, alga-like, or folded into a bag-shape.

FRUCTIFICATION.

Spores contained in an urn-shaped vessel, which at first is covered with a cap, when ripe opening by a number of fine teeth (except in case of *Andreaea*) to allow the spores to escape.

Spores contained in a globular capsule (except in *Anthoceros*, where it is linear), on a weak stalk, in some species on underside of an umbrella-shaped stalked receptacle, in others immersed in substance of the frond. Capsule, when ripe, opens into four valves. Among the spores are fine spiral threads.

SCENT AND USE.

Dicranum scoparium has a smell like freshly turned up soil.

Several have strong scents, like Bergamot, Heather, Pencil-Cedar, or decayed Cress.

Employed for stuffing beds, and packing and growing plants.

Of no commercial utility.

BOULDER-CLAY FROM THE NORTH OF IRELAND,
WITH LISTS OF FORAMINIFERA.

FORAMINIFERA FROM THE ESTUARINE CLAYS OF
MAGHERAMORNE, CO. ANTRIM, AND LIMAVADY
STATION, CO. DERRY.

PLANKTON STUDIES.

The fifth monthly meeting of the Winter Session was held in the Museum on 21st March—the President, Mr. Robert J. Welch, M.R.I.A., in the chair.

Mr. Joseph Wright, F.G.S., read two short papers, one on "Boulder-Clay from the North of Ireland, with Lists of Foraminifera," and the other "Foraminifera from the Estuarine Clays of Magheramorne, Co. Antrim, and Limavady Station, Co. Derry." Mr. W. J. C. Tomlinson proposed, and Mr. N. H. Foster seconded, that Mr. Wright's papers should be published as Appendices to the Club's Proceedings, which was passed, and these papers will be found in the present issue.

The President called upon Mr. W. J. Dakin, D.Sc., of Liverpool University, for his paper on "Plankton Studies."

Dr. Dakin explained the meaning of the term plankton, which was first used by the German physiologist Hensen in 1887. It includes all those small animals and plants which are to be found floating in the waters of lakes or oceans, and which may or may not have the power of swimming, but which at the same time are as much at the mercy of winds and currents as inanimate floating objects. These organisms can be easily captured by towing nets of extremely fine silk through the water. Dr. Dakin,

who has been for the past year carrying out a research on the plankton of Lough Neagh, described the various nets which have been devised to catch the plankton for the purpose of quantitative estimations, and mentioned some of the results of this work. Hensen, for example, was able by determining the number of plaice eggs floating in a certain area of the Baltic Sea to calculate the number of plaice which must have been present in that area to lay the eggs. Since the number of plaice caught by man *per annum* in the same area was known, it was easy to determine what proportion of the total fish living in that part was annually caught by the fishermen. The study of the plankton has of recent years become very important, and many biological problems, both economic and scientific, are awaiting solution, when the results of detailed research are known. Thus the great question of the food of fishes, and indirectly therefore the food of man, is bound up with the plankton. Many fishes feed directly on these small organisms floating in the water. Other fishes feed on somewhat larger animals, but even these depend indirectly on planktonic life, which forms the last link between the minerals dissolved in the water and the complex organic compounds devoured by the lowest animals. There is a regular "sea-saw" of life, in fact, in the waters, and one could classify the organisms into producers (mostly plants) and consumers. Amongst the microscopic animals there is a continual struggle, the larger and better armed feeding upon the smaller and weaker, and the plankton caught at any time represents, in fact, the results of the conflict. The constitution of the plankton depends, however, in addition to this, on meteorological conditions. We find plankton present in Lough Neagh in great abundance all the year round, but the organisms are by no means the same at different seasons. There are some characteristic Winter forms. Others appear first in Spring, and soon become very abundant and then die off towards Summer. All these interesting changes can only be followed by an investigation of the water at regular intervals through a period of at least one year.

The lecturer pointed out that, as far as the plankton was concerned, the water of Lough Neagh was very prolific. For the whole year there is a total volume of plankton produced per cubic metre which exceeds that of the waters of the Irish Sea. This plankton is very similar in character to that of some North European lakes and differs considerably from that of the Scottish lochs and lakes of the English lake district. The resemblance to certain North German lakes is still further increased by the presence of *Mysis relicta*, which though not strictly speaking a planktonic organism, must be considered with the plankton. In conclusion, Dr. Dakin drew attention to the remarkable fact that, whereas on land the most productive regions are in the tropics, the conditions are reversed in the water, and both fresh-water lakes as well as the seas and oceans in temperate and Arctic regions are far more productive, as far as plankton and fish-life is concerned, than tropical waters.

The President and Messrs. Cunningham and Whitehouse having raised points for discussion, Dr. Dakin briefly replied, and the election of Miss Jane E. Montgomery and Messrs. H. M'Clelland, J. D. W. Stewart, and Herbert M. Thompson to membership brought the meeting to a close.

FOGOUS AND OTHER CORNISH ANTIQUITIES.

A meeting of the Archaeological Section was held on 29th March, Miss E. Andrews presiding, when Mrs. Hobson read a paper on above subject. In the course of her address, Mrs. Hobson said it could never be possible rightly to appraise the importance of any archaeological remains in any given district or country without some comparison with the same class of objects in other places and other lands in order to see things in their true proportions and get at their proper values. It was with the object of comparing the "souterrains" in Ireland with the "fogous" in

Cornwall that she visited the latter, and not only so, but to see how these structures stood in relation to other ancient remains usually designated under the head of "rude stone monuments." The fogous were subterranean artificial caves, sometimes called vouga, ogo, ogou, vau, &c. The first was translated a den or cave. Williams, in his Cornu-British Lexicon, had given "fo" a flight or retreat, and "gow" false, deceitful, hidden. These structures were built of rude stones put together as were souterrains, and with only slight differences in structure. In one was an arch dug out in earth and not faced with stones, but no arches were found in Ireland. Judging from rudeness of structure the fogou at Bolleit would appear to be older than any others visited. The south-west of Cornwall was marvellously rich in stone-circles, pillar-stones, holed-stones, &c., but there were fewer cromlechs than one would expect. Perhaps the most interesting structures in the locality were the supposed British huts with their sturdy walls and roughness of plan. Those at Chysanster, near Gulval, were the best. One could not fail to note the nearness of the various types of ancient monuments to the fogous, the one at Chysanster being practically part of the hut dwelling. Photographs and diagrams were projected on the screen of the caves at Castle Uny in Sancreed, Halligey, Pendeen, by St. Just, and many other places; also examples of words and sentences in Cornu-British, and many words still in use among the country people which are survivals. At the conclusion Mrs. Hobson expressed her thanks to Mr. David MacRitchie, F.S.A., Edinburgh, and to Mr. Tomlinson for the loan of some slides to illustrate the lecture.

The paper was favourably spoken to by Mr. W. J. C. Tomlinson, who on behalf of the members present thanked Mrs. Hobson for her address. The valuable information brought forward by the lecturer, was, he said, comparatively new to them all; and the personal researches undertaken by her, and now brought before the Section, deserved the highest commendation.

DELEGATE'S REPORT TO CORRESPONDING SOCIETIES
COMMITTEE OF BRITISH ASSOCIATION.

RARE OLD CHESTER.

The Sixth Monthly Meeting was held in the Museum on 25th April, the President, Mr. R. J. Welch, M.R.I.A., in the chair. The following report from the Club's Delegate, Mr. F. Balfour Browne, M.A., was presented. The meeting of the British Association was last year held in Sheffield, and the Conference of Delegates of the Corresponding Societies took place there also, there being two meetings, one on September 1st and the other on the 6th.

The first meeting opened with an Address by the Chairman, Dr. Tempest Anderson, and he gave a demonstration of a method of optical projection with an instrument invented by himself. This apparatus, the total cost of which is about £20, projects opaque flat objects right way up and right side forward upon a screen. Dr. Anderson explained that his chief difficulty had been to find a suitable protection against the intense heat produced by the four very powerful electric arc lamps which are necessarily fairly close to the object, there being no intervening condensers. A water tank with glass sides is the only screen at present, and Dr. Anderson seemed to think it would prove sufficient. A considerable amount of light is lost since it is first reflected from the object through a rapid portrait lens placed vertically above the object, and thence it is deflected to a horizontal direction by means of a mirror, and thus reaches a vertical screen, but Dr. Anderson's instrument showed coins, medallions, and flat geological specimens excellently.

I was then called upon to move "That a Committee of Biologists be formed to recommend the adoption of a definite system on which collectors should record their captures." At the previous meeting of the Delegates, held in London in October, 1909, I had referred to this subject in commenting on Professor

Haddon's Address, and the Committee of Delegates in July last requested me to bring the subject before the Conference at the Sheffield meeting.

I reviewed the various methods which were actually in use, such as the Watsonian County and Vice-County system, and its modifications, and the drainage area system, and referred to the fact that many collectors published their records upon no system, and that since their lists were only of use to the student of geographical distribution, it would be well if some uniform system could be generally adopted. I suggested that the only way of bringing about such a thing appeared to be by the appointment of a strong Committee of Biologists, whose recommendation would bear weight with all the local Societies and Editors of Natural History Journals.

Various Delegates spoke on the subject, and then the question arose as to what procedure could be taken if the Conference passed the motion.

When I remind you that I had been invited by the Committee of the Delegates to bring forward the motion, and when I add that I had myself written to the Secretary early in August asking this very question—a letter to which I received no reply—you will be surprised to hear that no suggestion was forthcoming. After some discussion it was suggested that I should bring the matter before the Zoological and Botanical Sections of the British Association, and Professor W. W. Watts (Caradoc and Severn Valley Field Club and the Birmingham Natural History and Philosophical Society) therefore moved as an amendment "That the Conference of Delegates approves of the proposal of Mr. F. Balfour Browne—that a Committee of Biologists be formed to recommend the adoption of a definite system on which collectors should record their captures;" and desires its representatives to support, before the Committee of Recommendations, a proposal from Sections D and K for the appointment of a Committee to carry out the suggestion."

This was duly seconded and passed and I undertook to bring the matter at once before the Sections referred to. I may add that the Sections nominated a joint Committee of which I am the Secretary, and the matter is now under consideration and will come before the Sections concerned at the Portsmouth meeting next August.

At the Second Meeting of the Delegates two subjects were brought forward. One, "The Adaptation of Roads to Fast and Heavy Motor Traffic," a subject upon which Mr. T. R. Wilton read a paper; and the other was a discussion, introduced by Professor Kendall, "On the Ordnance and Geological Survey Maps and the enhanced prices."

Now these Conferences, as the Chairman mentioned at the opening of his address, are concerned "chiefly with methods of conducting investigations in various branches of Science and especially in co-ordinating the efforts of our Corresponding Societies in carrying them out." In the discussion which followed the paper on roads, passing mention was made of the effect of dust upon plant life, but the question was really an engineering one and, in my opinion, scarcely one suitable for the Conference of Delegates.

The enhanced price of Ordnance and Geological Maps was, on the other hand, within our scope, and is of considerable importance, and the question was discussed as to what steps the local Societies could take in the matter. It was eventually agreed on the motion of Mr. Kidner (Herts. Nat. Hist. Soc.), "That the Corresponding Societies Committee consider the advisability of inviting the Societies represented at the Conference of Delegates to communicate with the Treasury and with their Members of Parliament with a view to reverting to the old prices of the Geological Survey Maps."

I have in this report criticised the action of the Committee in one or two matters. I would add that the meetings of this Section would be better attended if the Committee took steps to see that the meetings were advertised in the daily Journal of

the Association just as the meetings of the other Sections are. I received no notice of the time, date, or place of the meeting at which I was to bring forward my motion, and it was quite by accident that I found on the back of the Journal a short footnote of the time, &c., of the meeting. One or two Societies were not represented, at any rate at the first meeting, owing to their Delegates not having discovered when or where the meeting was to be held.

In the discussion which followed, Dr. A. R. Dwerryhouse strongly supported the Delegate in his criticism of the arrangements in connection with the Conference. He also dwelt upon the hardship to geological students occasioned by the raising of the prices of geological maps, for some of which the price had been advanced to 8/6 and even to 16/-, whilst the only ones remaining at the old price of 3/- were those showing merely a small proportion of land, the greater portion of the section being sea. The President, Messrs. H. L. Orr and W. J. C. Tomlinson, also joined in the discussion. Mr. N. H. Foster proposed and Mr. A. W. Stelfox seconded "that a copy of the Delegate's Report be sent to the Secretary of the Corresponding Societies Committee," and the motion was passed.

Mr. J. A. S. Stendall was then called upon by the President for his paper on "Rare Old Chester," in which he said—"A city of the ancients, a city unrivalled in the whole of the British Isles for its evidences of ancient times, a city of beauty, such is rare old Chester. The quaint old-world character of the place, encircled by its walls, with its 'rows' of unknown origin, and its many evidences of Roman and mediæval occupation, renders it of great interest to the historian and antiquarian. More than a thousand years of changeful history is presented to us in this city. The date at which Chester first became a Roman camp is uncertain, but it seems quite clear that it was not until some time in the latter half of the first century of our era, when we find the

Twentieth Legion stationed there ; and it was not long after this that the construction of the temples, baths, and other public buildings began. The first city wall was built by the Romans, and was doubtless of earth and turf. Nevertheless, historians agreed that it was probable that the Romans ultimately constructed stone walls. Such probability was confirmed in 1908 when a portion of the Roman stone wall was unearthed. The Romans having departed about the year 400 and Britain having again fallen into a state of semi-barbarism, Chester, a courted spot, seems to have been occupied in turn by the Romano-Britons, the Saxons, and the Danes. The latter, however, only retained occupation for a short period, for the city was restored to the Saxons by the valiant Ethelfleda, daughter of Alfred the Great, and wife of Ethelred, Duke of Mercia. Passing briefly over the mediæval history of the city up to the time of the civil wars, the lecturer proceeded to show his audience some of the more interesting sights of Chester by the aid of a large series of excellent lantern slides, some of which were kindly lent for the occasion by Messrs. Frank Simpson and Alfred Newstead, of Chester, to whom the lecturer tendered his best thanks. After examining the city walls and gates, with their numerous historical relics, a short tour of the city itself was made, and views of the Cathedral, the Castle, the "rows," and the quaint sixteenth and seventeenth century timbered houses having been put on the screen, Mr. Stendall concluded with a short account of the Grosvenor Museum and some of its finest exhibits. A discussion followed, in which the President, Dr. Dwerryhouse, and Messrs. Cunningham and May took part. The lecturer having briefly replied to several questions, a very successful meeting was brought to a close.

During the "Science Gossip Half-Hour" preceding the meeting, Mr. Joseph Maxwell, J.P., reported the discovery of a rare Rotifer, *Stephanoceros eichornii*, in a pond at Longhurst, Dunmurry, Co. Antrim, the residence of Mr. John Brown, F.R.S.

ANNUAL MEETING.

The Annual General Meeting of the Club was held in the Museum, on 28th April—the President, Mr. Robert J. Welch, M.R.I.A., in the chair.

The Hon. Secretary, Mr. A. W. Stelfox, read the 48th Annual Report.

The Treasurer, Mr. W. H. Phillips, submitted the Statement of Accounts.

The report of the Botanical Section was read by Mr. N. Carrothers; the Geological report by Mr. W. J. C. Tomlinson; the Zoological report by Mr. Joseph Maxwell; while the Archaeological report and the Librarian's report were read by Mr. A. W. Stelfox. These reports were adopted on the motion of the President, seconded by Mr. F. A. Heron.

Mr. William Chambers proposed, and Mr. George Raymond, seconded, the re-election of Mr. Robert J. Welch as President.

Mr. W. J. C. Tomlinson was re-elected Vice-President on the proposal of Mr. Nevin H. Foster, Mr. F. Balfour Browne seconding.

Mr. W. J. Fennell proposed, and Mr. George Donaldson seconded, that Mr. W. H. Phillips be re-elected Treasurer.

Mr. J. M. Dickson proposed, and Mr. W. R. Pim seconded, that Mr. Sylvanus Wear be re-elected Librarian.

Mr. Joseph Maxwell proposed, and Mr. R. H. Whitehouse seconded, that Mr. A. W. Stelfox be re-elected Hon. Secretary.

The following ten members of Committee were elected on the proposal of Mr. Wm. Chambers, seconded by Mr. W. A. J. M'Bretney:—Messrs. Robt. Bell, F. Balfour Browne, N. Carrothers, A. R. Dwerryhouse, W. J. Fennell, Nevin H. Foster, John Hamilton, W. A. Green, H. L. Orr, and Robert Patterson.

A vote of thanks to the retiring Hon. Secretary (Miss Jean Agnew) was proposed by Mr. Joseph Maxwell, and seconded by Mr. Robert Patterson, and Mr. Nevin H. Foster briefly thanked the members present on behalf of Miss Agnew.

The next item was a discussion upon the best means of disposing of the surplus Proceedings and other Publications of the Club. The report of the sub-committee appointed to look into the matter having been read by Mr. A. W. Stelfox, it was proposed by Mr. Nevin H. Foster, and seconded by Mr. W. R. Pim, that the matter be left in the hands of the Committee to deal with it in the manner suggested by the sub-committee.

A long discussion upon several points in connection with the rules of the Club took place, the most important being that proposed by Mr. J. A. S. Stendall, namely, the formation of a Junior Section of the Club at reduced subscription. The question of altering the method of election of members of Committee was raised by Mr. F. Balfour Browne, who proposed that a certain proportion of the retiring members be ineligible for re-election for one year. Several other members having spoken in favour of these changes in the rules, the President pointed out that nothing could be done at the present meeting as no notice had been given beforehand of the proposals.

Suggestions for places to be visited on the Summer Excursions having been received, the meeting terminated with the election of two new members—Miss Howlett and Mr. G. W. Shaw.



R U L E S

OF THE

Belfast Naturalists' Field Club.**I.**

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

II.

That the object of this 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 first pay an entrance fee of 5/-, and be proposed and seconded at any meeting of the Club, by Members present, and elected by a majority of 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 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, Librarian, and two Secretaries, and ten Members who form a Committee, and shall hold not less than eight meetings in the year. Five Members 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. In the event of a vacancy occurring among the Officers, the Committee may co-opt a member to fill such vacancy during the year only.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being Members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. Any Sectional Committee may elect its own Chairman and Secretary from its Members.

VII.

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 Archaeology 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.

VIII.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November till April inclusive.

IX.

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 archaeological 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.

X.

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 alterations 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 each intended alteration.

XI.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

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 subject mentioned in such written requisition.

XIII.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

- 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. 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 is incurred thereby.
- IX. No intoxicating liquors to be provided at the expense of the Club.

Exchanges of Proceedings, 1910-11.

- Aberdeen—Working Men's Natural History and Scientific Society.
Transactions, Vol. II., No. 4, 1909-10.
- Belfast—Presbyterian Historical Society of Ireland.
Report, 1909.
- „ Natural History and Philosophical Society.
Report of Proceedings, 1909-10.
- „ Ulster Journal of Archæology.
Vol. XVI., Parts 1 and 2.
- Birmingham—Field Naturalists' Club.
Transactions, Vol. I., Nos. 1 and 2.
- Cardiff—Naturalists' Society.
Report of Transactions, Vol. XLII., 1909.
- Chester—Society of Natural Science.
Annual Reports, Nos. 6, 8, 9, 11, 13 to 39.
Proceedings, Nos. 3, 4, 5, 6.
- Dublin—Royal Irish Academy.
Proceedings, Section B, Vol. XXIX., Parts 1, 2, 3, and 4.
„ „ C, Vol. XXVIII., Parts 3, 4, 5, and 12.
„ „ „ C, Vol. XXIX., Parts 1, 2, and 3.
- „ Royal Society of Antiquaries of Ireland.
Journal, Vol. XL., Parts 1, 2, 3, and 4.
- Dumfriesshire and Galloway Natural History and Antiquarian Society.
Report, Vol. XXI., 1908-09.
- Eastbourne—Natural History, Science, and Literary Society.
Transactions, Vol. IV., Part 3.
- Edinburgh—Geological Society.
Transactions, Vol. IX., Part 5, and Special Part.
- Glasgow—Geological Society.
Proceedings, Vol. XIV., Part 1, 1909-10.
„ Philosophical Society.
Proceedings, Vol. XLI., 1909-10.

- Hertfordshire—Natural History Society and Field Club.
Transactions, Vol. XIV., Parts 1 and 2.
- Leyden—Rijks Ethnographisch Museum.
Report, Oct., 1908, till Sept., 1909.
- Limerick—Journal of Field Club.
Vol. I., Nos. 2, 3, and 4.
Vol. II., Nos. 6 and 7.
- Liverpool—Geological Society.
Proceedings, Vol. XI. Part 1, 1909-10.
Retrospect of Fifty Years.
- ,, Naturalists' Field Club.
Proceedings, 1909, and 1910.
- London—British Association for the Advancement of Science.
Report of Corresponding Societies' Committee, 1910.
Report of Dublin Meeting, 1908.
Report of Winnipeg Meeting, 1909.
- ,, British Museum (Natural History) Handbooks.
Memorials of Charles Darwin.
Guide to Crustacea, &c.
,, British Vertebrates.
Catalogue of British Hymenoptera, by Claude Morley.
- Louth County—Archæological Journal.
Vol. II., Parts 2 and 3.
- Manchester—Field Naturalists' and Archæologists' Society.
Report and Proceedings, 1909.
- ,, Microscopical Society.
Transactions and Annual Report, 1909.
- Marlborough—College Natural History Society.
Report, No. 57, 1909.
- Miramichi—Natural History Association.
Proceedings, No. 6.
- Mexico—Geologico Instituto.
Boletin, No. 27.
- Monte Video—Annales del Muses Nacional.
Vol. VII., Tomo 4, Entrega 2.
- New Brunswick—Natural History Society of—
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WITH

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BY

JOSEPH WRIGHT, F.G.S.



BEING AN APPENDIX (NO. I. OF VOL. III.) TO THE
PROCEEDINGS OF THE
BELFAST NATURALISTS' FIELD CLUB
FOR 1910-11.

APPENDIX.

Boulder-Clays from the North of Ireland, With Lists of Foraminifera.

By JOSEPH WRIGHT, F.G.S.

Some years ago I received a number of packets of Irish Boulder-Clay for microscopical examination, most of them coming from members of the Belfast Naturalists' Field Club. Not being able to examine them at the time, they were laid aside and got overlooked. Coming across them recently, I found that two of the packets were of more than ordinary interest, having been taken from high altitudes in the vicinity of Belfast¹.

The foraminifera recorded in the following lists should not be looked on as giving all the forms that occur in these clays, as the process of floating, by which they are obtained, is far from being an exhaustive one², and in no case have more than one or two floatings been taken. Again, these clays are usually not only hard, but often more or less ferruginous, still further increasing the difficulty of washing them down. There can be little doubt that many of these clays, in which foraminifera have not been found, would have given very different results could they have been exhaustively examined.

¹ In 1894 foraminifera were also obtained by me in Boulder-Clay collected by the late Mr. Samuel A. Stewart, A.L.S., near the summit of Divis Mountain, 1,300 ft. O.D., and by Mr. William Gray, M.R.I.A., on Wolf Hill, 650 ft. O.D.

I would like to mention here that in 1896 and in 1900 I examined for Dr. George M. Dawson, F.R.S., Director of the Geological Survey of Canada, seventeen packets of Canadian Boulder-Clay, obtaining foraminifera from eight. All of these, with one exception, were from the third or highest prairie level. In only two of them were the altitudes given, viz., Victoria, 1,900 feet O.D., and twelve miles below Victoria, 1,850 feet O.D. At Moose Jaw, second prairie level, foraminifera were plentiful, 130 specimens being obtained.

² To ascertain how far the process of floating could be relied on, for giving the number of foraminifera in Boulder-Clay, one ounce troy of the highly fossiliferous clay from Woodburn, Carrickfergus, was examined exhaustively by this method, with the following result:—the first floating yielded 1,400 specimens, the second 166, and twenty-six floatings had to be taken before specimens ceased to come up, the number thus obtained was 2,032. The residue examined under the microscope contained 67 additional specimens. Proc. Belfast Nat. Field Club, 1901-02, p. 110.

The two sieves used in washing the clays were a galvanized wire sieve, 16 meshes to the linear inch, and a miller's silk sieve, 150 meshes to the linear inch.

Among the rarer forms met with were *Lagena Malcolmsonii*, *Frondicularia Milletti*, *Discorbina polyrraphes*, *D. minutissima*, *Pulvinulina Karsteni*, and *P. nitidula*.

Lagena levigata, var. *Malcolmsonii*, nov. Plate I., figs 1, 2.

Test elongate, slightly compressed, faces convex, extremities rounded, surface smooth, aperture a slit, short entosolenian tube. Black Mountain, Belfast, 900 feet O.D.

As a recent form it is rare. It has been found in shore gatherings near Dunfanaghy, Sheep Haven, and Rock Angus, Strangford Lough; in dredgings off Lambay Island, 32 fathoms, and south-west of Ireland, 30 fathoms.

Discorbina polyrraphes, Reuss, sp. Plate I., fig 3.

Rotalina polyrraphes, Reuss, 1845-46, Verstein böhm, Kreide, pt. 1, 35, pl. xii., fig. 18.

Test thin depressed, superior face slightly convex, inferior face slightly concave, peripherel edge rounded; composed of about three convolutions, the last consisting of about nine segments. Very minute in size. Divis Mountain, Belfast, 1,000 feet O.D.

As a recent species it has been dredged off Sherkin Island, south-west of Ireland, 30-33 fathoms, and in a shore gathering near Dunfanaghy, Sheep Haven, also at a few other places around the coast.

Boulder-Clay, Murphy's Quarry, Springfield Road, Belfast.

From Mr. Robert Bell, 1904. Weight of clay, 87.5 ozs. troy. After washing 26.3 ozs. fine, 4 ozs. coarse. Foraminifera rare.

FORAMINIFERA.

Cassidulina crassa, d'Orb., rare.

Lagena levigata, var. *lucida* (Will.), very rare.

Globigerina bulloides, d'Orb., rare.

Nonionina depressula (W. & J.), common.

This clay has the appearance of being deposited in shallow water and close to land. It contains an unusually large proportion of coarse material.

Boulder-Clay, Annadale Brickfield, Belfast.

From a layer of sand intercalated in Boulder-Clay, from Miss M. K. Andrews, 1906. Weight of sand, 43.5 ozs. troy. Foraminifera frequent.

FORAMINIFERA.

Miliolina subrotunda (Montag.), frequent.

Textularia globulosa, Ehr., rare.

Bulimina pupoides, d'Orb., very rare.

B. elegantissima, d'Orb., very rare.

Bolivina punctata, d'Orb., rare.

B. dilatata, Rss., very rare.

- B. plicata*, d'Orb., very rare.
Globigerina bulloides, d'Orb., very rare.
Orbulina universa, d'Orb., very rare.
Discorbina, sp., very rare.
Truncatulina lobatula (W. & J.), very rare.
Nonionina depressula (W. & J.), common.
Polystomella striato-punctata (F. & M.), very rare.
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Boulder-Clay, Carthill Brickfield, Coleraine.

From Miss M. K. Andrews, 1906.

FORAMINIFERA.

- Cassidulina crassa*, d'Orb., very rare.
Nodosaria scalaris (Batsch), very rare.
Frondicularia Millettii, Br., very rare.
Marginulina costata (Batsch), very rare.
Globigerina bulloides, d'Orb., very rare.
Nonionina depressula (W. & J.), common.
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Boulder-Clay, Eglinton, seven miles north of Londonderry (Northern Counties Railway), from Mr. J. R. Kilroe, 1907. The washing of this clay was done by Mr. Kilroe. Only two of the samples were examined, the others being too coarse to yield specimens. "One of these was held by a sieve 80 meshes to the inch, the other by cloth;" they weighed 2.2 ozs. troy. Considering the small quantity that was available for examination, it proved exceptionally rich in foraminifera, and would, in all probability, well repay further research.

FORAMINIFERA.

- Miliolina seminulum* (Linné), rare.
M. subrotunda (Montag.), very rare.
Bulimina fusiformis, Will., frequent.
B. elegantissima, d'Orb., very rare.
Bolivina variabilis (Will.), rare.
B. plicata, d'Orb., rare.
Cassidulina levigata, d'Orb., very rare.
C. crassa, d'Orb., common.
Lagenia marginata, W. & B., very rare.
Polymorphina lactea (W. & J.), very rare.
Globigerina bulloides, d'Orb., common.
Orbulina universa, d'Orb., rare.
Discorbina obtusa (d'Orb.), common.
Pulvinulina Karsteni (Rss.), very rare.
Truncatulina lobatula (W. & J.), very rare.
Nonionina depressula (W. & J.), common.
Polystomella striato-punctata (F. & M.), common.
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The following six packets of clay were given to me in 1894, but were not examined until 1908 :—

Boulder-Clay, Coleraine (pump shaft), from Mr. William Gray, M.R.I.A.

Weight of clay, 75 ozs. troy. After washing, 9.5 ozs. fine, .2 ozs. coarse. Fine clay and sand, with a few minute stones. Foraminifera rare.

FORAMINIFERA.

Cassidulina levigata, d'Orb., very rare.

C. crassa, d'Orb., very rare.

Frondicularia Millettii, Br., very rare.

Cristellaria acutauricularis (F. & M.), very rare.

Globigerina bulloides, d'Orb., rare.

G. rubra, d'Orb.? very rare, very small in size.

Nonionina depressula (W. & J.), frequent.

Boulder-Clay, Ballyhill, Co. Antrim, from Mr. William Gray, M.R.I.A.

Weight of clay, 16 ozs. troy. After washing, 5.6 ozs. fine, 2.2 ozs. coarse. This clay was only partially disintegrated in consequence of its hardness and ferruginous character, otherwise more specimens would, no doubt, have been obtained. Foraminifera very rare.

FORAMINIFERA.

Miliolina subrotunda (Montag.), very rare.

Bulimina marginata, d'Orb., very rare.

Bolivina variabilis (Will.), very rare.

B. difformis (Will.), very rare.

Cassidulina levigata, d'Orb., very rare.

Lagena levigata, var. *lucida* (Will.), very rare.

Nonionina depressula (W. & J.), very rare.

Boulder-Clay, Raloo, near Larne, 590 feet O.D., from Mr. William Gray, M.R.I.A.

Weight of clay, 39 ozs. troy. After washing, 14 ozs. fine, 12 ozs. coarse. This clay was very similar to the last; it was largely impregnated with iron, and was only partially washed down. Foraminifera very rare.

FORAMINIFERA.

Globigerina inflata, d'Orb., very rare.

Bolivina variabilis (Will.), very rare.

Boulder-Clay, Knockbracken Reservoir, five and a-half miles from

Belfast, on Saintfield Road, 340 feet O.D., dark, muddy Boulder-Clay, ten feet below surface of ground, from Mr. Leonard M. Bell. Weight of clay, 41.3 ozs. troy. After washing, 16.3 ozs. fine, 1.6 ozs. coarse. This clay washed down readily, and had shell fragments through it. Foraminifera abundant (491 specimens).

FORAMINIFERA.

- Miliolina seminulum* (Linné), rare.
M. subrotunda (Montag.), frequent.
Cornuspira involvens, Rss., very rare.
Textularia conica, d'Orb., very rare.
T. globulosa, Ehr., very rare.
Verneuilina pygmæa (Egger), very rare.
Bulimina pupoides, d'Orb., very rare.
B. elegantissima, d'Orb., very rare.
Bolivina punctata, d'Orb., very rare.
B. variabilis (Will.), common.
B. plicata, d'Orb., rare.
Cassidulina crassa, d'Orb., frequent.
Lagenia levigata (Montag.), very rare.
L. lineata (Will.), very rare.
L. sulcata (W. & J.), very rare.
L. Williamsoni (Alcock), very rare.
L. hexagona (Will.), very rare.
L. marginata, W. & B., very rare.
L. levigata, var. *lucida* (Will.), frequent.
Polymorphina lanceolata, Rss., very rare.
P. lactea (W. & J.), very rare.
Uvigerina angulosa, Will., very rare.
Globigerina bulloides, d'Orb., frequent.
Orbulina universa, d'Orb., frequent.
Discorbina obtusa (d'Orb.), frequent.
D. rosacea (d'Orb.), very rare.
Truncatulina lobatula (W. & J.), very rare.
Rotalia orbicularis, d'Orb., very rare.
Pulvinulina Karsteni (Rss.), rare.
P. nitidula, Chaster, very rare.
P. auricula (F. & M.), rare.
Nonionina depressula (W. & J.), very common.
N. pauperata, B. & W., very rare.
Polystomella striato-punctata (F. & M.), rare.
-

Boulder-Clay, Divis Mountain, Belfast, half-mile S.S.E. of summit, bank of stream, 1,000 feet O.D., from Mr. Samuel A. Stewart, A.L.S. Weight of clay, 42 ozs. troy. After washing, 9 ozs. fine, 7.7 ozs. coarse. Foraminifera frequent (42 specimens).

FORAMINIFERA.

- Miliolina seminulum* (Linné), very rare.
M. subrotunda (Montag.), very rare.
Cornuspira involvens, Rss., very rare.

- Bulimina fusiformis*, Will., frequent.
Bolivina punctata, d'Orb., very rare.
B. variabilis (Will.), very rare.
B. plicata, d'Orb., very rare.
Cassidulina lavigata, d'Orb., very rare.
C. crassa, d'Orb., very rare.
Lagena lavigata, var. *lucida* (Will.), very rare.
L. Orbigniana (Seg.), very rare.
Globigerina bulloides, d'Orb., common.
Discorbina rosacea (d'Orb.), very rare.
D. orbicularis (Terq.), very rare.
D. polyrraphes (Rss.), very rare.
D. minutissima, Chaster, very rare.
Pulvinulina auricula (F. & M.), very rare.
Nonionina depressula (W. & J.), very rare.
-

Boulder-Clay, Black Mountain, upper part of Colin Stream, about 900 feet O.D., from Mr. W. H. Milligen. Weight of clay, 16.6 ozs. troy. After washing, 2.7 ozs. fine, 7 ozs. coarse. Foraminifera frequent (22 specimens).

FORAMINIFERA.

- Bulimina fusiformis*, Will., rare.
Bolivina plicata, d'Orb., very rare.
Cassidulina crassa, d'Orb., very rare.
Lagena lavigata, var. *Malcomsonii*, nov., very rare.
Uvigerina angulosa, Will., very rare.
Globigerina bulloides, d'Orb., common.
Pulvinulina Karsteni (Rss.), very rare.
Nonionina stelligera, d'Orb., very rare.
N. depressula (W. & J.), very rare.
-

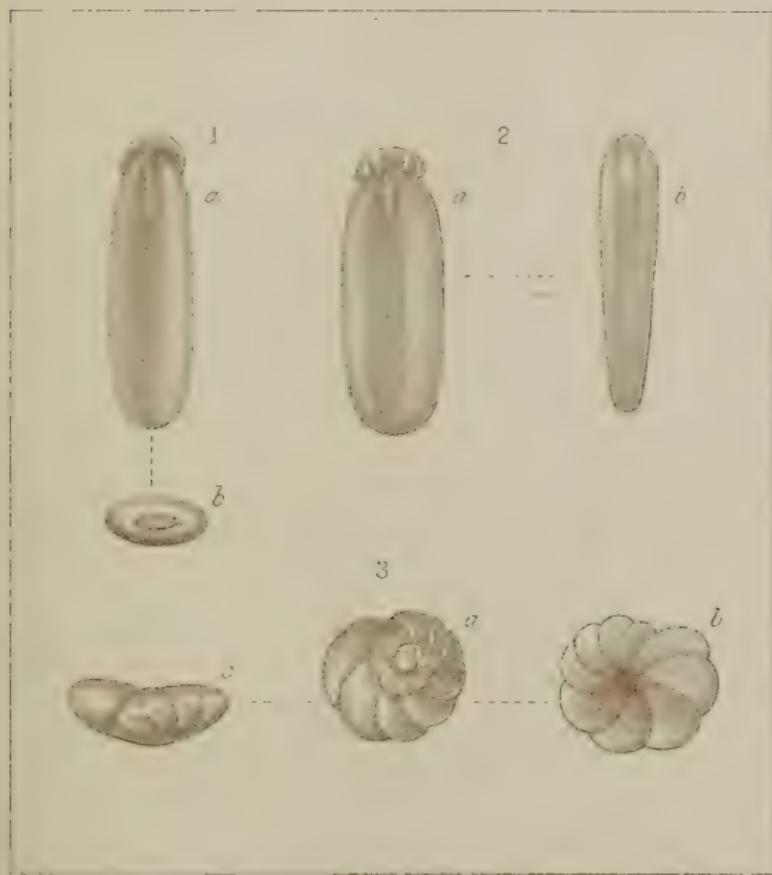
EXPLANATION OF PLATE I.

	Diam.
Figures 1, 2. <i>Lagena lavigata</i> , var. <i>Malcomsonii</i> , nov.,	x 95.
1a, 2a, lateral aspect;	
1b, oral aspect;	
2b, peripherel aspect.	
" 3. <i>Discorbina polyrraphes</i> , Reuss, sp.,	x 125.
a, superior aspect;	
b, inferior aspect;	
c, oral aspect.	



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FORAMINIFERA FROM BOULDER CLAY.



FORAMINIFERA

FROM THE

Estuarine Clays of Magheramorne, Co. Antrim,

AND

Limavady Station, Co. Derry.

BY

JOSEPH WRIGHT, F.G.S.



BEING AN APPENDIX (NO. II. OF VOL. III.) TO THE
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APPENDIX.

Foraminifera from the Estuarine Clays of Magheramorne, Co. Antrim, and Limavady Station, Co. Derry.

By JOSEPH WRIGHT, F.G.S.

In a list of the Post-Tertiary Foraminifera of the North-East of Ireland, which I had the honour of bringing before this Club in March, 1880, and which was published, with records from other places, in the Appendix of your Proceedings, 1879-80, I gave the results from Magheramorne and Limavady Station. I have since re-examined the clays from both these localities, which are the most interesting deposits of their kind in Ireland owing to the quantity of specimens and number of rare forms found in them, with the result that a number of species not then recorded have been obtained.

I now take this opportunity of revising the nomenclature and classification of my previous lists, and of bringing them into conformity with Brady's Report on the Foraminifera of the Challenger Expedition¹.

The foraminifera as well as the clays themselves at these two places are very dissimilar. At Magheramorne, the specimens are usually fairly large in size, especially the *Porcellanea*. The clay also contains Molluscan shells in considerable numbers, *Ostrea edulis* and *Pecten maximus* being exceptionally large. This clay must have been deposited at a moderate depth and under favourable marine conditions.

At Limavady Station the foraminifera are in much greater profusion, and there are few if any Molluscan shells. The clay itself is soft and fine, resembling the mud now deposited in the estuaries of some of our rivers and bays².

¹ Brady Rept. For. H.M.S. Challenger, 1873-1876 (1884).

² At Killybegs Harbour, dredgings taken at 7 and 17 fathoms consisted of a fine turf mud, which yielded numbers of minute *Lagena* and other foraminifera (Proc. Belfast Nat. F. Club Appendix 1880-81, p. 179). A still softer and finer mud, taken between tides a few yards east of Horn Head bridge, Sheep Haven, yielded foraminifera small in size, in the greatest profusion, the exceptionally large number of 142 species and varieties being obtained.

Nubecularia lucifuga, Defrance, (pl. II., fig. 1).*Nubecularia lucifuga*, Defrance, 1825, Dict. Sci. Nat., Vol. XXV., p. 210;

Atlas Zooph., pl. XLIV., fig. 3.

Magheramorne, common (C. Elcock).

Sigmoilina costata, Schlumberger, (pl. II., figs. 2-4).*Sigmoilina costata*, Schlumberger, 1893, Mem. Soc. Zool. France, Tome

VI., p. 57; p. 203 woodcut, fig. 4, pl. I. figs. 51, 52.

Magheramorne, frequent; Limavady Stn., one specimen. As a recent Irish species it has been obtained at Dalkey Sound, Dublin Harbour, also in a shore gathering east of Horn Head bridge, Sheep Haven. At both places it was very rare.

Articulina tubulosa, Seguenza, sp. (pl. II., fig. 7).*Quingueloculina tubulosa*, Seguenza, 1862, Atti. Accad. Gioenia Sci. Nat.

(2) pl. XVIII., p. 119, pl. II., fig. 8.

Limavady Stn., very rare.

Bulimina minutissima, Wright, (pl. II., figs. 5, 6).*Bulimina minutissima*, Wright, 1901-1902, Reade, Proc., Liverpool Geol.

Soc. Vol. IX., p. 163, pl. XIII., figs. 9-12.

Limavady Stn., common. As a recent species sparingly distributed around the Irish coast.

Lagena Stewartii, nov. (pl. II., fig. 8).

Test circular, compressed, the two faces convex, surface smooth, peripheral edge rounded, short entosolenian tube, aperture oval.

Limavady Stn., frequent. I have named this form after the late Mr. Samuel A. Stewart, A.L.S., who was the first to discover and name the Estuarine Clays at Magheramorne, and who afterwards added so largely to the record of the fossils found there.

Lagena laevigata, var. **marginato-perforata**, Seguenza, (pl. II., fig. 21).*Lagena marginato-perforata*, Seguenza, 1880, Atti. R. Accad. Lincei., ser. 3, Vol. VI., p. 332, pl. XVII., fig. 34

Magheramorne, very common; Limavady Stn., frequent. Recent Irish specimens very rare at a few stations. The specific name given to this shell by Seguenza is misleading, as what have evidently been taken for perforations are in reality short spines.

Lagena staphyllearia, Schwager, sp. (pl. II., fig. 9).*Entosolenia marginata* (young shell), Williamson, 1858, Rec. For. Gr. Br. p. 9, pl. I., fig. 21a.*Fissurina staphyllearia*, Schwager, 1866, Novara-Expd. Geol. (2), p. 209, pl. V., fig. 24.*Lagena Staphyllearia*, Sidebottom, 1906, Rec. For. Island of Delos, Manchester Memoirs, Vol. I., No. 5, pl. I., figs. 18-20.

Magheramorne, all the specimens (12 in number) found in this clay were very minute, and were only obtained from washings that had passed through the finest sieve used (millers silk 150 meshes to the linear inch). This may account for the very few specimens that have been found in British gatherings.

Lingulina carinata var. **biloculi**, nov. (pl. II., fig. 10).

Lingulina carinata? Sidebottom, 1907, Rec. For. Island of Delos, Manchester Memoirs, Vol. LI., No. 9, p. 3, pl. I., figs. 18, 19?

Test two chambers of about equal size, surface smooth, peripheral edge rounded, short entosolenian tube, aperture oval. Very minute in size.

Frequent at both Magheramorne and Limavady Stn., upwards of 20 specimens found at both places.

As a recent form it is very rare, a few specimens were found in a muddy shore gathering, east of Horn Head bridge, Sheep Haven.

Frondicularia Millettii, Brady, (pl. II., fig. 11).

Frondicularia Millettii, Brady, 1884, Chall. Rept., p. 524, woodcut 16a, b.

Limavady Station, very rare. Recent, between tides at Rockport, Belfast Lough, and east of Horn Head bridge, Sheep Haven. At both places very rare.

Ramulina levis, Jones, (pl. II., fig. 12).

Ramulina levis, Jones MS. 1875; Wright, Rept. Proc. Belfast Nat. F. Cl., 1873-74, App. III., 1875, p. 88, pl. III., fig. 19.

Ramulina levis, Balkwill & Millett, 1884, Journ. Micr. III., p. 83, pl. IV., fig. 7.

Limavady Station, very rare. Very small in size. Recent, Galway Bay, between tides, one specimen (Balkwill & Millett); east of Horn Head bridge, Sheep Haven, rare (6 specimens), very small in size.

Spirillina limbata var. **denticulata**, Brady, (pl. II., fig. 13).

Spirillina limbata, var. *denticulata*, Brady, 1884, Chall. Rept., p. 632, pl. LXXXV., fig. 17.

Limavady Station, very rare.

Discorbina Millettii, nov. (Pl. II., figs. 14-17).

Test free trochoid depressed, consisting of three convolutions with 3 to 4 segments in each, superior face smooth, inferior slightly depressed, ornamented with faint interrupted striae radiating from the umbilicus, peripheral edge acute. Named after Mr. Fortescue W. Millett, F.R.M.S. This lovely form is closely allied to *Discorbina rosacea*, but differs from it in the inferior side being ornamented. As only one poor specimen was found in the Limavady clay, those figured are from better examples dredged off the west coast of Ireland 36-79 fathoms. Recent, Irish specimens have also been obtained off the Gobbins, Co. Antrim, 59 fathoms; off the Skerries, Co. Dublin, 17 fathoms; and off Kinsale, Co. Cork, 12-13 fathoms.

Discorbina vesicularis, Lamarck sp. (pl. II., figs. 18-20).

Discorbites vesicularis, Lamarck, 1804, Ann. du. Museum, Vol. V., p. 183; Vol. VIII., pl. LXII., fig. 7.

Magheramorne, very rare.

Recent, dredged off Carnlough 5 fathoms; in shore gatherings at Rockport, Belfast Lough (Samuel M. Malcomson, M.D.); Brown's Bay, near Carrigtwohill, Co. Cork; east of Horn Head bridge, Sheep Haven; Fahan, Lough Swilly, very common; and Dundrum, Newcastle, Co. Down.

Biloculina Haddoniana, nov. (pl. II., fig. 22).

Test elongate oval, peripheral edge rounded, broad slit pouting aperture.
Limavady Station, very rare.

As a recent species it has been found in seven of the Lord Bandon gatherings,
S.W. of Ireland 40-120 fathoms; off the Gobbins, Co. Antrim, 59 fathoms; very
rare at all the localities where it has been found.

Named after Professor A. C. Haddon, F.R.S.

FORAMINIFERA FROM MAGHERAMORNE, CO. ANTRIM.

Nubecularia lucifuga, Defr., common.

Biloculina ringens (Lamk.), one specimen.

B. depressa, d'Orb., one specimen.

Spiroloculina limbata, d'Orb., very rare.

S. excavata, d'Orb., common.

Miliolina trigonula (Lamk.), very common.

M. , var. *insignis* Br., one specimen lost, the surface of
one of the segments only was partially ribbed, the others were smooth.

M. tricarinata (d'Orb.), frequent.

M. seminulum (Linné), common.

M. , var. *oblonga* (Montag.) frequent.

M. Auberiana (d'Orb.), common.

M. sclerotica (Kar.), frequent.

M. circularis (Born.), common.

M. subrotunda (Montag.), frequent.

M. seminuda (Rss.), very common.

M. fusca, Br., rare.

M. bicornis (W. & J.), common.

Sigmoilina tenuis (Cz.), rare.

S. costata, Schl., frequent.

Ophthalmidium inconstans, var. *carinata*, B. & W., very rare.

Cornuspira involvens, Rss., common.

Trochammina squamata, J. & P., rare.

T. inflata (Montag.), one specimen.

T. macrescens, Br., common.

Verneuilina polystropha (Rss.), one specimen.

Bulimina elegans, d'Orb., rare.

B. pupoides, d'Orb., frequent.

B. marginata, d'Orb., frequent.

B. fusiformis, Will., frequent.

B. elegantissima, d'Orb., frequent.

Virgulina squamigera (d'Orb.), very rare.

Bolivina punctata, d'Orb., frequent.

B. variabilis (Will.), common.

- B. plicata*, d'Orb., common.
Cassidulina laevigata, d'Orb., one specimen.
C. crassa, d'Orb., common.
C. subglobosa, Br., rare.
Lagena globosa (Montag.), rare.
L. laevis (Montag.), frequent.
L. , var. *clavata* (d'Orb.), rare.
L. lineata (Will.), common.
L. sulcata (W. & J.), common.
L. Williamsoni (Alcock), common.
L. striata (d'Orb.), frequent.
L. curvilineata, B. & W., one specimen.
L. quinquelatera, Br., one specimen.
L. semistriata, Will., common.
L. striato-punctata, P. and J., common.
L. squamosa (Montag.), rare.
L. hexagona (Will.), frequent.
L. marginata, W. & B., very common.
L. staphyllearia, Schw., rare, specimens very minute.
L. laevigata, var. *lucida* (Will.), very common.
L. , var. *marginato-perforata*, Seg., very common.
L. fasciata (Egger), frequent.
Nodosaria calomorpha, Rss., rare.
N. pyrula, d'Orb., one specimen.
N. obliqua (Linné), rare.
Lingulina carinata, var. *biloculi*, nov., frequent.
Cristellaria acutauricularis (F. & M.), frequent.
C. vortex (F. & M.), one specimen.
Polymorphina lactea (W. & J.), frequent.
P. , var. *oblonga*, Will., rare
P. communis, d'Orb., rare.
P. compressa, d'Orb., frequent.
P. rotundata (Born.), rare.
Globigerina bulloides, d'Orb., rare.
G. inflata, d'Orb., one specimen.
Spirillina vivipara, Ehr., rare.
Patellina corrugata, Will., common.
Discorbina globularis (d'Orb.), frequent.
D. obtusa (d'Orb.), very rare.
D. minutissima, Chaster, frequent.
D. rosacea (d'Orb.), common.
D. , var. *nitida* (Will.), frequent.
D. Wrightii, Br., frequent.
D. vesicularis (Lamk.), very rare.

- Planorbulina Mediterranensis* (d'Orb.), frequent.
Truncatulina refulgens (Montf.), rare.
T. lobatula (W. & J.), frequent.
T. ungeriana (d'Orb.), rare.
Pulvinulina Karsteni (Rss.), very rare.
P. nitidula, Chaster, very common.
Rotalia Beccarii (Linné), frequent.
Gypsina inhærens (Schultze), rare.
Nonionina depressula (W. & J.), common.
N. umbilicatula (Montag.), very rare.
N. asterizans (F. & M.), frequent.
N. stelligera, d'Orb., frequent.
N. pauperata, B. & W., very common.
N. turgida (Will.), very rare.
Polystomella striato-punctata (F. & M.), very common.
P. crispa (Linné), very common.
P. macella (F. & M.), rare.

FORAMINIFERA FROM LIMAVADY STATION, CO. DERRY.

- Biloculina ringens*, var. *elongata*, d'Orb., rare.
B. inflata, Wright, rare.
B. Haddoniana, nov., very rare.
B. depressa, d'Orb., frequent.
Spiroloculina excavata, d'Orb., rare.
Miliolina trigonula (Lamk.), frequent.
M. tricarinata (d'Orb.), rare.
M. seminulum (Linné), common.
M. „ var. *oblonga*, (Montag.), frequent.
M. venusta (Kar.), rare.
M. Auberiana (d'Orb.), rare.
M. sclerotica (Kar.), frequent.
M. Ferussacii (d'Orb.), frequent.
M. circularis (Born.), very common.
M. „ var. *sublineata*, Br., one specimen.
M. subrotunda (Montag.), common.
M. seminuda (Rss.), rare.
M. bicornis (W. & J.), very rare, small weak specimens.
Sigmoilina tenuis (Cz.), rare.
S. costata, Schl., one small specimen.
Ophthalmidium inconstans, var. *carinatum*, B. & W., common.
Cornuspira involvens, Rss., common.
Articulina tubulosa (Seg.), very rare.

- Haplophragmium Canariense* (d'Orb.), very rare.
Trochammina squamata, J. & P., rare.
T. ochracea (Will.), rare.
T. inflata (Montag.), rare.
T. macrescens, Br., rare.
T. plicata (Terq.), very rare.
Textularia conica, d'Orb., common.
T. concava (Kar.), very rare.
Verneuilina polystropha (Rss.), very rare.
Bulimina elegans, d'Orb., rare.
B. pupoides, d'Orb., frequent.
B. elongata, d'Orb., frequent.
B. marginata, d'Orb., frequent.
B. fusiformis, Will., very common.
B. elegantissima, d'Orb., common.
B. minutissima, Wright, common.
B. subteres, Br., common.
Virgulina Schreibersiana, Cz., rare.
V. squamigera (d'Orb.), frequent.
Bolivina punctata, d'Orb., frequent.
B. variabilis (Will.), frequent.
B. nobilis, Hantk., very rare.
B. textilaroides, Rss., very rare.
B. plicata, d'Orb., common.
B. dilatata, Rss., very rare.
B. difformis (Will.), common.
Cassidulina lavigata, d'Orb., frequent.
C. crassa, d'Orb., very common.
C. subglobosa, Br., rare.
C. Bradyi, Norman, very rare.
Lagena globosa (Montag.), frequent.
L. Millettii, Chaster, one specimen.
L. levis (Montag.), rare.
L. „ var. *clavata* (d'Orb.), frequent.
L. lineata (Will.), rare.
L. sulcata (W. & J.), rare.
L. „ var. *Lyellii* (Seg.), frequent.
L. costata (Will.), very rare.
L. Williamsoni (Alcock), frequent.
L. striata (d'Orb.), rare.
L. gracilis, Will., rare.
L. distoma, P. & J., very rare.
L. semistriata, Will., frequent.

- L. striato-punctata*, P. & J., rare.
L. hispida, Rss., very rare.
L. aspera, Rss., rare.
L. squamosa (Montag.), common.
L. " var. *reticulata* (Magill.), rare.
L. hexagona (Will.), frequent.
L. Stewartii, nov., frequent.
L. marginata, W. & B., very common.
L. " var. *inæquilateralis*, Wright, frequent.
L. lœvigata (Rss.), rare.
L. " var. *lucida* (Will.), common.
L. " var. *marginato-perforato*, Seg., frequent.
L. " var. *quadrata* (Will.), rare.
L. " var. *Malcomsonii*, nov., common.
L. fasciata (Egger), rare.
L. clathrata, Br., rare.
L. lagenoides (Will.), common.
L. " var. *tenuistriata*, Br., common.
L. ornata (Will.), frequent.
L. bicarinata (Terq.), common.
L. Rizzæ (Seg.), common.
L. Orbigniana (Seg.), common.
L. pulchella, Br., one specimen.
L. fimbriata, Br., very rare.
Nodosaria calomorpha, Rss., rare.
N. communis, d'Orb., rare.
N. filiformis, d'Orb., rare.
N. pyrula, d'Orb., rare.
N. scalaris (Batsch), frequent.
N. obliqua (Linné), very rare.
Lingulina carinata, d'Orb., rare.
L. " var. *biloculi*, nov., frequent.
Frondicularia Millettii, Br., one specimen.
Vaginulina legumen (Linné), very rare.
Cristellaria acutauricularis (F. & M.), rare.
C. crepidula (F. & M.), frequent.
Polymorphina lactea (W. & J.), very rare.
P. " var. *oblonga*, Will., frequent.
P. concava, Will., rare.
P. myristiformis, Will., very rare.
Uvigerina angulosa, Will., rare.
Ramulina laevis, Jones, very rare.
Globigerina bulloides, d'Orb., very common.
G. inflata, d'Orb., frequent.

- G. rubra*¹, d'Orb., frequent; very small in size.
Orbulina universa, d'Orb., rare.
Sphaeroidina bulloides, d'Orb., one specimen.
Spirillina vivipara, Ehr., frequent.
S. limbata, var. *denticulata*, Br., very rare.
Patellina corrugata, Will., common.
Discorbina globularis (d'Orb.), frequent.
D. obtusa (d'Orb.), rare.
D. minutissima, Chaster, common.
D. rosacea (d'Orb.), rare.
D. „ var. *nitida* (Will.), frequent.
D. Millettii, nov., very rare.
D. polypyraphes (Rss.), common.
D. orbicularis (Terq.), rare.
D. Bertheloti (d'Orb.), frequent.
D. Wrightii, Br., frequent.
D. tuberculata, B. & W., very rare.
Planorbulina Mediterranensis (d'Orb.), frequent.
Truncatulina lobatula (W. & J.), frequent.
T. variabilis, d'Orb., very rare.
Pulvinulina auricula (F. & M.), frequent.
P. haliotidea, Heron-Allen and Earland, frequent.
P. Patagonica (d'Orb.), frequent.
P. Karsteni (Rss), rare.
Rotalia Beccarii (Linné), common.
Gypsina inhaerens (Schulze), rare.
Nonionina depressula (W. & J.), very common.
N. asterizans (F. & M.), common.
N. stelligera, d'Orb., rare.
N. pauperata, B. & W., frequent.
N. turgida, Will., rare.
Polystomella striato-punctata (F. & M.), very common.
P. crispa (Linné), frequent.
P. macella (F. & M.), frequent.
P. arctica, P. & J. ?, rare.

¹NOTE.—Very minute Globigerina, with spire elevated, which are figured as *Globigerina* sp. in Brady's Rep. Chal. Foram., pl. lxxxii., figs. 8, 9. Similar forms have also been recorded by the late Dr. Chaster, Rep. Southport Soc. Nat. Sci., 1890-91, p. 64, who referred them to *G. rubra* (?), and "considers them in all probability weak, shallow water specimens of *G. rubra*." I have long held the same opinion as Dr. Chaster. They have been found recent in shore-mud east of Horn Head bridge, Sheep Haven, about half a mile further east close to Dunsanaghy, and in dredgings taken off the Gobbins, Belfast Lough, 59 fathoms.



PRESENTED

4 DEC. 1911

EXPLANATION OF PLATE II.

		Diam.
Figure 1.	<i>Nubecularia lucifuga</i> , Defrance,	x 45
„ 2-4.	<i>Sigmoilina costata</i> , Schlumberger, lateral aspects.	x 45
„ 5-6.	<i>Bulimina minutissima</i> , Wright, lateral aspects.	x 75
„ 7.	<i>Articulina tubulosa</i> , Sequenza,	x 62
„ 8.	<i>Lagena Stewartii</i> , nov.,	x 83
„ 9.	<i>Lagena staphyllearia</i> , Schwager, sp.,	x 115
„ 10.	<i>Lingulina carinata</i> , var. <i>biloculi</i> , nov.,	x 83
„ 11.	<i>Frondicularia Millettii</i> , Brady,	x 65
„ 12.	<i>Ramulina lævis</i> , Jones,	x 75
„ 13.	<i>Spirillina limbata</i> , var. <i>denticulata</i> , Brady,	x 83
„ 14-17.	<i>Discorbina Millettii</i> , nov., 14, superior aspect ; 15, peripheral aspect ; 16, 17, inferior aspect.	x 70
„ 18-20.	<i>Discorbina vesicularis</i> , Lamarck, sp., 18, superior aspect ; 19, inferior aspect ; 20, peripheral aspect.	x 75
„ 21.	<i>Lagena lævigata</i> , var. <i>marginato-perforata</i> , Sequenza,	x 75
„ 22.	<i>Biloculina Haddoniana</i> , nov.,	x 45



West, Newman lith.

FORAMINIFERA FROM ESTUARINE CLAY.



Reduced Prices of Proceedings.

In accordance with resolution passed at General Meeting held on 28th April, 1911, the following reductions have been made in the prices of the Proceedings, &c., to Members of the Club. When the stock has been sufficiently reduced prices will be raised again.

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*The following Publications of the Club can be had
from the Librarian.*

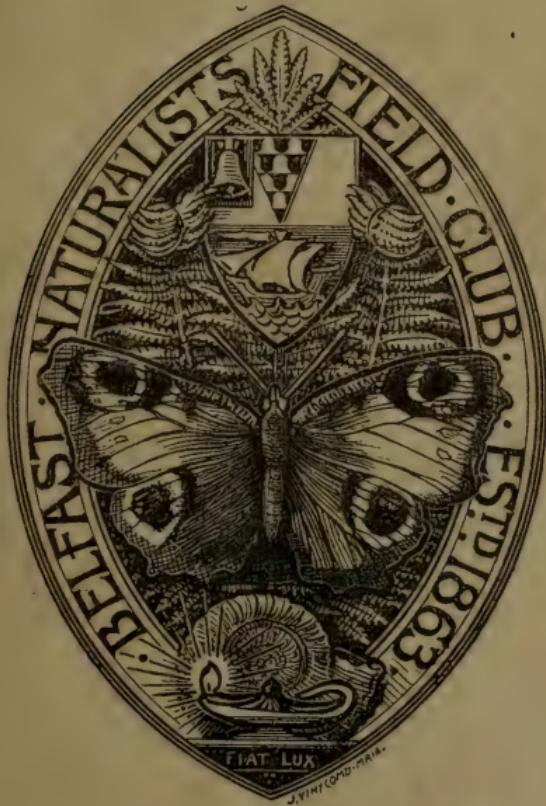
Eighth Annual Report—1870-71, containing Appendix II., List of Irish Liassic Foraminifera—Wright; and List of the Fossils of the Estuarine Clays of Antrim and Down—Stewart	2/6
Ninth Annual Report—1871-72	1/-
Tenth " do. 1872-73	1/-
Proceedings, Series II., Vol. I., Part I., 1873-74, containing Appendix III., List of Mosses of North-East of Ireland—Stewart; and List of Cretaceous Microzoa of North of Ireland—Wright, 2 Plates	2/6
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" Series II., Vol. II., Part I., 1880-81, containing Appendix VI., List of Foraminifera of South Donegal—Wright; Sponge Remains from Carb. Limestone, County Sligo—Wright; and Fossil Sponge-spicules, County Sligo—Carter, 1 Plate	1/6
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" Series II., Vol. II., Part V., 1884-85, containing Appendix IX., Ostracoda of Belfast Lough—Malcomson; Fungi of North of Ireland—Lett; Foraminifera of "Protector" Cruise, &c.—Wright; Cretaceous Foraminifera of Keady Hill—Wright; Irish Coleoptera—Patterson	3/-
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Some of above are now available to Members at reduced prices.

ANNUAL REPORT AND PROCEEDINGS.

SERIES II.
VOLUME VI.

PART V.
1911-12.



For Contents See Overleaf.



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CONTENTS.

	PAGE
List of Officers, 1911-12 ...	479
Annual Reports ...	481
Statement of Accounts ...	490
Excursions :—Magheramorne, Torr Head, Hillsport, Kilchief and Killard Point, Baron's Court, Cavan and District, Ellis's Cut, Loughgall and Armagh, Kells and Connor, Colin Glen, Glenshesk, Ardglass ...	491
Extraordinary General Meeting ...	493
Conversazione ...	510
Papers :—“Sand-Hills : Their Formation, Fauna and Flora”—Presidential Address—R. J. Welch, M.R.I.A.	514
“Plant Communities”—Rev. C. H. Waddell, B.D.	516
“Water Supply from Underground Sources”—A. R. Dwerryhouse, D.Sc.	527
“A Talk about Birds”—N. H. Foster, M.B.O.U.	518
“The Fauna of Cavan”—Members of Zoological Section	518
“The Vegetation of Calcareous Soils”—S. A. Bennett, B.Sc.	520
“The Rathns of an Ancient Settlement between the Bann and the Main Rivers, on the banks of Lough Neagh”—F. J. Bigger, M.R.I.A.	520
“Forest Trees”—Arthur Deane	522
“Rare Birds in the Municipal Collection”—J. A. S. Stendall	522
“Kitchen-Middens in Dingle Bay”—Rev. W. P. Carmody and A. G. Wilson, J.P.	524
“The Possibilities arising from Nature Study”—J. A. S. Stendall	525
“The Indigenous Trees in our Woodlands”—Rev. C. H. Waddell, B.D.	527
“Local Fossils and their Correlation to Recent Types”—James Orr....	527
“The Life History of Insects”—J. A. S. Stendall	528
“The Relation of the Plant and the Soil”—F. Balfour Browne, M.A.	528
“Recent Advances in the Evolution Theory”—Professor G. H. Carpenter, B.Sc., M.R.I.A.	528
“Geological Aspects of Coast Erosion”—W. J. C. Tomlinson	531
“Chalk and its Formation”—S. A. Bennett, B.Sc.	532
“Exhibition of Plants, with Notes on their General Characters and Habitats”—Members of Botanical Section	532
“Report of Delegate to Corresponding Societies’ Committee of the British Association”—F. Balfour Browne, M.A.	533
“Natural History of the Dragon-Fly”—F. Balfour Browne, M.A.	535
“Beekite or Cycloidal Chalcedony”—J. Strachan	536
“Pond Life”—Joseph Maxwell, J.P.	548
Annual Meeting	548
Rules	550
Exchanges	553
List of Members	556
List of Junior Members	562
List of Officers, 1912-13	563



Cloghoughter Castle or "Bedell's Tower" from the south.

PHOTO.

R. J. WELCH.

ANNUAL REPORT AND PROCEEDINGS
OF THE
**BELFAST NATURALISTS'
FIELD CLUB,**

FOR THE YEAR ENDING 31st MARCH, 1912.

(FORTY-NINTH YEAR.)

SERIES II.

VOLUME VI.

PART V.

1911-12.



Belfast:

PRINTED AT "THE NORTHERN WHIG" OFFICES, VICTORIA STREET.

1912

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FORTY-NINTH YEAR, 1911-12.

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The Museum,
College Square North, Belfast.

Annual Report.

Your Committee have pleasure in submitting the forty-ninth Annual Report. The work accomplished during the past year by your members will be found to compare favourably with that done in former years; yet some branches of Natural History remain untouched in our district.

In order that the services of fresh workers may be enlisted your Committee have established a Junior Section, from which it is hoped that many Field Naturalists may arise in the future. During the year 36 new members were elected, of whom only 30 have qualified for membership. There have been 6 deaths and 10 resignations, leaving the total membership on 31st March, 1912, at 393. Of these 19 were Junior Members.

At an Extraordinary General Meeting held on 16th June, 1911, for the purpose of making alterations in the rules of the Club, the admission of Junior Members at a reduced subscription and without entrance fee was authorised, and the method of nominating and electing Members of Committee was changed.

The Memorial to our late member, Samuel Alexander Stewart, has been completed and erected in the City Cemetery, at a total cost of £70 18s 6d. The list of subscribers and statement of accounts in connection with this Memorial have been posted in the Club Room.

The following excursions were held during the Summer Session :—

Torr Head, Co. Antrim	...	...	27th May.
Kilclief and Killard Point (Half-Day)	...	...	17th June.
Baron's Court, Co. Tyrone	...	...	1st July.
Cavan and District (Long Excursion)			12th—14th July.
Ellis's Cut, Lough Neagh (Half-Day)			29th July.
Loughgall and Armagh	...	...	12th August.
Kells and Connor (Half-Day)	...	...	26th August.

The average attendance at these excursions was but 29. This compares unfavourably with that for the two previous years when the average attendance was respectively 42 and 53. Your Committee regret that the Summer Excursions were not so well patronized as in former years and would welcome any suggestion whereby these field-days could be made more popular.

The work done upon the Excursions of the Club, as well as that accomplished at the excursions held by the various Sections, will be found in the Proceedings. At the Conversazione opening the Winter Session 250 members and friends were present: this important meeting of the Club was held in the Assembly Buildings on 28th October, 1911.

The Winter meetings were held as heretofore in the Museum, College Square North, your Club having again been granted the use of their rooms on the old terms by the courtesy of the Belfast Corporation. The following papers were read at the Monthly and Sectional Meetings held during this Session :—

1911.

- Tuesday, 21st November—"Sandhills: their Formation, Fauna and Flora,"
The President (Robert J. Welch, M.R.I.A.).
- Saturday, 25th November—"Concerning Plant Societies: an introduction to
the study of Types of British Vegetation," W. J. C.
Tomlinson.
- Wednesday, 29th November—"Water Supply from Underground Sources,"
A. R. Dwerryhouse, D.Sc., F.G.S.
- Wednesday, 6th December—"A Talk about Birds," Nevin H. Foster,
M.B.O.U.
- Wednesday, 13th December—"Notes on the Fauna of Cavan," Members of
the Zoological Section.
- Saturday, 16th December—"The Vegetation of Calcareous Soils," S. A.
Bennett, B.A., B.Sc.
- Tuesday, 19th December—"The Rath's of an Ancient Settlement between the
Bann and Maine Rivers, on the Banks of Lough Neagh,"
Francis Joseph Bigger, M.R.I.A.

1912.

- Wednesday, 3rd January—"Forest Trees," Arthur Deane.
- Wednesday, 10th January—"Rare Birds in the Municipal Collection," J. A.
Sidney Stendall.

- Tuesday, 16th January—"Kitchen-Middens in Dingle Bay," Rev. W. P. Carmody and A. G. Wilson.
- "The Possibilities arising from Nature Study," J. A. Sidney Stendall.
- Saturday, 20th January—"Trees indigenous in our Woodlands," Rev. C. H. Waddell, M.A., B.D.
- Wednesday, 24th January—"Local Fossils and their correlation with recent types," James Orr.
- Wednesday, 31st January—"The Life History of Insects," J. A. Sidney Stendall.
- Saturday, 17th February—"The Relation of the Plant and the Soil," F. Balfour Browne, M.A., F.R.S.E., F.Z.S.
- Tuesday, 20th February—"Recent Advances in the Evolution Theory." Prof. G. H. Carpenter, B.Sc., M.R.I.A.
- Wednesday, 28th February—"Geological Aspects of Coast Erosion," W. J. C. Tomlinson.
- Wednesday, 6th March—"Chalk and its Formation," S. A. Bennett, B.A., B.Sc.
- Saturday, 16th March—"Exhibition of Plants, and Notes on the work of the Summer Session," Members of the Botanical Section.
- Tuesday, 19th March—"Report as Delegate to the British Association," and "The Natural History of the Dragon-Fly," F. Balfour Browne, M.A., F.R.S.E., F.Z.S.
- Wednesday, 27th March—"Beekite or Cycloidal Chalcedony," James Strachan.
- Wednesday, 3rd April—"Pond Life," Joseph Maxwell, J.P.
- Tuesday, 16th April—Annual Meeting.

Mr. F. Balfour Browne represented the Club at the British Association Conference of Delegates, held at Portsmouth in September, 1911, and has submitted his report which will be found in the Proceedings.

The Treasurer will lay before you his Statement of Accounts, which is not so satisfactory as last year. This is accounted for by the fact that our Proceedings for the previous year were exceptionally large.

The Librarian's Report and those of the Botanical, Geological, Zoological, and Junior Sections, as well as that of the Sub-Committee appointed to adjudicate on Collections sent in for the Club's Prizes will be submitted.

For hospitality received by members of your Club and for permission to visit their estates, your Committee desire to thank His Grace the Duke of Abercorn, the Rev. Charles K. and Mrs. Pooler of Downpatrick, Mrs. Cope of Loughgall, and Mr. and Mrs. Black of Liminary, Co. Antrim.

In conclusion, your Committee desire to record their thanks to the Superintendents of the several Railway Companies for facilities afforded on the different excursions; to the Press for publishing reports of the Club's meetings; and to the Public Bodies and Kindred Societies who have favoured the Club with their publications during the past year.

(Signed)

A. W. STELFOX,

MARGARITA D. MITCHELL, } *Hon. Secs.*



Librarian's Report.

The usual exchanges of Proceedings with other Societies have been made.

Twenty copies of Volume II. of our Appendices have been bound and are now for sale.

Ten volumes of the "Journal of the Royal Society of Antiquaries of Ireland" have also been bound and are available for members.

"British Ferns and their Varieties," by C. T. Druery, has been purchased. Miss M. K. Andrews has handed over to the Club the copy of "Phycologia Britannica," by William Henry Harvey, M.D., M.R.I.A., which belonged to the late Mr. S. A. Stewart, and Mr. George Donaldson has presented two books on the Botany of the United States, viz.:—"Our Native Ferns and their Allies," by L. M. Underwood, and Asa Gray's "Manual of the Botany of the Northern United States." To Miss Andrews and Mr. Donaldson the thanks of the Club are hereby tendered.

(Signed)

SYLVANUS WEAR, *Librarian.*

Report of the Botanical Section.

The Committee have much pleasure in reporting that the work done by this Section since last Annual Meeting has been well maintained, with results which we regard as very satisfactory. The attendance at the meetings during the Winter Session was the largest since the formation of the Section.

The weather during the Summer of 1911 was exceptionally favourable for outdoor work. Many special localities were visited by our members and some interesting plant records made, of which we select the following as being the most important:—

Orobanche rubra and *Cuscuta Epithymum*, at Killard Point, Co. Down; *Spiranthes Romanzoffiana* at Kilmore, also in Co.

Down. The re-discovery of *Lathyrus palustris* in quantity near Ellis's Cut, Co. Armagh, was an interesting event, as this rare Ulster plant was long considered extinct in this station.

During the Winter Session five meetings were held (the special subject under consideration being Ecology or Plant Association) at which important and instructive lectures were given by W. J. C. Tomlinson, S. A. Bennett, Rev. C. H. Waddell, and F. Balfour Browne.

The best thanks of the Committee are due to Mr. G. Donaldson for his gift of a large, well-mounted, and named collection of North American plants.

(Signed)

N. CARROTHERS, *Hon. Sec. of the Section.*

Report of the Geological Section.

The Committee report that five excursions were held during the past year—Magheramorne, 6th May; Ballydown, Islandmagee, 3rd June; Hillsport, 2nd September; Colin Glen, 16th September; and Glenshesk, 23rd September. The principal feature of the first four excursions was a careful examination of the Cretaceous strata, one of the most complete sections exposed being at Colin Glen. Here in ascending the river, and owing to repeated "faulting" not only the Cretaceous, but also the Lias and the Trias were traversed several times, and many interesting fossils were obtained. At Magheramorne, Ballydown, and Hillsport the Cretaceous also yielded good results. The excursion to Glenshesk, under the leadership of Dr. Dwerryhouse, was undertaken to examine the glacial features of the district, and deserted Overflow Channels of impressive type were studied.

The Section held four evening meetings during the Winter Session. On 29th November Dr. Dwerryhouse gave an interesting lecture on "Water Supply from Underground Sources;" on 24th January Mr. James Orr read an instructive paper on "Local

Fossils and their correlation with Recent Types." He exhibited a fine collection of fossils from our local rocks and showed with every conspicuous type a specimen of the nearest living representative. Mr. W. J. C. Tomlinson's paper, on 28th February, dealt with the "Geological Aspects of Coast Erosion," in which he gave a graphic description of the agencies to which it is due, and showed a fine collection of lantern slides. On 27th March, Mr. James Strachan gave an important lecture on "Beekite or Cycloidal Chalcedony." He concluded with a summary of his own original investigations on the subject, and we hope his lecture will be printed *in extenso*.

In Glacial Geology the Committee report the investigation of Boulder-Clay at Tyrone Brickfield, Dungannon, and the further examination of the Portstewart Sandhills. Erratics from both districts were determined by Professor Cole and Mr. Kilroe, to whom the Committee tender their best thanks. Many of the Dungannon boulders are of local origin, in connection with which Mr. Kilroe notes "the generally local character of the erratics in the Dungannon area is consistent with the area being one approximating to the axis of dispersion during the latest phase of main glaciation."

The thanks of the Section are also due to Professor Cole for a copy of his important paper, "Glacial Features in Spitsbergen in relation to Irish Geology."

In conclusion, the Committee record with regret the death of one of the members of the Section, Mr. John Brown, F.R.S.

(Signed)

MARY K. ANDREWS, *Hon. Sec. of the Section.*

Report of the Zoological Section.

Considerable work has been done by members of this Section during the past year; that accomplished on the occasion of the Summer excursions will be found in the Club's Proceedings.

Several members continued the study of their respective groups in connection with the Natural History Survey of Clare Island.

Two meetings of the Section were held during the Winter Session. At the first of these, on 13th December, several members gave the results of their investigations during the long excursion held at Cavan. The second meeting took place on 10th January, when the Hon. Sec. of the Section read a paper entitled "Rare Birds in the Municipal Collection."

During the Season 1911-12 numerous papers by members of Section have been published.

Two prominent members of the Section, Messrs. Nevin H. Foster and A. W. Stelfox, have, during the past session, been admitted to the Membership of the Royal Irish Academy.

(Signed)

J. A. SIDNEY STENDALL, *Hon. Sec. of the Section.*

Report of the Junior Section.

The inauguration of this branch of the Club took place at an Extraordinary General Meeting held on 16th June, 1911.

Nineteen members have up to the present time been elected, but it is hoped during the coming year considerably to increase this number.

The Committee of the Section, having realised the difficulty of popularising Natural History by indoor meetings only, have arranged to hold afternoon excursions for Junior members during the Summer. These will be arranged to illustrate in a practical manner the lectures held during the Winter months.

Five meetings have been held, at which elementary papers on Botany, Zoology, and Geology were read ; short extracts of the papers will be found in the Proceedings.

(Signed)

J. A. SIDNEY STENDALL, *Hon. Sec. of the Section.*

Report of Sub-Committee on Prize Competitions.

The Committee appointed to adjudicate on the Collections submitted for the Club's prizes report that only one member submitted a set of photographs for Prize No. 14. As this collection did not comply with the conditions, as to numbers, no prize was awarded.

Prize No. 6.

The collection of Fossil Fish-Remains from the Carboniferous limestone of County Armagh, submitted by Mr. C. Bulla for Prize No. 6, contains a number of the less common species. The specimens are in some cases exceptionally good, and, in the opinion of the Sub-Committee, the Collection is well worthy of the prize.

(Signed)

W. J. FENNELL,

M. D. MITCHELL,

S. WEAR,

ARTHUR R. DWERRYHOUSE.



Dr. Treasurer's Account for the Year ending 31st March, 1912. Cr.

Proceedings.

SUMMER SESSION.

MAGHERAMORNE.

The members of the Geological Section commenced their excursions with a very interesting one to Magheramorne to study a typical section in the eastern division of our Cretaceous strata on 6th May, Mr. Robert Bell kindly acting as field conductor. From Glynn the party returned by train to Belfast.

TORR HEAD.

On Saturday, 27th May, the inaugural excursion of the Club took place, when twenty-four members and friends proceeded to Ballycastle. Upon arrival brakes were immediately mounted for Torr. Many features of geological interest were passed during the drive, of which the great accumulation of Glacial drift through which the Carey River has cut its way, was most commented upon. Leaving the brakes at a point some 800 feet above Ballycastle, the party proceeded on foot towards Torr, and in a few minutes the watershed was crossed and a grand view of the coast once more obtained. From this vantage ground Torr Head, crowned by the modern signal station, which stands on the site of Dun Baragh, lies at our feet; to the left rises Grianan-Mor, where the Antrim M'Donnells formerly lighted fires to signal to their brethren of The Isles; and to the right Runabay Head is partially hidden by the Green Hill and Crockan Point. Over Torr and seemingly but a few miles distant, stretches the nearest point of the Scotch coast—the great peninsula of Cantyre—while behind it projects the rugged summit of Goatfell, in Arran. The Clyde isles of Sanda and Ailsa

Craig lie a little to the south, and behind these the Ayrshire coast is faintly seen, uninteresting in general but broken here and there by prominent features, such as the "False Craig."

The Geology of the Torr area is strikingly different from that of the rest of Antrim. Here the Chalk rests directly upon the Pre-Cambrian schists, the oldest rocks in Ireland, which rise to a height of nearly a thousand feet. To the south the basaltic cap of Carnanmore still overlies the Chalk, but over the greater part of the area this rock has been completely worn away. Encircling the greater part of Torr Head itself is a band of Primitive limestone some 20 feet thick, which at the extreme point is faulted down. Large blocks of gneiss were also found, but this rock, which so closely resembles some of the coarser schists, was not seen *in situ*. The prevalence of boulders of a red granite, possibly of Scotch origin, may also be worth mentioning. The botanical members had a busy day, and most of the expected plants were seen. These included *Vicia sylvatica*, *Epilobium angustifolium*, *Saxifraga aizoides*, *S. hypnoides*, *Parnassia palustris*, *Geranium lucidum*, *Empetrum nigrum*, *Cystopteris fragilis*, *Draba incana*, and *Arabis hirsuta*, while *Sisymbrium Thalianum* and *Erophila vulgaris* were added to the list for this locality. Of the Mollusks only *Arianta arbustorum* is worthy of mention; this species which occurs in several spots near the village of Torr, being observed by the Botanists in great plenty among the "Alpine" plants along the Chalk escarpment. The Primitive limestone at Torr Head is, in parts, riddled with "Helix-borings," in this case *Helix nemoralis* being responsible for the phenomenon. From the large numbers of young examples of this shell observed in the borings, it would almost appear as if a pilgrimage from the surrounding schists had taken place, during this, the season of growth, the lime being essential for the purpose of shell-making. Only two common species of Woodlice were observed, but several Millepedes and Centipedes, a hitherto neglected group, were collected, the common *Stomius marginata*, *Julus albipes*, and a species of

Lithobius being taken. At 3-45 brakes were again mounted, and the party returned to Ballycastle, where, after tea at the Antrim Arms Hotel, a short business meeting was held—the Vice-President (Mr. W. J. C. Tomlinson) presiding, at which Miss M. A. Andrews and Miss K. Ward were elected to membership.

HILLSPORT.

The Geological Section visited Hillsport, Islandmagee, on Saturday, 3rd June

EXTRAORDINARY GENERAL MEETING.

A written requisition, signed by twenty-five members of the Club, having been received by the Hon. Secretary, an Extraordinary General Meeting was held in the Museum, College Square North, on Friday, 16th June, for the purpose of amending the rules of the Club. At this meeting it was resolved that Junior Members—under 21 years of age—be admitted to the Club without Entrance Fee on the payment of an Annual Subscription of 2/6. The composition of the General Committee was altered; and the method of electing Ordinary Members of Committee changed.

The amended Rules were printed and circulated amongst the members of the Club and will be found in this issue of the Proceedings.

KILCLIEF AND KILLARD POINT.

On Saturday, 17th June, a party of 51 members and friends entrained for Downpatrick. Here brakes were in waiting, and the party proceeded to Ballyhornan Bay and the promontory of Killard. Arrived at Killard the party dispersed over the promontory for lunch and natural-history work, the Botanists especially meeting with good success. At 3-30 the drive was continued to Kilclief Castle, which was entered and examined by a number of the party, while a short paper describing the ancient structure was

read, adding greatly to the information and pleasure of the party. Strangford was reached about 4-30, where the members of the Club were entertained to tea by the Rev. Charles K. and Mrs. Pooler, of Downpatrick. At the conclusion of the meal a short business meeting was held, Dr. Dwerryhouse occupying the chair in the unavoidable absence of the President, and in a few well-chosen words he expressed the thanks of the Club to Dr. and Mrs. Pooler on this the second occasion of their kindness to the members. He was ably seconded by the Rev. Dr. Hamilton. The election of six new members—Miss M. A. Blackwood, Miss M. L. Foster, Miss A. B. Foster, Master Nevin H. D. Foster, Master George B. Brown, and Master Max Brown, concluded the proceedings.

Among the Plants noted on the excursion may be mentioned *Orobanche rubra*, *Calystegia Soldanella*, *Cynoglossum officinale*, and the *Eryngium maritimum*. The four common species of Wood-lice and *Armadillidium vulgare* were abundant at Killard, while *Trichoniscus roseus* and *Cylisticus convexus* occurred in the greenhouse at Oldcourt. The Land-shells *Pupa muscorum* and *Helicella barbara* were taken at Killard Point.

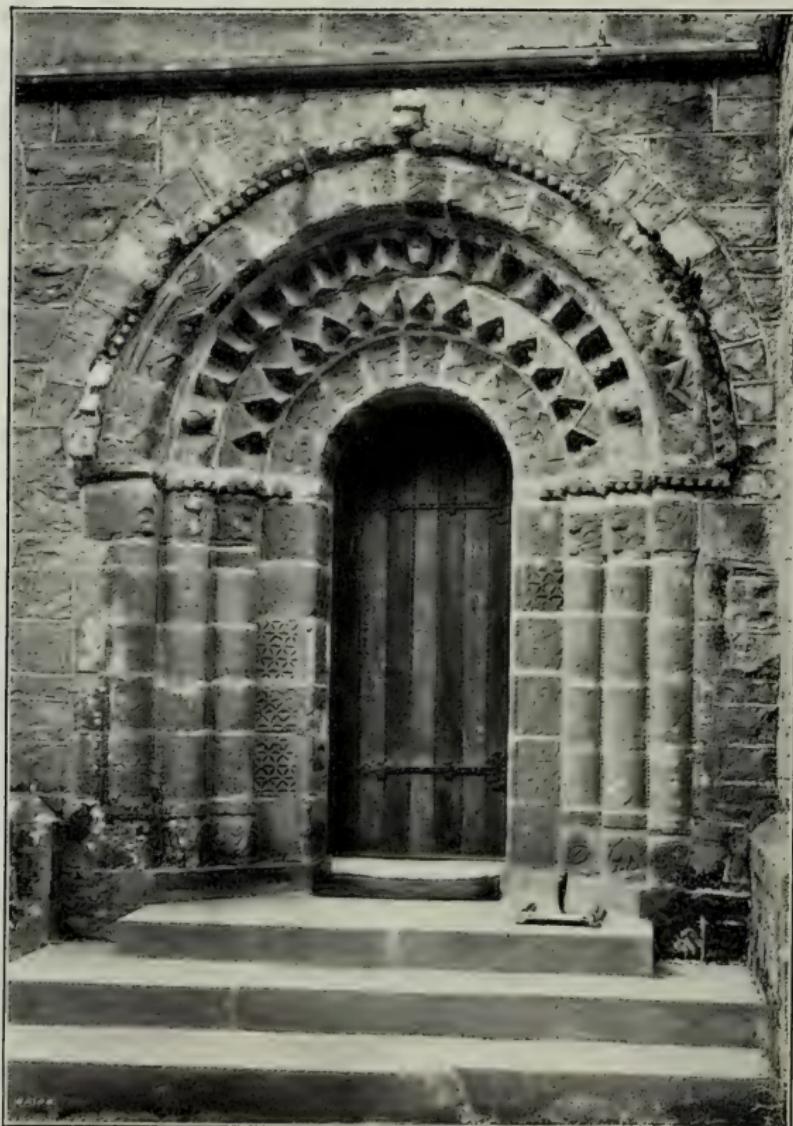
BARON'S COURT.

The third excursion of the Summer Session took place on Saturday, 1st July, to Baron's Court, County Tyrone, the residence of his Grace the Duke of Abercorn, K.G. After a brief interval at Newtownstewart the party set off on cars for their destination, charmingly situated in a narrow valley about two miles southwest of Newtownstewart. It extends in a south-westerly direction for fully three miles and at the extreme end is the parish church. Within the demesne the lowest ground in the line of the valley bottom is occupied by a chain of three long narrow lakelets. The modern castle, dating from the latter part of the eighteenth century, stands on a terrace on the eastern side of the middle lake, known as Lough Fanny.

Thirty-nine species of birds were observed during the day, none of them being other than common. On an elevation in the woods on the east side of the lake, just opposite the island stand the extensive ruins of an old castle dating back to pre-Plantation days, now the ivy-clad home of Owls and Jackdaws. In a corner of it were the remains of a Wild-Duck's nest, where a brood had been successfully hatched a few weeks before. Baron's Court is one of the two recorded breeding places of the Redstart in Ireland, but the forester, who knows the bird and saw the nests for two years in succession, said that it had not been seen there for the past twelve years. The history of several of the ruined castles of the district is somewhat obscure. The one referred to had evidently been of great strength and importance. The architecture and masonry bespeak for it a long history. The Baron's Court Cromlechs, situated on the deer-park side, were fully described in the "Journal of the Royal Society of Antiquaries" for December, 1907, from notes and photographs supplied by Lady Alexandra Hamilton. They consist of a group of three chambers, one of which has the covering-stone still in its original position on the supporting stones, and the covering-stone of another was found in removing the earth and rubbish which had accumulated round the structure, the upright stones remaining in position. The chambers are orientated. The ends towards the east are open and the western ends closed. Some beads and a fragment of pottery were found underneath when excavations were made in the Summer of 1907. A great anchor which lies on the lawn in front of the landsteward's residence was the object of much attention on account of its historic interest. It belonged to the French frigate in which James II. embarked at Waterford Harbour in 1690 after the defeat of his forces at the Boyne. About three o'clock the members began to assemble together at the Castle. The Botanists had nothing new to report beyond what had already been listed from the locality by Miss M. C. Knowles in the "Irish Naturalist" for

March, 1897. One member who collected Lichens handed in a good list. Large collections of Centipedes, Millepedes, Spiders, Mites, Harvestmen, as well as Insects of various sub-orders, were taken for examination. The four common species of Woodlice were seen, but searchers in the hot-houses were rewarded by the finding of *Trichoniscus roseus*, *Metoponorthus pruinosis*, *Cylisticus convexus*, and *Armadillidium nasatum*, none of which species are known to be native in County Tyrone. The recent long spell of dry weather militated against a large list of Mollusca, but most of the local species, with the exception of *Helix hortensis*, were obtained. In the woods *Zonitoides excavatus*, *Acanthinula lamellata*, and *Acicula lineata* were the best finds, the last-named being a new record for Tyrone. The fresh-water species were not well represented, but *Planorbis crista* added another species to the county list.

The cars were mounted at 3-40, and the return drive to Newtownstewart made under ideal weather conditions. On arrival at the Abercorn Arms Hotel, all dismounted, and were soon busily engaged on a welcome tea, which Mrs. Marshall, the proprietress, had in readiness. After tea a brief business meeting was held—the President (Mr. R. J. Welch) occupying the chair. On the motion of the ex-President (Mr. N. H. Foster), seconded by Mr. S. A. Bennett, a vote of thanks was passed to his Grace the Duke of Abercorn for the permission given to visit and explore his beautiful demesne. Immediately after the members made their way on foot to the railway station, examining hurriedly on the route the battlemented gable of the old castle, the old six-span stone bridge over the river, and having a distant view of the remains of Henry Awrey O'Neill's Castle, perched on the bare hill top to the south of the town. The river has long been noted for its pearls, which are found in the Pearl-Mussel (*Margaritana margaritifera*), but few of value have been got in recent years. This is probably due to the ruthless destruction of the shells by the more ignorant pearl-fishers.



Ancient Doorway from Trinity Abbey.

Now in Kilmore Cathedral.

PHOTO.

R. J. WELCH.

CAVAN AND DISTRICT.

The Committee selected Cavan as the district for visitation on this year's "long excursion," which took place on 12-14 July. The members assembled at Belfast Station on the morning of the Twelfth, and took their places in reserved carriages attached to the 8 o'clock train, and their numbers were augmented by some who joined the train at Lisburn and at Portadown. Cavan was reached shortly after 11 o'clock, and here the party received further accessions on the arrival of the Midland Great Western train, which conveyed some Dublin and Limerick members. Immediately after arrival lunch was served in the Farnham Hotel, the headquarters of the party during their stay in Cavan, and on its conclusion brakes were in readiness to convey the members to the Cathedral Church of Kilmore. This modern church stands on the site of the Abbey of Cella Magna, founded at an early period by St. Columba. The vestry door of the church was taken from the Abbey on Trinity Island, Lough Oughter, a few miles distant, and forms one of the finest examples of the Hiberno-Romanesque style extant in Ireland. In the adjoining graveyard were interred the remains of the celebrated Bishop Bedell, "the last of the English." After a thorough inspection of the church and its precincts the drive was continued to the demesne of Killykeen where, through the courteous attention of Mr. Travers Blackley, Lord Farnham had granted permission for the afternoon to be spent. In the picturesquely-situated tea-house on the shore of Lough Oughter afternoon tea was served, and the members scattered to indulge in their varied avocations. At 6-30 the return drive commenced, and little more than an hour sufficed to enable all to seat themselves at the dinner-table in the hotel. After dinner the members were conducted to the Gallows Hill, the rounded summit of which is capped with Boulder-Clay and almost devoid of vegetation. From this eminence an extended panorama of the surrounding country was obtained, with the town of

Cavan nestling in the valley close beneath. The country all round bears testimony to the moulding effects of an ice-age. Drumlins of the typical hog-back form abound, and through many of these can be traced overflow channels, now dry, but which once were cut by rivers issuing from the glaciers of that period. The intervening meadows often display characteristics suggesting dried-up lake beds, and an entrenched fort seen from the top of Gallows Hill in one of these depressions was, when constructed, in all probability situated on the margin of one of these now vanished lakes. A long and interesting day's proceedings was outlined in our programme for Thursday. Starting from the hotel at 9 o'clock, our route lay northwards to Butler's Bridge, where was crossed the River Anna, the main feeder of the Cavan lakes from the east; and shortly afterwards a halt was called at Baker's Bridge, under the arches of which flows the River Erne, on this occasion practically little more than a dry river bed. Here a short time was spent while the photographers of the party obtained souvenirs of the interesting place, and the collectors added to the contents of their varied receptacles. Remounting the brakes, the drive was continued to the village of Milltown, from which all proceeded on foot to the ruins of the Abbey Church and Round Tower of Drumlane, to the examination of which, with the adjacent extensive traces of monastic buildings and surrounding environment, three hours were allotted. A monastery was founded here in the sixth century by St. Edan, Bishop of Ferns, and became subject to the Abbey of St. Mary, at Kells. The architectural features of the now standing ruins suggest twelfth to fifteenth century work, the eastern portion of the church for about 25 feet having been evidently added to the building towards the close of this period. The east window is almost wholly destroyed, but the portions remaining show that it was far from devoid of beauty. In plan the church is a rectangular building possessing neither transepts nor porches, and the side walls are supported on the outsides by large buttresses. The main entrance in the western gable is a circular-headed door of

peculiar design, bearing on the crown of the arch the carved head of a bishop wearing his mitre. The south door, situated near the western gate, has a pointed arch, as has also the priests' door in the northern wall. It is evident that the great altar stood about the middle of the Church on the south side, and opposite it in the north wall is the "squint," through which persons disqualified from entering the building might witness some of the ceremonial. Near the north-west corner of the Church stand some forty feet of the Round Tower, constructed, like the adjoining building, of local Carboniferous sandstone. The lower portion of the tower, to a height of some twenty feet, is a magnificent example of dry stone construction, the component blocks having been worked to fit into each other so closely that even now it is barely possible to insert a knife-blade between them, and the outer face having been carefully smoothed all over. The upper portion is of ordinary coursed rubble construction, and the circular-headed entrance, some twelve feet above ground level, is protected by a similar opening a few feet above it. The form of these openings indicates that this Round Tower constitutes an example of one of the later of such erections. These ruins are now vested in the Board of Works, and consequently not liable to further dilapidation. Surrounding them is an extensive burying-place, still used, the site occupying a commanding position overlooking Derrybrick Lough, about a couple of hundred yards distant. South of these relics on a lower-lying portion of the ground are the extensive remains of the monastic buildings of which little save the traces of foundations now remain. By the side of these ruins at 12-30 an excellent lunch was served by Mr. Pershaw, manager of the Farnham Hotel. Shortly before three o'clock the conductor's whistle sounded the time for departure, and after a further drive of three miles, we crossed the River Erne and entered the thriving little market town of Belturbet, where a pleasant surprise awaited the members—viz., a refreshing afternoon tea, for which the conductors had secretly made arrangements in the Central Hotel.

One and a half hours were spent in Belturbet, some of the members visiting the Parish Church, whilst others explored the town or collected by the river's bank, and at five o'clock the return drive was commenced, the morning's route being rejoined at Drumalure. Twenty minutes were allowed to enable the Botanists to search for treasures in the extensive bog of Drumsillagh, through which the road here runs. The headquarters were reached one minute before scheduled time, and after dinner the customary business meeting was held—the President (Mr. R. J. Welch) in the chair. On the motion of Rev. Canon Lett, seconded by Mr. Robert Walsh, a cordial vote of thanks was passed to Lord Farnham and to his agent (Mr. Blackley) for permission to explore in Killykeen and Farnham, and to Mr. S. Jones for his many thoughtful attentions and assistance in arranging the programme. Canon Lett also proposed, and Mr. N. H. Foster seconded, that a message of sympathy be conveyed to Miss Agnew, and an expression of hope that she might soon again be able to take her wonted part in the work of the Club. Nine o'clock on Friday morning found all the members seated in the brakes awaiting the starting signal, and about half an hour later Farnham Demesne was entered. Passing the front of Farnham House, the avenue led through woods, which by the tall straight growth of the tree trunks gave evidence of careful supervision during growth. On reaching the southern end of Farnham Lake all dismounted, and the Botanists set out to explore the recesses of Derrygid Wood and the margins of the several lakes situated in the demesne. The gardens claimed the attention of some, and the many scenic vistas throughout the demesne gave opportunities to painters and photographers to secure mementoes of a pleasant day. All too soon the time for departure arrived, and the members returned to the hotel to partake of lunch. Then came the time for packing up, and at 4.55 our train steamed northwards amid farewell greetings from our friends, who five minutes afterwards would be proceeding

southwards. During the three days no darkening clouds appeared, and the tropical conditions prevailing, if somewhat of a disadvantage to the collectors, rendered the outing one of the most pleasurable in the annals of the Club's history.

The unusually dry season was not favourable for collecting many of the Flowering Plants of the district, and the Mosses were generally dried up. It was remarkable how poor was the growth of yellow and purple Loosestrife, Meadow-sweet, Valerian and other marsh plants, but access could be had to many places usually under water. The variety *Philippeana* of the Moss *Nekera pumila* was found on a tree at Kilmore Cathedral and in several places in the wood by Farnham lake. This variety has not been recorded before from Ireland, and the record is interesting, as the typical plant has not been found further north than Wicklow and King's County.

At Derrywinny Bog the following plants were observed:—*Rhynchospora alba*, *Drosera anglica*, and the Mosses *Sphagnum medium*, *S. cuspidatum*, and a beautiful form of the latter floating in the bog-holes. The Royal Fern was seen in several localities. The woods of Killykeen by Lough Oughter produced some characteristic plants of the Carboniferous limestone, *Juncus glaucus*, and *Schoenus nigricans*, and the Moss *Weisia curvirostris* was in great luxuriance on the shores of the lake. The Water Radish, *Nasturtium amphibium*, and *Carex acuta* and *Samolus Valerandi* were also found here.

At Baker's Bridge, where the Erne was crossed, the Water Radish was seen again together with *Samolus Valerandi*, *Salix Caprea*, and *Ceterach officinaria* growing on the walls.

The pretty composite, *Chrysanthemum Parthenium*, was found naturalized on the walls of Drumlane Abbey; and by the ruins of the monastic buildings grew Elecampane, *Inula Helenium*, and the Dwarf Elder, *Sambucus Ebulus*; and in a marsh by the lake *Sium angustifolium*. In one spot near the Abbey an interesting Alga, *Gomphosphaeria lacustris*, was found floating in the lake.

This species is not mentioned in the older manuals, as it was only described by Chodat in 1898. In Messrs. West's paper on the Plankton of the Irish Lakes they say that it occurred in prodigious quantity in Lough Corrib. "In damaged colonies the radiating structure of the internal mucus can be readily observed." This was the case with the specimens found at Drumlane. At Belturbet *Ranunculus peltatus* var. *truncatus* was found in the river with *Potamogeton perfoliatus*, and in Drumsillagh Bog, near Butler's Bridge, *Rhynchospora alba*, *Salix pentandra*, and *Lemna trisulca*. The woods and lake shores at Farnham produced many interesting plants, an abundance of the graceful *Carex Pseudocyperus*, *C. acuta*, *Lysimachia Nummularia*, *L. vulgaris*, *Euonymus europaeus*, *Prunus insititia*, and *Viburnum Opulus*.

Little attention had been given to the Mosses of Co. Cavan, and the following species, which were observed during the excursion, are new records, as they are not noted for county division 30 in the "Census Catalogue of British Mosses"—*Ditrichum flexicaule* (shore of Farnham lake), *Dicranella cerviculata*, *Dichodontium pellucidum* (by Farnham lake), and the var. *fagimontanum* (at Killykeen), *Campylopus pyriformis*, *Trichostomum crispulum*, *Weisia curvirostris*, *Barbula cylindrica*, *B. revoluta*, *Orthotrichum affine*, *O. Lyellii*, *Webera nutans*, *W. nutans* var. *longiseta* (Derrywinny bog), *Bryum pallens*, *Leucobryum glaucum*, *Polytrichum attenuatum*, *Cinclidotus fontinaloides*, *Climacium dendroides*, *Anomodon viticulosus*, *Brachythecium populeum* var. *majus*, *Eurhynchium tenellum*, *E. rusciforme*, *Amblystegium filicinum*, *Hypnum cupressiforme* var. *filiforme*, *Sphagnum cuspidatum*, and *S. medium* (Derrywinny Bog).

No rare Hepatics were met with, the most uncommon species collected being—*Marchantia polymorpha*, *Kantia sprengelii*, *Aneura latifrons*, *Cephalozia connivens* (all at Killykeen, on the shore of Lough Oughter), *Lunularia cruciata* (at Kilmore old Churchyard), *Cephalozia leucantha* (in Derrywinny Bog), and *Madotheca platyphylla* (in Farnham Wood).

The faunal notes relating to this excursion will be found among the Proceedings of the Winter Session, being detailed at a meeting of the Zoological Section.

ELLIS'S CUT, LOUGH NEAGH.

The fifth Summer excursion took place on Saturday, 29th July, when twenty-seven members started from Belfast by the 1-50 train, and in little over half an hour arrived in Lurgan. Here brakes were in readiness to convey the party to the shores of Lough Neagh. The drive terminated at Shan Port, and the members then walked along the shore to Ellis's Cut, this section of the lake margin, about a mile in length, including all that portion of County Down which impinges on Lough Neagh. The canal was crossed at the Ellis's Cut lock, and a walk of five minutes sufficed to bring the members to Leansmount, where the brakes were waiting, and prompt to time—5-45—the return journey to Lurgan was commenced. Tea was served in the Brownlow Arms Hotel, and afterwards the President, Mr. R. J. Welch, gave a resumé of the work hitherto accomplished in the Natural History Survey of Clare Island. The 7-30 train conveyed the party from Lurgan, and from its windows the members had an opportunity of witnessing an unusually magnificent display of lightning, the flashes, which followed closely one after another, appearing to rise from the ground and to disappear in the dense black cloud above. By the time Lisburn was reached the storm had for the time exhausted itself, and Belfast was reached shortly after eight o'clock. The country between Lurgan and Lough Neagh is covered with drumlins, and on the shores of the lake the Geologists found numerous erratics of Scotch granite. The Botanical Section was well represented and the following list includes some of the best finds of the afternoon :—*Ranunculus Lingua*, *Lathyrus palustris*, *Œnanthe fistulosa*, *Sagittaria sagittifolia*, *Thalictrum flavum*, *Typha angustifolia*, *Lysimachia vulgaris*, and *Spiranthes Romanzoffiana*, the

latter being new to the flora of County Down. Some fourteen species of Fresh-water Mollusks were taken, including *Sphaerium lacustre* and *Pisidium amnicum*, the latter much more abundant than usual. Numerous specimens of the Water-Woodlouse, *Asellus aquaticus*, and small bright blue Dragon-flies were noted. Many Polyzoa and Cladocera were collected, whilst among the Rotifera taken *Stephanoceros eichornii*, *Melicerta ringens*, and *Limnias ceratophylis* were identified, and proved very plentiful. Two species of Spiders, *Pandosa amentata* and *Pirata piraticus*, and one Phalangid, *Phalangium ophilio*, were found.

LOUGHGALL AND ARMAGH.

The sixth excursion of the Summer Session was held on Saturday, 12th August. Upon arrival in the Primateal City the party were conducted to the Roman Catholic Cathedral, and after an inspection of this fine building, started for Loughgall. Upon entering this prettily-situated hamlet attention was drawn to the church (to which repairs occasioned by the lightning of the 29th July were being carried out), the ruins of the old church, the schools, and other buildings of the community. Opposite the entrance gates of the Manor House the party dismounted, and, entering the demesne, proceeded to the lunch rendezvous by the lake-side. After an interval of half an hour most of the party proceeded towards the gardens, crossing on the way the beautiful avenue of Lime trees which leads from the entrance gates to the Manor House. At the entrance to the garden the members were met by the gardener, who acted as conductor for the remainder of the visit. A splendid Yew alley formed the first item of interest, some of the trees being reported to be over three hundred years old. Tea awaited the return of the party at Armagh, after which —Mr. Nevin H. Foster in the chair—a short business meeting was held, and the election of Miss Patchell to membership concluded the meeting. Afterwards the entire party set out on foot for the Palace, visiting on the way the ruins of the Franciscan

Abbey, built during the eighteenth century. Upon arrival at the Palace the party were received by the Lord Primate and Mrs. Crozier, and the Royal Portraits hung in the dining hall were viewed. A tour of inspection commenced with a visit to the entrance hall, where the fine collection of portraits of the former Primates is placed. Upon the entrance door the coats-of-arms of the Primates are emblazoned. The Chapel, a separate building of the same date, was next visited. This contains some beautiful oak work and exquisitely-executed carving characteristic of the period. A tour of the surrounding garden was the next item on the programme, and during a brief halt a formal vote of thanks to Dr. and Mrs. Crozier was passed by acclamation, on the proposal of Mr. F. A. Heron, seconded by Dr. Hadden, after which the party returned to Armagh and entrained for Belfast.

Not a great deal of work was accomplished by the Naturalists of the party, the many items of interest in the programme militating against strenuous field work. The Botanists, however, reported several interesting plants, among which *Carduus acanthoides*, a somewhat local Thistle; *Eupatorium cannabinum*, *Lithospermum officinale*, and *Carex pendula* and *C. acuta*, two of the less common Sedges. The Spike Rush *Cladium Mariscus*, known to occur round the margin of the lake at Loughgall, was not seen on this occasion. Two interesting species of Shells were found by the Conchologists at Loughgall, one of these—*Zonitoides nitidus*—being an addition to the fauna of County Armagh; the other—*Limnaea auricularia*—a fresh-water species, had not been recorded from the county except from Lough Neagh. In the garden at the same locality it was interesting to see *Hygromia rufescens* aestivating upon the trunks of the Yew, Apple, and other trees. Insects were particularly common, but were only molested by one member of the party, who reported nothing of special interest. The thickets and groves in Loughgall demesne afford ideal sanctuaries for numerous Birds, and, as would be expected under such conditions, many species of Warblers, Tits, and Finches were noted.

Among the Birds observed on the lake were a couple of pairs of Great-crested Grebes, one of which was accompanied by its brood of three almost full-grown chicks. The four common species of Woodlice were observed in the district, as were also the rarer *Trichoniscus pygmæus* and *Porcellio pictus*. In the Manor House gardens *T. roseus*, *P. dilitatus*, *Haplophthalmus mengii*, and *Metoponorthus pruinosus* were taken, a specimen of the last species being also captured under some slates lying in the railway yard at Armagh. *H. mengii* and *M. pruinosus* had not been recorded previously from County Armagh.

KELLS AND CONNOR.

The seventh excursion of the Summer Session was held on 26th August, to Kells and Connor, County Antrim. The party travelled by train to Kellswater Station, where they were met by conveyances. On reaching the site of the ancient Cathedral of Connor the party were met by the Rector (Rev. O. W. Clark), who kindly pointed out the objects of interest to be seen, including an ancient baptismal font discovered by the Rev. W. P. Carmody when rector of the parish, and now suitably erected in the sacred building. Under the guidance of Mr. Clark the party visited the rectory grounds, and were pointed out an ancient walled fort. A fragment of a Celtic cross preserved in the rectory was noted. Before leaving a hearty vote of thanks was passed to Mr. Clark for his kindness, on the motion of the Rev. W. S. Smith. The next objective was Templemoyle, a Monastery formerly known as St. Mary's of the Desert. The western gable of the Church still stands, and an ancient graveyard with the vault of the O'Haras surrounding. A drive along the valley of the Kellswater brought the party to the farm of Mr. James Black, Liminary, where a souterrain was recently discovered: there are three chambers, all of which were successfully inspected by some of the members. This place is the site of the ancient Castle of Sir Cahal O'Hara, the ponderous gate pillars of which still stand. A visit to a

kistvaen and stone circle was the last item in a busy afternoon, these remains being in the townland of Ballymarlow. The latter monument is in a wonderful state of preservation. Ballymena was reached in good time, and an excellent tea was served in Whiteside's hotel, at which a short business meeting was held, under the presidency of Mr. W. J. C. Tomlinson, when a vote of thanks was passed to Mr. Black for his kindness at Liminary, and to Mr. Joseph Skillen, a local member, for acting as guide to the party during the afternoon, on the motion of Mr. W. R. Pim. The Secretary having made some announcements, the party proceeded to the train, on the way to which a halt was made at the Town Hall to see a pillar associated with the '98 rebellion.

COLIN GLEN.

The members of the Geological Section visited Upper Colin Glen on 16th September. There was a large attendance, twenty-eight taking part in the excursion. One of the most complete sections of our Cretaceous strata is exposed along the banks of the river, and we owe very complete descriptions of it to the late Professor Ralph Tate, the founder of our Field Club, and more recently to Dr. W. Fraser Hume, F.G.S. The party was under the guidance of Mr. Tomlinson and Mr. Bell.

GLENSHESK.

The Geological Section of the Club had an excursion to Glenshesk on 23rd September. The occurrence in the neighbourhood of Belfast of dry gullies excavated out of the solid rock, and mostly associated with deposits of Glacial detritis and esker-like accumulations of sand and gravel, has oftentimes been observed by local Geologists. These characteristic features are now spoken of as "dry gaps" and "overflow channels." They are such as could only, it is believed, have originated during glacial conditions. They are in most cases now entirely streamless; besides, they are such as could not possibly have

been carved out in times past by the normal land drainage of the area in which they occur. They are mostly steep-sided, and in those which still contain streams the latter are insignificant in comparison with the channels which they respectively occupy as to be evident misfits.

The party travelled to Armoy by train, and then drove to Glenshesk. The drive from Armoy took the members through the valley between Knocklayd (1,695 feet) and Croaghan (1,368 feet). This valley runs nearly east and west, and falls slightly in the latter direction. At its upper (eastern) end it is cut off by Glenshesk, running from south to north, a much deeper glen, and thus under present conditions there is no possible catchment for a stream of sufficient volume and power to excavate the valley. In point of fact it is now almost streamless. The conductor pointed out how this valley had been cut by the overflow of a lake which temporarily existed in Glenshesk, and whose waters were held up by the ice front of the Firth of Clyde glacier. This huge glacier would appear at that time to have stood across the mouth of the glen in much the same way that the great Aletsch glacier of Switzerland holds up the waters of the Merjelen See.

On reaching the neighbourhood of Glenbank House, in Glenshesk, seven members of the party descended to the Shesk, and, crossing it by a wooden footbridge, were soon lost to view in the recesses of the moorlands. After crossing to the right (eastern) bank of the river Dr. Dwerryhouse first explained the features presented to the eye on looking up the Shesk towards Bohilbreaga (1,077 feet). Then he led the way up by the Owencam River to the ford, where the latter stream is joined by the Greenan Water. Bending abruptly to the left, the channel of the Owencam was closely followed up among the hills, where it winds through a sinuous rocky gorge, until the members reached the open moorland. Overflow channels of a singularly impressive type were studied. These, as pointed out by the leader, had a different periods discharged the surplus waters of a second ice-

dammed lake which occupied the valley of the Glenmakeeran River. The waters of this Lake Glenmakeeran, which were at a higher level than those of Lake Glenshesk, flowed through a deep gorge cut in the solid rock, and which is now streamless, into Lake Glenshesk, and thence by the overflow channels before-mentioned into the valley of the Bush River, at Armoy. Several terraces of gravel in Glenmakeeran were pointed out, and it was shown that these corresponded respectively to the levels of three channels, which successively acted as overflows for the lake, it being explained that the terraces were deltas formed in the lake by inflowing streams, each delta assuming the level of the waters at its formation. Crossing the open moorland from Glenmakeeran, the party came to the upper stretches of the vast streamless overflow channel referred to, a gorge of magnificent proportions and great length. It is known locally as Altiffirnan Glen, and down along it the members made their way to the public road by the Glenshesk River.

Remounting the brake in waiting, a most enjoyable drive terminated in Ballycastle at five o'clock. The party left Ballycastle by the 6-10 p.m. train for Belfast.

ARDGLASS.

The customary "Boxing Day" excursion took place on 26th December, when 42 members travelled to Ardglass. On reaching Killough the party left the train and proceeded to walk by the shore in a downpour of rain, which sadly interfered with the collectors' ardour. Ardglass was reached at three o'clock and the members were received in Sean O'Neill's Castle (better known as Jordan's Castle) by Mr. F. J. Bigger and entertained to tea. After an inspection of the castle and its contents Mr. Bigger gave an interesting account of the history and fortunes of the castle, and a pleasant afternoon was spent in the historic stronghold of a long departed race of merchant princes.

Winter Session.

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

ANNUAL CONVERSAZIONE.

The forty-ninth Winter Session was inaugurated by a Conversazione, held in the Assembly Buildings on Friday evening, 27th October, about 250 members and friends being present. In the Zoological Section the special exhibit lent by the Belfast Municipal Museum attracted much attention. It included nine cases of rare birds taken in Ireland, including Bonaparte's Gull, Sabine's Gull, and Bonaparte's Sandpiper; also a series of cases of injurious Insects mounted to show their life histories. Mr. George Donaldson showed a case of Indian Butterflies, and Mr. Nevin H. Foster had a most interesting exhibit of Birds' Eggs, showing variation among eggs of the same species. Mr. John Hamilton exhibited living specimens of the larva of the Fox Moth. Mr. W. F. M'Kinney brought some curious Insects showing protective mimicry, from Brazil, and also a varied display of Australian and Spanish Shells. Mr. A. W. Stelfox exhibited living specimens of the larger British Land-Shells. Mr. R. J. Welch's exhibit of the Land and Fresh-water Mollusca from the South-East of England was a series showing mainly species which do not occur in Ireland, and included two species, *Planorbis vorticulus* and *Valvata macrostoma*, only recently added to the British list. Mr. J. A. S. Stendall showed, by the aid of the Microscope, the circulation of the blood in the foot of the Common Frog, and Mr. H. Lamont Orr brought a Song-Thrush's nest with unusual lining, and a Wasp's nest in a flower-pot. Mr. Whitehouse

exhibited the Parasite of sleeping sickness, and the small Jelly-fish that form part of the Plankton of the English Channel. Professor Gregg Wilson showed a case illustrating variety in Guillemots' eggs.

In the Botanical Section quite one of the features of the exhibition was a very fine series of water-colour drawings by Dr. H. Drinkwater (Wrexham), of British Plants. In interesting contrast to this last-mentioned exhibit were the carefully-executed water-colour drawings of British Plants and other Natural History objects by Mr. A. G. Stubbs (Herts), who used transparent colours, in contrast with the opaque medium employed by Dr. Drinkwater. Mr. N. Carrothers's exhibit included *Lathyrus palustris*, *Rosa hibernica*, *Spiranthes Romanzoffiana* from County Down, *Pyrola secunda* from County Antrim, and *Pyrola rotundifolia* from Lancashire. Among the specimens of Irish Lichens shown by Mr. Glover *Lichena pygmæa*, *Verrucaria nitida*, *Cladina rangiferina*, and *Physeia estanea* were noteworthy. Rev. Canon Lett showed under cultivation the rare Hepatics, *Dumortiera irrigua*, and *Pellia calycina* and herbarium specimens of some very rare Mosses from Colin Glen. Mr. W. H. Phillips had some very finely executed nature prints of British Ferns, and the Rev. C. H. Waddell had an interesting exhibit of Botanical Specimens, among which we noted the Evening Primrose and *Calamagrostis Hookeri*.

In the Geological Section Mr. Robert Bell exhibited Cephalopoda from the Lower Lias, County Antrim. Mr. Charles Bulla's exhibit of Carboniferous Fish-remains included representatives of the following genera:—*Cladodus*, *Cabadus*, *Deltoptyshius*, *Ordous*, and *Colonodus*. Mr. George Donaldson showed his prize collection of local Cretaceous Fossils, and also Shells from the Boulder-Clays of Antrim and Down. Dr. A. R. Dwerryhouse exhibited a magnificent collection of fossil Echinodermata. Mr. William Gray illustrated very fully the subject of "Limestone" in its geological and economic aspects. His collection included the chief minerals of which lime or calcite forms a part, and a variety

of the beautiful and interesting forms that calcite itself assumes in cavern deposits, &c. Examples of the limestones of all known geological periods were exhibited, including a series of Irish marbles. Mr. James Strachan had specimens of Eurite from Ailsa Craig, some very rare Zeolites from foreign sources, and Polished Agate. Decidedly one of the most interesting exhibits was that of Mr. Joseph Wright, whose exquisitely mounted microscopic specimens of Foraminifera from the estuarine clays of Limavady Junction and Magheramorne elicited great admiration.

In the Miscellaneous Section Mr. F. J. Bigger had a very striking exhibit of different examples of St. Brigid's Crosses, of rushes, straw, or peeled seileach, still made on St. Brigid's eve in every province of Ireland, and nailed up above doors and fire-places and beds. Mr. A. M'I. Cleland showed the various properties of the Bunsen flame. Mr. Francis C. Forth exhibited a very fine series of Geographical Illustrations, showing (1) land forms and (2) climate and vegetation. Mr. Forth also exhibited a set of relief Maps of various countries. The exhibit of recent finds of Stone and Bronze objects from the Prehistoric hearths at Dundrum, County Down, shown by Mrs. W. A. Green and Mr. A. Shemeld, included a piece of pottery painted in brilliant colours, probably Etruscan, a bronze axe and pins, stone axes, &c. Another carefully-thought-out exhibit of antiquarian interest was that of Mr. W. J. Knowles, who displayed Prehistoric Implements of stone, &c., showing comparison between Irish and foreign examples. Mr. Robert May showed a portrait of Patrick Doran, Geologist and Antiquary. Mr. James Orr's exhibit of Electric Furnace Products included carborundum, electrite, alundum, and graphite. Mr. Sylvanus Wear brought a series of interesting Microscopic Slides. Amongst the Photographic exhibits specially noted were some Photographs by Mr. S. H. Douey and Mr. J. L. S. Jackson; Antiquarian and Natural History Photographs, by Mr. W. A. Green; and Photographs connected with the Club's excursions during the past Summer Session, by Mr. Robert J.

Welch. Miss Praeger's beautifully sculptured portrait of the late Mr. S. A. Stewart was exhibited ; and Mr. W. S. Mollan showed Water-colour Sketches of the Rosapenna and Cavan districts, by Rev. A. L. Sydney Smith. At nine o'clock a short business meeting was held—the President (Mr. R. J. Welch) in the chair. Mr. Welch gave a brief *résumé* of the Club's work during the Summer Session, and drew special attention to the lately-formed Junior Section of the Club. Seven new members—Miss M. P. Harper, Miss Olive Maxwell, Miss Kathleen Maxwell, Rev. C. M. Young, Messrs. M. M'Cracken, Albert E. Douglas, and Samuel Freeland were elected, five of whom were junior members.

A lantern display of views mainly taken at the Summer excursions by the Club members followed. Mr. D. J. Hogg's slides, showing sunset and cloud effects, were particularly lovely. Other slides were shown by Messrs. Wear, Stelfox, Douey, Gray, and Welch.

PRESIDENTIAL ADDRESS.

SAND-HILLS: THEIR FORMATION, FAUNA AND FLORA.

On the evening of Tuesday, 21st November, the President, Mr. R. J. Welch, M.R.I.A., read his address on "Sandhills, their Formation, Fauna and Flora," before a large and representative audience. The President said, in the course of his address, coast-dunes are one of the small compensations for the waste of the land by the sea in other places, and they are formed by the wind, one of the main causes of denudation. Once formed they become the best protection against marine erosion. Dunes form rapidly where the sea accumulates sand above the low-water mark, so that it becomes dry between the tides. This may be seen any windy day on strands if the tide be low, especially if the wind is blowing landwards. It may be asked from whence the enormous amount of material in our big sand-hills is derived. The material, at least on our east coasts, is almost entirely fine quartz grains. It is formed by marine erosion, and the disintegrating action of frost, while rivers are constantly bringing down debris from the hills, and from their own beds. The sand-hills so common at the mouths of many rivers are largely formed by the material brought down by these rivers, and the material forming them may have done duty many times before in past geological periods, for the sandstones of to-day are only the consolidated lake, sea, or æolian sands of Cretaceous, Triassic, Carboniferous, or more ancient times. The Glacial Period, too, left behind enormous quantities of loose friable material containing much fine gravel and sand. Though the great majority of dunes in temperate regions are formed of siliceous material, yet we have in the west of Ireland and in Devon and Cornwall areas of more or less calcareous dunes

formed mainly from fine shell debris, urchin tests, spines, and foraminifera. The best known of these are the Campion Sands, at Rosapenna, and the famous foraminifera sands at Dog's Bay, Connemara. That vegetation greatly assists dune formation is well known, and in our country Bent, Marram, or Star-grass is the chief assistant to the wind as a dune-builder. Many of the plants which live on sand-hills possess long roots, or spreading rhizomes, and they probably act in a chemical as well as in a mechanical way, especially where calcareous matter is present. When the natural vegetation of a dune area is broken through by man, rabbits, or cattle, or destroyed in any way, the sand often starts to drift inland, and great devastation in all parts of the world has been caused in consequence. Perhaps the Landes area in western France is the best known European example, and the Culbin Sands in Scotland the most marked British one. One of the worst cases of devastation by blowing sands in Ireland was at Rosapenna, Donegal. Here the Campion Sands from the great dunes which fringe Tramore, Sheephaven, covered and destroyed sixteen farms and Lord Boyne's house and grounds in 1784. These light calcareous sands are composed of finely comminuted shells, sea-urchins, and foraminifera from Tramore, and even now have to be carefully watched in dry windy seasons. Rutland Island, Burtonport, in Donegal, was completely devastated by blowing sands between 1806 and 1846. It was a green island, a thriving fishing station, the herring fishery in 1784 yielding £80,000, and the Government established a military station there. In forty years the sand had completely buried the place, only the chimney of the school showing above it. At Horn Head part of the road is completely buried, and the sand has drifted up the hill to an altitude of 350 feet. In south-west Mayo the inhabitants near the shore have great difficulty in keeping the sand from travelling inland. Near Broadhaven the Bent was burnt off the sand-hills, and the sand commenced to travel up the hill to the north-east. In 1878 it had crept up 700 feet, destroying

all before it, and the occupiers had to move to the other side of the hill. In Oney Island, off the Galway coast, the sand has covered up a village, and the natives now come out of holes like rabbits out of burrows. In Inishmore, Aran, and at Errismore sands are travelling southward out to sea. At Culbin, in Scotland, blown sands overwhelmed an estate that was rented at £6,000 per annum. In the Kurische Nehrung a long narrow sandy neck of land on the north coast of Germany, blowing sands buried, and then left free, a church. The Merthyr Mawr sand-hills in Glamorganshire cover an old town.

The lecture was illustrated by a magnificent set of lantern slides, taken mainly by the lecturer; by a number of dune-building plants sent by Mr. Manning, of Rosapenna, and by a large series of land-shells, which live on sandy areas, exhibited by Mr. Stelfox. At its conclusion Dr. A. R. Dwerryhouse addressed the meeting, and, after the President's reply, the election of a junior member, Mr. Norman Carrothers, terminated the proceedings.

PLANT COMMUNITIES.

The Botanical Section commenced their Winter meetings on Saturday, 25th November. The Chairman of the Section (Rev. C. H. Waddell) presided. He intimated to the members present that it had been decided to devote their meetings this Winter to the study of the methods of plant ecology. With this end in view the book just published by Mr. Tansley, of Cambridge, entitled "Types of British Vegetation," would be used as a basis for the lectures to be given at succeeding meetings of the Section. Mr. W. J. C. Tomlinson then gave the introductory lecture.

An interesting interchange of views took place after the delivery of the lecture, in which the Chairman and Messrs. S. A. Bennett and N. Carrothers took part.

"WATER SUPPLY FROM UNDERGROUND SOURCES."

The Geological Section of the Club held its first meeting of the Winter Session in the Museum, on Wednesday, 29th November, when Dr. A. R. Dwerryhouse read a paper on "Water Supply from Underground Sources." There was a very large attendance, and Mr. W. J. C. Tomlinson presided. Before calling upon Dr. Dwerryhouse the Chairman referred to the opportuneness of the subject to be brought before the members that evening. Not within living memory had there been throughout these islands a season of such intense and prolonged drought as had been experienced during the past Summer and Autumn.

At the conclusion of the lecture a letter of apology for non-attendance was read from Mr. William A. Traill, and a very interesting discussion followed, in which Messrs. R. J. Welch, Wm. Gray, S. A. Bennett, G. Donaldson, and the Chairman took part. In reply to questions with regard to recent suggestions that the supply of Belfast should be supplemented from underground sources, Dr. Dwerryhouse stated that he had no data regarding the amount of water now drawn from the Triassic sandstone beneath the city, but that in all probability this was not far from the maximum quantity which the rocks were capable of yielding, and that heavy pumping for a public supply would therefore seriously interfere with the supply from existing wells. He did not think that the Greensand beneath the basalts of the Antrim plateau would be likely to yield a large permanent supply owing to the narrowness of the Greensand outcrops and the fact that they occurred on steep ground where the run-off was excessive and the amount of water available for replenishing the underground stores correspondingly small.

A TALK ABOUT BIRDS.

The first meeting of the newly-formed Junior Section was held in the Museum, on 6th December, the Chairman of the Section, Mr. Robert Patterson, presiding. Mr. Patterson offered two prizes to be competed for by the junior members—one for the “best-kept notebook recording the information acquired at the Winter meetings,” and one for the “best-kept nature diary for the year 1912”—and, after the Hon. Secretary of the Section had read various rules and bylaws, Mr. Nevin H. Foster, M.B.O.U., proceeded to deliver the first address to the Junior Section. Mr. Foster gave a description of some of our birds and their nesting habits, illustrated by lantern slides shown by Mr. S. Wear.

THE FAUNA OF CAVAN.

A meeting of the Zoological Section was held on 13th December, the Chairman of the Section, Mr. N. H. Foster, presiding.

The Chairman said that in respect to county lists of fauna and flora Monaghan and Cavan were the most imperfectly worked counties in Ulster, and this induced the Committee to select Cavan for visitation on the Club’s long excursion in July last. Four working Botanists and three Zoologists took part in the proceedings, and all did an amount of work, but the dry Summer proved a serious handicap to collectors, and doubtless many plants and animals escaped observation on this occasion.

During the time spent in Cavan nothing extraordinary was observed in respect to its avifauna. Perhaps the most interesting item was the sight of a Garden-Warbler near Kilmore, this bird being now practically unknown in our home Counties. The common birds were abundant, the diversified nature of the district affording suitable haunts for numerous species, and the total number of species observed amounted to sixty-eight. A breeding colony of Herons was seen in Derrygid Wood, the

nests being placed in the tops of tall beech trees. The many large lakes are doubtless well stocked with water-frequenting birds, but time did not permit their exploration. Several Mute Swans were noted, some of them being accompanied by their broods, but of the Ducks only the Mallard and Pochard were observed. Every lake visited was tenanted by one or more pairs of Great-crested Grebes, and the Little Grebe was also very common.

Among the Crustaceans the following were obtained :—The Amphipod *Gammarus pulex*, and the fresh-water Isopod *Asellus aquaticus*, both of these being found commonly in the lakes and streams. Previous to their visit only the four common species of Woodlice—*Trichoniscus pusillus*, *Philoscia muscorum*, *Oniscus asellus*, and *Porcellio scaber*—were recorded from County Cavan, and to these they were enabled to add four, viz., *Trichoniscus roseus*, *T. pygmaeus*, *Porcellio pictus*, and *Metoponorthus pruinosus*. Of these two must be regarded as introduced species—*T. roseus* and *M. pruinosus*—having been found only in a greenhouse.

Mr. Balfour Browne reported the capture of *Dytiscus circumcinctus* by Mr. Welch near Drumlane. Hitherto this species had, in Ireland, only been taken in Armagh, but during the past Summer it has been taken by the speaker near Moira, County Down.

Mr. A. W. Stelfox described the Land and Fresh-water Shells which were found during the July excursion, and compared the list with one compiled in the mountainous part of the county on a previous occasion. Five species proved to be new records for Cavan, of which the most interesting were *Acanthinula lamellata*, *Hygromia fusca*, *Arianta arbustorum*, and *Acroloxus lacustris*.

The Spiders and Harvestmen were submitted to Mr. D. R. Pack Beresford, who reports :—

" Most of the Spiders sent me were unfortunately immature, and many were therefore impossible to identify. I found however seven species :—*Tegenaria derhamii* Scop., *Labulla thoracica* Wid., *Meta segmentata* Cl., *M. merianae* Latr., *Lycosa ruricola* De Geer, *Pardosa pullata* Cl., and *P. amentata* Cl. Of these only

the three last named had been previously taken in County Cavan, though all are common species. There were also two species of Harvestmen (*Phalangidae*) *Mitopus morio* Fabr., and *Nemastoma lugubre* O.F.M. Both are common species but had not been recorded before from the county."

Mr. Robert J. Welch, Mr. W. A. J. M'Bretney, and others having discussed some of the finds, the proceedings terminated.

THE VEGETATION OF CALCAREOUS SOILS.

The second meeting of the Botanical Section was held on Saturday, 16th December, Mr. W. J. C. Tomlinson presiding. A paper was read by Mr. S. A. Bennett, B.Sc., on "The Vegetation of Calcareous Soils."

Mr. Bennett's paper, which was illustrated by many herbarium specimens of the plants commented upon, elicited the cordial approval of the large attendance of members present. In the discussion that followed the following took part:—Messrs. S. Wear, C. E. Robertson, N. Carrothers, H. S. Staley, and the Chairman. Mr. Bennett having replied, the meeting concluded.

THE RATHS OF AN ANCIENT SETTLEMENT BETWEEN THE BANN AND THE MAIN RIVERS, ON THE BANKS OF LOUGH NEAGH.

The second monthly meeting was held in the Museum, on 19th December, when a lecture on above subject was delivered by Mr. F. J. Bigger, M.R.I.A. Mr. R. J. Welch presided, and there was a large attendance.

In the course of his observations Mr. Bigger said that in many recent visits through "Old Drumail," "Sweet Duncane," and "Holy Cranfield," which three parishes lie between the Maine and the Bann, he was struck with the number of raths that were visible at every turn of the road, the number being more than he

usually met with in the course of his journeys. On several occasions he examined some of them in detail. Dozens of them were to be found in the area referred to, and where any one had been destroyed its site was still traceable; in no case had all the evidence of its existence been lost. It was quite noticeable that these raths were all much of the same type; they varied in size and in the number of ramparts, but not otherwise. They were clearly not military strongholds, nor were they burial mounds. None of them were high-centred or conical; they were almost invariably sunk in the centre. They occupied no high, commanding, impregnable sites. They were scattered fairly evenly over the district, which was undulating and freely rivered, in former days having much wood, with ample marshy ground, thus affording strong natural protection from any invading force. The land was rich and of old cultivation, with wide pastures for countless cattle. It was certainly a rich agricultural and pastoral country, sloping gently to the south, where it was bordered by the lapping waves of Lough Neagh. Only one religious site of any importance was included in the district, the old church and holy well of Cranfield. Lying close to the mainland in the waters of the lake to the south were the three Isles of Fenagh and the Scawey Rock. The three islands were historic. One had the site of an ancient cill, one had the ruins of an O'Neill cottage, and the third was still natural. The islands were seldom visited, so remote were they, but they were well worth a day spent on them, and so was the Scawey Rock. In Daws Bay one of the most interesting relics was an old penal altar on the edge of the lake. It appeared to him that a numerous people lived long in this district, occupying these old raths, tilling the fertile slopes, and raising cattle with comparative security. These raths were every one homesteads and farmsteads. Proceeding, Mr. Bigger discounted the allegation that the raths were the work of the Normans. There were more raths in Fermanagh than all the Normans who came to Ireland could build in an hundred years. Mr. Bigger went on to give a

number of interesting details connected with the old raths, photographs of many of them being thrown on the screen. He also had shown a number of views depicting present-day life on the banks of Lough Neagh, and these added materially to the interest of the lecture.

Before the conclusion of the meeting Miss Rynes, Miss Houston, Master Ian Stewart, and Master C. V. R. Blackwood were elected members.

FOREST TREES.

At the second meeting of the Junior Section of the Club, held on Wednesday, 3rd January, in the Museum, a short paper was given by Mr. Arthur Deane on forest trees. The chair was occupied by Mr. Robert Welch. Numerous specimens of shoots, leaves, &c., kindly supplied by Mr. Davis, of the Botanic Gardens, were afterwards examined by the members with much interest. On 5th January a number of Junior members of the Club met in the Municipal Museum, Royal Avenue, where the exhibits were explained by the assistant curator, Mr. J. A. S. Stendall.

RARE BIRDS IN THE MUNICIPAL COLLECTION.

At the second meeting of the Zoological Section of the Club, held in the Museum, on Wednesday, 10th January, an interesting paper on the above subject was read by Mr. J. A. S. Stendall. The Chairman of the Section, Mr. Nevin H. Foster, occupied the chair. Mr. Stendall chose for his subject eighteen of the rarest specimens in the municipal collection, and briefly described their history from the date and place of their capture till the present day. Seventeen of these birds belonged to the Belfast Natural History and Philosophical Society's collection, which had recently been transferred to the Belfast Corporation. The actual specimens referred to, being on exhibition during the lecture, added greatly to the interest of the meeting, especially as these had

recently passed through Mr. Stendall's hands, and are now beautifully mounted for exhibition. Some of these birds, though shot in the early part of the last century, are in perfect condition, and among the most interesting may be mentioned the example of Sabine's Gull, *Xema sabini*, the first recorded specimen for the British Isles; Bonaparte's Gull, *Larus philadelphicus*, from the River Lagan, the first British specimen; Bonaparte's Sandpiper, *Tringa fuscicollis*; the Buff-breasted Sandpiper, *Tringites rufescens*; the American Bittern, *Botaurus lentiginosus*, shot near Armagh in November, 1845; the first authenticated Irish specimen of the Red-backed Shrike, *Lanius collurio*, a bird common in many parts of England, though of very rare occurrence in Ireland; the Snowy Owl, *Nyctea scandiaca*; the Black-necked Grebe, *Podiceps nigricollis*, one of our rare Winter visitants; the first Irish specimen of the Surf Scoter, *Ædemia perspicillata*, a duck of North American origin; the Pink-footed Goose, *Anser brachyrhynchus*; and, lastly, a beautiful specimen of a Falcon. The last-mentioned bird was but a year old when captured in County Donegal in 1859, and was described at that period as an Iceland Falcon, *Falco islandus*. Recently, however, our local ornithologists have been inclined to refer the specimen to the Gyrfalcon, *F. gyrfalco*. This latter had been considered by some merely the Scandinavian variety of the Iceland Falcon, which is, again, closely related to the Greenland Falcon, *F. canidans*. At the close of the discussion which followed, in which the Chairman and Mr. Robert Patterson were the chief speakers, it was proposed by Mr. Patterson, and seconded by Mr. Stelfox, and passed, that the following resolution should be sent to the municipal authorities:—"That the Falcon on exhibition to-night should in our opinion be submitted to English authorities before being definitely named and placed on exhibition before the public." Mr. Stendall having replied to several queries, the meeting terminated.

KITCHEN-MIDDENS IN DINGLE BAY.

THE POSSIBILITIES ARISING FROM NATURE STUDY.

At the third meeting of the Club, held in the Museum on Tuesday, 16th January, two interesting papers were read. The President, Mr. Robert J. Welch, who occupied the chair, first called upon the Rev. W. P. Carmody to read the paper prepared by himself and Mr. A. G. Wilson on "Kitchen-Middens in Dingle Bay." Mr. Carmody, after a brief description of the great range of sand-dunes in Dingle Bay known as The Inch, proceeded to describe the extensive middens which the authors discovered on these sandhills, in which he said—The middens were evidently more extensive at one time, for they have been cut into by the sea, so that a section is exposed forming a low cliff of five or six feet, almost entirely consisting of cockle shells. At the foot of this tiny precipice, almost along the whole 1,000 feet of its sea frontage, we found many scores of stone "rubbers" and "hammers." The rubbers were simply the stones of the beach flattened by continual use. The largest measured about one square foot in area by about one and a half inches thick. Upon asking a local farmer if he had seen these "cockle-beds," we were surprised by the answer—"Oh, yes; the people of this place do be boiling cockles there every year." Having seen many middens in other parts of Ireland, and being satisfied ourselves that the middens of Inch were ancient, partly because of the presence of stone implements and partly because our first midden rested upon a "raised beach," this answer was considered to be merely "making conversation." When visiting our friend Major John MacGillicuddy, of Ballynagrown House, near Inch, upon the following day, we were still more surprised, however, to find the statement of the farmer confirmed. Therefore we returned to the site of the middens, and carefully examined the whole place afresh, and we have both come to the same conclusion—viz., that the kitchen-middens of Inch were originally of the same type as

other more familiar middens, such as those at Rosapenna, in Donegal, or at Whitepark Bay, in Antrim ; that is to say, they are certainly primitive, and probably pre-historic settlements of man, but that they show remarkable peculiarity in having been occupied ever since. We are of opinion that this curious method of cockle-gathering is a close parallel to the survival of the "bee-hive" hut in the same barony, and of the "maroge" (as the curragh is called) in Corkaguiney, and of "pampooties" in Aran. A considerable discussion followed upon this announcement that at Inch the methods of primitive man are still in regular operation, in which the President, Mr. J. M. Dickson, and the authors took part.

The second lecture of the evening was called for by the Chairman. This was delivered by Mr. J. A. Sidney Stendall, in which he said —In nature study we aim at seeing, understanding, enjoying, and practically learning from the natural world round about us. The study tends to enlighten the mind, and provides a healthy recreation for those persons whose lives are mostly spent amidst the worries of business. But, says the unenlightened, how am I to learn the right method by which to commence the study of natural objects? My answer is that it is never too late to learn. In these days persons requiring a little teaching in the ways of nature are adequately provided for. All towns of any standing boast of a Natural History Society. Why not become a member of one of these? You would then be brought into contact with others who are interested in your particular subject, and with those who, having gained knowledge by past experience, are in a position to start you on the right path. Of course the best way is to begin when young, and many societies now make it a special feature of their work to teach young people the rudiments of natural history.

This Belfast Naturalists' Field Club has recently started a Junior Section, and the Committee have arranged an interesting series of lectures, and hope to organise in the coming Summer

short and inexpensive excursions to enable the members to examine nature as it appears before them and to have interesting points explained to them by their leader. During the past few years schools have been paying considerable attention to nature study, especially in England, where it has grown enormously popular. In Belfast, I believe, it is making great strides, and will soon become universal. Past methods of teaching having defects which must be remedied, the chief object of my address is to point out one very serious defect, and to make a plea for its immediate discontinuance. In some parts of England nature study has become an absolute curse, and it may come to pass, unless care be taken, that Irish schools also will go the right way to make their names an abomination to all true lovers of nature. The defect referred to is the wanton destruction of various objects, which through one cause or another have become or are becoming of rare occurrence. Specimens of these are carried home in dozens by the scholars—mainly through ignorance—where a few or even one would be sufficient, only to be allowed to wither and die and be cast into the refuse heap on the following day. Having instanced several cases where plants have been all but exterminated by so-called “nature study parties” Mr. Stendall referred to the danger of offering prizes for collections of specimens, and pointed out that prizes should be awarded for observation of and intelligent interest in plants and animals rather than for specimens. The lecturer continued—Our Schools should take an example from this Field Club. Mr. Robert Patterson, the Chairman of the Junior Section, has signified his intention of presenting two prizes this year to the members of the section. One is for the “Best note-book recording information received at the lectures during the Winter months,” and the other for “The best kept nature diary for the year 1912.” Could anything be more harmless? I think not. Neither collecting nor rare specimens are mentioned. The Junior Section of the Club is only in its infancy, but as time goes on the Committee hope to

see its membership increased. On behalf of the Committee of the Belfast Naturalists' Field Club I tender to you, young and otherwise, my earnest plea for the discontinuance of the older method of teaching, which abomination constitutes one of the possibilities arising from nature study.

A somewhat heated discussion followed in which at least one member desired to see all collecting of specimens prohibited, while several others considered that Mr. Stendall had overestimated the dangers likely to arise from the teaching of "Nature Study" by incompetent persons. Among those who took part in the debate were the President, Mrs. Hobson, and Messrs. W. J. C. Tomlinson, H. L. Orr, J. M. Dickson, Robert Patterson, and R. H. Whitehouse. Mr. Stendall having answered several questions and defended his point of view, and two junior members—Miss Vera Morris and Master James Gorman—having been elected, a most instructive meeting terminated.

THE INDIGENOUS TREES IN OUR WOODLANDS.

Before the Botanical Section on 20th January the Chairman, Rev. C. H. Waddell, M.A., B.D., read an interesting paper on the above subject. An enlightening discussion followed Mr. Waddell's paper, and an examination of dried specimens concluded the meeting.

LOCAL FOSSILS AND THEIR CORRELATION TO RECENT TYPES.

A meeting of the Geological Section of the Club was held in the Museum on Wednesday, 24th January, when the above paper was read by Mr. James Orr. The Chairman of the Section (Mr. W. J. C. Tomlinson) presided. After reading his paper Mr. Orr gave a practical lesson on the subject by means of a beautiful collection of fossils which he had obtained from our local fossiliferous rocks. With every conspicuous type of fossil form he had a specimen of its nearest living representative.

A short discussion followed, in which Dr. Dwerryhouse, Messrs. W. A. Green, G. Donaldson, and the Chairman took part.

THE LIFE HISTORY OF INSECTS.

On 31st January Mr. J. A. S. Stendall gave a short paper on this subject at a meeting of the Junior Section, held in the Museum. The chair was taken by Mr. Robert Patterson.

Having first briefly classified the division of that great class of the Animal Kingdom comprising all Insects, Mr. Stendall took a few typical examples of the different orders into which this class is sub-divided and traced their life histories from their source until they reached the perfect insect.

A short discussion followed Mr. Stendall's remarks, in which several junior members took part, and an examination of the specimens on exhibition concluded the meeting.

THE RELATION OF THE PLANT AND THE SOIL.

On Saturday, 17th February, before the members of the Botanical Section, Mr. F. Balfour Browne, M.A., F.R.S.E., F.Z.S., gave an instructive paper on the above subject. The Chairman of the Section, Rev. C. H. Waddell, occupied the chair. The lecture gave rise to a considerable discussion, in which most of the members present joined.

RECENT ADVANCES IN THE EVOLUTION THEORY.

The fourth monthly meeting of the Winter Session was held in the Museum on 20th February, when Professor G. H. Carpenter, B.Sc., M.R.I.A., gave an interesting lecture on the above subject. The President (Mr. Robert J. Welch, M.R.I.A.) occupied the chair, and presided over the best attended meeting of the Club during the session.

Professor Carpenter in the course of his address said—To-day the general principle of evolution is on almost all hands accepted. The precise value of natural selection in the evolution theory is still, and is likely to remain, a matter of dispute. With regard to the general evolutionary idea, it was noteworthy that Darwin was led to it by his observations on the recent and extinct faunas of South America when he travelled there during the memorable voyage of the Beagle. Since Darwin's death many gaps in our knowledge of the geological record have been at least partly filled, and groups of specialised animals once regarded as isolated have been brought into touch with more generalised extinct relations. Within the last few years the historic Devonian quarry of Kiltorcan, in County Kilkenny, has yielded the fossil remains of an undoubtedly Isopod Crustacean—*Oxyuropoda* of Carpenter and Swain—which proves the existence in Paleozoic times of woodlouse-like organisms. Devonian rocks contain also the oldest known fossil Insects, and the morphological researches of Dr. H. J. Hansen and others have now established a somewhat close relationship between Insects and Crustaceans—possibly a special relationship between Insects and the Woodlouse group. The presence of a pair of minute appendages behind the mandibles in Springtails and Bristletails corresponding to the maxillulae of Crustacea was pointed out by Hansen, and I have lately been able to demonstrate these structures in the primitive armoured larvae of certain Beetles (Dascillidae). They occur also in the Symphyla and in the most primitive Millepedes, and a close numerical correspondence in the segmentation of all the principal classes of the Arthropoda is highly probable. From these thoughts on the general "doctrine of descent" we turn to a few of the explanations of the method of evolution that have been put forward. The discussion as to the relative importance of the Darwinian factor of "natural selection" and the Lamarckian factor of "use-inheritance" still goes on, not always in the most strictly scientific spirit. Natural selection explains readily adaptive characters that

are often common to large zoological groups. But can it explain specific differences that have no apparent utility to their possessors? Can it be due to natural selection, for example, that the caterpillar of *Smerinthus populi* has a green tail-horn and the closely similar larva of *S. ocellatus* a blue one? And an enormous number, probably the majority, of specific differential characters are of such a nature. Yet there can be no doubt that the influence of natural selection on the world of life is great and continuous. Can as much be said for the use-inheritance? On the one hand we have that great Darwinian Professor Weismann, with his theory of the "continuity of germ plasm" from one set of gametes to the next, the bodies of successive generations regarded almost as by-products of the germ cells, which they are unable to affect, ruling use-inheritance out of court. On the other hand we have the belief, still held by many, that the body of the individual, affected by exercise or environment, can influence the germ cells that it encloses. The basal factor of evolution is heredity, with variation. We may ask next what recent advances have been made in our knowledge of variation, its nature and its causes. Darwin, at any rate in his later years, was disposed to attach much importance to comparatively slight "continuous" variations, and Francis Galton's statistical studies originated the modern "biometric" school, of whose methods the late Professor W. R. Weldon gave a brilliant exposition in a popular lecture delivered at Belfast before the British Association in 1902. The offspring of exceptional parents appear, when large numbers are treated statistically, to regress towards type. Divergences of measurable characters from the normal tend to fall along a symmetrical curve on either side of the mean. On the other hand, Professor Bateson, De Vries, and others have laid stress on the importance of "discontinuous" variations or "mutations." The fact of discontinuous variation leads us directly to the work of Mendel, published in 1865, neglected for more than thirty years, and rediscovered only at the very end of the nineteenth century. The most marked advances

in the evolution theory during the past ten years have undoubtedly been along the lines of Mendelian research. The simpler results at least of the Mendelian breeding experiments are now generally known among naturalists. The most recent advances in Mendelian work make it at least highly probable that in many animals sex-differentiation is itself a Mendelian factor. Mendel's work began by experiments in hybridising, and we need to remember that every sexual union is more or less of the nature of a "cross." Without claiming that "Mendelism" explains all the facts of inheritance, we may admit that it gives at least the promise of explaining very much. And an explanation of the fixation of definite characters of no utility in the "struggle for existence" is exactly what we need as a supplement to natural selection. But if we know something of the nature of variation and the "laws" which govern inheritance the cause of variation is still largely a mystery. So as the light of Science advances we realise an enlarging circle of the unknown, and we receive with meekness the wise warning of Thomas-a-Kempis—"If thou knowest many things, and thinkest that thou understandest them well enough, be sure of this, that there are many more things of which thou art ignorant."

Professor Gregg Wilson proposed a formal vote of thanks to the lecturer, and commented on the capable manner in which he had dealt with this very wide subject. Mr. F. Balfour Browne in seconding the vote, raised an interesting point of discussion on the possibility of descent along parallel lines. The vote having been put to the meeting by the President and passed by acclamation, Professor Carpenter briefly replied. Four new members—Mrs. Kamcke, Miss S. Sloan, Masters Daly and Culbert—were elected before the meeting terminated.

GEOLOGICAL ASPECTS OF COAST EROSION.

At a meeting of the Geological Section held on Wednesday, 28th February, Mr. W. J. C. Tomlinson gave a paper on the

above subject. Dr. A. R. Dwerryhouse presided, and there was a very large attendance.

The paper was illustrated by a very fine series of lantern slides, and was followed by a discussion, in which Mr. R. J. Welch, Mr. William Gray, Mr. S. A. Bennett, Mr. C. M. Cunningham, and the Chairman took part.

CHALK AND ITS FORMATION.

At a meeting of the Junior Section held on 6th March, Mr. S. A. Bennett, B.A., B.Sc., read a short paper on the above subject.

The Chairman of the Section, Mr. Robert Patterson, presided.

EXHIBITION OF PLANTS, WITH NOTES ON THEIR GENERAL CHARACTERS AND HABITATS.

On Saturday, 16th March, the Botanical Section met in the Museum. The Chairman of the Section, Rev. C. H. Waddell, presided. The meeting was informal and devoted to an exhibition of Plants, with short notes on their characters and habitats by Members of the Section.

Mr. G. Donaldson exhibited and described a large, well mounted, and named collection of North American Plants.

Mr. H. L. Orr had on view a collection of Pinaceae mounted in a glass case, showing the cones and needles.

Mr. S. A. Bennett had a good variety of mounted Plants, collected during last Summer in North Wales, Yorkshire, and other stations in England.

Mr. S. Wear showed a nicely mounted collection of Plants, principally from the West of Ireland.

Rev. C. H. Waddell exhibited some interesting specimens from new stations in Down and Armagh.

Mr. N. Carrothers had a miscellaneous collection of rather rare and notable Plants.

A discussion followed, in which most of the members present took part.

REPORT OF DELEGATE TO CORRESPONDING SOCIETIES' COMMITTEE OF BRITISH ASSOCIATION.

NATURAL HISTORY OF THE DRAGON-FLY.

The fifth meeting of the Club was held in the Museum, College Square North, on Tuesday, 19th March, when Mr. F. Balfour Browne, M.A. (Oxon), F.R.S.E., F.Z.S., submitted his report as Delegate to the British Association and gave a delightful lecture on the "Natural History of the Dragon-Fly." The President (Mr. R. J. Welch) occupied the chair. Before calling upon Mr. Balfour Browne for his address the following resolution was carried by acclamation, on the proposal of the President:— "That we record our gratification at the honour which has devolved upon four of our members by being elected members of the Royal Irish Academy at the meeting of the Academy on 16th March, and we congratulate Dr. Dwerryhouse, Professor Gwynne-Vaughan, and Messrs. Foster and Stelfox on this recognition of their scientific work." On the proposal of Mr. A. W. Stelfox, seconded by Mr. Robert Patterson, a second resolution was carried, namely—"That Dr. R. F. Scharff, Ph.d., F.L.S., M.R.I.A., be elected an honorary member of our Club in recognition of his valuable scientific work and of the encouragement and aid which he has given to members of our Club in the study of natural history in Ireland."

Mr. Balfour Browne then laid the following report before the meeting:—I had the honour of representing this Society at the Conference of Delegates of the Corresponding Societies of the British Association held last year at Portsmouth. There were, as usual, two meetings of the Conference, one on 31st August and the other on 5th September.

At the first meeting the Report of the Committee was read, and in it was a reference to the attempt which had been made to

get the price of the Geological Survey Maps reduced to the old figures. It appears that while the price remains the same, a new series of maps, uncoloured but printed with the boundary lines of the formations, has been or is being issued, and that the cost of these maps is the same as that of the plain Ordnance Survey Sheets.

The Chairman of the Conference, Professor J. W. Gregory, gave an address upon "The Scientific Misappropriation of Popular Terms," in which he urged that Science will lose more by the misuse of current English than by the invention of new terms for new ideas and new materials.

Mr. Mark Webb (Selborne Society) next read a paper upon the "Protection of Plants," in which he suggested that considerable areas of land should be reserved and fenced in, and that keepers should be employed to guard these botanical sanctuaries. In the discussion, which was postponed until the next meeting owing to want of time, several speakers discussed the question from a less extravagant point of view than that taken by Mr. Webb, and reference was made to the powers exercised by several local authorities for preventing the destruction of wild plants in the open spaces under their control.

Mr. Harold Wager (British Mycological Society) then opened a discussion upon the study of Fungi by local Societies, with a view to getting assistance from the various societies in working out the natural history and distribution of the species. He also exhibited a large number of beautiful water-colour drawings and photographs of British species. A most interesting discussion followed, in which a number of well-known Mycologists took part. Another discussion upon "Co-ordination in the work of the local Scientific Societies" was opened by Sir Daniel Morris (Bournemouth Nat. Hist. Soc.), in which several delegates took part.

Your representative reported to the delegates on the work done by the Special Committee appointed "to formulate a

definite system on which collectors should record their captures." The final report of this Committee will be ready by the next meeting of the British Association in August.

In my last report—a copy of which was sent to the Corresponding Societies' Committee by this Society, but never acknowledged—I suggested that the meetings of this Section of the British Association might be better advertised, and I am glad to say that an improvement was noticeable at Portsmouth, and that a further improvement has been promised for the next meeting.

Dr. A. R. Dwerryhouse having discussed a point of interest to Geologists, the President called upon Mr. Balfour Browne for his lecture on the Dragon-fly, in which he mentioned that the group of Dragon-flies is an extremely ancient one, fossil forms having been found even in the Carboniferous strata. These Palaeozoic Dragon-fly ancestors were apparently amongst the largest Insects which have ever occurred, some of them measuring more than two feet across the expanded wings. After referring to the present almost world-wide distribution of these insects, the lecturer described how he had reared some of the species from the egg, and he dealt with many interesting details in their life history. Mr. Balfour Browne then referred to experiments made by him as to the effects of temperature upon the nymph, or sub-aquatic stage, of these insects, and mentioned that the warming of the water in which the nymph dwelt to Summer temperature, even for a short period during Winter, had the effect of reducing the duration of the nymph stage by a whole year. A discussion followed, in which the President, and Messrs. John Hamilton, N. H. Foster, and C. M. Cunningham took part. After Mr. Balfour Browne had briefly replied, the election of five new members—Dr. Marion B. Andrews, Mrs. Ferguson, Miss Grainger, Messrs. L. Mueller, and J. Hewton—terminated the meeting.

BEEKITE, OR CYCLOIDAL CHALCEDONY.

The monthly meeting of the Geological Section was held in the Museum on Wednesday evening, 27th March, when Mr. James Strachan gave a most interesting lecture on "Beekite, or Cycloidal Chalcedony," with an account of his original investigations into its origin. In the unavoidable absence of the Chairman of the Section, Mr. James Orr presided.

Mr. Strachan said :—This paper is intended to supplement the excellent Monograph* recently published by W. H. Wickes, of Bristol, who has given us a very concise account of the history and distribution of this mineral. I shall deal more particularly with the question of its probable mode of origin as revealed by microscopical and chemical analyses. This involves a rather more exhaustive account of the literature on the subject, with special reference to the various authors' geogenetic theories, than that presented by Wickes. The various writers on the subject will be dealt with briefly in chronological order, and finally I shall give the results of my own investigations.

It is here necessary, however, to state exactly the nature of "beekite," a mineral species not generally described in mineralogical text-books. Beekite is a form of chalcedony of secondary origin, found encrusting and replacing the calcareous remains and skeletons of such fossil marine organisms as mullusks, corals, and encrinites. Its typical form consists of minute globules and discs surrounded by concentric wheels or whorls of chalcedony. It also occurs in small masses composed of aggregates of globular and vermicular forms of the same substance. The name "beekite" is derived from its discoverer in England, a Dr. H. Beeke, of Bristol, but it has also been described as "annular" and "orbicular" chalcedony. The name "cycloidal," which I have applied to it, is due to Ruskin, and in distinction to ordinary chalcedony, which is "spheroidal" in form, the word seems most appropriate.

* "Beekite."—Proc. Bristol Nat. Soc., Vol. II., Part III., 1910.

BIBLIOGRAPHY AND HISTORY.

Walch, of Jena :—*Natural History of Petrifications*—Nurnberg, 1769. Described and figured beekite on some fossils : probably the earliest reference of importance on the subject. About this time, as detailed by Wickes, there were numerous but unprofitable speculations as to its nature.

Leopold von Buch:—*On the Silicification of Organic Substances, etc.*—Berlin, 1831. Described beekite accurately and established its siliceous composition. From his observations he inferred that the carbonate of lime was not replaced directly by silica, but that only the organic matter was acted upon directly. His most important remarks concerning its origin consist in his description of knobs and whorls of chalcedony as “similar to wave action.”

M. Alexandre Brongniart:—*Essay on Orbicular Silica*—Paris, 1831. Also described beekite accurately and laid stress upon the influence of organic matter in the silicification.

Dr. Henry Beeke, Dean of Bristol from 1814-1837, is recorded to have drawn the attention of English Geologists to the occurrence of this mineral in the neighbourhood of Bristol.

Petzholdt:—*Silicification of Organic Bodies*—Halle, 1853. Described the “warts and rings of silica” on fossil shells, and went carefully into the question of the origin of beekite. He concluded that the silicification always commenced at the surface of the shell, that in every case it was the carbonate of lime which was acted upon, and that there was no evidence to shew that organic matter was necessary for silicification. He also recorded that the silicification of shells is not always accompanied by the beekite formation.

Bischof:—*Silicified Organic Remains*—in his text book of “Chemical and Physical Geology,” 1855. Went carefully into the question of the silicification of shells. Observed that the space required by the silica deposited was much greater than that of the calcareous substance replaced. Compared the penetration of

silica into shells with its penetration between the cleavage surfaces of minerals as analogous phenomena. Remarked the difference, however, between the silicification of calc-spar and shell carbonate of lime, and inferred that the presence of organic matter in the latter, *if the amount of organic substances in shells were not so small*, might play some part in the process. He concluded cautiously that the recognition of the true causes of these differences remained for future investigation.

Wm. Pengelly:—*On the Beekites found in the Red Conglomerates of Torbay*—a paper read before the British Association at Cheltenham, 1856. Described beekite as chalcedony and gave a characteristic description of its appearance and occurrence. Observed that the “tuberles and rings” of chalcedony always surrounded a fossil nucleus. Although the fossil had often disappeared it was often possible to trace its character in the distorted beekite replacement. He theorised that the chalcedony of beekite was a replacement of carbonate of lime caused by water containing silica in solution percolating through conglomerate rocks.

Church:—*Beekite*—Philosophical Magazine, Vol. XXIII., 1862. Gave a chemical account of English beekites. His analyses shew Silica 91 to 93 per cent.; Lime (as silicate) 2-3; Iron oxide 2-2.5; Water 1-2; Carbonic acid and Organic Matter 1.5-2.5. With regard to its origin he compared the circular disposition of beekite to other forms of silica which have a tendency to develop circular and spherical forms.

W. H. Wickes:—*Beekite*—Bristol Nat. Soc., Proc., Vol. II., Part III., 1910. This writer has confirmed many of the observations made by older writers. The chief features of his results are:—(1) the extension of our knowledge of the occurrence of beekite from one or two British localities to numerous localities all over the British Islands, from the Cambrian limestone of Durness in Scotland to the Chalk of Surrey and of Antrim in geological time. He also adds a list of foreign localities, shewing

conclusively that beekite is not limited in occurrence either geographically or stratigraphically. (2) He has brought forward a novel and ingenious theory to account for its origin, in which he postulates three factors—(a) the presence of a calcareous organism, as a nucleus or base, (b) an attacking force of boring worms, or sponges, and (c) the presence of silica in solution in the water in sufficient quantity to admit of deposition. He also lays stress upon the agency of organic matter in depositing and attracting the silica. He supposes, in brief, that the decomposing animal matter of the organism attracted silica from the sea-water and deposited it on and around the bore-holes formed in the shells, etc., by parasitic and predatory creatures, such as worms, etc. "The process would start as soon as decomposition commenced, therefore Beekite would be formed shortly after the death of the victim, and would probably be a fairly rapid deposit." He also refers to the boring of tenantless shells on the beach by *Bryozoa*, etc., as taking place after the formation of beekite upon them.

LATER INVESTIGATIONS.

The specimens of beekite I have examined were supplied partly by Mr. Wickes and partly by Mr. Robert Bell, who discovered beekite in the Cretaceous of Co. Antrim, and with whom I had the pleasure of procuring many specimens *in situ*.

OCCURRENCE.

With regard to the occurrence of beekite the chief feature that strikes the writer is the fact that it always occurs in porous rocks such as sandstone, limestone and conglomerates. As observed by Wickes it is frequently associated with other deposits of silica, such as flint and chert, which I believe to be contemporaneous in formation with the beekite. It is always associated with marine fossils, and in many cases appreciable quantities of organic matter are present. Even the specimens which appear most free from organic matter yield characteristic odours when ignited.

In examining the local deposits (Co. Antrim) I was much struck by the fact that beekite is practically absent from the Chalk, abundant in the Chloritic Sands and Yellow Sands, but practically absent again in the Glauconitic Sands, although the same and similar shells persist through all the strata. Its absence from the Chalk and abundant presence in the English Carboniferous limestones may be accounted for by the fact that the former is comparatively free from organic matter which is most certainly a factor in the formation of beekite. The Chloritic and Yellow Sands of Co. Antrim are highly fossiliferous, and at the time of their deposition probably contained much organic matter, which would account for the formation of beekite.

In the Glauconitic Sands of Co. Antrim beekite appears to be absent, but here again at the time of its deposition another factor made itself felt. Iron oxide and iron silicate have even a greater attraction for organic matter than silica; and the large quantities of iron in these beds fully accounts for the neutralisation of the organic matter as a factor in the possible formation of beekite. As the iron compounds disappear beekite appears to increase. Silicified shells without beekite are found in the Glauconitic Sands, however, but a microscopic examination of these specimens (for example, *Exogyra conica*), reveals the fact that the crystals of replacing chalcedony are much larger than those of beekite, suggesting that they were of much slower formation.

All of the fossils in one bed are not beekised, and the fact that two fossils are found side by side one coated with beekite and the other untouched, is in many cases due, I believe, to the fact that aragonite yields more rapidly to dissolving solutions containing carbonic acid gas (and organic acids) than calcite. Although calcite shells are found coated with beekite, and taking the latest researches on the subject of the nature of shell-layers into account, I am of the opinion that aragonite is more frequently beekised than calcite, and more heavily than the latter.

APPEARANCE.

The characteristic appearance of beekite has already been described. "Tubercles," "warts," globules and discs of chalcedony are surrounded by whorls, or to use Von Buch's happy description, waves of the same mineral. A typical specimen of *Exogyra columba* may be described. It consisted of a whole valve of this fossil heavily beekised inside and outside. On immersion in hydrochloric acid the interior of the valve, consisting of unreplaced carbonate, was dissolved out leaving a cavity between the two layers. The whorls or waves varied in number from 2 to 7 around the nuclear discs, and in one case 3 sets of 6 whorls were surrounded by a common set of whorls seven in number, having a total diameter of 1 cm. The whorls on the interior of the shell bore no regular disposition towards those on the exterior. The space between the exterior and interior contained stalactitic masses of beekite of branching form, pointing roughly towards the interior space. Occasionally these stalactites presented the ringed form, in which case they appeared like little columns of buttons growing smaller and smaller towards the interior of the cavity. The total thickness of the beekised valve was 6 mm., and that of the interior and exterior deposits of silica 1 to 1.5 mm. The stalactites of beekite inside the cavity were composed of threads and globules of chalcedony. The whole appearance suggested an attacking force of a solvent solution, greatest on the interior and exterior surfaces of the shell and diminishing gradually as it worked its way into the shell material. In some cases the whorled structure of the beekite was more evident on the interior of the valves, suggesting a preponderance of organic matter on that side.

COMPOSITION AND MICROSCOPICAL APPEARANCE.

My chemical analyses gave very similar results to those of Church, to which I can add but little. A typical specimen of *Exogyra columba* beekite from the Chloritic Sands of Co. Antrim gave Silica 97.32 per cent.; Lime 2.24; Aluminium and Iron

Oxides .04; and Organic Matter .4. With regard to its physical properties, the most remarkable is its porosity which, of course, points towards its pseudomorphous character. A finely powdered specimen after prolonged soaking in water had a density of 2.52 gms. per cc., but after prolonged boiling it rose to 2.6. Under the microscope the exterior waved formation of beekite, with its beautiful ridges of snow-white silica, makes a fine object for a 2 to 3 inch objective. From an examination of numerous thin slices I found that the exterior whorls of a system bear no crystalline relationship in disposition towards that of the nuclear disc they enclose. The disc or nucleus invariably shows a radiated structure, and black cross under polarised light. Slices cut further down, below the ridged or furrowed exterior, also shew the concentric structure, but this consists of alternate circles of porous and more compact chalcedony. The compact circles correspond to the exterior ridges or waves of the beekite, while the more porous circles underlie the air-spaces between the ridges.

The porous nature of beekite makes it a difficult object to slice, and it is almost impossible to get rid of air-bubbles in the balsam. Mounting in oil is the remedy for the latter difficulty.

ORIGIN OF BEEKITE.

From a careful consideration of all the evidence available I have arrived at the conclusion that three factors were at work in the formation of this interesting form of silica:—

- (1) A calcareous ground-work such as a shell or coral.
- (2) The presence of organic matter in the shell-material and possibly around it.
- (3) A porous sediment containing freely circulating waters having silica, carbonic acid, and probably organic acids (such as lactic acid) in solution.

In my opinion the time of formation is a very debatable point, but undoubtedly it may be referred to the period of the consolidation of the sediment, and was probably contemporaneous

with flint and chert deposits. In the Chalk of Antrim the only deposits of beekite I have seen are associated with fossils in hollow flints.

With regard to the mode of formation, I regret to state that I cannot find definite evidence from the exterior of beekised fossils or from microscopic examination of sections to support Wickes' ingenious theory with regard to boring by worms, etc. The general trend of the evidence is against it. Again, there are details which negative it; for example, fragments of shells are beekised in exactly the same fashion as whole shells, even around the broken edges; also, the process does not penetrate the shell in the manner of bore-holes, but gradually, with diminishing intensity to zero-point.

The microscopic examination of slices also gave the negative to Church's comparison of beekite to other radiate masses of silica. The nucleus is radiated, but the surrounding whorls have only a mechanical relationship to the former.

After puzzling the matter over for some time I came to the conclusion that the most feasible explanation of the phenomena presented by beekite may best be explained by regarding it as a chemical crystalline precipitate of chalcedony, replacing carbonate of lime (aragonite more frequently than calcite) formed by osmotic action in an organic medium. The organic matter of shells is very small (about a half per cent.), but it is of a gelatinous colloid nature. Various forms of animal gelatine have been isolated from marine organisms. The presence of such matter in shells is demonstrated by the action of hydrochloric acid upon them. The carbonate of lime dissolves slowly and a gelatinous framework is left behind. Possibly the organic matter from decomposing animal matter in the circulating waters of the sediment in which the beekite was deposited was a predisposing cause. Acids, such as lactic acid, are formed by the decomposition of animal matter, and I find that calcium lactate has an appreciable solvent action on colloid silica. The latter could be furnished from microscopic

siliceous organisms which abound in the strata containing beekite. Given such conditions I believe that the small amount of colloid organic matter present in the shells provided a medium through which the silicifying waters slowly entered. The beekisation of shells—greatest on the exterior and interior surfaces—corresponds with the distribution of the organic matter in many shells. The rings of beekite surrounding nuclear points mark the periodic movement of the chemical action of replacement. Sollas* has suggested a somewhat similar explanation of periodicity for the formation of certain banded flints, but I venture to suggest that beekite or cycloidal chalcedony is the first mineral which definitely confesses its own history as an osmotic periodic growth.

CONCLUSION.

In conclusion, the following notes are added to make clear certain differences between the results of Mr. Wickes' observations and my own :—

(1.) Mr. Wickes regards the formation of beekite as a process which took place chiefly before sedimentation of the affected fossils, and that the organic matter of the latter attracted and deposited the silica while the decomposing organisms were exposed to the action of sea-water.

On the other hand I believe that the presence of shell fragments (such as *Inoceramus*) with the broken edges beekised, and single valves of shells beekised both on the interior and exterior, and with an intervening layer of shell-material without any sign of bore-holes, points distinctly to chemical action taking place after sedimentation.

(2.) Mr. Wickes regards the organic matter of the organism as the chief factor in the deposition of the silica. In my conclusions I recognise two essentially different processes at work in the formation of beekite; (a) the solution of the silica of sponge spicules and siliceous organisms (constructed from opaline silica)

* Age of the Earth, p. 152.

by chemical means, viz., saline water containing organic matter in solution. This might be described as the gathering of silica from the mother-sediment; and (b) the replacement of the calcium carbonate of the fossil by silica; solutions of the latter diffusing through the colloid organic matter of the shell-material and attacking the carbonate at various points. These points became centres of chemical action around which the periodic movement spreads as recorded by the rings of chalcedony and by alternations of compact and porous rings of chalcedony.

(3.) Mr. Wickes has drawn my attention to descriptions of silicified bore-holes by Hudleston (in "Yorkshire Oolites," Proc. Geol. Assoc., 1878, p. 443). The silicification of such bore-holes I regard in the same light as the silicification of the edges of broken shells. The rings of beekite at each end of the bore-holes shew that the shell was completely surrounded, inside and outside, by the silicifying medium. My own conclusion is that the majority of the systems of beekite rings on fossils cannot be referred to a bored origin, and where such can be definitely ascribed to bore-holes the periodic nature of the diffusion rings is still evident.

(4.) Mr. Wickes has asked me for a chemical explanation of the absence of beekite from the following fossils, which I now give:—

- (a) *Vertebrata*.—Phosphate of lime is the chief constituent of bones. According to Liebig the phosphate of bones requires 1,500 times its own weight of water saturated with carbonic acid to dissolve it, while according to Bischof carbonate of lime requires only 1,000 parts for its dissolution. The latter is, therefore, a more easily replaceable substance. In fossil bones much of the phosphate still persists, although in marine remains it is often replaced by a basic silicate of alumina—a still more insoluble substance.

- (b) *Fresh-water Fossils*.—In this case we have to deal with shallow waters containing little mineral matter in solution. The conditions are obviously different from those that prevail in ocean sediments where we have large quantities of dissolved solids and greater depths. The only specimens of silicified fresh-water fossils that I have examined appeared to indicate silicification by hydro-thermal agencies long after sedimentation.
- (c) *Crustacea*.—The shells of this group are quite different in chemical composition from those of the mollusks and corals which we find beekised. They are composed chiefly of *chitin*, which is a very insoluble cellulose derivative containing a much smaller proportion of calcareous matter than the former. The mineral part is frequently the less soluble phosphate to a great extent. A chitinous phosphatic shell is thus clearly less liable to suffer siliceous replacement in the presence of shells composed of carbonate of lime.
- (d) *Cephalopoda* (with few exceptions).—This is the most highly organised group of the Mollusca, and the horny organic matter present in the shells appears to possess quite a different nature from the gelatinous residue obtained by dissolving the shells of the lower mollusks in acid. The only examples of beekite on this group I have seen in the Cretaceous beds of Co. Antrim were two specimens of the calcite guard of *Belemnitella* very slightly beekised.

On the whole it is a remarkable fact that the calcareous structures chiefly affected and replaced by beekite are those which possess a netted or spicular structure (such as corals and sponges) or a honeycombed structure (such mollusks as the *Lamellibranchia*), and which leave a gelatinous colloid residue (described by Carpenter as "animal glue") when digested in acid. This substance is probably allied in composition to the gelatinous





BEEKITE.

Photo.

J. Strachan

spongin of sponges, and is the colloid medium through which, I believe, the siliceous solutions diffused in the formation of beekite. The fact that aragonite is more easily dissolved and replaced than calcite depends almost entirely on the nature of the organic matter of the shell.

An interesting discussion followed, in which Mr. Robert Bell, Mr. S. Wear, Mr. R. May, and the Chairman of the meeting took part, and Mr. Strachan's fine collections were then carefully examined.

DESCRIPTION OF PLATE XX.

FIG. 1.—Exterior of *Exogyra columba* from Chloritic Sands, Colin Glen, near Belfast; coated heavily with beekite, $\times 1\frac{1}{2}$ diameters. Photographed from fossil embedded *in situ*.

FIG. 2.—Typical microscopic appearance of beekite by reflected light, $\times 10$ diameters. From *Exogyra columba* as above.



POND LIFE.

Mr. Joseph Maxwell, J.P., gave a lecture on the above subject at a meeting of the Junior Section held on 3rd April. The chair was occupied by Mr. George Donaldson, and there was a good attendance of Junior members. The lecture was illustrated by numerous lantern slides and living specimens.

ANNUAL MEETING.

The Annual Meeting was held in the Museum, College Square North, on Tuesday evening, 16th April. The President (Mr. Robert J. Welch, M.R.I.A.) occupied the chair.

Mr. A. W. Stelfox, Hon. Secretary, read the Forty-ninth Annual Report.

The Treasurer (Mr. W. H. Phillips) submitted the Statement of Accounts.

The Report of the Botanical Section was read by Mr. N. Carrothers, the Geological Report by Miss M. K. Andrews, the Reports of the Zoological and Junior Sections by Mr. J. A. Sidney Stendall, the Librarian's Report by Mr. S. Wear, and that of the Sub-Committee appointed to adjudicate on collections sent in for the Club Prizes was read by Dr. A. R. Dwerryhouse. The Reports were adopted, on the motion of the President, seconded by Dr. A. R. Dwerryhouse.

Mr. Robert J. Welch proposed, and Mr. Joseph Maxwell seconded, that the Rev. Canon Lett, M.A., M.R.I.A., be elected President of the Club for the year 1912-13. This resolution was warmly supported by Mr. William Gray, and passed unanimously.

Dr. A. R. Dwerryhouse proposed, and Mr. W. A. J. M'Bretney seconded, that Mr. F. Balfour Browne, M.A., F.R.S.E., F.Z.S., be elected Vice-President.

Mr. Robert Patterson proposed, and Mr. George Donaldson seconded, that Mr. W. H. Phillips be re-elected Treasurer.

Mr. W. A. Green proposed, and Mr. W. R. Pim seconded, that Mr. Sylvanus Wear be re-elected Librarian.

It was proposed by Mr. William Gray, and seconded by Mr. G. Raymond, that Mr. A. W. Stelfox and Miss M. D. Mitchell be re-elected Hon. Secretaries.

On the proposal of Mr. Robert May, seconded by Mr. W. J. Fennell—Miss M. K. Andrews, Messrs. N. Carrothers, Nevin H. Foster, and J. A. S. Stendall were elected Hon. Secretaries of the Geological, Botanical, Zoological, and Junior Sections respectively.

The following nine ordinary members of Committee were elected by ballot :—Miss S. Blackwood, Dr. A. R. Dwerryhouse, Messrs. Robert Bell, W. J. Fennell, W. A. Green, H. L. Orr, Robert Patterson, W. J. C. Tomlinson, and Robert J. Welch.

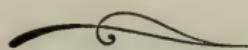
A request was made by Mr. E. J. M'Kean, supported by Mr. W. J. Fennell, that the Archaeological Section be re-formed.

Five new members were elected to the Club :—Miss Fetherstonhaugh, Miss E. L. Andrews, Miss M'Kevitt (Junior), Mr. T. G. M'Bride, and Mr. A. D. Kennedy (Junior).

Arrangements for the Summer Session were discussed and places to visit suggested.

A hearty vote of thanks to the retiring President was proposed by Mr. John Hamilton, seconded by Mr. Wm. Duncan, and passed by acclamation.

Mr. Robert J. Welch having replied, a similar vote of thanks to the retiring Vice-President, proposed by Mrs. Hobson, and seconded by Mr. Robert Patterson, brought the meeting to a conclusion.



R U L E S
OF THE
Belfast Naturalists' Field Club.

**As amended at the Extraordinary General Meeting held
for the purpose on 16th June, 1911.**

I.

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

II.

That the object of this Society be the practical study of Natural Science and Archaeology in Ireland.

III.

That the Club shall consist of Ordinary, Junior, Life, Corresponding and Honorary Members. The Ordinary Members shall be proposed and seconded at any meeting of the Club and elected by a majority of votes of the members present. They shall pay annually a subscription of Five Shillings and shall, on election, pay an entrance fee of Five Shillings.

That the composition fee for Life-Membership be Four Guineas.

Junior Members, who must be under the age of 21, shall be elected in the same way as ordinary members, but shall pay an annual subscription of Two Shillings and Sixpence (2/6) and be exempt from entrance fee. On attaining their majority they shall become Ordinary Members and shall pay an annual subscription of Five Shillings. Junior Members shall not receive any printed matter except the usual notice; shall not have the power to vote; and shall not borrow books from the Club's Library without special permission from the Librarian.

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 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, Librarian and one or two Secretaries, together with the Secretaries of the various Sections of the Club. 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 General Committee shall consist of the above-named officers with nine ordinary members of Committee and shall hold at least eight meetings during the year; five persons to form a quorum.

That three ordinary members of Committee shall retire annually in order of seniority, those retiring being ineligible for re-election for one year. Should any ordinary member of Committee fail to attend at least three of the Committee meetings held during the year his or her place may be considered vacant and another member elected to fill the position. No ordinary member of Committee shall hold the post of Secretary in any of the Sections. That in the event of a vacancy occurring in the General Committee a new member may be co-opted to fill such vacancy for the remainder of the year.

That nominations for ordinary members of Committee shall be sent in writing to the Secretary on or before the 21st day of March in each year. That the privilege of nominating members of Committee shall be held by all Ordinary and Life Members of the Club. That the names of those members so nominated shall be published on the circular convening the Annual Meeting, at which the Ordinary Members of Committee shall be elected by ballot.. That should the necessity arise the retiring members of Committee shall be balloted for.

VII.

The Committee may from year to year appoint Sectional Committees as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six members of the Club. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. The Chairman of such Section to be annually appointed by the General Committee.

VIII.

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 Archaeology 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.

IX.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November till April inclusive.

X.

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 archaeological 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.

That the General Committee may offer from time to time such prize or prizes as they may deem desirable for competition among Schools in or near Belfast.

XI.

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 alterations 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 each intended alteration.

XII.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XIII.

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 subject mentioned in such written requisition.

XIV.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

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. 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 is incurred thereby.

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

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Professional Papers, Nos. 72, 73, 75.

Monograph, No. 52.

Bulletins, 431, 436, 438, 439, 441, 443, 445-447, 449, 450, 452, 453,
457-465, 467, 469, 472-474, 478, 483, 486-490, 495.

Water Supply Papers, 256-258, 261, 265, 269, 270, 272, 274.

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Bulletin, Vol. IX., Nos. 1, 2, 3.

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Ninth Annual Report—1871-72	1/-
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Proceedings, Series II., Vol. I., Part I., 1873-74, containing Appendix III., List of Mosses of North-East of Ireland—Stewart; and List of Cretaceous Microzoa of North of Ireland—Wright, 2 Plates	2/6
Series II., Vol. I., Part II., 1874-75	1/-
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Series II., Vol. I., Parts V. and VI., 1877-78 and '78-'79 (in one)	1/-
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Series II., Vol. II., Part I., 1880-81, containing Appendix VI., List of Foraminifera of South Donegal—Wright; Sponge Remains from Carb. Limestone, County Sligo—Wright; and Fossil Sponge-spicules, County Sligo—Carter, 1 Plate	1/6
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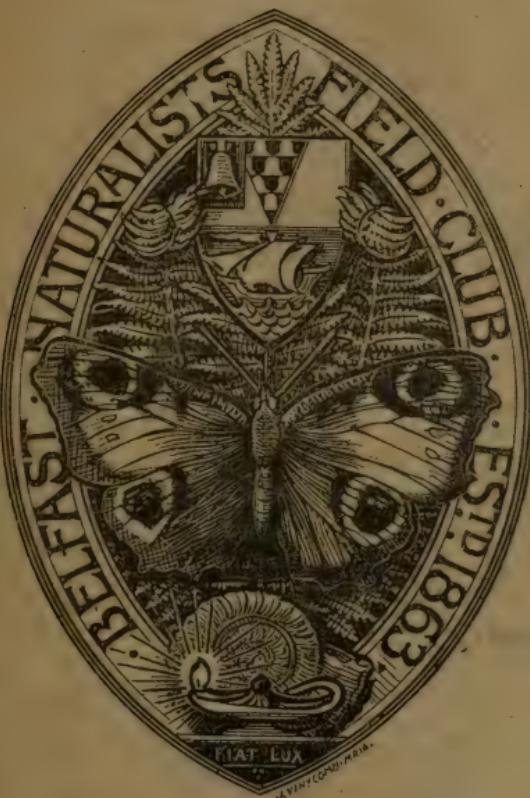
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ANNUAL REPORT

. . . AND . . .

PROCEEDINGS.

With Title Page and Index to Volume VI.



SERIES II.

VOLUME VI.

PART VI.

1912-13.

For Contents See Overleaf.



PRINTED FOR MEMBERS ONLY.

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C O N T E N T S .

	PAGE
List of Officers, 1912-13	567
Annual Reports	569
Statement of Accounts	593
Excursions :—Glenoe, Carlingford, Rowallane, Toome Bridge, Soldierstown and Aghalee, The Coast of Louth and the Boyne Valley, Tollymore Park, Rossmore Castle	594
Slieve-na-griddle	630
Conversazione	610
Papers :—“Botanists of the North of Ireland”—Presidential Address—Rev. Canon Lett, M.A., M.R.I.A.	615
“Some Geological Features of Scotland and their Relation to North of Ireland”—A. R. Dwerryhouse, D.Sc., M.R.I.A.	628
“The Worship of the Magna Mater”—Major Berry, M.R.I.A.	631
“The Gorges of the Tarn”—A. M'I. Cleland	633
“Outline of Geological Observations in North-East Londonderry collected during the Progress of Revision Work”—J. R. Kilroe, A.R.C.Sc.I.	634
“Report of Delegate to the British Association”—F. Balfour Browne, M.A.	663
Annual Meeting	665
Rules	667
Exchanges of Proceedings	670
List of Members	674
List of Officers, 1913-14	683
Index to Vol. VI.	685
Title Page	—

ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST NATURALISTS'
FIELD CLUB,

FOR THE YEAR ENDING 31ST MARCH, 1913.

(FIFTIETH YEAR).

SERIES II.

VOLUME VI.

PART VI.

1912-13.



Belfast:

PRINTED AT "THE NORTHERN WHIG" OFFICES, VICTORIA ST.

1913.

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FIFTIETH YEAR, 1912-13.

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1912-13.

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ROBERT MAY,
Hon. Sec. of the Section,
40, Hopefield Avenue,
Belfast.

Annual Report.

YOUR Committee have the honour to submit to you the Fiftieth Annual Report.

In the year just ended, as throughout the previous forty-nine, a considerable amount of active field-work has been accomplished by your members in Botany, Zoology, Geology, and Archæology. A meeting to celebrate the Fiftieth Anniversary of your Club's foundation will be held on the 10th day of next month, at which Delegates, representing many of the great Natural History Societies of the United Kingdom, will be present.

Your Committee rejoice that of the sixty-nine persons who signed the document requesting the formation of your Club in 1863, six are still with us and hope to be present at the celebration meeting. During the past year 35 new Members have been elected, of whom 31 have qualified by paying the necessary fees, while four former members have rejoined. Against this increase of 39 your Committee regret that they have to record 3 deaths and 37 resignations, while 11 names have been struck off the roll of membership for non-payment of subscriptions, leaving the membership of your Club at 381 on 31st March, 1913.

Eleven Committee meetings have been held during the year, the attendances of Members at which was as follows:—

A. W. Stelfox	...	...	11	|	H. L. Orr	...	...	6
S. Wear	...	...	11	|	A. R. Dwerryhouse	...	...	5
J. A. S. Stendall		...	10	|	W. J. Fennell	...	...	4
Miss M. D. Mitchell		...	9	|	W. A. Green	...	...	4
N. Carrothers	...	...	9	|	Miss M. K. Andrews	...	...	3
N. H. Foster	...	...	9	|	F. Balfour Browne	...	...	3
R. Bell	...	...	8	|	Robert Patterson	...	...	3
R. J. Welch	...	...	8	|	W. J. C. Tomlinson	...	...	3
Miss S. Blackwood		...	7	|	Canon Lett	...	...	2
R. May	...	...	7	|	W. H. Phillips	...	...	1

The following excursions were held during the Summer Session :—

Glenoe (Half-Day) ...	...	...	11th May.
Carlingford ...	...	...	25th May.
Rowallane, Saintfield (Half-Day) ...	...	...	8th June.
Toome ...	...	...	22nd June.
Soldierstown (Half-Day) ...	...	...	6th July.
The Boyne, Drogheda, and the Coast of Louth (Long Excursion) ...	...	...	12th—15th July.
Tollymore Park ...	...	...	10th August.
Rossmore Castle, Monaghan ...	...	...	14th September.

The average attendance at the Summer excursions was 41. It will be seen that the excursion to Moyola Park, Castledawson, did not take place. This was due to the refusal of the owners to permit your Club to visit the estate. During the coming Summer it is hoped that several open-air lectures will be given on the occasion of the excursions.

The Winter Session was opened by the usual Conversazione, held in the Assembly Buildings on 31st October, at which 310 persons were present.

The Winter meetings were held in the Museum, College Square North, your Club once more having been granted the use of their rooms on the old terms by the Belfast Corporation.

The following papers were read at the Monthly Meetings held during the Winter Session :—

1912.

Tuesday, 19th November—"The Botanists of the North of Ireland," The President (Rev. Canon Lett, M.A., M.R.I.A.).

Tuesday, 17th December—"Some Geological Features of Scotland and their relation to the Structure of the North of Ireland," A. R. Dwerryhouse, D.Sc., F.G.S., M.R.I.A.

1913.

Tuesday, 21st January—"The Worship of the Magna Mater," Major R. G. Berry, M.R.I.A.

Tuesday, 18th February—"The Gorges of the Tarn, Cevennes," A. M'I. Cleland.

Tuesday, 18th March—"Outline of Geological Observations in the North-East of Londonderry, collected during the progress of revision work," J. R. Kilroe, A.R.C.Sc.I.

The titles and reports of the papers read at the Sectional meetings will be found in the Annual Reports of the various Sections, which will be presented to you.

During the year the Archaeological Section was re-organised.

Mr. F. Balfour Browne, M.A., F.Z.S., F.R.S.E., represented your Club at the British Association Conference of Delegates held at Dundee in September, 1912, and has submitted his report, which will be found in the Proceedings.

The Treasurer will lay before you his Statement of Accounts, showing a balance in favour of your Club of £8 9s 4d, which is wonderfully satisfactory considering the expenses incurred during the year 1911-12, which left us with an adverse balance of £20 15s 11d at the commencement of the past year.

The Librarian's Report, and those of the Botanical, Geological, Zoological, Archaeological, and Junior Sections, as well as that of the Sub-Committee appointed to adjudicate on the Essays sent in for your Club's Prizes, will be submitted to you.

Your Committee are glad to be able to announce that there has been fair competition for some of the prizes offered to pupils attending secondary schools in Ulster, and they hope that when these prizes become more widely known more entries will be received. Your Committee regret, however, that no Junior member of your Club was sufficiently energetic to compete for the prizes offered by the Chairman of the Junior Section.

For hospitality received by members of your Club and for permission to visit their estates, your Committee desire to place on record their thanks to Lord Rossmore, Lord Roden, Sir Frederic Lambert of Beau Parc, W. J. D. Walker, Esq., C.B., of Drogheda, H. Armitage Moore, Esq., J.P., of Rowallane, Co. Down, and F. W. Millard, Esq., of Camla House, Monaghan.

Your Committee desire to thank also the Superintendents of the various Railway Companies for kind attention and facilities afforded on the Summer excursions: the Press for publishing reports of the Club's meetings: and the Public Bodies and

Kindred Societies who have furnished your Club with their publications during the past year.

Your Committee beg to draw your attention to the resignation of Mr. W. H. Phillips, and desire to thank him for his devoted service in the past. Towards the middle of the first year of your Club's existence, in 1863, Mr. Phillips took over the duties of Treasurer, which position was left vacant by the death of Mr. A. F. Herdman. In 1870 Mr. Phillips temporarily resigned, but in 1891 he was again elected Treasurer, a position which he has, therefore, occupied for twenty-eight out of the fifty years which your Club has been in existence.

(Signed)

A. W. STELFOX,
MARGARITA D. MITCHELL, } *Hon. Secs.*



Librarian's Report.

Two or three Societies have been added to our List for exchange of Proceedings.

We are indebted to Mr. John Adams, of Dublin, for copies of several of his papers read before the Royal Irish Academy and the Royal Dublin Society : and to the Irish Board of Agriculture for the Geological Survey's Memoir on "The Inter-basaltic Rocks of North-East of Ireland." The Club's thanks are hereby conveyed to them for their gifts.

(Signed)

SYLVANUS WEAR, *Librarian.*

Report of the Botanical Section.

Four meetings in connection with this Section were held during the Winter Session. At the first meeting held on the 4th December, Mr. S. A. Bennett, B.A., B.Sc., read a very interesting paper entitled "Notes on Plant Associations from Slemish, Co. Antrim," illustrated by typical mounted specimens from the locality.

The next meeting was held on the 8th January, when Mr. H. L. Orr gave an instructive description of *Pinus sylvestris*, and described in brief many other members of cone-bearing plants. Many nicely mounted types were used to illustrate his remarks. Mr. S. Wear afterwards exhibited on the screen a fine series of lantern slides, made from photos. taken by himself, illustrating some typical western Irish plants and their habitats. At this meeting most of the members saw for the first time a fine healthy growing plant of the Mediterranean Heath.

At the meeting held on the 5th February, in conjunction with the Zoological Section, we were favoured by the presence of Mr. R. Ll. Praeger, M.R.I.A., who gave us a lecture entitled "What do we mean by a 'Native' Species?" In the course of his address, after pointing out the general character of the European flora, and tracing the progress of human interference with the pre-existing

vegetation, and the various classifications of native and non-native plants which had been proposed, Mr. Praeger said the definition of a native species employed by Dunn in his "Alien Flora of Britain" requires us to ask three questions relating to the species under consideration.

- (1.) Have the ancestors of it been in the district since pre-historic times?
- (2.) Did it reach its present habitat without the aid (either intentional or accidental) of man?
- (3.) Is it living on ground which has been undisturbed by man?

If we can answer these three questions in the affirmative, we may, according to Mr. Praeger's formula, regard the standing of the species as NNN in whatever area we may be considering. On the other hand, the standing of an alien plant, brought from a cornfield, into which it was transported with seed by man, and planted in cultivated ground is regarded as ***. Between these two extremes we have six combinations of N and *. Thus the standing of a plant which has spread from a lake such as Lough Neagh into an artificial waterway such as the Lagan Canal changes from NNN in the lake to NN* in the canal. And again one brought by man from Lough Neagh where it was NNN and placed in an artificial pond becomes N**. An alien which in a garden would be ***, becomes similarly *NN, if it spreads by its own powers to undisturbed ground: or it becomes *N* if it spreads to cultivated ground.

In conclusion, Mr. Praeger pointed out that only those plants whose standing in any district can be regarded as NNN or NN* may be considered for general purposes to be "Native."

The last meeting was held on the 5th March, when the Chairman of the Section (Rev. C. H. Waddell, B.D.) gave a very interesting lecture on "British Violets and Pansies." After pointing out their general character and history, the lecturer went

on to say that the order *Violaceæ* is represented in this country by a single genus *Viola* which is divided into two well defined sections—the “Violets” and the “Pansies.” Much attention has lately been given to the study of the British species, Mrs. Gregory having published a monograph on the Violets, and Dr. Drabble a synopsis of the wild Pansies. Much work still remains to be done especially in the latter group, by growing the different forms (which can easily be done from seed) and observing their life history.

Attention was drawn to a Continental species *Viola epipsila*, a sub-species of the Marsh Violet, *Viola palustris*, which has lately been found in England and Ireland. It was said to be strange that *Viola sylvestris* (or *V. Reichenbachiana*) had not yet been recorded from Co. Down.

The cleistogamous or later flowers without petals, which occur in the Violets, were described. Mrs. Gregory's observations go to show that these do not produce more fertile seed, as was once supposed, than the ordinary flowers. A fine series of mounted specimens was exhibited including the variety *ericetorum* of *Viola canina*, found on our sandhills, which seems distinct from the larger typical plant.

The outdoor work during the Summer Session was carried on to some extent in conjunction with other sectional and regular excursions of the Club, also by small parties, and by individual members.

From the results received we select the following :—Mr. A. W. Stelfox found a fine colony of *Arctostaphylos Uva-ursi* on the side of a gully on Agnew's Hill, Co. Antrim. Rev. W. P. Carmody found *Lactuca virosa* at Whitehead, Co. Antrim. *Orchis pyramidalis* was found growing on the canal bank near Aghalee, Co. Antrim. Canon Lett reported the finding of *Ammi majus*, a native of Southern Europe, in Co. Down. *Asplenium marinum* and *Cochlearia danica* were seen growing on the walls of the old church of Ardtole, near Ardglass, Co. Down. On the occasion of

the Junior Section's excursion to Belvoir Park, *Saxifraga granulata* was re-found. This proved to be the "double" form and is therefore doubtless an artificial introduction.

The Committee regret that more work was not accomplished during the Summer Session, but this was largely due to the season being most unfavourable for outdoor work. They hope, however, next year to be able to record better results.

(Signed)

N. CARROTHERS, *Hon. Sec. of the Section.*

Report of the Geological Section.

The Committee report that four excursions were held during the past year—Cavehill Quarry and Carr's Glen, 4th May; Giant's Causeway, 7th September; Ballyclare, 21st September; and Ballymurphy, 5th October. The record of fossils on the first excursion was good, including spines and teeth of *Diadema lobatum* Wright, found in Carr's Glen—the first locality in Ireland from which this fossil was recorded, a few years ago, by Mr. Robert Bell.

At the Giant's Causeway Mr. W. A. Traill gave an interesting account of the Geology of the district, and contended that the "Red Bed" between the Upper and Lower Basalts was not merely a bed of basalt metamorphosed into its present condition, but was either an independent ash-bed or more probably a liquid mud eruption similar in source to the immense pumice-beds found in the Canary Islands and in other volcanic districts. Mr. James Strachan conducted the Ballyclare excursion. In describing the geological features of the district, he drew attention to the typical glacial formations of the Six-Mile-Water Valley, and to the interesting problems supplied to petrologists in the area marked on the survey map as Lower Basalt. Two dolerite intrusions within this area were visited, one at Crag Hill or the "Craigs,"

an intrusive sill of fairly coarse holocrystalline olivine dolerite, found by Mr. Strachan to be identical in petrographical character with the dolerite of Ballygalley Head, about ten miles eastward ; the other intrusion, N.E. of Crag Hill, is a small boss of dolerite, so finely grained that it may be called a true aphanite. On its summit two marked sets of glacial striæ were observed, running respectively nearly North and South and East and West. At Ballymurphy fine specimens of selenite and some pseudomorphs—after crystals of rock salt—were found in the Trias. Ailsa Craig riebeckite rock and other "erratics" were noted in the Boulder-Clay.

Microscopic exhibits and demonstrations by members of the Section were given on 30th November, the opening meeting of the Geological Winter Session. On 29th January Mr. James Strachan gave an instructive lecture on "The County Antrim Basaltic Plateau." After describing its main features, Mr. Strachan proceeded to give a petrological classification of the various types of basaltic rock found in the county. The zeolite-bearing lavas were described, and the origin of these interesting minerals discussed. In describing the interbasaltic beds, the lecturer referred to the recent view that the iron ores and bauxite had largely originated from the weathering of basalt *in situ*, but he ventured to dispute this theory as applied to at least the uppermost series of the interbasaltic beds, which undoubtedly showed stratigraphical evidence of sedimentation. Mr. Strachan concluded his lecture with a brief reference to the effects of glacial action in carving out the scenery of the county. Another lecture to have been given by Mr. J. R. Kilroe, A.R.C.Sc.I., was transferred, by request, to a later meeting of the whole Club.

In Glacial Geology the Committee report considerable progress, especially in the critical region west of the Bann. The area of distribution of Ailsa Craig rock has been extended beyond the Roe, Madame Christen having detected it at Moys, about two miles west of that river, and at an elevation considerably above

400 feet. It was also found at Limavady and Kilrea. The records from Moys and Limavady show a marked westerly advance, Coleraine and Portstewart having been the previous limits in this direction. It was recorded by Mr. Bell for the first time at Aghalee, three miles east of Lough Neagh, and from Drumaneway, two miles west of Randalstown. Dervock is also a new locality, but notwithstanding its occurrence there it was not found in any of the small gravel-pits near Ballymoney. Another valuable record is the discovery of Ailsa rock by Mr. Bell, last September, on the White Mountain, north of Lisburn, at a height of 800 feet, the highest level from which he has hitherto obtained it. From the localities already enumerated other interesting erratics were obtained, and collections were also made from Aghadowey, Garvagh, Derrybeg, Carmean near Moneymore, Cookstown, Glasgow Hill (esker one mile north of Cookstown), Blue Door (gravel-pit near Cookstown), Sherrygroom, Coalisland, and Cullion Glen, N. Slieve Gallion. Red and pink granites were much in evidence, and with them there was a large admixture of other erratics such as diorites, epidiorites, syenites, schists, &c.

By kind permission of the Director, a large number of erratics were forwarded to the Geological Survey Office, Dublin, and were determined by Mr. J. R. Kilroe. The probable origins of the erratics in the annexed lists are largely given from these determinations. They show that many erratics have a probable southern source, confirmatory of the Field Club's earlier observations. It will be remembered that in Madame Christen's "Summary of recent Glacial Investigations" (Appendix VII. of Vol. II. *Proceedings* of the Belfast Naturalists' Field Club for 1905-6, p. 329), she refers to having been frequently assured that we should never find erratics north of their place of origin. "Our experience," she writes, "does not at all bear out this assertion, which postulates a simple southward ice-flow, and omits to reckon with radiating local systems of glaciation that may have persisted over high ground prior to, and long after, the great central plain

of Ireland and the Irish Sea were free from solid ice. A scrutiny of the tables giving the compass direction of parent localities of definitely recognised erratics shows a surprisingly frequent mixture of southern rocks even in our most northerly districts." A study of the origins of the erratics given in the lists for this year indicates a similar mixture of rocks, not only probable north-eastern and northern sources appear, but also many probable southern sources, and where only alternative origins could be given the southern not infrequently are placed first as being the more probable ones. From the Ballymoney district the evidence of ice-movement from the south is of special interest. In Madame Christen's "Summary" already quoted, we find (p. 325) a reference to Mr. Close's readings of striations at Seccaun* Quarry, three and a half miles from Ballymoney, and at Cullybackey. The latter looked, he thought, as if the grinding movement were towards the N.N.W., but he supposed this must be impossible. On hearing from Madame Christen of the discovery of rhyolites at Ballymena and Killagan he was much interested to find his reading of the striations confirmed. Our records last year of rhyolite from the South obtained in the gravel-pits at Seacon, Heagles, and Dervock† is another gratifying confirmation of Mr. Close's reading of these glacial *striæ*.

The clay at Glenkeen brickworks, Aghadowey, had not the appearance of ordinary Boulder-Clay, and Madame Christen rightly conjectured that it might be a lake deposit, probably "warp-clay;" a specimen was forwarded for determination and her view was fully confirmed. Mr. Kilroe considers it to be "warp-clay" laid down in an expansion of the Bann, which stood at a much higher level than at present, and before glacial conditions had quite vanished from the region. In this clay some curiously shaped silt concretions were noted, similar in appearance

*Mr. Close writes "Seccaun," but it is presumably same as Seacon.

†Mr. Robert Bell finds the specimens obtained at Heagles and Dervock resemble the rhyolite of Ballycloughan (Quarrytown). The precise origin of the Seacon specimen is not yet determined.

to those found at Carthall, near Coleraine, where they are locally known as "rock of the clay." A small sample of the "warp-clay" was kindly examined microscopically by Mr. Joseph Wright, F.G.S., but it yielded no Microzoa.

In regard to the variety of red and pink granites, which have in this and previous years been noted in our district, the sources naturally are varied, many are from Slieve Gallion, some resemble Scottish types, and some resemble the Barnesmore type*. Exceptionally large boulders of pink granite are reported by Mr. Bell from Cullion Glen, N. Slieve Gallion, and in esker gravels at Carmean, near Moneymore, he found pinkish granites very numerous. He obtained from the same section a large specimen of haematite ore, and in forwarding this erratic, drew attention to its importance in giving well defined direction, the haematite ore being found *in situ* on North Slieve Gallion.

We desire here to record that the Section is not only indebted to Mr. Bell for much assistance in Glacial work, but also for the services he has rendered to local mineralogy, and which have recently been rewarded, by his election to the membership of the Mineralogical Society of London.

In last year's report reference was made to the investigation of Boulder-Clay at Dungannon and of the Sand-hills at Portstewart. The details are included below, also the possible origins of a few miscellaneous erratics that awaited determination. In the following lists, where determinations are given, the probable source or sources of the erratics follow each rock or group of rocks.

*Specimens of the Barnesmore type of granite were submitted by Madame Christen to Dr. J. S. Flett, Director of the Geological Survey of Scotland. After submitting them to Dr. Horne and Mr. Macconochie, Dr. Flett wrote "They are both of opinion, that these rocks are not Scotch. Whether they are Irish or not, we cannot say, but I think it very probable that they are."

*LVII. Dungannon, Tyrone Brickfield. Brown Boulder-Clay, overlain by black Boulder-Clay. Erratics:—Jasper, green rock series of Mid-Tyrone—red granite, possibly N.W. Donegal—granite, possibly Donegal, probably a N.E. source—granite, not like Slieve Gallion, uncommon in Donegal, source probably north-eastward—ironstone nodules, dolomitic limestone, red limestone, concretionary iron ore, sandstone, probably local—porphyritic syenitic granite, quartz-porphyry, probably Slieve Gallion—quartzite, diorite, epidiorite, Dalradian series, possibly not distant, N.-westward or possibly N.-eastward—chalk, flint, gneiss, basalt, Carb. conglomerate—1 Carb. coral—Microzoa doubtful—brown clay yielded one foram., *Nonionina depressula*, which may have got in accidentally—in black clay, after being washed, a few round stones and Carboniferous fossils were found.

LVIII. Portstewart Sand-hills. Epidiorites, meta. grits, granite, quartzites, arkose, porphyritic felsite, metamorphic sandstone, Dalradian, from Londonderry, Donegal, or Scotland—rhyolite (? trachyte), Tertiary series, Antrim—coarse granite. Scotland or possibly N.W. Donegal—orthoclase rock (syenite group), granite, Donegal or N.E.—granite-porphyry, syenite, Slieve Gallion—granite, N.E. or N.W. LII. (earlier records). Granites, probably Barnesmore—quartzite, porphyries, Cushendun area—granite, probably Cushendun dyke—riebeckite rock, Ailsa Craig—schist, altered diabase with epidote.

LIX. Limavady, Ballast-Pit near Railway Station. Erratics:—Riebeckite rock, Ailsa Craig—gabbro, fels. porphyry, hypersthenite, S. (Slieve Gallion)—metamorphosed grit, epidiorites, quartzite, vein quartz, S. (Dalradian)—fine gneiss, N.—granulite, Tyrone—red granites, hornblende schist, granite, epidiorites, S. (Slieve Gallion) or N.—diorite, with granular

*This and following numbers refer to the MSS. glacial schedules in the Library of the Field Club.

ground, South—meta. grit, fine grey granite, micaceous quartzite, gneiss, South or North—flint, basalt, sericite, dolerite.

LX. Derrybeg Brickfield, Limavady, Boulder-Clay. Erratics :—Meta. coarse grit, Carb. sandstones, quartzite, diorite with granular ground, South—metamorphosed grit, mica hornblende-schist, South or North—red and pink granites, crushed felsite, S. (Slieve Gallion) or North—epidote granite with hornblende, South, Tyrone axis—Basalt coated with calc. concretionary clay, local—diorite, chalk, gneiss. No Microzoa in the clay.

LXI. Moys, nearly four miles S. of Limavady, Gravel-Pit, Knockandunn. Erratics :—Riebeckite rock, Ailsa Craig—fine grained granite, probably not Ailsa rock —metamorphosed grits and sandstones, quartzite, South—pink granite, Carb. sandstone, South (Slieve Gallion) or North—gneiss, North ? floor of Channel, felsite (syenite series) ? Tyrone—schist, quartz, flint, basalt.

LXII. Aghadowey, Gravel-Pit, Clare Hill. Erratics :—Micropegmatitic granite, quartz-porphyry, grey granites, South, (Slieve Gallion)—crushed granite, North—quartzite, felsite, metamorphosed grit, South (Dalradian) or North—vein quartz, epidiorite, South (Slieve Gallion) or North.

LXIII. Kilrea, Gravel-Pits. Erratics :—Riebeckite rock, Ailsa Craig—red and pink granites, green phyllite, rhyolite, diorite, gabbro, S. (Slieve Gallion)— red Carb. limestone, S. Cookstown —coarse gneiss, dark red granite, N. or S.?—red and greenish granites, S. (Slieve Gallion) or North—quartzite, S. (Dalradian) or North. Probable infiltration in basalt. Fossil, Carb. with coral.

LXIV. Cavanmore Road, Gravel-Pit three miles from Kilrea. Erratics :—Hornblendic granite N. or S.—quartzites, grey granite, red granites S. or N.—rock probably modified by Eocene or Miocene hot-springs, South or South-West—

metamorphosed sandstone, crushed felsite, South (Dalradian) or North—limestone probably Carboniferous—dark red granite S.?—diorite, flints.

LXV. Garvagh Quarries. Boulder-Clay and “Sands and Gravels.” Erratics:—Numerous red and pink granites, grey granite, hornblendic lamprophyre (camptonite)? andesite, pebbly grits, quartz-porphyrries, syenite, South (Slieve Gallion)—mica schist, metamorphosed grits, quartzite S. (Dalradian) or N.

LXVI. Cookstown District, Gravel-Pits. Erratics:—Numerous red and pink granites, grey granite, aplite vein, felsites, felsite porphyries, syenites, diorites, crushed fragmental rock, ophitic gabbro, quartz, hornblende-porphry, pink pegmatite, quartz-porphry, Slieve Gallion—dolerite, Tyrone—banded granite, ? Slieve Gallion—gneiss, Slieve Gallion or Central axis—metamorphosed sandstones and grits, quartzite, N.W. (Dalradian)—gneiss at junction of dolerite and granite, Slieve Gallion or Tyrone axis—flint, chalk, basalt, schist. Fossils—Carb. limestone with Lithostrotion and fragments of encrinite stems.

LXVII. Coalisland, Sand- and Gravel-Pits, fine current bedding. Erratics:—Syenite, grey, pink, and red granites, hornblendic granite, crushed felsite, felsite porphyries, quartz-porphyrries, fine grained gneiss, hypersthene or pyroxenite, granite porphyries, lamprophyre, felsites, Slieve Gallion—gneiss, Scotland, possibly Slieve Gallion—gneiss, North—quartzite, reddened by haematite, red band of Slieve Gallion—andesite, Tyrone Devonian—probable insoluble residuum of siliceous limestone, local Carboniferous—flint, boulders, diorite, mica schist, quartz.

LXVIII. Sherrygroom, Gravel-Pit about five miles South of Cookstown. Erratics:—Crushed conglomeratic sandstone, Dalradian S., epidiorite N.W. (Dalradian), syenites, felsite porphyry, granite (aplite in), lamprophyre, pink granites,

hornblende schist, Slieve Gallion—granites, Barnesmore?—andesite, Tyrone Devonian—diorite, Slieve Gallion or Tyrone axis—gneiss, Scotland? or Slieve Gallion—fine-grained granite, not Ailsa rock, but resembling it, flint, basalt, mica schist—Fossils, Carboniferous, with Lithostrotion and fragments of encrinite stems.

LXIX. "Blue Door" or "Finger" Gravel-Pit, near Cookstown.

Erratics:—Red granites, syenites, hornblendic granites, Slieve Gallion—chalk, flint, quartzite.

LXX. Glasgow Hill, Esker one mile north of Cookstown.

Erratics:—Hornblendic granite, including pieces of diorite, coarse felsite porphyry, granite with inclusions of mica schist, hornblendic granites, syenite, diorites, porphyritic felsite, Slieve Gallion—granulitic gneiss, Tyrone axis S.W.—epidiorite, from westward—chalk, flint breccia, local—flints, basalts, chalk, quartz.

LXXI. Aghalee, Section of Sands and Gravels overlying basalt in a quarry south of the Aghalee Bridge over Lagan Canal.

Erratics:—Riebeckite rock, Ailsa Craig—granites, hornblendic granites, diorites, syenite, aplitic granite, quartz-felsite (altered rhyolite), Slieve Gallion—fine grained sandstone from west—rhyolite, Templepatrick—clay ironstone, jasper, flint, chalk, mica schist, white quartz.

LXXII. Cullion Glen, North Slieve Gallion, Boulder-Clay overlying Carb. limestone. Erratics:—Carb. conglomerate from south—haematite and quartz, red band Slieve Gallion—sheared felsite, Tyrone axis to West—andesites, quartz andesite, syenites, granites, hornblendic rock, diorites, camptonitic lamprophyre, local—chalk, flints, jasper, conglomerate, schist, red sandstone, quartz.

LXXIII. Carmean, Esker close to Railway Station, about two miles North of Moneymore. Sands and Gravels. Sands of a red colour, and numerous pink granites common throughout the section—jasper, haematite ore, North Slieve Gallion—

fine grained sandstone, W.—granites, syenite, hornblende granite, diorite, Slieve Gallion—Carboniferous conglomerate, South—sandstone, probably Lower Carboniferous strata—crushed pegmatite.

LXXIV. Drumaneway, Esker two miles west of Randalstown. Erratics :—Riebeckite rock, coarse and fine, Ailsa Craig—rhyolite, probably Templepatrick.

LXXV. Dervock, Carnullagh Gravel-Pit one mile to East. Erratics :—Riebeckite rock, Ailsa Craig, N.E.—rhyolite, S.* Ballycloughan—pink granites, mica felsites, gneiss, mica schists, quartz schists, fine granite, quartzites, granite and quartz vein, probably from N.E.—granite, felsite with quartz and mica, sandstone, felsite from N.E. or S.W.

LXXVI. Ballymoney, very small Gravel-Pits. Erratics from Seacon, N. :—Rhyolite from South,*—felsite, quartz-felsite, N.E.—felsite, altered rhyolite, N.E. or South. Erratics from II eagles :—Rhyolite from South Ballycloughan (Quarrytown) -chalk with manganese dendrites, granite, granulitic felsite, felsite, ironstone, quartzite, probably from N.E. Erratics from Ballybrates :—Ferruginous sandstone, gneiss, felsite, red granite from N.E. Another small pit near (Darcus') consisted almost entirely of basalt boulders in a stiff matrix, but sandstone, red granite, and flint recorded, from N.E. or S.W.

LXXVII. Macfin, Gravel-Pit right bank of Bann near Macfin Station. Erratics :—Granites, diorites, aplites, quartzites, felsites, N.E.—flint, quartz.

LXXVIII. Coleraine, Hillman's Fancy, large Sand-Pit near Railway Station. Erratics :—Riebeckite rock, Ailsa Craig—pink granites, porphyritic granite, crushed felsite, pegmatite vein in granite, N.E.—diorite, granite in diorite, andesite,

*A further confirmation of Mr. Maxwell Close's reading of striations at Seecaun Quarry and Cullybackey, see Madame Christen's Summary of Glacial Investigations, Appendix VII. to Vol. II., *Proceedings B.N.F.C.*, 1905-06, p. 325.

granite, quartz felsite, syenite, felsite, red granite, porphyritic felsite, jasperised rock, (?) felsite, granite with micaceous knots, andesite, N.E. or S.W.—chalk, flint, quartz, quartzite.

LXXIX. Monaghan. Boulders—ferruginous jasperised shale, local, possibly Ballyjamaduff area—sandstone, local—white chert, Carb. limestone. From canal bank—calc. pebbly sandstones, limestone, dolerite, calcareous grit, sandstones, all local—felsite (?), local. From three mile House, S. of Monaghan—felsp. grit ? Silurian, S.E.—felsite porphyry, (?) Slieve Gullion—quartzite, quartz vein ? Dalradian, N.W.—sandstone, local, sandstone, local or Silurian—metamorphosed grit ? Dalradian or Silurian—chert, local. From esker, eight miles from Monaghan—calc. sandstone with cemented coating of pebbles, felsp. grit, felsite, chert, limestone, sandstone, local—felsite porphyry ? Slieve Gullion..

LXXX. Ballymurphy, Belfast (Springfield Brick-works), Boulder-Clay overlying Trias. Erratics :—Riebeckite rock, Ailsa Craig—chalk, flint, chalcedony, basalt, quartzite, quartz, clay ironstone, Fair Head dolerite, Rhætic, Lias, Old Red Sandstone, weathered granite.

Derived Fossils. *Terebratula*, *Cardium rhæticum*, and *Modiola minima*. On a former occasion Mr. Bell found a shell of *Astarte*, and the clay from which he obtained it, when submitted to microscopic examination by Mr. Joseph Wright, yielded Foraminifera.

Portrush, New Waterworks, Boulder-Clay. Grey granite, West of Scotland.

Glenoe, Boulder-Clay. Rhyolite, Tardree type, and a few imperfect fossils.

Armagh. Granite invading hornblende rock, Tyrone axis.

Maghaberry, near Moira. Hornblendic granite probably N.E. (Scotland)—epidiorites, Donegal or Tyrone type, also Co. Derry type—quartzite, mica schist, Ailsa Craig rock 12 in. × 7 in. × 6 in.

Lagan, Brick-field. Porphyritic felsite, hornblendic granite, probably North-east (Scotland).

The Committee report the purchase of four geological works—"Students' Lyell" by Judd; "Tertiary Igneous Rocks of Skye;" "Geology of Ore Deposits" by Thomas and Macalister; and "The Lost Towns of the Yorkshire Coast" by T. Sheppard. They have added also five micro-sections of erratics to the microscopic slide collection, *i.e.*, Epidote granite with hornblende from Derrybeg, granite invading hornblende rock from Armagh, granulitic felsite from Ballymoney, granite resembling Barnesmore granite from Portstewart, and crushed felsite from Coleraine.

The Committee acknowledge most gratefully the great assistance rendered by Madame Christen in the glacial investigation of numerous districts West of the Bann, which resulted in the successful extension of the distribution of Ailsa Craig rock to Moys, two miles West of the Roe, to its detection in other localities, and to important additions to the Glacial Geology of our district. To her energy is largely due our fine type collection of "erratics," and her "Summary of Glacial Investigations" is a valuable record of Field Club work. They tender their best thanks to Professor Cole and to Mr. Kilroe for the determination of erratics, also to Mr. Joseph Wright for the determination of Microzoa. They desire to thank Professor Cole for his important paper on "The Problem of the Liffey Valley," and to acknowledge the continued courtesy of the local Press in reporting the excursions and meetings of the Section.

(Signed)

MARY K. ANDREWS, *Hon. Sec. of the Section.*

Report of the Zoological Section.

Three meetings of the Section were held during the Winter Session. The first, on 5th February, was in conjunction with the Botanical Section, when Mr. R. Ll. Praeger, B.A., M.R.I.A., gave an address on "What do we mean by a 'Native' Species?" At

the second meeting, on 12th March, which, by kind permission of the Vice-Chancellor of Queen's University, was held in the Biological Theatre of the University, Mr R. H. Whitehouse, M.Sc., gave an instructive lecture on "The Structure and Life-History of Sea Squirts." On 2nd April Mr. Joseph Maxwell, J.P., spoke on "Rotifers: where and how to find them and how to mount them."

Distributional work continues to receive the attention of the members of the Section. Among the most important records of the year may be mentioned the finding of *Limax cinereo-niger* in Drumbo Glen, Co. Down, this being the first record of this Slug from the county: whilst *Helix lamellata* was discovered in Corry's Glen, Hillsborough, constituting a third locality for this Mollusk in Co. Down. Perhaps the most interesting find of the year consisted in the discovery of the False Scorpion, *Obisium lubricum*, in Corry's Glen, Hillsborough, and the Centipede, *Lithobius crassipes*, at Dungiven, Co. Derry, constituting two additions to the Irish fauna. Another False Scorpion, *Obisium cambridgi*, previously only known in Ireland from the counties of Cork and Kerry, was obtained at Benevenagh, Co. Derry. Numerous new county records for False Scorpions and Myriopods have been obtained, and the additions to the Woodlice distributional records were published in the *Irish Naturalist* for March, 1913.

(Signed)

NEVIN H. FOSTER, Hon. Sec. of the Section.

Report of the Junior Section.

The Committee have pleasure in reporting the progress made during the past year.

The year commenced with a total of nineteen members, eighteen new members have been elected, three have resigned, and one transferred to the Senior Section, giving at the present time, a total membership of thirty-three.

Four excursions were held during the Summer and were, on the whole, well attended, and much useful work was accomplished. An extra excursion was conducted on 1st January, by Mr. Stelfox, through Crow Glen, which proved of great interest, but unfortunately was poorly attended.

Four Winter meetings have taken place, the attendance at which has been rather disappointing.

11th December—"An Evening with the Microscope," William Gray, M.R.I.A.

1st January—"Slugs and Snails," A. W. Stelfox, M.R.I.A.

22nd January—"The Study of a Frog," R. H. Whitehouse, M.Sc.

19th February—"How Caves are formed in Limestone districts, with description of the Mammoth Caves of Kentucky," Adam Speers, B.Sc., J.P.

The Committee, recognising the difficulty of certain Junior members attending evening meetings, have issued to each junior a circular, asking a series of questions. The following is a summary of the answers :—Ten cannot attend evening meetings ; six can attend : two are out of town ; two (at business) complain that the meetings are held too early in the evening : twelve intimate that Saturday afternoon is the most suitable for meetings ; one votes for Wednesday afternoon ; one for Friday evening ; one for any evening except Thursday or Saturday : three state no time ; eleven intimate they could attend Saturday afternoon meetings once a fortnight. All wish excursions during the Summer in preference to indoor meetings : eighteen state Saturday afternoon to be the most suitable time for excursions : one wishes Tuesday or Wednesday : twelve are most interested in Botany : eight in Zoology ; three in Geology.

From this return the Junior Committee hope to arrange a programme which will be more in accordance with the desires of the Junior members, than has been possible hitherto.

(Signed)

J. A. SIDNEY STENDALL, *Hon. Sec. of the Section.*

Report of the Archaeological Section.

Three excursions of the Section were held during the past Summer. The first was to Carrickfergus, when a visit was paid to the ancient Church of St. Nicholas. Here the party were met by the Rev. Frederick J. M'Neice, B.D., Rector of the Church. From the pulpit the Rector gave a lucid historical account of the sacred edifice, after which our Chairman, Mr. W. J. Fennell, F.R.I.B.A., described its architectural features, and drew attention to a recently discovered Anglo-Norman Cuneiform Stone about to be erected in the porch for preservation. In the Town Hall the members were met by Mr. David Law, Town Clerk, who kindly described the ancient Charters and other relics of the town which he had displayed on a table. The Castle and other places of historic interest were visited, and votes of thanks were conveyed by our Chairman to the Rev. Mr. M'Neice and Mr. David Law. The second excursion was to Ardglass, when a visit was paid to the ancient Church of St. Nicholas, which stands on the summit of the hill of Ardtole (*Ard Tuathail*—Tuathail's height). St. Patrick's Well, on the shore, was next visited, after which the party, escorted by a piper and standard-bearer in the ancient costume of the Gael, walked to Castle Shane, the property of Mr. F. J. Bigger, M.R.I.A., who kindly brought them over the castle and described the relics of antiquity there enshrined, and subsequently entertained them to tea. A vote of thanks to Mr. Bigger for his hospitality concluded a most enjoyable day. The third excursion was to Malusk and Roughfort. After visiting the historic graveyard of Malusk the party walked to Roughfort to see the fort and the excellent Kistvaen (*Cairn Grainne*) preserved there. On the 1st of July a lecture was delivered in the Queen's University of Belfast by Professor R. A. Stewart Macalister, M.A., F.R.S.A., A.R.C.O., Professor of Celtic Archaeology, University College, Dublin. The Hon. Sec. of this Section wrote to the Secretary of the Queen's University requesting invitations for the members of our Section, which he kindly sent, and the Section

was well represented at the lecture—the subject of which was “Irish Archaeology, Past, Present, and Future.” The following papers were given during our Winter Session with great success, all having a good attendance of members.

“Hints to Students of Archaeology” (illustrated by lantern slides), Mr. F. J. Bigger, M.R.I.A.

“A Day in Maghera,” with exhibition of rush crosses and harvest knots, Miss Elizabeth Andrews.

“Irish Spectres,” Mr. E. J. M’Kean, B.A., B.L.

“Irish Medallists,” illustrated by examples of their art, Mr. William Mayes.

“Irish Tokens,” illustrated by drawings of rare Ulster tokens, Mr. J. A. Sidney Stendall.

“Norse and Irish Ships,” illustrated by drawings showing construction and details of ships, Major R. G. Berry, M.R.I.A.

The excursions and ordinary meetings of the Club were also well attended by members of the Section.

(Signed)

ROBERT MAY, *Hon. Sec. of the Section.*

Report of Prizes Sub-Committee.

The ten essays sent in competition for the Club’s Prize A—“For the best written account of the structure and life-history of a plant of the Order *Ranunculaceæ*”—offered to pupils attending any recognised secondary school in Ulster, give evidence of sound teaching and of good work accomplished by the several writers. At the same time, it must be said, that a little more originality in the description of the life-history and structure of the plant (all the competitors chose the Lesser Celandine for their essays) would have been commendable. The drawings of the competitors are, without exception, carefully executed; if these were done from nature, the fact should have been stated on each sheet. Three of the essays have, in addition to the illustrative drawings, sets of well-prepared mounted specimens of the Lesser Celandine; these are evidence of creditable field-work, or personal gathering of the plants in their habitats.

It was noticed in the process of examining the essays that eight of the young ladies forgot to state in their manuscripts their home or private address, in addition to the name of the school ; this omission, however, was not taken into account in awarding the marks on this occasion.

This prize is awarded to Miss Madge Tomb, Ladies' School, Cookstown, Co. Tyrone, with 81 per cent. of full marks. The following are highly commended :—Miss Jane Reid, Royal School, Dungannon, with 79 per cent. and Miss Minnie Ferguson, of same school, with 78 per cent.

Although there was no competition for Prize C.—“ For the best description of one of the large rivers of Ulster from its source to its mouth ”—the essay submitted by Master Samuel Gibson M‘Connell, Campbell College, Belfast, has been adjudged worthy of the prize.

No entries were received for the Zoological Prize B.

(Signed)

HENRY WM. LETT,
C. H. WADDELL,
M. W. REA,
S. WEAR,
N. CARROTHERS,

Prize Sub-Committee.

Dr. Treasurer's Account for the Year ending 31st March, 1913. **Cr.**

RECEIPTS.	PAYMENTS.
To Liabilities from last year	85 14 3
Anonymous Donation	1 1 0
" Subscriptions	83 15 0
" Do. Junior	2 2 6
" Entrance Fees	4 15 9
" Balance from Excursions	0 10 9
	85 14 3
	By Balance from last Account
	" Prize
	" Insurance
	" Expenses—R. Welch
	" Deficit on Conversazione
	" Delegate's Expenses
	" Irish Field Club Union (2 years)
	" <i>Irish Naturalist</i> (2 years)
	" Gratuity to Caretaker
	" Expenses of Junior Lectures
	" Printing Annual Reports (2 years) &c.
	" Postages
	" Commission to Collector
	" Gas Account
	" Lantern Expenses
	" Rent of Club Room
	" Balance
	89 19 7
	22 19 0
	3 18 6
	0 6 3
	0 13 0
	18 0 0
	8 9 4
	£177 18 6
1913.	... ... ... £8 9 4
To Balance	

(Signed) W. H. PHILLIPS, Hon. Treasurer.

Proceedings.

SUMMER SESSION.

GLENOE.

The first excursion of the year was held on 11th May, when fifty members and friends turned up at the Midland Station for the journey to Glenoe. About a quarter of a mile from the village of Glenoe the members turned down through a field to the right to visit a rath of exceptional interest, arising from the fact that in the centre are the ruins of an old stone-built farmhouse. These indicate that probably human occupation of this rath had gone on continuously from the time it was formed to protect the wattle or skin huts of its early makers almost to the present day. Just after leaving this field and resuming the walk to the village the Grasshopper-Warbler was heard producing its strange and monotonous call, which many of the members had never heard before. After a short rest the party walked up the gentle slope leading to the glen near Rungill Bridge. Some good collecting was done in this glen, which, being quite hidden from the road, is probably unknown to most people, though it is very much prettier and more attractive than the waterfall at Glenoe itself. All too soon the conductor's whistle sounded for the return journey, and Glenoe was reached punctually at five p.m. After tea a short business meeting was held, the ex-President, Mr. R. J. Welch, in the chair. The first business was a vote of condolence and sympathy to the relatives of our late much-esteemed member the Rev. W. S. Smith, of Antrim. This was feelingly moved by Mr. William Gray, who referred to Mr. Smith's many-sided activities and his continued and helpful interest in all

natural history subjects and in the work of the Field Club. The vote was passed in silence, the members standing bareheaded. Two new Junior members—Miss Bessie Dundee and Master Ernest W. M'Clelland—were elected. A visit was then paid to the waterfall at Glenoe, and the geologists examined the quarry in the chalk. The homeward journey was then begun, and on the way the old graveyard at Glynn, the ruins of the church, and the quaint headstones were examined with interest. The 7.30 train brought the party back to Belfast. The ornithologists noted from their arrival at Glynn 39 species of Birds, none of which were uncommon. Several interesting Land-Shells were unearthed at Rungill Glen, among which *Acanthinula lamellata*, *Arianta arbustorum*, and *Higromia fusca* may be mentioned. Amongst the specimens of special botanical interest found were—*Sisymbrium Alliaria*, *Mercurialis perennis*, *Polypodium vulgare* var. *serratum*, *Geum intermedium*, **Lonicera xylosteum*, *Geranium lucidum*, and *Veronica montana*, and the Alga, *Lemanea Batrachospermum*.

CARLINGFORD.

The second excursion was held on 25th May, when forty-five members and friends went to Carlingford. On the journey the geologists observed how the railway from Portadown to Newry runs along a great Glacial overflow channel, which took the surplus water of Lough Neagh when the mouths of the Bann and Belfast Lough were closed by the ice of the Firth of Clyde glacier. On arrival at Carlingford the party divided, the majority, under the guidance of the President, proceeding to inspect the many interesting buildings in the town. Among the places visited may be mentioned Lord Thomas's or Taffe's Castle; the Throstel, and the adjoining square tower, evidently the fortified private residence of some of the old Northmen or Danes who settled here; the Abbey; and King John's Castle. Meanwhile the remainder of the party had

proceeded to Greenore, and walking along the shore examined a splendid section of a raised beach which is well stratified, and contains numerous fossil shells. Many typical shore-plants were found here. Turning landwards the limestone quarries were next visited. After this the party ascended Carlingford Mountain, and were amply rewarded by a magnificent view from the top. The mountain is a great igneous complex containing both acid and basic rocks. The two parties subsequently met at the hotel, where after tea a short business meeting was held—the President (Rev. Canon Lett, M.A., M.R.I.A.), in the chair. Five new members—Miss M. I. Adams, Miss Audrey M'Meekin, Miss M. W. H. Mitchell, Rev. T. W. Davidson, and Mr. James Hamill—having been elected, the proceedings terminated. The party reached Belfast at nine p.m. During the day the following finds were recorded from the district by various members:—HYMENOPTERA ACULEATA—*Psithyrus barbutellus*, *Nomada alternata*, *N. ruficornis*, *Andrena trimmerana*, *A. fuscata*, *Bombus terrestris*, *B. lucorum*. CHRYSIDIDÆ—*Chrysis ignita*. COLEOPTERA—*Carabus granulatus*, *Amara communis*, *Anchomenus parumpunctatus*, *Aleochara brevipennis*, *Coccinella 7-punctata*, *Silpha subrotundata*, *Meligethes flavipes*, *M. aeneus*, *M. viridescens*, *Anaspis maculata*, *A. ruficollis*, *Sitones lineatus*, *Phyllobius viridiæsis*, *Centhorrhynchus assimilis*. LEPIDOPTERA—*Pieris rapæ*, *Euchloe cardamines*, *Vanessa urticae*, *Thera variata*, *Coremia ferrugata*. MYRIOPODA—*Linotænia maritima*. PSEUDO-SCORPIONES—*Chthonius rayi*. CRUSTACEA ISOPODA TERRESTRIA—*Ligia oceanica*, *Trichoniscus pusillus*, *Oniscus asellus*, *Porcellio scaber*, *Armadillidium vulgare*. Mr. Grierson has recorded some ninety species of Land and Freshwater Snails from County Louth, of which about fifty occur in the neighbourhood of Carlingford. The most interesting of these latter are *Milax gagates*, and *M. sowerbyi*, which are abundant at King John's Castle with *Hygromia rufescens*, while *Helicella intersecta*, *H. barbara*, *Pupa muscorum*, and *Cœcilioides acicula* occur near the quarries south of the town. The botanists

reported the following as of special interest :—*Selaginella selaginoides*, *Ranunculus Baudotii*, *Glaucium flavum*, *Arenaria serpyllifolia*, *Drosera rotundifolia*, *Artemisia vulgaris*, *Centaurea Scabiosa*, *Pinguicula vulgaris*, *Lamium album*, *Chenopodium Bonus-Henricus*, and *Orchis incarnata*.

ROWALLANE, SAINTFIELD.

The third excursion of the Summer Session was held to Rowallane, Saintfield, on 8th June. The destination of the party, which numbered eighty-six, was the beautiful gardens of Mr. H. Armytage Moore, J.P., by whose kind permission the members of the Club were granted the run of the whole estate, including the Rock-Garden, upon which Mr. Moore and his gardener, Mr. Watson, have spent so much labour. This feature is situated some distance south of the house on the summit of one of the little rocky knolls for which this district of County Down is famous. In making the rock-garden all the existing soil was removed from the rock, which was then re-covered with specially prepared earth, numerous "pockets" being formed for the reception of the plants. On the occasion of the Club's visit the garden was, perhaps, a little past its best, but presented a wonderful variety of interesting plants in flower, among which the Primulas, Azaleas, and Saxifrages were exceptionally well represented. Many of the more local Britannic plants were included in the collection, including the lovely white form of *Dabeocia folifolia*. After visiting the gardens, tea was enjoyed on the lawn, following which a short business meeting was held—Mr. Balfour Browne, M.A., F.R.S.E., Vice-President, in the chair. Three new members—Mrs. Byrne, and Messrs. W. W. Gibson and W. J. M'Cluggage—were elected, and before the proceedings terminated votes of thanks were passed to Mr. H. Armytage Moore for his very kind permission in allowing the party to visit his demesne, and to Mr. and Mrs. Watson for their attention and courtesy.

The party then proceeded to visit the grounds, and many fine conifers were seen, and some *Araucariae* bearing cones were specially remarked. On an old wall near the stables, Mr. W. H. Phillips reported the finding of the fern *Asplenium septentrionale*, whose spores must have reached this country by accidental means.

TOOME BRIDGE.

On the 22nd June a party conducted by Mr. Robert May paid a visit to Toome, the intention being to go down the Bann on boats to Lough Beg and Church Island, with its old ecclesiastical remains and holy well. Owing to the boisterous state of the weather, however, this part of the programme had to be given up. Instead a visit was paid to Brecart Lodge and its gardens, the owner, Mr. Thompson, acting as cicerone to various points of interest. This included a walk along the Bann, which skirts the demesne, and from here a good view of Lough Beg and Church Island was obtained. Before leaving, a cordial vote of thanks to Mr. Thompson was moved by Mr. G. Donaldson, seconded by Mr. S. Wear, Mr. Thompson kindly extending an invitation to the Club for some future date. The botanists noted some interesting plants; the Wild Roses were this year in the greatest profusion, all over tall hedges and ditch sides, and Potentillas in the Toome marshes fringed the marsh drains in profusion. The best plants noted were *Viburnum Opulus*, and the orchid, *Habenaria bifolia*. On returning to Toome a visit was paid to the remains of the Temple of Liberty, recently destroyed by fire, and to the site where the famous Bann flint-flakes are found, and good specimens were obtained. After tea at the O'Neill Arms Hotel, a business meeting was held—Mr. Adam Speers, B.Sc., in the chair—during which two new junior members—Messrs. Arthur Robinson and Louis L. C. Jackson—were elected.

SOLDIERSTOWN AND AGHALEE.

On 6th July forty-two members travelled to Moira, their object being to study the fauna and flora of that portion of the Lagan Canal known as the Broad Water. This interesting reservoir dates but from the formation of the canal, which was constructed towards the close of the eighteenth century. It has been formed by the damming up of the western end of the Aghalee Valley by the canal embankment. Leaving the road at Moira Station the party at once proceeded along the towing-path towards Soldierstown Bridge, and the botanists of the party were soon rewarded by the sight of several interesting plants. The Great Spearwort, *Ranunculus Lingua*, was abundant in the ditches alongside the path, while the beautiful "Flowering Rush," *Butomus umbellatus*, and the Sweet Flag, *Acorus Calamus*, were also common. The two last-mentioned plants are not considered native, but the latter has now been established in the district for upwards of one hundred years. Another plant of extreme interest was noted in the canal, this was *Ranunculus circinatus*, our rarest species of Water Crowfoot, which was discovered here some years ago by a member of the Club. The Great Bedstraw, *Galium Mollugo*, occurred on the roadside near the old church of Moira. Passing under the bridge at Soldierstown the more energetic members proceeded along the north shore of the Broad Water in the direction of Aghalee, distant about two and a half miles. Fresh discoveries here awaited the botanists, for the somewhat local Orchid, *Orchis pyramidalis*, was found on the towing-path and in a quarry close to Aghalee, while in the latter habitat the Spurge, *Euphorbia exigua*, was common. In this quarry at Aghalee the geologists had a happy time, many erratics being discovered embedded in the Glacial drift overlying the basalt. The exact district from which these boulders and pebbles had been carried by the ice has yet to be determined, but the leader of the party pointed out that they had evidently come from the district west

of Lough Neagh since many samples of schist, granite, Carboniferous sandstone, quartzite, and pebbles from the Old Red conglomerates were found amongst the debris of local rocks.

Instead of pursuing its natural course down the valley at Aghalee, the canal turns southward and enters Lough Neagh by Ellis's Cut. The object of this detour is not obvious at present, but we must remember that in the days when the canal was constructed the waters of the great lake stood at a considerably higher level and the now cultivated flat between Aghalee and Portmore was but a low and often-flooded marsh, through which it would be difficult to make a waterway. An interesting feature of the district visited is to be found in the shell-marls which in many hollows underlie the cultivated fields. At the close of the Glacial Period all these hollows nestling among the drumlins held small lakes, and these marls were laid down during this epoch. Through the natural deepening of their outlets and the gradual filling up of their basins by vegetation the smaller of these lakes have now disappeared, but their history can be traced in the marls, which contain many fresh-water shells, plant seeds, and other objects of interest to naturalists. Since the deposition of some of these marls many additional species would appear to have arrived in the district, crushing out in the struggle for existence some of those which were dominant during the formation of the deposits. The best example of the disappearing fauna is perhaps *Planorbis glaber*, a fresh-water shell, which is abundant in these marls, while at the present time it is confined in the counties of Antrim and Down to a few isolated habitats, where it still lingers in spite of the competition of stronger species. One of the retreats of this ancient species is to be found in the hot mill-ponds in the city of Belfast, where it appears to be free from annoyance by its competitors, and is often abundant. The construction of the canal between the basin of the Lagan and Lough Neagh has no doubt aided the dispersal of some species, such as *Limnea auricularia*, *Anodonta cygnea*, and *Sphaerium lacustre*, which, though frequent

in Lough Neagh, appear to have spread recently to the Lagan drainage area, and are certainly increasing in it. The party returned to Belfast at 7.40.

THE COAST OF LOUTH AND THE BOYNE VALLEY.

The annual long excursion was held during the July holidays, when the members travelled by rail to Drogheda on 12th July. The rain of the morning cleared up before their arrival, and perfect weather attended the party during their week-end stay in Drogheda. Twenty-seven members and friends participated in the proceedings. After lunch the party drove along the southern side of the Boyne estuary. On the mud flats fringing the river a quantity of sea-birds and waders were observed. Beyond the quaint little fishing village of Baltry a halt was called and a visit paid to the church of Termonfeckin and its famous crosses. Here the photographers were busily employed, whilst the collectors made good use of the time at their disposal before the drive was resumed to the village of Clogher. The party were conducted to the ancient ruined church and burying-ground, and then to St. Denis's Well, from which a somewhat rugged walk over the headlands brought them to the harbour, where they were entertained to tea by Mr. W. J. D. Walker, C.B. Afterwards the botanists and zoologists enjoyed a pleasant hour on Clogher Head before returning to Drogheda.

Upon the cliffs of Clogher Head several interesting plants were noted, including the Sea Lavender, *Statice occidentalis*, the Sea Purslane, *Atriplex portulacoides*, and the Sea Spleenwort, *Asplenium marinum*. Along the walls near the coastguard station grew an abundance of the grass *Poa rigida*, and on the hillside by the old church the thistle, *Carduus pynocephalus*, was plentiful, associated with *Senecio sylvaticus*. During the return drive to Drogheda several plants of interest to Northern botanists were noted, among which may be mentioned *Rosa arvensis*, *Ballota nigra*, *Matricaria discoidea*, and *Ceterach officinarum*.

During the day thirty-nine species of Birds were observed. The four common species of Woodlice were seen as well as the Pill-Woodlouse, *Armadillidium vulgare*, and the finding of *Trichoniscus pygmæus* added a species to the recorded fauna of County Louth. Two species of Pseudo-Scorpions, *Chthonius rayi* and *C. tetrachelatus*, taken here, are also additions to the County's fauna. On the sand-dunes to the south of Clogher the Land-Shell *Helix pisana* reaches its most northerly habitat. This Mollusk, which is one of the characteristic species of the Mediterranean littoral, appears to have had a more continuous range through Western Europe in former days, it being known as a fossil in some districts where it is now extinct. At present it is confined in the Britannic area to the south-west of England and Wales and to the east coast of Ireland from Rush to Clogher Head.

Leaving Drogheda on Saturday morning, the party drove westward through the suburb of Mell, with its characteristic mud-built cottages, and along the northern bank of the Boyne. A halt was called at the obelisk marking the site of the battle in 1690, to enable the members to inspect this historic place, and some of them visited Schomberg's grave on the southern side of the river. Thence on to Slane, where the party was conducted to St. Patrick's Hill, about an hour being devoted to an examination of the ancient remains, which consist of a church of simple plan, with a fine tower at the west end, and on the north side a large group of monastic buildings, all appearing to date from the late Gothic period. Afterwards some walked and others drove to Beau Parc, Sir G. Francis W. Lambert, Bart., having courteously granted permission for the exploration of his beautiful demesne. The marvellous contortions of the Carboniferous limestone cliffs on both sides of the river here formed a topic for discussion. After a tour of the gardens, the return to Drogheda along the south bank was commenced. In the evening the usual business meeting was held, the President (Rev. Canon Lett, M.A., M.R.I.A.), in the chair. On the motion of the President, seconded by Mr.

W. B. Burrowes, cordial votes of thanks were passed to Sir G. F. Lambert for permission to visit Beau Parc and to Mr. Walker for his hospitality and many acts of attention to the members during their visit to the district.

The marshes along the Boyne above Drogheda shelter an abundance of flowering plants typical of such a habitat. During the drive to Slane the St. John's Wort, *Hypericum perforatum*, and *Tragopogon pratensis* were seen near the obelisk. The latter plant is known by the English name of "Jack-go-to-bed-at-noon" from the fact that its flowers close at midday. Along the canal on the Meath side of the river, at Oldbridge, *Thalictrum flavum* and *Carex riparia* were seen. One of the most striking plants of the neighbourhood of Slane was *Geranium pyrenaicum*, which was very common on St. Patrick's Hill, where the beautiful thistle, *Carduus crispus*, was noted also. The banks of the Boyne between Slane and Beau Parc yielded some additional plants, such as the Yellow Loosestrife, *Lysimachia vulgaris*, Water Figwort, *Scrophularia aquatica*, Hemp Agrimony, *Eupatorium cannabinum*, and the Valerian, *Valeriana officinalis*; while on the limestone cliffs *Geranium lucidum* was common in places. Several naturalised plants grew abundantly by the river at Beau Parc, the beautiful white Bell-flower, *Campanula rapunculoides*, covering the banks for nearly half a mile, while the Mullein, *Verbascum Thapsus*, was common in the woods of Slane Castle on the north bank of the river. On one of the walls at Slane grew in great profusion the Scale Fern, *Ceterach officinarum*, the fronds attaining a size seldom seen in this species.

The zoologists were rewarded by finding of the Pygmy Woodlouse, *Trichoniscus pygmæus*, in the woods of Beau Parc, this being the first record for this species from County Meath, as is also *Trichoniscus roseus*, found in the gardens, but it is possible that the latter may be an artificial introduction. It was taken, however, in County Meath on the following day by the riverside at Kells in an apparently natural habitat. The finding of the

Pseudo-Scorpion, *Chthonius rayi*, also proved an addition to the County's fauna.

There was no fixed programme for Sunday, and several of the members visited the many places of interest in Drogheda, some of them being kindly entertained during the afternoon by Mr. and Mrs. Walker at their beautiful residence, The Sycamores. Others visited the celebrated tumuli of Dowth and Newgrange, and during dinner regaled those who had not accompanied them with graphic descriptions of their adventures among these prehistoric remains.

The conchologists of the party made a pilgrimage to Temple Demesne, at Collon, County Louth, the first-known locality for the land-shell *Vitrina hibernica*. They were rewarded by finding it alive in abundance in all stages of growth under dead leaves and twigs. Returning from Collon, *via* Mellifont, this rare shell was taken on the Meath side of the Mattock River, opposite the famous abbey, thus extending its known range into a second county division. The botanists with this party noted the alien, Medick, *Medicago falcata*, near Collon, in Meath, and *Rubia peregrina* near Monasterboice.

Seven o'clock on Monday morning saw a group of enthusiastic members wending their way to a gravel-pit, where an hour was spent by the geologists in noting the somewhat peculiar stratification of the sands and gravels, and obtaining examples of the "erratics" for further investigation, whilst the ornithologists studied the bird life of the river and its banks. Subsequently the train was taken for Kells, and on arrival there the members were conducted to the church. In the churchyard stand the remains—about ninety feet high—of a round tower and several richly-decorated crosses, and almost an hour was spent in the examination and photographing of these relics of a long past age. The opinion was expressed that the old church tower adjoining the modern building should be denuded of its encircling ivy, which is proving a source of great danger to the structure. The next object visited

was the stone-roofed cell or chapel known as St. Columbkill's House, which is built in a style reminiscent of the famous oratory of Gallerus in County Kerry. St. Columbkill was born in 521 A.D., and the architecture of this structure as well as that of the round tower close by is consistent with the tradition that they were erected during the sixth century.

From here some of the members made a detour to view the well, named after the same saint, ere proceeding to visit the Cross of Kells. This cross, elaborately enriched with sculptured figures and devices, stands in the main street of the town, and is said to have been raised from the prostrate position in which it was found by Dean Swift. The time at disposal after lunch was spent in exploring the town, whilst some of the members proceeded to the Maudlin Bridge over the River Blackwater ere entraining at 3.40 for Drogheda, whence during the evening the party left for their various destinations. This last day's trip being devoted to the interests of the archaeological section few plants of interest were seen, but *Carex pendula*, which occurred in the woods of Headfort Castle, is worth noting. The mollusks *Helix hortensis* and *Pyramidula rupestris* were the only ones of interest seen at Kells, both species occurring in the graveyard at the round tower, while the latter was also common in the crevices between the stones on St. Columbkill's House. Returning by train to Drogheda tea was partaken of in the White Horse Hotel, the abiding place of the members during the excursion, and afterwards the party separated, the majority returning to Belfast, which was reached at 9 o'clock p.m.

During the visit fifty-eight species of birds were observed, and it is interesting to record that here at least the Goldfinch is common, many of these beautiful birds being noted throughout the district.

TOLLYMORE PARK.

On 10th August the seventh excursion of the Summer Session was held, a party of members and friends, numbering thirty-one, travelling to Newcastle. On arrival at Tollymore Park the party passed first of all by the river side to see the quaintly-built old sawmill, where they were interested to notice that large quantities of beech and other hard woods were being sawn into wedges for the Belfast shipyards. Further on they crossed the river by one of the numerous bridges, and proceeded towards the upper end of the stream to view the fine specimens of conifers and other trees for which the demesne has long been famous. Amongst the most remarkable of the trees one may mention numerous Oaks, very fine specimens of Spanish Chestnut, Spruces, Larches, Silver Firs, Beech, Horse-Chestnuts, and on the avenue leading to the Barbican Gate has been planted a double row of fine Deodars. In the undergrowth in the woods *Melampyrum pratense* was very noticeable, growing in great profusion. *Gnaphalium sylvaticum*, *Pimpinella Saxifraga* and *Lycopodium clavatum* were also observed. Many different species of Hawkweeds grow in this district. The following were obtained:—*Hieracium anglicum*, *H. crocatum*, and *H. vulgatum*, the small number being due no doubt to the destruction of the flowers by recent flooding. Everywhere the growth of the plants was most luxuriant, and this was particularly noticeable in connection with the ferns. Plants of the Hard Fern, *Blechnum Spicant*, were growing abundantly everywhere, and many bifid fronds were obtained. *Asplenium Trichomanes* was collected also from one of the bridges, where it was growing profusely. Higher up on the mountain side the Beech Fern, *Polypodium Phegopteris*, and the Brittle Bladder Fern, *Cystopteris fragilis*, were found growing in the crevices of the rocks. The woods afforded a happy hunting-ground for workers on mosses, hepatics, and fungi. Two interesting hepatics were noticed—a dark brown, almost black, form of *Marsupella emarginata* var. *minor*, which

grows in several places at the sides of the carriage drives, and fruiting plants in fine condition of *Asterella hemisphaerica*, which were found in small quantity at its well-known locality, Parnell's Bridge. After lunch in the demesne the party proceeded to the rock-garden, which has been formed along both sides of a little glen, with very steep sides. The plants here are chiefly flowering shrubs, most of which were in full bloom. A very pretty species of Broom came in for special admiration, and the brightly-coloured flowers of a scarlet *Tropaeolum* added much to the beauty of the garden. The conchologists reported the finding of a number of species, the best of which was *Hygromia fusca*, a species almost confined to the British Isles, and in Ireland confined to cliffs and mountain glens where the Great Wood Rush grows. Shortly before five o'clock the party left the demesne, and the journey was resumed to Castlewellan, where a short business meeting was held, the President (Canon Lett, M.A., M.R.I.A.), in the chair. A vote of thanks was proposed by Mr. R. J. Welch, and seconded by Mr. Adam Speers, to the Earl of Roden for kind permission to visit the demense, and was passed by acclamation. One new member—Mrs. Metge—having been elected, the meeting terminated.

ROSSMORE CASTLE.

On Saturday, 14th September, a party of forty members and friends spent an enjoyable day at Rossmore Castle, County Monaghan. Travelling from Belfast by the 9.30 a.m. train the party were met at the Monaghan Lodge by Mr. W. F. de Vismes Kane, who acted as conductor for the remainder of the day, and whose fund of local as well as scientific knowledge proved of great advantage to the party. Near the lodge Mr. Kane pointed out the remains of a small ruined cromlech, and deplored the want of a suitable public body to preserve such antiquities. Upon arrival at the Castle the members were conducted through the chief apartments by the housekeeper. From the Castle the party

proceeded *via* the garden to the Mausoleum, near which lunch was partaken of, and subsequently the walk was continued down the glen to the wishing well. In the glen can be seen the last remnant of the old native woods, specimens of the Spindle Tree, *Euonymus europaeus*, Ash, and Oak. In this spot some members of the aboriginal fauna still lingered likewise in spite of the presence of Rhododendrons and other naturalised shrubs, the Land-Snails *Acanthinula lamellata*—an addition to the fauna of County Monaghan—and *Pupa anglica* being taken plentifully with numerous other species like *Hyalinia alliaria*, which do not shun altogether cultivated areas. For the botanists the day proved rather disappointing, but Mr. Kane kindly pointed out the habitat of the rare rush *Scirpus sylvaticus*, which grows by the stream-side below the wishing well. Search of the greenhouses in the garden yielded an interesting series of imported species. Among the Woodlice the following four species, new to Monaghan, were taken:—*Trichoniscus roseus*, *T. stebbingi*, *Porcellio dilatatus*, and *Metoponorthus pruinosus*; while in the palm-house two young specimens of the "Slug-Snail," *Testacella haliotidea*, were captured. The members of the genus *Testacella* find a happy hunting-ground in the underground burrows of worms, upon which they prey almost exclusively, and as it is difficult to drag a heavy and unwieldy shell through these subterranean and tortuous passages this appendage has been gradually altered by nature until it has assumed the shape of a small flat saucer placed at the extreme posterior end of the animal. The following Myriapods were obtained:—*Lithobius variegatus*, *Geophilus proximus*, *G. longicornis*, *Glomeris marginata*, *Craspedosoma rawlinsi*, and *Julus niger*; and the False-Scorpion *Chthonius rayi* was taken also. Towards four o'clock the party concentrated on Camla House, where a sumptuous tea was awaiting them, provided by Mr. and Mrs. F. W. Millard. Close to Camla House was taken another Woodlouse new to the County—*Porcellio pictus*. After tea a short business meeting was held—the President, Rev. Canon Lett, in the

chair. The Chairman, having welcomed Mr. Michell, a member of the Bournemouth Nat. Sc. Society, called upon Mr. F. A. Heron to propose a vote of thanks to Lord Rossmore and Mr. and Mrs. Millard for permission to visit Rossmore Castle and for hospitality to the members of the Club. The motion was seconded by Mr. W. B. Burrowes, and passed by hearty acclamation, to which Mr. Millard briefly replied. Madame Christen proposed, and Mr. Robert Welch seconded, that the thanks of the party be conveyed to Mr. W. F. de V. Kane for his guidance during the day. A new member, Mr. M'Cready, having been elected, the meeting terminated, and the party returned to Monaghan to entrain for Belfast. The ornithologists reported having observed thirty-three species of birds during the day. They were pleased to learn of the great increase of the Tufted Duck as a nesting species in Lord Rossmore's demesne. Numbers of Siskins were seen among the fir-trees, and it is probable that this bird nests in the park.



Winter Session.

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

ANNUAL CONVERSAZIONE.

The Fiftieth Winter Session of the Club was inaugurated by a Conversazione held in the Assembly Buildings on 31st October. A very interesting series of exhibits had been arranged on tables in the body of the hall, and the company, numbering three hundred and ten, spent a most enjoyable evening examining the various objects.

In the Zoological Section a special exhibit, lent by the Belfast Municipal Museum, attracted much attention. It included models illustrating insects injurious to agricultural and forest crops. Mr. F. Balfour Browne showed drawings illustrating points of interest in the life history of some Water-Beetles. A special appeal had been made to members to exhibit objects of interest to members of the Junior Section, and many were kind enough to respond, amongst whom may be mentioned Mr. F. C. Forth, who exhibited a fine collection of Entomological and Botanical specimens, mounted in frames under glass. Mr. William Gray exhibited the cornea of an insect's eye, showing multiple images. Mr. Nevin H. Foster showed six species of living Woodlice, and had a short account of these animals printed, of which copies were distributed. Mr. Joseph Maxwell and Mr. William Duncan showed living examples of *Stephanoceros eichornii*, by the aid of the microscope, from a brick-pond at Oldpark. This species of Rotifer is now found to be fairly common around

Belfast. In his exhibit of living Land and Freshwater Snails, Mr. R. J. Welch included living freshwater Mollusca from the Lagan ; and from Coe Fen, Cambridge, fine specimens of the Trumpet Shell, *Planorbis corneus*, and other species. With these were examples of the shells of each species cleaned and mounted. Mr. A. W. Stelfox exhibited some living examples of Irish Slugs, amongst which special mention must be made of *Limax cinereo-niger* from Drumbo Glen, which constitutes a new record for County Down. He showed also living Snails from Algeciras, Spain, and living Millepedes from Burmah. An exhibit which was the centre of attraction throughout the evening was that of Mr. R. H. Whitehouse, of Pond-dwellers in aquaria, and some specimens of *Salamandra maculosa* and *Lacerta viridis* lent by the kindness of Professor Gregg Wilson, aroused much interest. Some fine caterpillars of *Bombyx cecropia* were exhibited by Mr. John Hamilton.

In the Botanical Section several exhibits were worthy of special notice. A fine selection of mounted specimens was shown by Mr. N. Carrothers, amongst which *Lathyrus palustris* from Ellis's Cut, Co. Down, must be mentioned. Mr. S. A. Bennett exhibited a surprising number of species of plants collected by pupils of Campbell College in the grounds. Rev. C. H. Waddell showed plants which are rare in Co. Down, *Orchis pyramidalis* found at Greyabbey being specially noteworthy. Mr. H. L. Orr showed cases illustrating the fruiting of various trees found in the neighbourhood, and Mr. W. H. Phillips showed British Ferns printed from life, while Mr. W. J. C. Tomlinson exhibited some Dorset plants collected during the past Summer in the vicinity of Weymouth. An exhibit of living plants was shown by Mr. A. W. Stelfox, which included *Saxifraga oppositifolia*, *Silene acaulis*, *Arenaria verna*, *Dryas octopetala*, and *Orobanche rubra*, collected recently at Benevenagh, Co. Derry. These were accompanied by maps giving their Britannic distribution, and by photographs showing their habitats. Some photos. illustrative of the habitats

of Alpine plants in Ireland and Norway were also shown by Mr. Stelfox.

In the Geological Section Mr. Robert Bell showed some Crystalline Gypsum, new to the district, which he had found in Ballymurphy brickworks. Mr. A. M'I. Cleland exhibited photographs and geological specimens from the Auvergne district, Central France. Dr. A. R. Dwerryhouse showed relief models of Belfast district, illustrating contour of the grounds and the relation of the surface drainage to the slope of the country. These models assist in illustrating some of the problems of Glacial Geology, particularly as regards modifications produced in the drainage system by the ice of the Glacial Period. Specimens of rocks of the Isle of Arran were displayed also by Dr. Dwerryhouse, some of which have already been recognised in the Glacial drift of the North of Ireland, and were collected with the object of determining whether or no other Arran rocks have contributed to our drift deposits. An exhibit of much local interest was that of Mr. W. J. Fennell, which included fine specimens of Smoky Quartz crystals of Mourne Granite, Chalcedony, Iceland Spar, Gypsum, Glauconite, &c.

In the Miscellaneous Section some Rush Crosses and Harvest Knots from the North of Co. Antrim, exhibited by Miss Elizabeth Andrews, aroused much interest. Mr. T. W. Dunlop showed a collection of ancient Stone Implements from the Tertiary gravels of North-West Texas. With these he had specimens from Irish gravel-pits. Mr. Robert May had an exhibit of old Irish Rush-light and Candle-holders of various types, some for candles only, some for candles and resin slots, and some for candles and rush-lights. Toasters of various types were shown, also a bone of an Irish red deer found during excavations for foundations of the new premises for Messrs. Coates & Co., Belfast. Canon Lett's exhibit of a stone from Dromore, known as "St. Colman's Pillow," proved very interesting. For many years it has been in the graveyard of Dromore Cathedral, and is now in

Canon Lett's charge. The stone weighs about one hundred-weight. Mr. Charles Bulla showed a "baton du commandment" and some linen stamps, about eighty years old. Specimens of glass slag from the site of the extinct glasshouse at Ballycastle, fragments of pottery in various stages of manufacture from the site of extinct pottery works near Larne Harbour, and objects of flint from the bed of the River Shesk at Ballycastle, were shown by Mr. W. H. Patterson.

Amongst the exhibits of photographs and drawings were nature photographs by Mr. A. B. Morris; enlargements of photos. of places visited by the Club during 1912 by Mr. S. H. Douey; photographs of Rome and Naples and other objects shown by Mr. Adam Speers; five photographs of the Roman Aqueduct, "Pont du Gard," near Nimes, by Mr. A. M'I. Cleland; and photographs from Balkan States and the East by Mr. G. W. Shaw. Mr. F. J. Bigger showed a collection of coloured shields with decorative devices from the early crosses of County Down. He also exhibited drawings and photographs of Castle Sean, formerly known as Jordan's Castle, Ardglass. Mr. Robert J. Welch exhibited photographs illustrating flax culture in Ulster; a "Harvest Churn;" and photos. of the Boyne Valley, Rossmore Castle, &c.

At nine o'clock a lantern display was given, at which many views illustrating the Summer excursions of the Club were shown by Messrs. F. J. Bigger, S. H. Douey, W. A. Green, D. J. Hogg, H. L. Orr, S. Wear, and R. J. Welch.

Previous to the lantern display the President addressed the meeting, and welcomed the country members and friends of the Club. These included Mr. W. J. D. Walker, of Drogheda, whom he was happy to say had rejoined the Club that night. He was glad to see that Mr. J. N. Milne was able to be present, but regretted that Mr. Joseph Wright, one of the original members of the Club, had been unable to attend owing to slight indisposition. Continuing, Canon Lett said "that in this our fiftieth year we

have two original members exhibiting, a remarkable testimony to the study of Natural Science as a healthy recreation. The average attendance at the Summer excursions was forty-two—a distinct improvement on 1911—and, although the Summer of the past year was a wet one, rain never interfered with any of the excursions. The working of the Junior Section promises to be a success, but some problems yet remain to be solved in connection with it, and members are invited to send suggestions to the Junior Committee. The celebration of the fiftieth anniversary of the Club's foundation will be held next May. A good programme has been arranged, and it is expected that many delegates from our sister clubs in England will attend the meeting. The first business meeting of the winter session will be held on Tuesday, 19th November, when I hope to have the honour of speaking to you on the Botanists of the North of Ireland." The election of eight new members—Miss D. Forth, Miss H. Ledgerwood, and Messrs. R. M'Creary, J. W. Dunlop, N. J. Ledgerwood, R. Long, S. M. Macoun, and R. J. Wight—terminated the meeting.

PRESIDENTIAL ADDRESS.

"BOTANISTS OF THE NORTH OF IRELAND."

The first meeting of the Winter Session was held in the Museum, on 19th November, when the President, Rev. Canon H. W. Lett, M.A., M.R.I.A., gave a most interesting address on "The Botanists of the North of Ireland," in which he said:—
"The Botanists of whom this paper treats are those whose botanical work was carried on in the northern part of Ireland, or who were natives of the province of Ulster. Of these several will be mentioned whose names have not hitherto appeared in any published list of the Botanists of Great Britain and Ireland, and a few particulars will be added to what has been already recorded concerning others who have long since obtained a place amongst the Botanists of the North of Ireland.

The Most Rev. William Nicholson, F.R.S., born in Cumberland 1655, died at Derry 1727. Was Bishop of Derry 1718-1726, and Archbishop of Cashel 1726-1727. Did much botanical work, especially in early life. A portrait of him was formerly at Tullyhogue, Co. Tyrone.

Sir Hans Sloane, one of the most distinguished men whom the County Down has produced, was born at Killyleagh in 1660. His library and natural history collections, bequeathed to the nation, became the nucleus of the British Museum. A full account of his life will be found in Sir W. Jardine's "Memoir of Sir Hans Sloane," and in the "Dictionary of National Biography."

There was a contemporary of Sloane's who, if anyone ever did, deserves to be reckoned as a botanist; this was Sir Arthur Rawdon, b. 1662, d. 1695, grandfather of the celebrated Earl of Moira, and ancestor of the present Marquess of Hastings. He

built a residence at Moira in Co. Down, where he had extensive gardens with "walks, vistoes, a labyrinth, canals, ponds, and groves," laid out in the fashion of the time, around it. In all this he was inspired and encouraged by Sloane's consignments and distributions of foreign plants, and he sent out his own gardener—one James Harlowe—to Jamaica to bring from thence some exotic trees and plants for the gardens at Moira. There is no record of the result of this experiment. But Rawdon sought for trees in more temperate regions; and Walter Harris in his history of the County Down, which was published in 1744, gives the names of nine trees and plants that were then remaining and growing well in the Moira Demesne. And thirty years ago there were three of the rare trees still in existence, while one of the plants, the *Acorus Calamus*, or Sweet-scented Flag, which had been planted in Sir Arthur's ponds has disappeared, together with the ponds, but has taken up its abode in the long level of the Ulster Canal between Moira and Blaris, as our local botanists well know. Sir Arthur is quite forgotten at Moira, not a trace of his mansion remains, while of his beautiful gardens the only things left now are the depressions where formerly were the ponds and canals. As a further proof of Sir Arthur having been a botanist, I may mention that William Sherrard, who died in 1728, visited Sir Arthur Rawdon at Moira, from which he explored the Mourne Mountains and the shores of Lough Neagh.

John Templeton was born in Belfast in 1766, where he died and was buried in 1825. In any notice of North of Ireland botanists a prominent place must be assigned to his name and work. His life was short but strenuous. He lived in an age when the study of botany was making progress in Great Britain, and in the investigation of the plants of Ireland he gave much assistance to several British authors, in whose works it is duly acknowledged, but he himself published very little. He had intended, however, to publish a "Flora Hibernica," and had the work well in hand. The manuscripts and drawings for this are

still in existence, and are evidence of his painstaking researches and industry. He aimed to make his work as perfect as was possible, and when some of his friends urged him to complete and publish his Flora it was his diffidence that held him back.

The authors whom Templeton helped by sending them specimens were :—Sir James Edward Smith in “English Botany” and “Flora Britannica;” Louis Weston Dillwyn in “British Confervae;” Dawson Turner in “British Fuci” and “Muscologia Hibernica;” Dubourdieu’s “Histories of Antrim and Down,” and Sampson’s “History of Londonderry.”

The MSS. left by Templeton consist of seven volumes. One of these is a small 8vo. half bound. It is in the Library of the Royal Irish Academy, and contains 280pp. of lists of Cryptogams, chiefly Mosses, with their localities. In this book is inserted a letter from Miss F. M. More, sister of Alexander Goodman More, to Dr. Edward Perceval Wright, Secretary Royal Irish Academy, dated March, 1897, in which she says “the manuscript which accompanies this letter was drawn up between 1794 and 1810 by the eminent naturalist, John Templeton, in Belfast. It was lent by his son, Dr. R. Templeton, to my brother, Alex. G. More, when he was preparing the second edition of the ‘Cybele Hibernica,’ on condition that it should be placed in the Library of the Royal Irish Academy afterwards.” The other six volumes are quarto size, and contain 1,090 folios, with descriptions of many of the plants, and careful drawings in pen and pencil and colours of many species. They were lent some years ago to the Belfast Natural History and Philosophical Society.

All the drawings were executed by Templeton himself, they are every one most accurately and beautifully drawn, and the colouring is true to nature and artistically finished, those of the Mosses and Hepaticas being particularly so.

Rev. Thomas Dix Hincks, LL.D. (1767-1857), born at Dublin, died at Belfast, and was buried at Killyleagh, Co. Down. Was Corresponding Secretary of the Belfast Botanical Society,

and contributed "On Flora of Ireland" to "Annals and Magazine of Natural History," VI. (1841) 1, and to "English Botany" (2014-2184).

Hannah Hincks (1798-1871) of Belfast, was a botanist and algologist; she was the oldest daughter of the Rev. Thomas Dix Hincks, and is often mentioned in "Flora of Ulster" and "Flora of the North-East of Ireland" as "of Ballycastle." This is an error which arose from the number of plants she found at Ballycastle, to which sea bathing resort she paid an annual visit. She formed a good Herbarium of Irish plants.

James Lawson Drummond, M.D., born at Larne 1783, and died at Belfast 1853, and buried at Ahoghill, Co. Antrim. Was a botanist, and one of the founders of the Belfast Botanic Gardens in 1820, and of the Belfast Natural History and Philosophical Society in 1821, to the *Proceedings* of which he contributed.

Rt. Rev. Richard Mant, D.D., son of Rev. Richard Mant, born at Southampton, 12th February, 1776, died at Ballymoney, Co. Antrim, 1848, and was buried at Hillsborough. He had been a scholar of Winchester, and then Fellow of Oriel, Oxford, and in 1820 became Bishop of Killaloe, and in 1823 Bishop of Down, and lived at Holywood in a residence now incorporated with the Palace Barracks. He was distinguished as a divine and commentator on the Bible, an accomplished preacher, and a sacred poet. From his college days he was a keen botanist and was familiar with all our native plants. There is a good life-size portrait of him in Culloden House, Cultra. My father, who was one of his examining chaplains, used to tell a good anecdote about Mant and a Belfast gentleman; after dinner one day as the party strolled round the garden, the Bishop's Presbyterian friend plucked a leaf off the plant, *Aegopodium Podagraria*, and presenting it asked—"Mr. Bishop, how is it that my gardener tells me that the worst weed he has to contend with is Bishop's Weed?"—"And" replied Dr. Mant "my gardener says the most troublesome weed in my garden is called Elderweed!"

The Very Rev. Holt Waring, born 1766 and died 1850, who was Rector of Shankill or Lurgan, and Dean of Dromore, had a most delightful garden at his residence, Waringstown House, close to the village of the same name in Co. Down. There was in it a choice collection of rare trees and shrubs, and hardy foreign as well as native plants, and there was also a fine rock-garden in one part of it with a large collection of hardy ferns, and a pond for choice aquatics. A peculiarity of the whole was that every plant had a legible label with the proper scientific name. I saw it sixty-five years ago when it was in perfection, it was my first introduction to a good collection of ferns, and till quite recently I never saw a better. This garden flourished till the end of the last century.

There was a family named Hancock long resident in Lisburn, one of whom, Dr. Thomas Hancock, born in that town in 1783, was a botanist and skilful physician, who eventually settled in London.

George Dickie, born in Aberdeen in 1812, became Professor of Natural History at Belfast in 1849. He returned to his native city in 1860 as Professor of Botany in Aberdeen University, and in 1864 he published his well-known and useful little "Flora of Ulster," where his botanical field work in the North of Ireland is fully recorded. A short biography of him appears in the "Flora of the North-East of Ireland."

Rev. William Hind, a member of a well-known Belfast family, born in Belfast 1815, died in Suffolk 1894, was curate of Derriaghy, Co. Antrim, in 1839. His collection of British Plants is in the Herbarium of Trinity College, Dublin.

Professor Ralph Tate, F.L.S., born at Alnwick, Northumberland, and died in 1901 at Adelaide, South Australia, author of "Flora Belfastiensis," published in 1863, which gives the results of his investigations of the plants in Down and Antrim within a radius of fifteen miles from Belfast. He taught for many years natural science classes which the Government established in

Belfast, and in 1863, in conjunction with a number of his pupils, founded the Belfast Naturalists' Field Club. A full account of this will be found in the "Irish Naturalist" for 1902.

Miss Catherine Gage, daughter of Rev. Robert Gage, rector of Rathlin, born in 1816 on Rathlin Island, where she died 16th February, 1892, and is buried, took a great interest in the native Flora of the Island, and made a series of excellent drawings of most of the plants, which are in the possession of the family. Her list of the Island plants is very complete; the Dicotyledons being 204, and the Monocotyledons 21. This was prepared for the Botanical Society of Edinburgh, and an abstract of it was published in the "Annals and Magazine of Natural History" for the year 1850.

James R. Garrett, of Holywood, Co. Down, solicitor, born 1820, died 1855, is known to Belfast zoologists as co-editor with Robert Patterson of Vol. IV. of Thompson's "Natural History of Ireland," in addition to being a zoologist was a student of the plants of the North-East of Ireland. He was one of the first fern fanciers of the district, and had at Holywood a fernery in which were grown specimens of all our native ferns, with several of their fancy varieties. I have now in my fernery two fine plants of *Lastrea Felix-mas* var. *cristata*, which originally came from his garden.

Rev. Richard Oulton, born in 1812 at Cooldagh, near Ballymoney, Co. Antrim, died at Holywood in 1880, was curate of St. Anne's, Belfast, Chaplain to the Forces, and Registrar to the Queen's College. He was a keen botanist, and was intimate with the plants of the Counties Down, Antrim, and Armagh, and knew all the localities for the rarer species. He had formed a good herbarium of the local plants, which twenty years after his death, on the demise of his widow, was sold, together with some other natural history collections and his library, in Belfast.

In the second edition of "Cybele Hibernica" (1898), at p. 520, is the following correction of a notice of a very rare plant

that was omitted in error from its proper place in the book. "*Euphorbia Peplis*, L., Garraris Cove, near Tramore, Waterford (Miss Trench): Mackay, 1859—and spec. in Herb. Mackay in Trinity Coll., Dublin. First found by Miss Trench in 1839, but not since seen, though sought for by R. M. Barrington in 1870 and 1871, and by H. C. Hart in 1882, no doubt extinct." I may add that the Rev. C. H. Waddell searched for this plant with me in 1902, but we did not find it. The locality is two miles south of Tramore, and the disappearance of the plant may be accounted for by the removal every year of large quantities of the beautiful gravel forming the beach and headlands at the spot. This lady, Helena Trench, born in Dublin 1820, died at Killiney 1908, and buried at Loughbrickland, was a daughter of the Rev. F. S. and Lady Helena Trench. She married Jeffry Lefroy, Vicar of Aghaderg and subsequently Dean of Dromore. In early life she was an enthusiastic botanist and student of Irish and Continental plants, the taste for which she had inherited from her mother. Her large and well preserved herbarium was given by her in 1885, on the death of her husband when the family left the North of Ireland, to the Banbridge Young Men's Christian Association.

George Crawford Hyndman, born in Belfast 1796, died at Belfast 1867, was a botanist as well as a conchologist. On his death a large collection of his shells was purchased for the town of Lurgan, where it still exists in the Town Hall. He had an excellent herbarium which passed to his nephew Mr. Hugh Hyndman, LL.D., and he was well acquainted with the plants of Ulster.

William Thompson, born at Belfast, 2nd November, 1805, died in London, 17th February, 1852, author of the "Natural History of Ireland," gave attention not only to the Vertebrate and Invertebrate animals (except Insecta and Infusoria), but also to the Vegetable Kingdom in all its various forms; he was truly a many-sided naturalist, and may fairly be claimed as a botanist. Some departments of cryptogamic botany gave exercise to his

powers of observation, as shown by his paper "On a minute *Alga*, which colours Ballydrain Lake," and more especially by the number of localities contributed by him to Professor Harvey's splendid work, "Phycologia Britannica." Dickie in the preface to the "Flora of Ulster" acknowledges the botanical memoranda of the late Mr. W. Thompson as having furnished valuable information for the "Flora," in the pages of which are numerous records of his collecting of various plants. And in the Belfast Museum is a herbarium formed by Thompson, which is of itself an enduring evidence of his industry and research in the fruitful fields of botany. An account of his life was published in the posthumous Vol. IV. of his "Natural History of Ireland."

David Moore, F.L.S., was born at Dundee 1807, and died at Dublin 1879. He came to Ireland, one of those able adventurous Scotchmen who have done so much for science in this island, in 1828, as assistant to James T. Mackay, the director of Trinity College Botanic Gardens; and in 1835 he received an appointment as botanist on the Ordnance Survey of Ireland. The district which Moore surveyed was County Londonderry, and part of Antrim. His discoveries are recorded in the "Phytologist" (1857), in Colby's "Co. Derry," in his own "Synopsis of the Mosses of Ireland," in the *Proceedings* of the Royal Irish Academy (1872), and in his "Report on Irish Hepaticæ" in *Proceedings* of the Royal Irish Academy (1876). A brief biography will be found in the "Flora of the North-East of Ireland."

Thomas Drummond, A.L.S., died Havana, Cuba, 1835. Came from Forfar on the formation of the Belfast Botanic Gardens, of which he was the first Curator. He did not remain long in Belfast, but made good use of his time collecting Mosses, which were subsequently published in a folio without any letter-press under the title "MUSCI SCOTICI," though a large number of the specimens are Irish. There is a copy in the Belfast Museum Library.

Lady Kane, *née* Katherine Baily, born 11th March, 1811, died at Dublin 15th February, 1886, was authoress of the "Irish Flora," 1833. A considerable number of plants are first recorded from Down and Antrim in this volume.

Theobald Jones, F.L.S., Admiral, M.P. for Londonderry, was born at Dublin 1790, and died there 12th February, 1868. He contributed papers on Lichens to the *Proceedings* of the Dublin Natural History Society. His large herbarium of Lichens is preserved in the National Museum, Kildare Street, Dublin.

David Orr, engaged in Glasnevin Gardens under Dr. Moore, 1854, retired 1882, died at Dublin 1892. He had resided in Belfast, where he noted many plants, some of them very rare mosses, as occurring in the district; but a suspicion of error has fallen upon a portion of his work and deprived it of the value it otherwise would have had.

Rev. W. T. Whan, M.A., born (1835) at Ballylifford, near Moneymore, Co. Derry. Taught classics and botany in the Old Academy, Cookstown. Ordained by the Tyrone Presbytery (1860) as a missionary to New Zealand, where he remained some years, and subsequently removed to Victoria, Australia, where he died (1905). His name occurs frequently in Dickie's Flora as the collector of plants in the Counties of Armagh, Londonderry, and Tyrone.

The Flora of the North-East of Ireland by Samuel Alexander Stewart, A.L.S., F.B.S.E., and Thomas Hughes Corry, F.L.S., F.B.S.E., published in 1888 by the Belfast Naturalists' Field Club, marks an epoch in the work of the botanists of the North of Ireland. It contains the results of the work of nearly all the botanists who have investigated the plants of our district, and no other part of Ireland except Co. Dublin has yet been so well examined. T. H. Corry, born in Belfast in 1860, was drowned in Lough Gill, Co. Sligo, 4th August, 1883, while exploring for the purposes of the Flora, and with him his friend Mr. Charles Dickson, a solicitor of Belfast, who was also an enthusiastic

botanist and was helping in the investigation. Mr. Corry was a diligent worker, and had already attained a position amongst rising botanists beyond what his twenty-four years seem to warrant. He was Lecturer on Botany in the University Medical and Science Schools, Cambridge; and Assistant Curator of the University Herbarium.

Stewart was thus left to carry on the preparation of the Flora for the press, and he took the greatest care in testing every record that it was possible to test and confirm. This was a feature of his life. He never took anything for granted, and therefore his botanical work is thoroughly reliable. His care in this respect was so great as occasionally to disturb some of his friends and helpers, but it was a good quality. He contributed several important reports on Irish Botany to the *Proceedings* of the Royal Irish Academy.

A most interesting biographical sketch of Stewart's life, by Rev. C. H. Waddell, B.D., will be found in the *Annual Report and Proceedings* of the Belfast Naturalists' Field Club for 1910-11, pp. 410-434, and in the "Irish Naturalist" for October, 1910. And in the same number of the "Irish Naturalist" is a contribution by Mr. R. Ll. Praeger on Stewart's Work, together with a complete list of his writings.

It is a tragic and remarkable coincidence that Stewart's death, like that of his coadjutor on the "Flora of the North-East of Ireland," was also the result of an accident. He died from injuries received from a fall in Ann Street, Belfast, on 15th June, 1910.

David Redmond, born in parish of Connor, died 1905, and was buried in the new cemetery at Antrim. Was much interested in the study of our native plants, and was a member of the Belfast Naturalists' Field Club. He supplied a number of localities for rare plants to Stewart and Corry's "Flora of the N.-E.," added *Cerastium arvense* to the Flora of Antrim, and was the first to discover *Allium oleraceum* in Ireland. See in "Irish

Naturalist" for May, 1909, a record of the discovery by him of *Chenopodium polyspermum* on the shore of Lough Neagh.

Rev. Samuel Arthur Brenan, B.A., T.C.D., born 1837, died 1908 at Cushendun, and buried at Cushendall, was a keen botanist, and never thought any trouble too much or any walk too long in looking for a rare plant. He worked principally amongst the Flora of Antrim, Armagh, and Tyrone, and contributed notes to the "Journal of Botany" and "Irish Naturalist," and specimens to other workers. He left his herbarium to his friend, Mr. William Hancock, who deposited it in the Belfast Museum.

Canon John Grainger, D.D., rector of Skerry and Rathcavan, born 1830 at Belfast, died 1891 at Broughshane, where he is buried, gave his immense collections of stone and metal antiquities and coins, geological specimens, insects and shells, and library to the City of Belfast, though best known as an antiquary and geologist, was also a botanist. In the preface to "Flora Belfastiensis" the author acknowledges the assistance he received from him in the compilation of that book, and nothing gave him greater pleasure than to return home from one of the Naturalists' Field Club excursions bringing something new to add to his herbarium.

Isabella Maffett, daughter of Richard Maffett, M.D., F.R.C.S.I., of Glasslough, Co. Monaghan, born at Glasslough 1842, died 23rd April, 1907, and was buried at Mount Jerome Cemetery, Dublin. Contributed to the *Proceedings* of the Belfast Naturalists' Field Club. Herbarium is at Church House, Clyde Road, Dublin, of which Institution for many years she had been Mother Superior. She is mentioned by Stewart in the Introduction to "Flora of North-East of Ireland."

John Henry Davies, born at Penketh, near Warrington, 1838, died suddenly at Belfast 20th August, 1909, spent the greater portion of his life in Ireland. In very early life he developed a taste for botany, making a speciality of mosses, and corresponding

with Professor W. H. Harvey, of Trinity College, Dublin, and William Wilson, of Warrington. Specimens of mosses collected by him in Wicklow and Kildare in 1857, in which neighbourhood he then lived, are preserved in the herbarium of Trinity College. He contributed papers on the Mosses of Antrim and Down to the "Phytologist" and "Irish Naturalist" from 1857 to 1907.

Henry Chichester Hart, B.A., F.I.S., was born at Raheny, Co. Dublin, 29th July, 1847, and died at Carrablagh, on shores of Lough Swilly, 7th August, 1908. He did a very large amount of field-work between 1873 and the end of the century, parts of nearly every county in Ireland receiving his attention. He specialized in the flora of Co. Donegal. In Praeger's "Irish Topographical Botany" are listed fifteen papers on Co. Donegal botany alone which he contributed to the "Journal of Botany" and *Proceedings of the Royal Irish Academy*. This material was eventually summarized in his well-known "Flora of Co. Donegal." A short account of his life and work, from the pen of his friend, R. M. Barrington, appears in the "Irish Naturalist" for December, 1908.

Mrs. Mary Isabella Leebody, born in the Ards, Co. Down, died in 1911 at Londonderry, did good botanical work for many years, and added many records for the county in which she resided. She is frequently mentioned in the "Irish Naturalist."

Rev. George Robinson, M.A., Rector of Tartaraghan, Co. Armagh, born 1824 (?) died 1884, was a careful and ardent botanist, and contributed many records of the rarer plants from Co. Armagh to Dickie's "Flora of Ulster."

Another botanist who contributed to Dickie's records was W. H. Ferguson, of Belfast, who was a pupil of his.

A friend of Dickie's, William Millar, was a teacher in Belfast who had always been very desirous of promoting a taste for botany among his private pupils. He had an enthusiastic love for the native plants of his country.

Doctor Mateer was another Belfast botanist who also helped by his own work to foster a love of the study of botany.

Rev. William Sunderland Smith, of Antrim, died 1912, was intimate with the littoral flora of Lough Neagh. He published (1885) a little book "Gossip about Lough Neagh" which gives the names of the plants that grow around that lake.

James Townsend Mackay, A.I.S., M.R.I.A., was born at Kirkcaldy, Fife, 1775, and died at Dublin 1862. He published in the *Transactions of Royal Irish Academy*, Vol. XIV., 1825, "Catalogue of Plants found in Ireland." In 1836 he published "Flora Hibernica" in which there are many northern records of phanerogams and cryptogams.

Whitley Stokes, F.T.C.D., M.D., born at Waterford 1763, died at Dublin, 13th April, 1845, was a friend of Templeton's, with whom he collected plants in Ulster.

Robert Scott, M.D., died before 1813, discovered *Dicranum scottii* at Swanlinbar. He worked at mosses of the North of Ireland for Dawson Turner.

Edmund Murphy, 1828-65, landscape gardener of Dublin, contributed localities for plants from several northern counties to Mackay's "Flora Hibernica."

Francis Whitla, of Belfast, 1830-53, later of Dublin, knew Irish plants well, and contributed to "Flora Hibernica."

Richard Kennedy, a young and promising botanist, found in 1817 *Hottonia palustris* near Downpatrick.

Letitia Hannah Damer Sandys, born 1840 in the Isle of Wight and educated in America, came to Ireland and married Benjamin Nicholson White-Spunner, who became rector of Donaghmore, Co. Tyrone. She died 1911. She was a naturalist of wide tastes, her speciality being botany. She prepared and exhibited a herbarium in book form of the wild flowers of Ireland

which was exhibited at the Chicago Exhibition. This collection is now preserved by her son, who resides in Co. Meath.

James Shanks, born 4th November, 1854, died 2nd November, 1912, at Ballyfounder, near Portaferry, was an intelligent and successful farmer, who for his recreation studied the botany, archaeology, and geology of the district of Little Ards, in County Down. He took a great interest in the native plants of his locality, and every year exhibited large collections of the wild flowers of the Ards at all the local flower shows. He had made himself a pyramidal revolving stand for these occasions, which held a great many flowers and enabled all to be easily examined by the visitors. Mr. Shanks was of a retiring and modest disposition, and never made a parade of his learning."

"SOME GEOLOGICAL FEATURES OF SCOTLAND AND
THEIR RELATION TO THE STRUCTURE OF THE
NORTH OF IRELAND."

The second meeting of the Winter Session was held in the Museum on 17th December, when a most interesting lecture was delivered by A. R. Dwerryhouse, D.Sc., F.G.S., M.R.I.A., on the above subject. The President, Rev. Canon Lett, M.R.I.A., occupied the chair.

The lecturer directed attention chiefly to the Archæan and Palæozoic rocks, and showed that the great "Caledonian" earth movements which above all others determined the structure of the North of Ireland took place at the end of the Silurian Period. The structure of the North-West Highlands of Scotland was dealt with at some length, and it was shown that the Lewisian gneiss, the oldest rock known in the British Isles, had been formed by the crushing and shearing of a great complex of basic igneous rocks. The sequence of events prior to the deposition of the Torridon Sandstone was shown to be a complex and lengthy one, including (a) the intrusion of the igneous rocks; (b) their

conversion into gneiss by mechanical deformation; (c) the intrusion of four sets of igneous dykes; (d) further earth movements which converted the dykes into epi-diorites, hornblende-schists, mica-schists, &c.; (e) great denudation of the land surface, which removed the cover under which the igneous rocks and gneisses had been formed. The formation of the Torridon Sandstone was followed by earth movements and extensive denudation, and later by a downward movement of the land, which sank beneath the level of the sea in which the Cambrian rocks were subsequently deposited. At a later date after the formation of the Ordovician and Silurian rocks a still more stupendous series of earth movements set in, producing the enormous thrust planes and reversed faults so characteristic of the North-West Highlands. Attention was drawn to the natural division of Scotland into four great structural areas—viz., (1) the North-West Highlands, (2) the Eastern and Central Highlands, (3) the Central Valley (Clyde and Forth Valleys), and (4) the Southern Uplands, and the last three were shown to extend into Ireland, and were traced across the island to the Atlantic coast. Particular attention was drawn to the close similarity both in nature and arrangement existing between the Ordovician and Silurian rocks of the Southern Uplands of Scotland and those of County Down and the neighbouring districts, while many of the quartzites and limestones of the Central Highlands between the Caledonian Canal and the Grampian Fault were shown to have their counterparts in the counties of Londonderry, Donegal, and Tyrone.

At the conclusion of the lecture Mr. R. J. Welch raised some very interesting questions on the subject matter of the paper, and thanked the lecturer for the lucid explanation he had given of such difficult problems.

Mr. W. J. C. Tomlinson also commented on the interest of the paper, and pointed out how necessary it was that more work should be done on the same lines in Ireland, as has been done by the Geological Survey in Scotland.

Dr. Dwerryhouse having replied, the Chairman conveyed to Mr. Nevin H. Foster the hearty congratulations of the Club upon his election as a Fellow of the Linnean Society of London, one of the greatest honours which a field naturalist can obtain. He also expressed regret that the Club is about to lose two of its members, Mr. and Mrs. Balfour Browne, who were leaving for England.

EXCURSION TO SLIEVE-NA-GRIDDLE.

On Boxing Day a small band of enthusiastic members travelled to Downpatrick by the 10.50 a.m. train. Upon leaving the train the party proceeded on foot to the Wells of Struell, situated some two and a half miles east of Downpatrick. In former days a "pattern" was held annually at this sacred place, so closely associated with St. Patrick. After inspecting the various wells, to which miraculous healing powers are attributed, and a visit to the "stations" on the neighbouring hill, the party proceeded on their way to Slieve-na-griddle. In ascending this summit a protruding boss of igneous rock was examined. The rock, which in some respects resembles a granite, is of uncertain age, but is certainly post-Silurian. Several good hand specimens showing the junction of the igneous and Silurian rocks were obtained. In most cases near the junction what appeared to be "junction-breccia" was observed. Some pieces of the igneous rock showed traces of "slickensiding," possibly due to earth foldings after the rock had consolidated. Proceeding towards the top of the hill, some exposed surfaces of the underlying Silurian rocks showed traces of severe glaciation. The glacial *striæ*, which ran in all cases due north and south, were almost at right angles to the bedding of the rocks. Close to the highest point a small overflow channel or "dry gap" was pointed out, cut during the later stages of the Glacial Period by the waters from the melting ice which stood against the northern slope of the hill. The descent

of the hill was made to Lough Money, and after a visit to the ruined Stone Circle near Ballyalton, the party returned to Downpatrick, passing on the way the Gallows Hill. A brief visit to the grave of St. Patrick in the grounds of the Cathedral was made before tea, which was partaken of at the Down Hunt Arms. The botanists reported several Summer flowers in bloom, including Daisies, Buttercups, Dandelions, Field Madder, a species of Geranium, Dead Nettle, Toad-Flax, and an abundance of Gorse, showing the unseasonableness of the weather, which had prevented these plants from obtaining their customary Winter sleep.

"THE WORSHIP OF THE MAGNA MATER."

The third meeting of the Winter Session was held in the Museum on the 21st January. The President (Rev. Canon Lett, M.R.I.A.) occupied the chair.

Major R. G. Berry, M.R.I.A., delivered a most interesting lecture on "The Worship of the Magna Mater." He stated that for some years past he had devoted a considerable amount of attention to the Neolithic civilisation of the Mediterranean area and its extensions, and his conclusions had led him to the belief that there existed in Neolithic times a great goddess cult which had its beginnings among the Palæolithic cave dwellers, probably from the worship of an earlier steatophagous race. The process of anthropomorphism from pillars of wood and stone and from totemic animals could be witnessed from Sinai to France and from Egypt to the British Isles. The lecturer called attention to the difference in the conformation of the earth to-day from that displayed in prehistoric times, when a great central sea had occupied the heart of Asia and land-bridges connected Africa with Europe, and when the North Sea and English Channel were dry land. About 7,000 B.C. there was an invasion of Egypt from the direction of the Red Sea by people who differed very little physically from the early Egyptians, but bringing with them new gods. These

backwashes of population occurred at many different times bringing fresh infusions of culture. Similar migrations extended to Europe, and a horde advanced along a trade route marked by the megalithic monuments, along the Atlantic coast to the British Isles and Scandinavia. From the Irish and Scandinavian writings, and from comparisons of excavations at different centres, they had learnt the uses of these structures, the appearance of their builders, and the nature of their civilisation. They found their religious ideas expressed in an extended litholatry, and out of the pillar-stones they saw emerging at Sinai, in France, and in Ireland, a goddess. The worship of meteorites and concretions, and their development into goddesses, was common all over this area. The cult of the woman was the characteristic of Neolithic art. From the first origin of art displayed in the drawings of animals and women on the Palaeolithic sanctuary walls down to bronze times no one thought of investing clay or stone with the form of a man. It could not be doubted that all these goddesses were imitations and variations or personified attributes of one original All-Mother, from whom all gods and goddesses proceeded. The Great Mother was a personification of the impersonal Divine Essence which was pictured in the Egyptian idea of primal night and the Babylonian watery chaos, the earth's soul or nature, which remained necessarily the same whatever might be the forms and names under which it displayed itself, and the gods were projections of her personality, attributes personified. In that welter of religions which accompanied the decline of national life in antiquity the serene figure of the Magna Mater, in her many forms, stood out like a star in a stormy sky. The religion of the Great Mother, with its dignity and composure, its solemnity and decorum, its immemorial and mysterious sanctity, was beautiful, chaste, and kindly—a flower whose beauty was only dimmed by comparison with a purer and more reasonable religion.

At the close of the lecture a discussion took place, in which the following took part:—Canon Lett, Mr. R. J. Welch, Miss E.

Andrews, Mr. A. Basil Wilson, Mr. Robt. May, and Dr. Rusk. The lecturer having replied to the numerous questions, the meeting terminated.

"THE GORGES OF THE TARN."

The fourth meeting of the Winter Session was held in the Museum on 18th February, when a paper was read by Mr. A. M'I. Cleland on the above subject. A very large audience followed this lecture with the greatest interest and attention. The chair was occupied by Mr. R. J. Welch, M.R.I.A., who suitably introduced the lecturer. After a brief reference to the district of the Cevennes and its connection with the Huguenot wars in the fifteenth century and the Camisard revolt in the early days of the eighteenth, the lecturer described the Causses as vast flat limestone plateaux, spreading out from the south-western flank of the Cevennes range, and giving rise to several rivers, among them the Tarn, which ultimately join the Garonne, and flow into the sea in the Bay of Biscay. From the sylvan Tarn the lecturer led his audience to the volcanic district of the Auvergne, a region covered by craters so recently extinct as to give one the impression that their last discharges took place only a few centuries ago. But neither history nor legend had any record of the volcanoes of the Auvergne having been known to be active. After a visit to Puy de Dome and various other mountains and to several interesting castles, a trip was made to the basaltic plateau of Gergovia, 2,000 feet high, and the site of an ancient Gaulish city. Here Vercingetorix, the last Gaulish chieftain, inflicted a severe defeat on Julius Cæsar in 52 B.C., destroying upwards of 4,000 of his best troops. A most interesting lecture was brought to a close by a brief visit to the quaint hill-village of La Roche Blanche, with its old cave dwellings in the limestone cliff, inhabited within the memory of living man. The lecture was fully illustrated throughout by a series of excellent views taken by the lecturer when touring in the South of France during last Summer.

The following were elected members of the Club :—Miss M. K. Duffin, Miss F. M. Ritchie, Miss I. Doherty, Miss N. Humphreys, Miss S. Bell, Miss I. Boyd, and Miss E. C. Montgomery.

“OUTLINE OF GEOLOGICAL OBSERVATIONS IN NORTH-EAST LONDONDERRY COLLECTED DURING THE PROGRESS OF REVISION WORK.”

At the fifth meeting of the Winter Session on 18th March, the above paper was read by Dr. A. R. Dwerryhouse on behalf of the author, Mr. J. R. Kihoe, A.R.C.Sc.I., who was unable to be present at the meeting. Mr. Robert J. Welch, M.R.I.A., occupied the chair, and there was a large attendance of the members of the Geological Section of the Club.

PHYSICAL GEOLOGY.

“Many features of importance in this highly interesting region do not seem to have received much attention in the original rapid survey on the one-inch scale. It is, therefore; here proposed to give an outline of the principal conclusions to which I have been led, in the revised survey of the region on the six-inch scale, particularly North-east Londonderry ; and this is offered with the sanction of the Director of the Geological Survey. Many details are reserved for the more extended account.

The watershed separating the valleys of the Roe and Bann passes at or near to the summits of the escarpment overlooking the former river, being only about $4\frac{1}{2}$ to $5\frac{1}{2}$ miles distant from it ; while the watershed is 6 to 9 miles distant from the Bann.

One extremely interesting fact connected with the formation of the Roe Valley is, that the principal features of the escarpment —Benevenagh, Keady Hill, Donald’s Hill, and Benbradagh—have receded eastward from the course of the Roe, approximately in inverse proportion to their heights. This we might expect on the hypothesis that the valley and escarpment alike owe their origin

to subaërial rather than marine denudation. The river, doubtless, commenced to flow upon the surface of the newest basalts, in a northerly direction; and when, during erosion, it touched the softer Cretaceous and Triassic strata, a gorge was formed which ultimately expanded to form the present valley, *pari passu* with the lowering of the river course. The resulting escarpment presents a sublime array of natural features, extending in an irregular *sinus* from Benevenagh in the north to Benbradagh in the south.

GEOLOGICAL FORMATIONS.

A table is here given in which the formations are presented according to age, in descending order; but only those to which special reference can be made in this outline. Indeed little can be added to the published accounts regarding the Metamorphic rocks, Carboniferous and Triassic strata, Chalk and Lias, partly because they have been already well described, and partly because they are largely concealed by drifts and later deposits.

TABLE OF FORMATIONS, ETC.

Peat.	Boulder-Clay of Third Stage.
Blown Sand.	Sand, Gravel, and Boulder Bed.
Raised Beaches.	Boulder-Clay of Second Stage.
Glacial-flood Gravels and Warp-clays.	Boulder-Clay of First Stage.
Moraines.	Upper Basalt.
Eskers, Esker Sands, etc.	Interbasaltic Beds:
Modified Boulder-Clay.	Lower Basalt.
	Old Blackwater Alluvium.

The last member of this series I introduce more or less tentatively, hoping to give fairly satisfactory reasons for its existence: while also advancing reasons for a belief in its continuance into, and prolonged deposition of, the series of beds commonly known as the Lough Neagh Clays. That is to say, the series continued throughout the periods of Lower Basalt, the Interbasaltic Beds, and (in the upper reaches of the valleys at least) the Upper Basalt, as well as subsequently, after the Glacial Period, and even up to recent times, with their present alluvial additions.

I assume that the term Interbasaltic Beds is familiar to all ; and that they are known to consist of *lithomarge* formed *in situ* from the Lower Basalt, with "pavement," a highly coloured red lithomarge, both of which show a *pseudo*-stratification : these underlie, either *lignite*, occurring often in thick seams, *bauxite*, which in places shows evidence of sedimentation,* or *iron ore* (black and compact or loose and pisolithic), which seems to have been collected through alternate droughts and drenchings,† in small lakes on the surface, and may in places show stratification ; or yet again *bole*, a clayey iron-ore ; occasionally also conglomerates, the result of lake-shore erosion.

BASALTS.

The most casual observer cannot fail to be struck with the extreme regularity of the basaltic layers presented in the magnificent cliffs and headlands, which face the north coast, from Bellarena to Castlerock along the Midland Railway Line. However critically examined, such uniform lava-flows seldom appear to be irregular, terminable or dovetailed with other flows on the same horizons, and are highly suggestive of having been originally very fluid basalts. From Benevenagh to Magilligan, to a great height in the cliffs, they are characteristically amygdaloidal, and are rarely columnar.

In the vicinity and latitude of Keady Hill, however, and further south, columnar structure is frequently to be seen, even in the lowest layers, and amygdaloidal structure is not common. Moreover, another structure such as that described by Sir Arch. Geikie‡ in the Sanday basalts, with alternating thin layers of ophitic and granular basalt, is frequently to be seen in the area east of Keady, and this peculiarly banded rock is occasionally highly crumpled. I take these structures to indicate that the

*Memoir. "Interbasaltic Beds of North-east Ireland," pp. 7, 31, 39, 50.
†*Op. cit.*, p. 8.

‡"Ancient Volcanoes," Vol. II., p. 190. See Note A at end of paper.

basaltic flows, by the time they had reached this part of our region, had attained a condition approaching entire solidification.

Again, in the vicinity of Benevenagh, delicately branching pipe-amygdaloid* is of frequent occurrence, with the stems normal to the bases of the layers, or nearly so, from which it is evident that these fluid basalts must have lain very near their origin until complete solidification supervened. Placing all these facts side by side, I venture to infer that, while making full allowance for outpourings from small fissures here and there over the plateau, instances of which I have met with, *an abundant source of lava must have lain to the north of, and not very far distant from, the present land.*

Another group of facts which has appeared to me worthy of attention is the vast aggregate thickness of the basaltic layers (900 feet or very probably more) west of the Bann, represented on the published Survey maps as Lower Basalt, while immediately east of the river the thickness of this member of the series—lessening from East Antrim towards the west—is only about 150 to 200 feet. This matter is discussed in the recently issued Survey Memoir,† where the conclusion is stated that *the basalt west of the Bann belongs to the Upper series of sheets rather than to the Lower*, a conclusion which involves an overlap of the series.

The Middle Zone crops out in the Keady escarpment, where it is represented by the characteristic rocks—bole, “pavement,” and lithomarge. The last is formed of and rests upon a thin representative of the Lower Basalt, which in large part is a beautifully columnar rock.

This is associated with a black structureless basalt, with inclusions of calcite in different forms, crystalline quartz, manganese oxide, fantastically shaped congeries of Chalk flints taken up from the adjoining floor, and indurated clay and flint breccias.

**Op. cit.*, Vol. II., p. 187.

†“The Interbasaltic Rocks of North-east Ireland,” pp. 26-28; 120-121.

The Zone also crops out near the summit of Craignashoke,* where lignite has been excavated;† but the Lower Basalt being there entirely absent, and therefore no lithomarge or bole existing at this point, the lignite and haematite are the only representatives of the Zone. It may here be explained that "Zone" is henceforth used in this paper in a general, not in the precise sense, being a convenient term to express an approximate horizon, which, under the circumstances, may represent the period of *some* upper outpourings of the Lower Basalt, and that of *some* lower outpourings of the overlapping Upper series.

Attention is here invited to the remarkable conglomerate at Coagh, referred to in the recently issued Memoir.‡ It was formerly (not correctly) described as volcanic conglomerate. "Unfortunately," however, we read "some sections which would have thrown additional light on the matter . . . are no longer visible." If they were, we should probably find that some, if not all, the rock referred to is a true water-formed conglomerate of sedimentary origin. One specimen, which I have seen from the locality, has certainly such an origin. It consists of strongly cemented waterworn débris of basalt evidently formed near the shore line of a sheet of water; a singularly interesting piece of evidence, marking a *break* between the basalt from which it was formed and that which covers it. These facts it will be noticed are consistent with the belief that the latter is Upper Basalt §

The existence of the Upper Basalt, west of the Bann, is accounted for on the presumption that a *considerable dislocation*

**Op. cit.*, pp. 27-28. The lignite is accompanied by "brown haematite."

† It is well to note that the deposit of lignite is of such importance, here, as also near Salter's Castle and at Sandy Bay, to be afterwards mentioned—where the "interbasaltic" position of the lignite might be doubted—that it has been excavated as a fuel; just as at Black Hill, near Glarryford, and other places where it is of unquestionable "interbasaltic" origin; while its occurrence at other horizons between basaltic sheets is of comparatively trifling importance.

‡*Op. cit.*, p. 101.

§ And the occurrence of fragments of rhyolite in the conglomerate is thus easily accounted for, the only known rhyolites in the region being interbasaltic.

has taken place, parallel to the course of the river, with a down-throw to the west, greatest near Coleraine, and diminishing southward, so as to vanish in the vicinity of Lough Neagh.

It has been noted that the directions of the Roe and Bann are northward, while that of the nearest large river, the Main, is southward. It is also a notable fact that the Interbasaltic Zone, east of the Bann, falls away southward from Tully Hill, near Portglenone, where it is 550 feet above datum, to approximately the lake level, say 50 feet above datum, near Cranfield Bay, north of Lough Neagh. The Zone, however, falls away northward from 1,400 feet in Benbradagh, by Keady, to the sea-level at Downhill. From these data corroboration is drawn for the commonly accepted opinion that the directions of the present drainage were initiated upon the surface of the Upper Basalt, after a series of subsidences and dislocations, consequent upon the latest eruptions. To such movements, no doubt, we may attribute the formation of the Lough Neagh basin ; and amongst the many fractures distinctly traceable, we may infer the existence of the fault running northward by Coleraine. It lies along the torsion-line of a vertical cosmic wrench, which sets adjacent parts of the original ground at diverse inclinations, namely, that of the valley of the Main on the east, and that of the Roe and Bann valleys on the west.

The distance to which the Lower Basalt extended southward, overlapped by the Upper, is not alone in itself an interesting question, but possesses such importance, to my mind, in connection with the age and formation of Lough Neagh, that I cannot omit reference to it here, though the reference must necessarily be brief. We have seen that the Interbasaltic Zone reaches approximately the lake-level near Cranfield Bay at its north margin. Passing to the Six-mile Water valley, we find felsitic rocks at 190 feet above datum in Templepatrick, basaltic-conglomerate, bole, and lignite in Ballymartin, and lignite with leaf-beds at 200 in Ballypalady, all representative of the Interbasaltic Zone. Chalk, which appears at Templepatrick, seems to

form the valley bottom, under alluvium and drifts, as far as the river, 600 yards to the northward, and was the original floor of the Lower Basalt at a level of 140 to 150 feet above datum. This member of the basaltic series, therefore, must here be little more than 40 to 50 feet thick, where present; a very different tale from a thickness of some 700 feet of supposed Lower Basalt at Divis, only 7 miles off. The original fall in the surface of the Upper Basalt suggested in the fall westward of the Six-Mile Water implies, moreover, a descent in the Interbasaltic Zone towards the lake, and prepares us for an outcrop of the beds precisely where lignite-beds are reported at the lake-margin.

Again, on the south side of the valley, the Zone is 655 feet above datum on the east side of Lyle's Hill, against 613 feet on the west side in a distance of some 400 yards. This gives a decline of some 11 feet in 100 yards; in so far as we are justified in drawing an inference from such meagre data—and there is nothing positive against the inference—a descent of such magnitude would bring Upper Basalt into the large drift-covered tract of Rickamore, west of Lyle's Hill, and an outcrop of the Zone at the lake margin, still further south than the embouchure of the Six-Mile Water. That no records of the Interbasaltic Beds* have been met with in Rickamore is not of great moment as *contra* evidence, for Prof. Seymour speaks of the dying out of the Zone "towards the north-west end of the Upper Basalt outcrop."† From what I have seen personally, I should say the same circumstances obtain, southward and south-eastward; so that we are practically without a distinguishing plane, westward and southward, by which to determine whether the basalt beyond Lyle's Hill in those directions is Lower, and not rather—as I believe it to be—Upper.

* "Inter. Beds," pp. 100, 101. Mining Captain Dryburgh made borings here, in the townland of Claremont, which revealed *bole*, as well as lignite and lithomarge, as he personally informed me.

† "Inter. Beds," p. 89.

It is confirmatory of these contentions that lignite has been very plentifully recorded on the east side of Lough Neagh—"from Cranfield southward to Seagoe in Armagh," to use the words of John Kelly.* It will be particularly borne in mind that the lignite at Claremont (Cranfield Bay) is associated with lithomarge, formed *in situ* from Lower Basalt,† and that Upper Basalt may not be very distant, though concealed by drifts.

Sometimes, doubtless, the lignite occurs in fragmentary form, indicating detachment from an original source,‡ but a source which must be in proximity, because the substance is so friable. Frequently, however, there seems good reason to believe, it was formed in beds up to 5 feet and even 9 feet in thickness, and to some extent continuous, and pure. So much so that an adit was run upon one of these beds many years ago by a Mr. French. There seems to me little doubt, therefore, that along the lake shore on its east side, if stripped of its covering of Glacial and post-Glacial deposits, there would be found proof of the existence of the Interbasaltic Zone of rocks, just as in the case at Claremont, near Cranfield Bay, on the north side.

Nor is it only on the north and east sides that indications of an important lignite Zone—in all probability of Interbasaltic date—have been found: on the west side, too, lignite occurs at or near the level of the lake. Mr. Egan mentions§ "a small pit" (400 yards south of Salter's Castle) "used by people of the neighbourhood to obtain lignite for fuel," as well as fragments of

*Paper. *Proceedings Roy. Irish Acad.*, Vol. X., pp. 307 *et seq.*

†"Interbasaltic Rocks," p. 100. The suggestion that a widespread exposure of this friable substance has been the source of all the lignite recorded on the borders of Lough Neagh, or that such a substance should have survived the denudations which removed its hard cap of Upper Basalt—including the ordeal of at least three stages of glaciation—and remained for removal by later erosion, as well as segregation by a sedimentary process, is a proposition that many geologists will find it difficult to accept.

‡Some layers as thick as 15, 20, and 25 feet have been recorded at Sandy Bay (*Journal Roy. Geo. Soc.*, Vol. IV., p. 175), but the report has been there called in question by the late E. T. Hardman.

§Explanation accompanying Sheet 27, p. 34.

lignite along the shore, such as are in other places associated with the Lough clays. Still more important is a reference by Portlock to a "stiff bluish clay" at the mouth of the Ballinderry River, under 6 feet of alternate layers of sand and imperfect lignite. Even if we suppose the lignite there to have been carried along the river course to the mouth (as is most probable), its source, a bed of lignite *in situ*, must have been exposed to erosion by the stream; which, taken conjointly with the conglomerate at Coagh, brings us to the same conclusion as that above mentioned, viz., the occurrence of a representative of the Interbasaltic Zone near the lake-level on the west side, as on the east.

Portlock also mentions that the stiff bluish clay beneath the lignite rests upon finely crystalline basalt. It may be that this clay is (like that at Claremont) *lithomarge*, and the basalt under it Lower Basalt; but this cannot with any degree of certainty be asserted. Taking, however, the indications available and certain, it is not improbable that the recent subsidence which submerged the portion of the present Bann course, furrowing the lake bottom,* has concealed, through a relative rise of the water, and by means of a wider spread of recent lake deposits, an outcrop of the interbasaltic beds around the *northern half* of the lake.

We are certain that the Lower Basalt extended southward as far as Claremont, and in but trifling thickness at Templepatrick; but can the same be said of any point further south? A boring was put down at Sandy Bay through lignite and clay beds to 76 feet 6 inches† *without piercing basalt*. Hardman represents a great thickness of Lower Basalt under Lough Neagh, but this entirely eludes us; so far from there being a wide-spreading outcrop of basalt along the shallow synclinal trough south-westward, which we might expect, upon such a hypothesis, there is

*Pointed out by Sir A. Geikie, D.C.L., LL.D., F.R.S., etc., in "Ancient Volcanoes," Vol. II., p. 451.

†Hardman, "On the Age and Formation of Lough Neagh." *Proc. Roy. Geo. Soc. I.*, Vol. IV., p. 175.

absolutely none to be found *in that direction*. Instead of this a boring made 2 miles from the south-west shore revealed 264 feet in depth of the Lough clays under 30 feet of Boulder-Clay; and Hardman, who records the facts, gives it as his own opinion that the clay-beds have an aggregate of 500 feet in thickness.

And, again, we must ask what becomes of the 700 feet of so-called Lower Basalt at Divis, which could scarcely have failed to spread—possibly in still greater thickness*—westward as far as, indeed beyond, the lake. This also eludes us. The corresponding disparity between the thickness at Divis, and the very thin representation of true Lower Basalt at Templepatrick, has already been pointed out.

Again lignite, associated with “red pisolithic earth,” is known to occur between the Chalk and Basalt at Knocknadona, north-west of Lisburn; and can it safely be asserted that this is not a representative of the lignite series of Lough Neagh, towards which the ground maintains a gentle slope due to the general depression of the lake-area? The depression which initiated the formation of the lake is of quite a mild degree as compared to the depth of clay reported near the south-west border; and, while it is comparatively easy to fancy how alluvial and delta deposits might soon fill up so great a depth, one factor in the problem should not be overlooked: it is this, that the present Blackwater and Bann *could not have eroded*, and *disposed of the products of erosion* of so great a hollow—*i.e.*, about 250 feet for certain, and 450 feet probable. The Bann at present flows over shallows of basalt at Portglenone; and the Lagan, a possible alternate course for the drainage, also flows upon rock near Lisburn.

*For it will be shown that in pre-volcanic times a valley existed—that of the old Blackwater—with its gentle descents from east and west, which would have facilitated the accumulation of Lower Basalt there, if such a thickness of lavas as 700 feet were heaped up on its east side, only a few miles off. At the stage of Upper Basalt outpourings, there may have been so great a thickness, even greater, but this, like as at so many other points in Antrim, has been carried off by denudation. The softer beds beneath were preserved by being at a lower level than that at which waste was proceeding.

As to the possible glacial origin of the hollow, reasons will presently be given for the belief that the deposits were in all probability *preserved* during the periods of glacial-erosion rather than that the hollow should be attributed to such a cause. The clays moreover in certain places underlie Boulder-Clays; and portions of the lignite, of the lake region, have been detached and carried northward by the ice.

The conclusions to which this array of facts, and somewhat anomalous hypotheses, point, seem to me fairly obvious; they are given in the following summary, and it will be noticed that they form an amplification of the possibility mentioned by Sir A. Geikie,* viz.: that "the pipe-clays and lignites" of Lough Neagh "may belong to the sedimentary zone that separates the Lower and Upper Basalts."

1.—It is not unlikely that the Upper Basalt is of greater extension on the east side of the lake than has hitherto been supposed; and it may ultimately be proved to encompass the lake.

2.—The lignites with the accompanying silicified wood and clay iron-ore, near the lake-shore, represent generally the Interbasaltic Zone of Antrim.

3.—The Zone is also probably represented by the lignite south of Clare, near Banbridge, which would relegate the covering rock to the Upper series of sheets.

4.—The Lower Basalt may not occur much to the southward of the middle of Lough Neagh, along a line north-westward by Ballinderry and Coagh, and northward of Craignashoke; thence eastward by Lyle's Hill; while the Upper Basalt occurs as far at least as the opening just referred to, south of Clare.

5.—The Lough Neagh Clays, though a continuous series, consist of deposits belonging to five different stages, as follows, beginning with the oldest:—

* "Ancient Volcanoes," Vol. II., p. 450.

- (a.)—Pre-volcanic alluvial clay and silts, which filled an old Blackwater Valley at a level some hundreds of feet above the present level of the river.
- (b.)—Delta and alluvial deposits laid down in the southern half of a shallow far-spreading lake, formed through a damming of the old Blackwater, by lava-sheets belonging to the Lower series. Erosion by this lake would account for the curious conglomerate at Coagh.*
- (c.)—Sediments and interbedded lignites, whether fragmentary, non-continuous or formed nearly where grown, synchronizing with the formation of lithomarge, lignite, iron-ore or bauxite upon the surface of the Lower Basalt.
- (d.)—Clays and lignites deposited during and subsequent to the Upper series of outpourings, and the subsequent depression and fracturing.
- (e.)—Glacial deposits and subsequent alluvial accumulations, including fragmentary lignite beds.

The preservation of such soft materials during the periods of greatest glaciation is a common subject of surprise : I attribute it to the following conditions, viz :—

First.—That the lake region and south-westward was filled with dead ice, and was shielded by the high ground overlooking Belfast, from the ploughing action of the overwhelming sheet from the north-east, after which—

Second.—The same region lay upon the axis of a gradually accumulating Irish System, which obstructed an inflow of ice from the north, and subsequently sent its own ice in an overwhelming sheet northward. This sheet of ice carried some pieces of lignite along the Bann valley

*See previous foot-note (p 638.). It will be borne in mind that the fall in level from Coagh to the margin of Lough Neagh, where the corresponding zone is supposed to occur, represented by lignite, is some 200 feet ; which, being due to the post-volcanic depression of the lake area, would not have previously existed. Under these circumstances the dammed waters of the Blackwater could easily have spread westward as far as is supposed.

towards Portglenone, but possessed little erosive power near the axis of accumulation which, according to Maxwell Close and Professor Hull, lay directly over the middle of Lough Neagh. It will be remembered that the axis stretched south-westward over the lake from the highlands of South Antrim.

We must now turn to the glacial phenomena of this very interesting region.

GLACIAL DEPOSITS.

If it would not seem entirely out of place for a stranger to attempt it, I should have much pleasure in testifying to the patient and long-persevering zeal evinced by your Club in the study of Glacial questions, especially in the North-east of Ireland, though your inquiry has by no means been limited to that region. Your collection of erratics is, I can well suppose, the most extensive that any region of equal size can boast, and a more interesting one for the display of skill in this respect could, I think, not be found. For here, contending, well-marshalled boreal forces of the past, have had their stubborn conflicts, with well-nigh infinitely varying results, and have left multitudes of relics strewn upon many a field.

Unfortunately, or the contrary, I am not one who has fallen in with the simple conception of adequate submergence during Glacial times, with its concomitant of detritus-charged floating ice, to account for everything met with—from the existence of *Foraminifera* upon Divis hill to the beautifully formed eskers in the Lagan Valley. That submergence to some extent obtained is by no means denied;* and I am far from approaching your region in any spirit of contention. I merely plead for kindly forbearance on the present occasion; and am glad, in such matters, both to recognise and avail myself of the principle of toleration for all.

*The existence of *Mytilus edulis*, associated with post-Pliocene Boulder-Clays, near the shore of Lough Neagh, seems to prove it (W. Swanston "On Supposed Fossiliferous Clays over Basalt," &c., *Geo. Mag.*, 1879, p. 69).

Amongst many proofs which may be given of the conclusion arrived at many years ago, more or less generally accepted since, of a westerly ice-flow over Ulster,* I may instance, at the outset, the occurrence of Ailsa Craig erratics in the Roe Valley. Through the assiduous labours of Madame Christen and Miss Andrews several specimens of the rock have been unearthed at Moys and Limavady, and at Dervock. †

To Mr. Robert Bell we are also indebted for the tracings of erratics, amongst which he discovered those of Ailsa Craig at Aghalee, and near Randalstown. †

During the recent Survey of the Drift-deposits of the Londonderry region ample evidence was obtained for a considerable inflow of ice, charged with shell-bearing clay and boulders, referred to in detail in the new Survey Memoir of that region.‡ Of this encroachment from the north or north-east ample corroboration has presented itself some 12 miles inland in the Roe Valley.

Furthermore, abundant evidence, in the form of glacial *striæ* and wide distribution of erratics from the south, is available throughout North Derry, for an extensive northerly ice-movement from the accumulation along Maxwell Close's axis, already mentioned.

It is obvious that a region which has experienced such vicissitudes—successive ice-movements in such a variety of directions—must necessarily present as great an admixture of non-local rocks at each point, as submergence and *débris*-charged ice-bergs could possibly afford. There is this difference between the possible outcomes of the two hypotheses which must not be overlooked, namely, that, in the former case, there is the possibility of classifying the drifts, however varied the admixtures in certain places; whereas in the hypothesis of submergence, and distribution by ice-bergs, it is not easy to perceive the likelihood of that possibility.

*The hinder part, it may be necessary to explain, being of Scottish ice, and the foremost, probably of Irish ice pushed forward.

† See Geological Section Report *ante*.

‡ "The Geology of the Country around Londonderry," 1908, pp. 54-56.

The constancy of the direction of glacial *striae*, throughout wide regions, has long been regarded as a weighty argument against the adequacy of submergence and floating ice to account for the distribution of drifts ; and I should ask permission to mention another conception which seems to me to militate against the submergence theory. Take the case of chalk erratics known to be carried up over the escarpment, westward into the Braid Valley. If the submergence were adequate to float bergs over the points where these fragments occur, we cannot suppose that they could have been wrenched off by glaciers which yielded the bergs, from the Chalk outcrop, several hundred feet lower down.

From such reasonings, I trust the standpoint here taken, that of continuous ice-sheets moving in various directions at different times, will be deemed admissible, if only as a working hypothesis.

One other point of a general bearing may here also be mentioned, namely, the occurrence at Portstewart and elsewhere in North Derry, of granite blocks of striking resemblance to Barnesmore granite. One of these, 3 feet by 3 feet 6 in. in diameter, I have met on the slope just below Heathfield House, north of Garvagh. I do not think anyone will contend for their transference by an ice sheet so far *eastward*, from Barnesmore across formidable ridges ; and carriage by floating ice over submerged land requires the supposition of marine currents *towards* the ice-bound coast of a continent, or towards an archipelago of ice-covered islets and ice-flows. I prefer to think that these erratics have come either from Scotland or from a submerged source to the north of Ireland.

For many years I have ventured to hold—

1st.—A west by south ice-flow from Scotland, as that representing the oldest and greatest period of ice-accumulation.

2nd.—A period of accumulation of glacial materials—snow, *névé*, ice—along the axis originally suggested by Mr. Maxwell Close, and at first adopted by Prof. Hull as the oldest known in Ireland.

3rd.—Local accumulations in mountain groups.

To these I have recently found it necessary to add another important ice-flow, intermediate between the first and second moving southwards over parts of Ulster, of which evidence is found at least 12 miles inland, as previously mentioned. We may now proceed to consider the phenomena resulting from these systems of glaciation, beginning with the first.

EARLIEST BOULDER-CLAY.

Evidence for the incoming of thick ice from the Irish Sea, up over the eastern escarpment of the Antrim plateau, has already been referred to. Further evidence is available at Knockan Hill, near Broughshane, where fragments of Chalk, lithomarge, and pavement are contained in beds of sand and gravel, and must have come from the eastward. I do not dwell upon this here, as the subject is dealt with in the recently issued Survey Memoir.* Reverting to the region now especially in view, one of the most striking facts met with is the occurrence of hard compact brown Boulder-Clay derived almost wholly from basalt, but containing some chalk and flint fragments, with smooth and scratched pebbles and stones of basalt, in a stream bounding Ardinarrive, two miles west of the Roe and six miles west of the nearest possible, as well as the most likely source, of the clay and enclosed fragments.† So far as I have seen, this is the only instance of such a clay in the Roe Valley; indeed, in view of the subsequent ice movements presently to be dealt with, much evidence of the kind could scarcely be expected to survive. Closely corresponding evidence, however, is to be observed in a stream-bank at Bollee, on the east side of the valley, where layers of fine silt, gravel, and large rounded blocks—all derived from

* "The Interbasaltic Rocks of North-east Ireland," p. 71.

† See Note B at end of Paper.

basalt of the plateau, and obviously the products of well washed Boulder-Clay—are to be found under some 12 feet of an entirely different kind of Boulder-Clay to be afterwards described. The washed basaltic *débris* rests upon New Red Sandstone, about one mile and a half west of the plateau-basalt, its source; and both of the instances here given testify to the former existence of a *westerly moving ice-sheet*.

The occurrence of Ailsa Craig erratics, in the gravel-pits near Limavady and at Moys,* is the strongest corroborative evidence obtainable of a westerly flowing ice-sheet. The erratics were probably deposited, in the first instance, higher up the valley southward, and have been carried downward to their present sites, partly, perhaps, by a subsequent ice-sheet moving northward, and partly by torrential waters from melting glaciers; but of their carriage westward from their original source there can be no question.

BOULDER-CLAY OF THE SECOND STAGE.

In the Drift Memoir of the Londonderry District,† ample evidence was presented of an inflow of thick ice from the sea over the northern parts of this country, as already mentioned, in the form of red shell-bearing calcareous Boulder-Clays, in some of the present valley bottoms. Portlock traced those clays up to 450 feet above datum on the west side of the Roe Valley‡—assuming them to be marine deposits of Tertiary age, and the shells to have been formed nearly *in situ*. But it is rare indeed to find any whole shells: all practically are fragmentary, and must have suffered intense crushing in so yielding a matrix as the Boulder-Clay, to be in so fragmentary a condition. In an ice-sheet, however, the shells would of course have suffered fracturing..

On the east side of the valley I have traced the red shell-bearing Boulder Clay, from the stream bed of the Castle River, to 450 feet above datum in the bank of a stream bounding Gortnarne on the south, about 12 miles inland. The ice-sheet bearing

* See Geological Section Report *ante*.

†“Geology of the Country around Londonderry,” p. 54.

‡“Report of Londonderry and Tyrone,” p. 158. See Note C at end.

these materials must have flowed southward with a fair measure of directness, else it could scarcely have borne the materials to such a height on the *east* side of the valley. On the sea-floor it would have found shells, mingled with marly clay and rounded débris of the basalt, as well as splinters of chalk and chalk-flints, many of which stud the Boulder-Clay.

In the Bann Valley I have not had full opportunity of tracing out the occurrence of the corresponding Boulder-Clay; but think the deposit on the ground, overlooking the Bann on the east, largely consists of the red Boulder-Clay. In this valley, however, a certain association of granitic, schistose and epidioritic rocks, as erratics, occurs in such notable prominence that one is forced to seek a cause for their presence. Such an association can scarcely have originated in the south, a source of this character being wanting there; there is, however, a distinct multiplication of granite erratics, noticeable as one proceeds southward by Garvagh and Kilrea, pointing to Slieve Gallion as the source. It would be a somewhat bold conclusion to ascribe the occurrence of the schists and epidiorites to the first great ice-flow, namely, that from the eastward. Of an extensive movement from Donegal and Londonderry over the basalt plateau and other intervening high grounds, there seems no evidence whatever, and no reasonable grounds for conjecture. We are, therefore, shut up to the north or north-east, where the sea conceals the prolongation of the Central Highland rocks, and part of the Archaean Gneiss area; and I am glad to find confirmation of this conclusion in that of Dr. Dwerryhouse* regarding the ice-flow over this part of Ulster.

An important corollary to the conception of this inflow from the north, seems to obtain in the broken up condition of the north-west face of the Benevenagh promontory. Thick ice, with an erosive pressure of some 50 tons on the square foot, operating upon the escarpment beneath the cliffs of basalt some 800 feet in

* "British Association Report" for 1911.

height, as the great stream swept around the promontory into the great *sinus* north-east of Limavady, would soon have made inroads upon the soft Triassic strata forming the slope. This would, when melting supervened, have deprived the heavy cap of its retaining buttress, inducing landslip after landslip, which have decked the present slope with numerous jagged and pinnacled peaks. That the period of down-slipping took place prior to the next stage of glaciation* is rendered obvious by the occurrence of well-formed moraines high up on the broken ground below the sheer cliffs. And that the down-slipping is attributable to a great erosive force impinging upon the escarpment, as described, finds confirmation in the absence of such a disposition of strata and basalt anywhere else,† along the neighbouring escarpments, however steep.

INTERGLACIAL BEDS.

Certain beds of silt, sand, gravel and boulders—some of very large size and all well rounded—occur in the stream-bank at Bollee bridge 3 miles from Limavady. They were previously mentioned as associated, in origin at least, with the oldest Boulder-Clay; all their materials have been derived from the basalt, yet they rest upon the New Red Sandstone, a mile and a half west of the basalt. They do not contain any other material, not even, so far as I could find, either chalk or sandstone; while they are overlain by 12 feet of red loose Boulder-Clay with numerous erratics of mica-schist, metamorphosed grit, chalk and chalk-flints as well as basalt—a deposit belonging to the succeeding stage of glaciation. The melting and washing, which entirely separated the clay from these beds of gravel, etc., certainly occurred between the first and third stages; had the washing been wide-spread we should expect much

*It is, moreover, highly improbable that the sharp jagged features which now deck the slope could have had pre-Glacial origin. Their very fresh appearance would certainly not have survived the inflow of thick ice from the north, had they existed then.

†The broken condition of the slope at the promontory of Garron Point, near the entrance to Glenariff, is suggestive of causes similar to those which operated at Benevenagh.

chalk and flint *débris* intermixed, and pieces of marl and Triassic Sandstone probably. Further reason will be given for believing that the melting succeeded rather than preceded the second stage of glaciation.*

THIRD STAGE OF GLACIATION.

The ice which carried the Boulder-Clay belonging to this stage of glaciation has left us by far the greatest collection of records. Nearly all the glacial *striæ* met with, are attributable to this system ; some are noticeable on the summit of Lougheramore Hill† (1,070 feet above datum) and many in the lower ground, especially on the basalt plateau ; and the prevailing direction is a little to the west of north, with an occasional tendency to swing more to the westward. At one point near Ballynacally More, three miles north of Garvagh, the direction indicated is about 15 degrees north of west—which is exceptional.

The Boulder-Clay belonging to this stage is also interesting ; and the evidence of ice-movement, derived from the erratics, equally convincing. The contents of the Boulder-Clay point almost wholly to a southern origin ; though, in the Roe Valley, boulders of basalt predominate, near the escarpment, lessening gradually as we proceed westward, and becoming rare, with a preponderance of metamorphic boulders, on the valley sides west of the Roe.

One of the most interesting pieces of evidence, that the ice of this stage moved northward, is to be found in the Largantea Valley, east of Benevenagh, where *débris* of the Chalk, gathered up from the outcrop northward from Keady, is strewn along the stream course up to its head waters, but in decreasing quantity, while chalk-flints may be picked up on the highest portion of the ground there ; and I have found metamorphosed grit borne from the south, at the summit of Benevenagh 1,260 feet above datum.

*See note B at end.

†“ Memoir of the Londonderry District,” pp. 52, 53.

An interesting circumstance, bearing upon the relation of the Boulder-Clay of the third to that of the second stage, was noticed in the bank of a small western tributary of the Roe, $3\frac{1}{2}$ miles south of Limavady. There, pieces of reddish compact highly calcareous Boulder-Clay are enclosed in a more gravelly non-calcareous clay, showing that the former had been laid down prior to the latter; and, that the ice carrying the latter, while not entirely erasing the former from the valley, broke it up here and there, and carried it along as it did ordinary boulders and other detritus, to be redeposited, as described, during the period of melting.

In the Bann Valley erratics of the several varieties of Slieve Gallion rocks strew the ground, and are enclosed in the Boulder-Clay from which the materials in many gravel-pits have come. The numbers of those rocks increase proportionally, southward, by Garvagh and Kilrea, as mentioned above, a fact which indicates a northerly movement of their once containing ice, as already remarked. Confirmatively of this a dark grey highly calcareous clay, studded with basalt and other boulders, is to be seen in high steep stream banks at Gorran Bridge, about 3 miles north by west of Garvagh, and at Bovagh House, just north of that town. The clay is identical in character with that derived from the glacial waste of Carboniferous limestone, which seems to me to point to the Carboniferous area south of Maghera as its origin.

BOULDER-CLAY OF FOURTH STAGE.

Directly covering the rock on the basalt plateau west of the Bann, and often found as a thin layer upon previous Boulder-Clays is a loose-textured mixture, though when of considerable thickness it is hard and tough at the bottom. A study of this mixture convinces one that it is a Boulder-Clay of comparatively local origin, though frequently mixed with untravelled materials, quite local. It seems to mark the decline of general glacial conditions, when accumulations of snow, *névé*, and ice lay upon the higher ground and were subject to periodical meltings and

renewals, when, moreover, small glaciers existed in the higher portions of the valleys.

DEDUCTIONS FROM THE FOREGOING.

When we consider the successive stages of glaciation, we are led to the inquiries, why they occurred, why the centres of accumulation changed, and why the movements of the ice-sheet were so diverse. We owe to Mr. G. W. Lamplugh, I think, the suggestion which points to a satisfactory solution. Starting with an ice-cap in Scandanavia, the moisture laden winds from the Atlantic would part with their burden in meeting the cold heights, and tend ever to *increase the accumulation on the west side of the latter*. This occasioned a very great accumulation in these islands, first in Scotland, which sent its sheet in over the Antrim coast, west by south, effecting also a general westerly movement of ice which had collected all over Ulster.

The accumulation still increasing in its western side, centralized next over the area of the Inner Hebrides; and in turn sent its tongues southward along the channel and to some extent into the valleys of northern Ulster, depositing there the red shelly Boulder-Clay.

This seems to have been followed by melting which occasioned the formation of the Bollee gravel and boulder-beds. Although, doubtless, in the higher grounds of Ulster, a new prevailing accumulation was in progress, which culminated in the axis noted by the late Mr. Close.

SANDS AND GRAVELS.

Sands and gravels of glacial origin are found widely scattered over the sides of both valleys, and are particularly abundant in the bottom of that of the Roe. Intercalated beds of sand and gravel are noticeable, in the gravelly Boulder-Clay belonging to the third stage; but these do not demand any special attention here. We shall consider briefly some eskers, moraines, and glacial flood gravels.

ESKERS.

One of the most interesting geological features in the region is a remarkable esker on the east side of the Roe Valley. It commences at a height of 850 feet on the Keady high ground, crosses the valley of the Curly River, northward, and wastes itself in scattered moraine hillocks near the Largantea burn. It rises on the north side of the Curly valley to a height of above 700 feet; and, connecting this by an imaginary line with its height above datum on the south side, the englacial river in which the materials of the esker were collected will be seen to have flowed in its ice-channel at least 150 feet above and across the Curly river-bed, this being 550 feet above datum at the point in question. The esker river flowed, in fact, in a temporary aqueduct at this height.

Another esker is to be seen two miles south of Ballydarrog, pursuing a curved, interrupted course south-easterly, through Moys and Ardinarrive; and an important, though short, ridge—The Mullagh—associated with moraine mounds of sand, occurs on the west side of Roe Park demesne, at Limavady.

In the Bann Valley, a curved esker is crossed by the main road southward at Killykergan, near Garvagh; others no doubt would be traceable in this valley, and on the ground between the Bann and Main, but I am unable to speak of them with any definiteness.

It will be noticed that the eskers mentioned pursue courses independent of those followed by the present drainage (a fact accounted for by the accumulation of the sands and gravels now forming the ridges) in rivers which furrowed the latest ice-sheet, before its surface had declined so far, through the melting, as to conform to the present shape of the ground. No better instance of this could be known than that of the first esker mentioned above: the second, though not so striking, is equally illustrative, for it crosses the stream bounding the two townlands.

Areas of sand and gravel in the valley of the Roe are crossed by this river, and the stream to the east of it, known as the Castle River. These may be of esker rather than of moraine origin, deposited between banks of an almost vanished ice-sheet; for at one point the gravelly Boulder-Clay of this (last) sheet lies against or rather rests upon the gravel, as may be seen at the gravel-pits near Ardmore.

MORAINES.

Amongst the latest relics of glacial phenomena in the region are moraines, which plentifully dot the ground in the form of dry hillocks on the wet peaty slopes, near the watershed between the valleys, and in the middle of the Roe Valley, between the Boulder-Clay tract and the tract of glacial-flood gravels to be next described. The most striking instance is the remarkable group of hillocks, some of them being high, steep, and impressive features, which extends from above Moys to the banks of the Roe. They are no doubt the outwash of glacial streams which trenched the melting ice-sheet once clothing the slopes of the imposing feature of Lougheramore Hill, on the west side of the valley.

Terraces of angular basalt blocks and smaller *débris* line the escarpment near its summit, here and there, in this valley, almost from south to north. These seem to be lateral moraines which margined the ice when it lowered from the height to which it once attained,* to become a glacier scarcely filling the valley.

Some well-formed moraine ridges and hillocks rest on the slopes of Benevenagh below the cliffs, undisturbed by such down-slipping as took place there, as was previously explained (p. 652). This fact would seem to indicate that the great breaches must have occurred prior to the ice-sheet of the third Stage.

*When, for instance, it carried Metamorphic erratics to the summit of Benevenagh; and when it was sufficiently thick over Keady ridge to afford conditions for the collection and flow of an esker-river starting on that high ground.

GLACIAL FLOOD-DEPOSITS.

The last stages of the melting and vanishing of glaciers from our region are marked by the formation of extensive deposits of sand, gravel, and shingle, and of warp-clays, the former predominating in the Roe Valley, and the latter in—so far as my experience goes—the valley of the Bann.

The gravelly deposits in the Roe Valley are the continuation of those described in the "Memoir of the Londonderry District," occupying a wide-spreading flat margining the coast, from the Foyle eastward to the Roe. The "Kettleholes," which form so striking a characteristic of the deposit near Derry, are represented also near Limavady, as may be seen beside the main road going westward towards the city.

Dovetailing with the sand and gravel, is a thick deposit of highly calcareous clay, which is laid open in the important brick-field at Derrymore, about two miles east by north of Limavady. This deposit extends north-westward, margined by the gravels on the west, and by Boulder-Clay on the east, for some two miles, beyond Aghanloo.

Similar calcareous brick-clays occur in the Bann Valley. An important pit may be seen half a mile west of the Coleraine Model School, just over the crest of the rising ground. It stands about 150 feet above datum; and here a striking section is laid open in an artificial water cut, several yards in length, showing alternating beds of clay, sand, and gravel, set on end. From this we may infer their original deposition against thick ice, which once probably filled the extensive hollow to the westward, its melting giving occasion to the great disturbance of the originally horizontal beds of clay, etc., as mentioned. In the Aghadowey River, at about 100 feet above datum, fine laminated calcareous clays are set at a high angle, which is to be accounted for in a similar way.

In Glenkeen, near Aghadowey, at about the 60 feet contour, the brick-clay is also worked; and, in the large pit south of the

high road, a good section of the clay is to be seen. It contains very few stones, but, with them, may be picked out round and fantastically shaped flattish concretions of fine calcareous silt. Stuck fast in this clay, at the time of my visit, was a stump of oak, standing fairly upright, but not I think rooted in the clay. It had evidently been washed into the temporary lake, in which the material here was deposited.

The clayey material seems to have been washed out of the highly calcareous Boulder-Clay previously mentioned, belonging to the Third Stage of glaciation. It is very near the clay in Aghadowey River, which must have been laid down against a hidden remnant of the glacier once filling the valley ; but must, I think, be distinguished from this, not only because of having been deposited at a lower level—60 feet instead of 100, but also because of its containing the oak stump which is comparatively fresh in its inner parts, apparently of more modern origin than glacial times. The three deposits of clay then would seem to mark gradual lowering of, possibly, a great ice-dammed lake, which once filled this valley at periods when its glacier was melting and disappearing, piecemeal.

RAISED BEACHES.

These formations have their features of geological interest, but so much has already been written concerning them, that little need be added here. What is known as *the* Raised Beach in the Roe Valley, and westward towards Derry, is a platform ranging from the 25 feet contour line, near the very persistent bounding cliff of gravel within, to about 12 feet above datum on its outer margin, where it descends, by two steps fairly recognizable in certain places, to the level of the reclaimed slob, or former foreshore. The two steps referred to, represent stages of uplift which dried all ; they are, therefore, themselves subsidiary raised beaches, about three feet and one foot above the foreshore, and vary up to 100 and 50 yards in width, respectively where

recognizable. The "gold ornaments," which formed the subject of the celebrated Government law-suit some years ago, were buried in the oldest, that is, the principal, raised beach.

ÆOLIAN DRIFT.

The remarkable sand-tract of Magilligan, projecting in triangular form north-westward, from the steep slope at the foot of Benevenagh, almost to Greencastle in Inishowen, presents a problem of unique interest, as I regard it.

It is represented on the published government maps as raised beach, dotted over here and there near the margins with sand-hills ; yet, except as affording probably an original foothold for the sand the raised beach character is wanting ; the tract as a whole shows neither an upper layer, nor a subsoil like those of the other raised beaches. Shells and shell fragments are abundant in the latter, while in openings for drains and wells throughout Magilligan they are conspicuous by their absence or rarity. Again the Raised Beach is characteristically flat, while the Magilligan sand-tract is *ridged* throughout. The ridges in the cultivated flatter parts are locally known as "ryelands," and the troughs, as "oatlands" or "coaghs." The persistence, regularity and extension even of the very minor ridges are unique, and supply us, on a small scale, with a character of scenery witnessed in the extensive deserts,* say of North Africa. Compared with the usual effects of wind upon sand-areas along the Irish coast, so very fitful and irregular, the regularity of arrangement in Magilligan is a matter of intense surprise. Along the north-eastern side, a valley runs N.W. and S.E. between ridges for about two miles. It is almost quite level and some 35 feet deep, at a point where the ridge between it and the present beach is 60 feet above datum. The ridges within this are lower and less regular, but each is separated from the neighbouring ridges by narrow far-stretching "coaghs," with loughlets, marshes or wet usually peaty ground.

*Beadnell of the Egyptian Survey in his "Memoir" for 1901, speaks (p. 9, etc.) of the strict parallelism of the sand-ridges in the Farafra Oasis, N.N.W. and S.S.E., this being, he remarks, the direction of the normal winds.

Almost equally remarkable is the persistence of the very low ridges in the interior of the tract. One, for example, near Bellarena Station, only about 3 feet higher than the adjoining hollows, and some 40 yards wide, is distinctly traceable for a distance of about a mile.

The trend of the ridges varies gradually from south-east and north-west to nearly east and west at Bellarena, swinging a little to the north of east near the high ground of Benevenagh and Magilligan Station. These directions may probably be explained on the assumption that the prevailing high winds from the north-west operated upon unlimited quantities of sand, the directions near the ground changing into conformity to that of the mountain foot, as the winds approached it.

It may be asked how are we to account for so much sand, when the present beaches laid dry at ebb-tides are of comparatively limited aggregate area ; and the beach within is not such as to yield blown sand ?

To account for it we may note the following data, viz. :—
(1.)—A portion of the great blown-sand tract occurs in Carrowmenagh, about one half to one mile south-west of the Roe Bridge, separated from Magilligan by the water and alluvial flat of the river. (2.)—It rests upon the main raised beach which is there some eight feet above the high tide level, and is cut into by the sea which formed the two successive shelves, lower than the main raised beach. (3.)—The blown sands therefore began to collect when the sea had so far receded as to leave the tract at Carrowmenagh free of water. Freshly exposed sand-beaches existed inside and outside Lough Foyle, at that stage of land-rise. (4.)—For each of the three discernable land-rises there was denudation of the older beaches, washings of the sands, and deposition of easily moved material on three corresponding foreshores. That is to say, there were foreshores exposed at four successive periods, each probably as large as the present foreshore, and not, like that

inside the lough, covered with mud and marine vegetation, but fresh and loose, easily dried and shifted because recently formed.

In this manner it seems to me the vast accumulation of sand, curtailed now through recent denudation, as compared with what it has been, is easily to be accounted for.

PEAT.

The common depth of peat on the minor hills of the plateau is 3 to $3\frac{1}{2}$ feet. About 8 feet seems to have been the thickness over parts of the flat ground there; and as much as 12 feet, in a flat west of Sconce Hill, some four miles from Coleraine, westward. It has been estimated as 20 feet deep in the valley of the Roe, in a peat-bog a mile to the south of Drumsurn.

It is almost needless to say that remains of ancient forests abound on the peat-bogs, most commonly those of fir, though oak trunks and roots are frequently to be met with. One of the most notable circumstances to be observed is, that a layer of fir roots occurs almost invariably in both valleys, and in the deeper bogs on the plateau, about four feet above the floor of the peat, very little or no other timber, or similar layer, being found in the four feet between. Hazel and alder are frequently to be noticed as well as birch. Remains of a thick forest of birch occur in a large bog one mile south of Moys, near Limavady.

Near the northern boundary of Ardinarrive, N.W. of Dungiven, rows of pointed stakes, timber scantlings and "noggins," were found in apparently an old mearing or "causeway," report says, under 12 feet of peat; and, half a mile south-west of Ringsend, near the Garvagh and Limavady road, stakes pointed with a sharp implement, and charred wood, were reported as occurring under 6 feet of peat, associated with oak trunks and roots."

At the close of the paper the Chairman, in reviewing the chief features of Mr. Kilroe's highly interesting paper, proposed that the best thanks of the Club be conveyed to Mr. Kilroe.

Several points of interest were raised by the Chairman, Mr. Geo. Donaldson, and Mr. A.W. Stelfox, to which, in the unfortunate

absence of the writer, Dr. Dwerryhouse felt unable to reply. The election of Miss J. H. MacAlpine to membership closed this successful meeting.

NOTES ADDED IN PRESS.

A.

Professor G. A. J. Cole has kindly made an examination of a specimen of basalt east of Keady Hill, showing the peculiar banded structure noted on p. 636 above, and sends me the following note thereupon :—" It is ophitic, with crystalline nodules of augite arranged in flow-bands."

B.

Referring to the basaltic Boulder-Clay in Ardinarrive stream, mentioned in the Paper (p. 649), it can now be added, as a result of this Summer's work, that, higher up the same stream, a thick deposit of sand and gravel, derived almost wholly from basalt, forms the west bank ; and is, in parts, overlain by Boulder-Clay belonging to the third stage of glaciation. The gravel contains *shell-fragments*, which more than probably had been washed out of the red Boulder-Clay of the second stage, present in the vicinity ; the washing obviously supervened between the second and third stages, and carried off the finer materials of the older Boulder-Clays at the point in question. This point is nearly 500 feet above datum.

C.

As a further result of this Summer's work it may be stated that the red shell-bearing Boulder-Clay was traced upward to the 500 feet contour, in the stream bounding the townland of Drumreighland, north-westward of Ardinarrive.

REPORT OF DELEGATE TO THE BRITISH
ASSOCIATION.

I had the honour to represent the Club at the Conference of Delegates of the Corresponding Societies of the British Association held last year in Dundee. Two meetings, as usual, were held, at the first of which the Chairman, Professor Bower, gave as his address a sketch of the life of the late Dr. Hooker.

Two years ago I brought to your notice (and you brought the matter before the Committee of the Delegates) the fact that these meetings of the Delegates received scant attention from the British Association, and were not fully advertised in the Journals of the meetings of the Sections. Last year I was able to report some improvement in this matter, and I mentioned then that a further improvement had been promised. This year a slight improvement

was noticeable, but one of the members of the Committee, the Rev. T. R. R. Stebbing, brought the matter before the meeting, and suggested that the meetings of the Delegates were to be regarded as equivalent to meetings of a Section, and should be advertised on the same footing, the Chairman's title being changed to that of President. This was duly approved, and the Committee are to do what they can in the matter.

There is at the present time a strong movement—with which I am not fully in sympathy—for the formation of sanctuaries in different parts of the country for the preservation of wild animals and plants. This subject was referred to by Mr. Mark Webb (Selborne Society) who read a paper upon the "Brent Valley Bird Sanctuary," and indirectly it was discussed by Mr. Horwood (Leicester Museum) who dealt with "State Protection of Wild Plants." Mr. Claridge Druce brought before the meeting a resolution "That this meeting of Delegates cordially approves of the objects of the Society recently established for the purpose of obtaining areas containing interesting specimens of flora and fauna and also objects of geological interest." This was carried unanimously, I being unwilling to put forward my views, having reason to believe that they are not those of members of this Club.

Following upon the discussion of last year upon the Study of Fungi by Local Societies, Miss A. Lorrain Smith (British Mycological Society) reported on the results she had obtained by sending round a circular to the Secretaries of a number of Local Natural History Societies asking certain questions, among which was one as to the number of members interested in Mycology, and if any lists of fungi or papers on them had been published by them. Over 100 Societies were thus circularised, and of these four acknowledged the receipt of the circular!

Mr. A. Newlands (Inverness Scientific Society and Field Club) read a paper upon "Water Power and Industrial Development in the Highlands of Scotland," which, although interesting and somewhat technical, was not, in my opinion, one that should have been accepted by the Committee of Delegates.

Dr. A. Loir, a Delegate to the British Association from the French Association, brought before the Delegates a proposal that in 1914, when the British Association meets in Australia, the Delegates should meet at Havre where the French Association is holding its meeting. This suggestion was favourably received, and it was decided to discuss the matter fully at the meeting of Delegates at Birmingham next year.

Owing to a mistake, although I attended the whole of the first meeting and part of the second, I neglected to sign the attendance book on the first occasion.

(Signed)

FRANK BALFOUR BROWNE.

ANNUAL MEETING.

THE CLUB'S JUBILEE.

The Fiftieth Annual Meeting of the Club was held in the Museum, College Square North, on 15th April. In the unavoidable absence of the President (Rev. Canon Lett, M.A., M.R.I.A.), it was moved that Mr. R. J. Welch, M.R.I.A., take the chair.

Before proceeding to the business of the meeting the Chairman moved a vote of condolence to the relatives of the late Mr. Hugh Lamont Orr, who was a warm supporter of the Club, and for many years a very active member. The motion was passed by the members standing in silence.

Mr. A. W. Stelfox, Hon. Secretary, read the Fiftieth Annual Report.

The Treasurer (Mr. W. H. Phillips) submitted the Statement of Accounts, and Mr. S. Wear, Librarian, read his report for the past year.

The Report of the Botanical Section was read by Mr. N. Carrothers, the Geological Report by Mr. A. W. Stelfox, the Zoological Report by Mr. Nevin H. Foster, and that of the Archæological Section by Mr. Robert May. The Report of the Junior Section was read by Mr. J. A. S. Stendall.

In moving the adoption of these reports, the Chairman expressed the gratitude the Club felt towards Mr. W. H. Phillips for the services he had rendered it, and his remarks were warmly endorsed by Mr. William Gray, M.R.I.A., who seconded the motion. Mr. Welch also drew the attention of all members to the coming celebrations of the Fiftieth Anniversary, and pointed out how necessary was the warm support of everyone connected with the Club to enable the Committee to make them a complete success.

Mr. R. J. Welch proposed, and Mr. F. A. Heron seconded, that Rev. Canon Lett, M.A., M.R.I.A., be re-elected President of the Club. This resolution was passed unanimously. Mr. N. H. Foster proposed, and Mr. G. Raymond seconded, that Mr. R. L. Praeger, B.A., B.E., M.R.I.A., be elected Vice-President. It was proposed by Mr. J. A. S. Stendall, and seconded by Mr. W. R. Pim, that Mr. Sylvanus Wear be re-elected Librarian. Mr. W. H. Phillips proposed, and Mr. George Donaldson seconded, that Mr. N. H. Foster, F.L.S., M.R.I.A., M.B.O.U., be elected Treasurer. On the proposal of Mr. Robert May, seconded by Mr. J. Hamilton, Mr. A. W. Stelfox, M.R.I.A., and Miss M. D. Mitchell, B.Sc., were re-elected Hon. Secretaries. Mr. J. Maxwell proposed, and Mrs. N. H. Foster seconded, that Messrs. James Orr, N. Carrothers, R. H. Whitehouse, J. A. S. Stendall, and Robert May be elected Hon. Secretaries of the Geological, Botanical, Zoological, Junior, and Archaeological Sections respectively. The following ordinary members of Committee were elected by ballot:—Miss M. W. Rea, Mr. S. A. Bennett, B.A., B.Sc., and Mr. Joseph Maxwell, J.P.

The Chairman announced that the Prize Sub-Committee had been unable to have its report ready in time; but that the awards would be announced in due course, and the report would appear in the *Proceedings*.

Suggestions for places to be visited during the Summer Session were received, and the business of the meeting was then brought to a conclusion.

RULES

OF THE

Belfast Naturalists' Field Club.

**As amended at the Extraordinary General Meeting held
for the purpose on 16th June, 1911.**

I.

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

II.

That the object of this Society be the practical study of Natural Science and Archaeology in Ireland.

III.

That the Club shall consist of Ordinary, Junior, Life, Corresponding and Honorary Members. The Ordinary Members shall be proposed and seconded at any meeting of the Club and elected by a majority of votes of the members present. They shall pay annually a subscription of Five Shillings and shall, on election, pay an entrance fee of Five Shillings.

That the composition fee for Life-Membership be Four Guineas.

Junior Members, who must be under the age of 21, shall be elected in the same way as ordinary members, but shall pay an annual subscription of Two Shillings and Sixpence (2/6) and be exempt from entrance fee. On attaining their majority they shall become Ordinary Members and shall pay an annual subscription of Five Shillings. Junior Members shall not receive any printed matter except the usual notices; shall not have the power to vote; and shall not borrow books from the Club's Library without special permission from the Librarian.

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 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, Librarian, and one or two Secretaries, together with the Secretaries of the various Sections of the Club. 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 General Committee shall consist of the above-named officers with nine ordinary members of Committee, and shall hold at least eight meetings during the year; five persons to form a quorum.

That three ordinary members of Committee shall retire annually in order of seniority, those retiring being ineligible for re-election for one year. Should any ordinary member of Committee fail to attend at least three of the Committee meetings held during the year his or her place may be considered vacant and another member elected to fill the position. No ordinary member of Committee shall hold the post of Secretary in any of the Sections. That in the event of a vacancy occurring in the General Committee a new member may be co-opted to fill such vacancy for the remainder of the year.

That nominations for ordinary members of Committee shall be sent in writing to the Secretaries on or before the 21st day of March in each year. That the privilege of nominating members of Committee shall be held by all Ordinary and Life Members of the Club. That the names of those members so nominated shall be published on the circular convening the Annual Meeting, at which the Ordinary Members of Committee shall be elected by ballot. That should the necessity arise the retiring members of Committee shall be balloted for.

VII.

The Committee may from year to year appoint Sectional Committees as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six members of the Club. No financial responsibility to be incurred by the Sub-Committee or any Officer of the Club without the previous approval of the Club's Committee. The Chairman of such Section to be annually appointed by the General Committee.

VIII.

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 Archaeology 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.

IX.

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 be original and to treat of the Natural History and Archaeology of the district. These Meetings to be held during the months from November till April inclusive.

X.

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 archaeological 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.

That the General Committee may offer from time to time such prize or prizes as they may deem desirable for competition among Schools in or near Belfast.

XI.

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 alterations in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretaries or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of each intended alteration.

XII.

Members of other Irish Field Clubs, residing temporarily or permanently in or near Belfast, may be enrolled Members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year, on production of a receipt showing that such subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of Members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XIII.

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 subject mentioned in such written requisition.

XIV.

That the Committee may 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.

RULES FOR THE CONDUCTING OF EXCURSIONS.

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. 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 is incurred thereby.

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

Exchanges of Proceedings, 1912-13.

- Barrow—Naturalists' Field Club and Lit. and Sc. Association.
 Proceedings, Vol. XIX.
- Belfast—Presbyterian Historical Society of Ireland.
 Fifth Annual Report (1911), two copies.
- Birmingham—Natural History and Philosophical Society.
 Annual Report, 1911.
 Proceedings, Vol. XII., No. 5.
- Bournemouth—Natural Science Society.
 Proceedings, Vols. I., II., and III.
- Cardiff—Naturalists' Society.
 Transactions, Vol. XLIV., 1911.
- Chester—Society of Nat. Science, Lit., and Art.
 Forty-first Report and Proceedings, 1911-12.
- Dublin—Royal Irish Academy.
 Index to Publications of 1786 till 1906.
 Proceedings, Vol. XXIX., Section B, Part 9.
 ,, Vol. XXX., Section B, Parts 1 to 21.
 ,, Vol. XXXI., Parts 13, 15, 16, 17, 18, 19, 20, 23, 25,
 27, 28, 30, 31, 33, 34, 40, 41, 43, 44, 46, 53, 56,
 57, 58, 59.
- „ Royal Society of Antiquaries of Ireland.
 Journal, Vol. XLII., Parts 1, 2, 3, and 4.
 Index to Vol. XLI.
- „ Irish Department of Agriculture.
 Memoir of Geological Survey of Ireland :—"The Interbasaltic
 Rocks of North-East Ireland."
- Drumfriesshire and Galloway Nat. Hist. and Antiquarian Society.
 Transactions, Vol. XXIV., 1911-12.
- Eastbourne—Natural History, Photographic, and Lit. Society.
 Transactions and Journal, Vol. V., Nos. 1 and 2.
- Edinburgh—Geological Society.
 Transactions, Vol. X., Part 1.

- Glasgow—Philosophical Society.
 Proceedings, Vol. XLIII., 1911-12.
- „ Geological Society.
 Proceedings, Vol. XIV., Part 2, 1910-11.
- Hertfordshire—Natural History Society and Field Club.
 Proceedings, Vol. XIV., Parts 3 and 4.
- Hull—Scientific and Field Naturalists' Club.
 Proceedings, Vol. III., Part 2.
 „ Vol. IV., Parts 1, 2, and 3.
- Leeds—Philosophical and Literary Society.
 Annual Reports, 1909-10 and 1910-11.
- Leyden—Rijks Ethnographisch Museum.
 Report, Oct., 1910, till Sept., 1911.
- Liverpool—Geological Society.
 Proceedings, Vol. XI., Part 3.
 „ Naturalists' Field Club.
 Proceedings for 1912.
- London—British Association for the Advancement of Science.
 Report of Portsmouth Meeting, 1911.
 Report of Corresponding Societies' Committee, 1912.
 „ British Museum (Natural History) Handbooks.
 “ Revision of the *Ichneumonidæ*,” Part 1 (Morley).
 “ Monograph of the *Mycetozoa*” (Lister).
 „ University College.
 Catalogue of Periodical Publications in Library.
- Manchester—Field Naturalists' and Archaeologists' Society.
 Report, 1911.
 „ Microscopical Society.
 Annual Report, 1911.
- New Brunswick—Natural History Society of—
 Bulletin, Vol. VI., Part 5.
- Norfolk and Norwich Naturalists' Society.
 Transactions, Vol. IX., Part 3.
- North Staffordshire Field Club.
 Transactions, Vol. XLVI., 1911-12.
- Nottingham—Naturalists' Society.
 Report and Transactions, 1910-11,

Nova Scotia—Institute of Science.

Proceedings and Transactions, Vol. XII., Part 3, 1908-9.

," " Vol. XIII., Parts 1 and 2, 1910-12.

Perthshire Natural History Society.

Proceedings, Vol. V., Part 4, 1911-12.

Stavanger—Museum.

Aarshefte fur 1911.

Toronto—Canadian Institute.

Transactions, Vol. IX., Parts 2 and 3.

Torquay—Natural History Society.

Journal, Vol. I., No. 4, 1912.

U.S.A.—Boston—Society of Natural History.

Proceedings, Vol. XXXIV., Nos. 9, 10, 11, and 12.

," Californian Academy of Science.

Proceedings, Series IV., Vol. I., Parts 3, 4, 5, and 6.

," Series IV., Vol. III., pp. 73-186.

," California—University of—

Bulletin, Series III., Vol. VI., No. 3.

," Chapel Hill N.C.—Elisha Mitchell Scientific Society.

Journal, Vol. XXVII., Nos. 3 and 4.

," Vol. XXVIII., Nos. 1, 2, 3, and 4.

," Chicago—Academy of Science.

Bulletin, Vol. III., Nos. 4 and 5.

Special Publication, No. 3.

," Cincinnati—Lloyd's Library.

Bulletins, 16, 17, 18, 19, and 20.

Bibliographical Contributions, Nos. 4, 5, 6, 7, and 8.

," Medford, Mass.—Tuft's College Series.

Scientific Series, Vol. III., No. 2.

," Missouri—Botanical Garden.

Report, 1910.

," New York—Academy of Science.

Annals, Vol. XIX., Part 3.

," Philadelphia—Academy of Natural Sciences.

Proceedings, Vol. LXI., Part 2.

," Vol. LXII., Part 1.

," Vol. LXIII., Parts 1, 2, and 3.

," Vol. LXIV., Parts 1 and 2.

U.S.A.—Rochester—Academy of Science.

Proceedings, Vol. V., pp. 39-58.

,, Washington—Geological Survey.

Bulletins, 389, 392, 393, 395, 398, 399, 401, 403, 406, 407, 415, 417,
419, 420, 422, 428, 448, 451, 454, 456, 466, 468, 470, 475, 477,
479, 482, 484, 485, 491, 494, 496, 497, 500, 504, 509, 511, 512,
514, 520, 523.

Water Supply Papers, 232, 235, 241, 245, 248, 249, 252, 263, 266,
268, 271, 273, 275, 280, 282, 284, 285, 289, 291, 294, 296, 298,
304.

Professional Papers, Nos. 64, 66, 67, 69, 70, 71 (and map), and 74.

Mineral Resources, 1909, Parts 1 and 2.

,, 1910, Parts 1 and 2.

Annual Report.

Indexed List of Publications.

,, Washington—Government Printing Offices.

Smithsonian Museum Report, June, 1911.

,, Wisconsin—Academy.

Transactions, Vol. XVI., Part 2, Nos. 1, 2, 3, 4, 5, and 6.

,, Wisconsin—Natural History Society.

Bulletin, Vol. IX., No. 4.

,, Vol. X., Nos. 1 and 2.



List of Members.

Any change in the Address of Members should be at once notified to the Secretaries by Post Card.

The dates prefixed to Members names signify date of Election.
O stands for an Original Member who signed the requisition for the formation of the Club in 1863.

Hon. Members.

- 1877. Lapworth, Professor Charles, LL.D., F.R.S., The University, Birmingham.
- 1904. Plunkett, Thomas, M.R.I.A., Enniskillen.
- 1902. Scharff, Robert F., Ph.D., F.L.S., M.R.I.A., National Museum, Kildare Street, Dublin.

Corresponding Member.

- O* Holden, J. S., M.D., Sudbury, Suffolk.

Life Members.

- 1894. Ewart, Sir W. Q., Bart., Glenmachan, Strandtown.
- 1903. Stelfox, A. W., A.R.I.B.A., M.R.I.A., Delamere, Chlorine Gdns.

Ordinary Members.

- 1912. Adams, Miss M. I., Margaret Street, Newry.
- 1890. Adams, John J., M.D., Ashville, Antrim.
- 1907. Adams, Rev. W. A., B.A., Antrim.
- 1905. Agnew, Miss Jean, 75 Evington Road, Leicester.
- 1892. Allibon, George H., 19 Short Strand.
- 1866. Anderson, Sir Robert, Bart., J.P., Donegall Place.
- 1911. Anderson, Miss Sarah, 4 Church View, Holywood.
- 1882. Andrew, J. J., L.D.S., University Square.
- 1892. Andrews, Miss, 12 College Gardens.
- 1890. Andrews, Miss M. K., 12 College Gardens.
- 1912. Andrews, Miss E. L., Inla, Comber.
- 1911. Andrews, Miss M. A., 50 Eglantine Avenue.
- 1912. Andrews, Dr. Marion B., 17 University Square.
- 1907. Baillie, W. T., Marathon, Knock.
- 1867. Barkley, James M., 24 Wellington Place.
- 1901. Barrett, J. H., Farnham Road, Bangor.
- 1906. Baxter, James, Midland Railway Company.
- 1905. Beck, Miss, 1 Derryvolgie Avenue.
- 1883. Beck, Miss Emma, Hampden Terrace, Rugby Road.

1905. Bell, Dr. Elizabeth, 83 Great Victoria Street.
 1893. Bell, Robert, 64 Newington Avenue.
 1896. Bell, E. George, Bellvue, Lurgan.
 1909. Bennett, Edward, Forth River Mill.
 1908. Bennett, S. A., B.A., B.Sc., Campbell College.
 1895. Berry, Major R. G., M.R.I.A., The Castle, Richhill.
 1884. Bigger, Francis J., M.R.I.A., Ardrie, Antrim Road.
 1898. Blackwood, Miss S., 6 College Green.
 1911. Blackwood, Miss M. A., 6 College Green.
 1887. Blair, Edward S., Rusheen, Glenburn Park.
 1904. Blair, Mrs. Edward S., Rusheen, Glenburn Park.
 1904. Boyce, Joseph, Kincora, Cregagh.
 1893. Boyd, Miss, The Elm Trees, St. Edward's Road, Southsea.
 1894. Boyd, W. C., Hazelbank Villa, Ravenscroft Avenue.
 1904. Braithwaite, W. T., 14, Botanic Avenue.
 1883. Brandon, Hugh B., J.P., 2 Wellington Place.
 1863. Brett, Sir Charles H., Gretton Villa South.
 1907. Brierly, J. C. A., Height, Cliftonville Road.
 1907. Brierly, Mrs., Height, Cliftonville Road
 1883. Brown, Thomas, J.P., 102 Donegall street.
 1907. Browne, F. Balfour, M.A., F.R.S.E., F.Z.S., 26 Barton Road, Cambridge.
 1909. Browne, Mrs. Balfour, 26 Barton Road, Cambridge.
 1874. Browne, W. J., M.A., Templemore Park, Londonderry.
 1903. Bruce, Mrs., Thornly, Holywood.
 1876. Bulla, Charles, 21 Maryville Park.
 1899. Burrowes, W. B., Ballynafeigh House.
 1912. Byrne, Mrs., 61 Raglan Street.
1903. Campbell, D. C., J.P., M.B.O.U., Templemore Park, Londonderry.
 1909. Campbell, John, Albert Brick Works, Carrickfergus.
 1903. Campbell, Wm. M., 34 Eglantine Avenue.
 1904. Carmody, Rev. W. P., Newtownbreda.
 1892. Carrothers, Nathaniel, 145 Stranmillis Road.
 1892. Carson, J. C., 8 Wellington Place.
 1907. Chambers, W., 3 Custom House Square.
 1901. Cheyne, H. H., Roseneath, Bangor.
 1891. Christen, Madame, St. Imier, Brig o' Gairn, Ballater, N.B.
 1904. Clarke, Mrs. John, 2 College Gardens.
 1907. Clarke, Thos., jun., Percy Street Flour Mills.
 1894. Cleland, Alex. M'I., Macedon, Green Road, Knock.
 1894. Cleland, Mrs. Annie, Macedon, Green Road, Knock.
 1890. Cleland, James A., Bernagh West, Malone Park.
 1893. Cleland, W. W., 56 Wellington Park.
 1904. Cocking, Miss C. E., Sunnyside, 33 Somerset Road, Huddersfield.
 1904. Cocking, Miss M. A., Sunnyside, 33 Somerset Road, Huddersfield.
 1909. Cooke, Mrs., 2 Caledonia Terrace.
 1892. Costigan, Wm., 4 Gt. Victoria Street.
 1904. Courvoisier, Mrs., Dunrock, Larne.
 1906. Cowie, James, Midland Railway Co.

1907. Craig, Robert, Foxrock, Helen's Bay.
 1909. Culbert, J. Carroll, Connswater.
 1893. Cunningham, Chas. M., L.D.S., D.D.S., Rostellan, University Rd.
 1884. Cunningham, Samuel, Fernhill.
 1882. Curley, Francis, J.P., High Street.
 1882. Curley, Mrs., Dunedin Terrace.
 1907. Curragh, W. H., Rosslyn, Stranmillis Road.
1912. Davidson, Rev. T. W., 8 Easton Crescent.
 1905. Dawson, R. A., A.R.C.A., Iniskeen, Holywood.
 1904. Deane, Arthur, Municipal Museum, Royal Avenue.
 1891. D'Evelyn, Alex. M., M.D., Ballymena.
 1891. Dickson, John M., 34 Wellington Park.
 1908. Dobbs, Miss M. E., Portnagolan, Cushendall.
 O Donaldson, George, 1 Prospect Street.
 1907. Doran, John, J.P., Dunottar, Malone Road.
 1904. Douey, S. H., Brook Villa, Barnett's Road, Knock.
 1897. Downing, Wm. M., 11 Garfield Street.
 1909. Drummmond, Miss Ina, 34 Atlantic Avenue.
 1897. Duncan, William, 42 College Park Avenue.
 1908. Duncan, William, 2 Manilla Terrace.
 1912. Dunlop, T. W., Scarva.
 1909. Dwerryhouse, A. R., D.Sc., F.G.S., M.R.I.A., Queen's University.
1884. Elliott, David, Ardroe, Bloomfield.
 1887. Elliott, George H., Bryndhu, Holywood.
 1905. English, James, Murray Street.
 1904. Entrican, Miss Sarah, 33 Botanic Avenue.
1868. Faren, W., 11 Mountcharles.
 1899. Fennell, Mrs., Deramore Drive.
 1894. Fennell, W. J., F.R.I.B.A., 2 Wellington Place.
 1911. Fenton, Francis K., 9 Donegall Square North.
 1912. Ferguson, Mrs., St. Helen's, Holland Park, Knock.
 1897. Finlay, Miss, St. Kilda's East, Old Nichol Street, Bethnal Green, London.
 1906. Finlay, Arch. H., Holywood.
 1908. Flynn, W. G. W., Galgorm, Ballymena.
 1899. Forth, Francis C., A.R.C.Sc.I., Technical Institute.
 1899. Foster, Nevin H., F.L.S., M.R.I.A., M.B.O.U., Hillsborough.
 1903. Foster, Mrs. N. H., Hillsborough.
 1909. Foster, Miss, Richmond Villas.
 1891. Frame, John, Alfred Street.
 1892. Fulton, David, Arlington, Windsor Avenue.
1904. Gaffikin, William, J.P., Notting Hill.
 1890. Galloway, Peter, 55 Botanic Avenue.
 1891. Galloway, Joseph, 50 Eglantine Avenue.
 1896. Gallway, W. H., Belgravia, Bangor.
 1892. Gamble, Miss, Lorne, Craigavon.

1899. Gamble, J. G., 42 Hopefield Avenue.
 1899. Gardner, Campbell, jun., Windsor Park.
 1893. Gibson, Andrew, Lansdowne Road.
 1912. Gibson, W. N., Par. Nat. School, Holywood.
 1905. Glover, James, Seaview, Kirkcubbin.
 1885. Godwin, William, Queen Street.
 1912. Grainger, Miss, Ballykeel, Holywood.
 1863. Gray, William, M.R.I.A., Glenburn Park, Cavehill Road.
 1892. Green, Mrs. Isaac, Hawthronden, Knock.
 1895. Green, Wm. A., 4 Salisbury Terrace, Chichester Park.
 1905. Greenfield, Miss M., 8 High Street, Holywood.
 1901. Greeves, J. Theodore, Nendrum, Knockdene Park.
 1901. Greeves, W. Leopold, Ormeau Avenue.
 1901. Greeves, Fergus M., Rydal Mount, Knock.
 1901. Gullan, H. F., City Hall.
 1909. Gwynne-Vaughan, Prof., M.A., M.R.I.A., Queen's University.

 1908. Hadden, D. H., Magharee, Portadown.
 1907. Hadden, Dr. Robert E., Ardralla, Portadown.
 1883. Hamilton, Rev. T., D.D., LL.D., Vice-Chancellor, Queen's University.
 1908. Hamilton, Miss, 5 Church Avenue, Holywood.
 1877. Hamilton, John, 5 Church Avenue, Holywood.
 1893. Hazelton, W. D., Oldforge, Dunmurry.
 1908. Henry, F. W., Ye Olde Castle, Castle Place.
 1876. Heron, F. A., Cultra, Holywood.
 1912. Hewton, J., M.P.S.I., Ava Pharmacy, Ormeau Road.
 1905. Hobson, Mrs., Marino.
 1892. Hobson, Benjamin, Marino.
 1895. Hogg, A. R., 13 Trinity Street.
 1908. Hogg, D. J., 16 Kansas Avenue.
 1903. Holland, Miss, 33 Wellington Park.
 1904. Holland, Frank, 76 Eglantine Avenue.
 1906. Hopkirk, F. G., Midland Railway Co.
 1911. Houston, Miss, Lisheen, Sans Souci Park.

 1901. Jackson, J. L. S., St. Helier's, Cavehill Road.
 1891. Jackson, A. T., 8 Derryvolgie Avenue.
 1892. Jaffe, Lady, Kinedar, Strandtown.
 1909. Jenkins, W. A., 6 Elmwood Terrace.
 1901. Johnson, Rev. W. F., M.A., F.E.S., Acton Glebe, Poyntzpass.
 1906. Johnston, F. W., The Cottage, Cultra.
 1908. Johnston, Mrs., The Cottage, Cultra.
 1907. Johnston, John Bruce, Cooleen, Marlborough Park North.

 1912. Kamcke, Mrs., Claremont, Holywood.
 1907. Kilgour, Peter, Monifeith, Forfarshire.
 1899. Killen, Wm., 22 Waring Street.
 1886. Kirkpatrick, F., 27 Oxford Street.
 1868. Knowles, W. J., M.R.I.A., Flixton Place S., Ballymena.
 1877. Kyle, R. A., 13 Donegall Place.

1863. Lamb, Miss, Tranmere, Osborne Park.
 1901. Larmor, H. G., J.P., Lisburn.
 1912. Ledgerwood, N. J., 10 Wellington Park.
 1912. Ledgerwood, Miss H., 10 Wellington Park.
 1877. Lett, Rev. Canon H. W., M.A., M.R.I.A., Aghaderg Glebe,
 Loughbrickland.
 1899. Lindsay, Prof., M.D., 3 Queen's Elms.
 1912. Long, Robert, 18 College Green.
 1893. Lowry, D. E., 25 Donegall Place.
 1908. Lowry, James, Llewellyn Avenue, Lisburn.
 1910. Lowry, Miss L., Hazlewood, Bloomfield.
 1910. Lynn, Miss M. J., Albany Cottage, Carrickfergus.
1913. MacAlpine, Miss J. H., Altnaveigh, Belfast Road, Lisburn.
 1905. MacCleary, A., College Square East.
 1894. MacCormac, Dr. John (the late), Great Victoria Street.
 1877. MacIlwaine, Mrs., Encliffe, Bangor.
 1903. MacIlwaine, Dr. J. E., 26 College Gardens.
 1864. MacKenzie, John, C.E., 2 Wellington Place.
 1904. Macoun, John R., Northlands, Deramore Park.
 1905. Macoun, Mrs., Clanrolla, Windsor Park.
 1912. Macoun, Stephenson, Clanrolla, Windsor Park.
 1901. MacRea, Kenneth, Balmoral.
 1876. Major, Rev. J. J., Doagh.
 1905. Malcolm, Miss Susan, Downshire Road, Holywood.
 1899. Malcomson, Walter, Cran-y-gael, Osborne Gardens.
 1899. Malcomson, J. G. B., Cairnburn, Strandtown.
 1901. Malcomson, Herbert T., 32 Arthur Street.
 1901. Malcomson, Joseph, 32 Arthur Street.
 1880. Marsh, Mrs., Glenlyon, Holywood.
 1867. Marsh, Joseph C. (the late), 2 Chichester Gardens.
 1891. Marshall, H. C., Bangor.
 1897. Massaroon, Mrs., Charles Street, Berkhamstead, Herts.
 1892. Maxton, James, Victoria Street.
 1908. Maxwell, Henry, Dunalbine, Deramore Park.
 1903. Maxwell, Joseph, J.P., Avonmore Lodge, Balmoral.
 1905. Maxwell, Mrs., Avonmore Lodge, Balmoral.
 1893. May, Robert, 40 Hopefield Avenue.
 1903. Maybin, Hugh, B.A., Intermediate School, Lisburn.
 1903. Mayne, H. Horner, Fierna, Osborne Park.
 1897. Megarry, John, 229 Springfield Road.
 1912. Metge, Mrs. R. H. Lisburn.
 1906. Millar, Thomas O., 306 Antrim Road.
 1907. Milligan, Miss, Drumgoole, Knockbreda Park.
 1894. Milligan, Alex., 225 Springfield Road.
 1901. Milne, J. N., Foylemore, St. Jude's Avenue.
 1910. Mitchell, Miss M. D., B.Sc., A.R.O.Sc.I., Drumbo Rectory.
 1891. Mollan, W. S., Hampton, Derryvolgie Avenue.
 1898. Montgomery, H. C., 40 Rosemary Street.

1913. Montgomery, Miss E. S., 26 College Green.
 1911. Montgomery, Miss Jane E., 8 Sandhurst Road.
 1890. Moore, John (the late), 11 Shaftesbury Square.
 1893. Moore, S. A., Ardgreenan, Downshire Road, Bangor.
 1907. Morris, A. B., Cloonee Villa, Rosetta Park.
 1903. Morrison, A. Cherrydene, Knock.
 1912. Mueller, L., 18 Stranmillis Gardens.
 1909. Muir, A. H., Craig Roystan, Castle Park.
 1909. Muir, Mrs., Craig Roystan, Castle Park.
 1892. Munce, W. B., Rosemary Street.
1899. M'Bretney, W. A. J., 31 Haypark Avenue.
 1909. M'Cance, James, 2 Easton Terrace.
 1884. M'Cleery, H. 20 Franklin Street.
 1908. M'Cleery, J. O., Ava House, Old Cavehill Road.
 1912. M'Cluggage, W. J., Riverside, Holywood.
 1901. M'Connell, James, 21 Cyprus Park, Bloomfield.
 1879. M'Connell, James, J.P., Stranmillis House.
 1903. M'Connell, Miss, Stranmillis House.
 1907. M'Cormack, Mrs., Craig Roystan, Cherry Valley, Knock.
 1891. M'Cormick, H. M'Neile, Craigavad.
 1912. M'Cready, John, 4 Mountcollyer Crescent.
 1912. M'Creary, R., 34 Thorndale Avenue.
 1905. M'Crum, Mrs., Ballyvesey, Carnmoney.
 1904. M'Kean, Edward John, B.A., B.L., Rosaville, Fortwilliam Park.
 1877. M'Kee, Wm. S., 20 Mill Street.
 1891. M'Kinney, W. F., Sentry Hill, Carnmonéy.
 1906. M'Kinney, Miss, Sentry Hill, Carnmoney.
 O M'Millan, W., J.P., 30 Ashley Avenue.
 1910. M'Mordie, R. J., J.P., M.P., Cabin Hill, Knock.
 1906. M'Neill, Charles S., 37 Ashley Avenue.
1884. O'Neill, Henry, M.D., 6 College Square East.
 1889. Orr, H. Lamont, (the late) 17 Garfield Street.
 1898. Orr, James, Lindenville, Charnwood Avenue, Cavehill Road.
1907. Parkhill, John, 9 Parkend Street.
 1910. Patchell, Mrs., 45 Malone Avenue.
 O Patterson, D. C., Glenard, Holywood.
 1888. Patterson, Robert, F.L.S., M.R.I.A., M.B.O.U., Glenbank, Holywood.
 1907. Patterson, Mrs. Robert, Glenbank, Holywood.
 1891. Patterson, Miss Clara, Glenbank, Holywood.
 O Patterson, Wm. H., M.R.I.A., Garranard, Strandtown.
 1909. Patterson, J. W., Rosavo, Cultra.
 1909. Patterson, M. S., Rosavo, Cultra.
 O Phillips, Wm. H., Lemonfield, Holywood.
 1867. Pim, John, J.P., Bonaven, Antrim Road.
 1868. Pim, Thos. W., 21 Victoria Street.

1869. Pim, Joshua, 6 Donegall Square South.
 1903. Pim, W. R., Lisnagarvey, Lisburn.
 1903. Pooler, Rev. Charles K., B.D., M.R.I.A., English St., Downpatrick.
 1890. Porter, F. A., Queen's Square.
 1890. Porter, Wm., Beechview, Balmoral Avenue
 1888. Praeger, E. A., Cultra, Holywood.
 1883. Praeger, R. Ll., B.A., B.E., M.R.I.A., National Library, Kildare Street, Dublin.
1910. Rankin, W. J., 82 Limestone Road.
 1901. Rankin, Will, Gordonall, Myrtlefield Park.
 1904. Rankin, Mrs., Gordonall, Myrtlefield Park.
 1907. Raymond, George, 66 Kansas Avenue.
 1907. Rea, Miss M. W., Salem House, Sydenham.
 1898. Reilly, George E., Woodburn, Carrickfergus.
 1903. Rentoul, Miss, The Lodge, Fortwilliam Park.
 1907. Rentoul, Dr., J.P., Lisburn.
 1907. Riddell, Mrs., Donegall Park.
 1903. Robb, H. M., 44 Ulsterville Avenue.
 1907. Robertson, C. G., Mountview, Cregagh.
 1904. Robinson, W. H., 7 Cheviot Street, Strandtown.
 1904. Roy, Charles, 2 Rossmore Avenue.
 1908. Rusk, John, M.D., Antrim Road.
 1909. Russell, Nelson, Lisburn.
 1911. Ryves, Miss, Richmond Lodge, Malone Road.
1899. Sandes, Robert, Chorlton, Adelaide Park.
 1907. Scott, Thos., J.P., Greenisland.
 1903. Sefton, Burton, St. Aubyn's, Deramore Drive.
 1909. Seymour, F. W., B.A., 7 Earlswood Road.
 1911. Shaw, G. W., Ulster Bank, York Street.
 1906. Shaw, William, Cliftonville Road.
 1905. Sheils, Rev. J., Saintfield.
 1904. Sinclair, Samuel, Inglewood, Adelaide Park.
 1890. Skillen, Joseph, Gladstone Terrace, Ballymena.
 1901. Sloan, James, Malone Avenue.
 1868. Speers, Adam, J.P., B.Sc., Holywood.
 1893. Stears, Samuel M., 6 Rosetta Avenue.
 1892. Steel, David, 10 Royal Avenue.
 1893. Steele, Miss, Dooneen, Marlborough Park.
 1911. Steele, Rev. W. C., B.D., The Manse, Hillsborough.
 1911. Stendall, J. A. Sidney, Municipal Museum.
 1903. Stephens, W. H., 13 Donegall Square North.
 1904. Stephens, John Kyle, J.P., 13 Donegall Square North.
 1881. Stevenson, John, Coolavin, Malone Road.
 1891. Stewart, Rev. Canon J. A., M.A., Killowen, Lisburn.
 1894. Stewart, W. J., Ormeau Road.
 1909. Stokes, W. J., Malone Park.
 1906. Storey, John W., B.A., Church of Ireland Y.M. Society.
 1901. Strachan, J., 1 Victoria Villas, Ballyclare.

1866. Swanston, William, F.G.S., 4a Cliftonville Avenue.
 1879. Swanston, Mrs., Cliftonville Avenue.
 1893. Symington, Prof., M.D., F.R.S., Queen's University.
1909. Thomas, Mrs. Harold, Hawthornden Road, Knock.
 1911. Thompson, Herbert M., 95 Eglantine Avenue.
 1871. Todd, John, J.P., Clarinda, Fortwilliam Park.
 1869. Todd, Wm. A., 24 Victoria Street.
 1901. Tomlinson, W. J. C., 17 Glandore Gardens.
 1911. Toppin, A. H., Jennymount Mills.
 1875. Traill, W. A., M.A. Ing., Bushmills.
 1879. Turtle, James G., Claremont, Strandtown.
 1904. Turtle, William Haydock, 1 Holyrood, Malone Road.
 1909. Turtle, Mrs. Herbert, Tanaghmore House, 83 Montclair Avenue,
 New Jersey, U.S.A.
1904. Vaughan, Henry R., Lagan Vale Estate, Stranmillis Road.
1879. Waddell, Rev. C. H., M.A., B.D., The Vicarage, Greyabbey.
 1903. Wakeman, W. J., C.E., 117 Cavehill Road.
 1894. Walsh, Robert, Abbotsford, Malone Road.
 1893. Walker, W. J. D., C.B., The Sycamores, Drogheada.
 1898. Walker, Miss, 44 Elmwood Avenue.
 1893. Walkington, Miss, LL.D., Strandtown.
 1905. Walkington, G. B., Gracecourt, Malone Park.
 1904. Walkington, Mrs., Oatlands, Ballinderry.
 1911. Ward, Miss K., Albertville, Sydenham.
 1888. Wardell, Miss, 4 Fitzwilliams Avenue.
 1909. Watson, John G., Aberdour, Clonevin Park, Lisburn.
 1905. Wear, Sylvanus, 19 Hopefield Avenue.
 1880. Welch, Robert J., M.R.I.A., 49 Lonsdale Street.
 1893. Wheeler, Mrs., Lennoxvale, Belfast.
 1911. Whitehouse, R. H., M.Sc., Queen's University.
 1877. Whitla, Sir William, M.D., College Square North.
 1908. Whitley, Miss, Malone Road.
 1903. Williamson, James, Sandown Park, Knock.
 1893. Wilson, Alec' G., J.P., Belvoir Park.
 1893. Wilson, George, 9 Bedford Street.
 1901. Wilson, Professor Gregg, M.A., D.Sc., M.R.I.A., Queen's University.
 1904. Wilson, Mrs., Deramore Park.
 1893. Woolcombe, Robt. Lloyd, M.A., LL.D. (Dublin University), F.I.
 Inst., F.R.C., Inst., F.R.G.S., F.R.E.S., F.S.S., M.R.I.A.,
 14 Waterloo Road, Dublin.
 o Workman, Rev. R., M.A., Crusheen, Cadogan Park.
 1901. Workman, W. H., M.B.O.U., Lismore, Windsor Avenue.
 1867. Wright, Joseph, F.G.S., 10 May Street.
- o Young, Rt. Hon. Robert, J.P., C.E., Rathvarna, Chichester Park.
 1911. Young, Rev. C. M., B.A., Bloomfield.

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 1911. Blackwood, C. V. R., Clanrye School, 8 Osborne Gardens.
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 1911. Brown, George B., 356 Ormeau Road.
 1911. Brown, Max, 356, Ormeau Road.
1911. Carrothers, Norman, 145 Stranmillis Road.
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1913. Doherty, Miss Irene, 8 Easton Crescent.
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 1913. Humphreys, Miss Norah, Lyndford, Osborne Park.
1912. Jackson, Louis L. C., St. Helier's, Cavehill Road.
1911. Maxwell, Miss Olive, Avonmore Lodge, Balmoral.
 1911. Maxwell, Miss Kathleen, Avonmore Lodge, Balmoral.
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INDEX.

- Acanthinula lamellata* 366, 381, 496, 519, 595, 608.
Accentor modularis 286.
Accipiter nisus 287.
Acicula lineata 366, 496.
Acorus Calamus 148, 206, 599, 616.
Acredula caudata 286.
Acrocephalus phragmitis 285.
Acroloxus lacustris 266, 370, 430, 519.
Actinia mesembryanthemum 37.
Actiniloba dianthus 179.
Adamsia palliata 179.
Ægopodium Podagraria 618.
Æthusa Cynapium 269.
Agabus arcticus 366.
Aghada 31.
Agrimonia Eupatoria 146.
Agriolimax agrestis 384.
A. laevis 21.
Alauda arvensis 287.
Alcedo ispida 287.
Alcyonium digitatum 179.
Aleochara brevipennis 596.
Alisma Plantago 269.
Allium oleraceum 206, 624.
A. ursinum 269, 318, 364.
A. vineale 206.
Amara communis 596.
Amblystegium filicinum 502.
Ammodiscus incertus 294.
Ammonites angulatus 388.
A. Bucklandi 388.
A. Johnstoni 388.
Ammi majus 575.
Amplexi zaphrentis 437.
Anagallis tenella 263.
Ananchytes gibbus 383.
A. ovatus 383.
Anaspis maculata 596.
A. ruficollis 596.
Anas boscas 287.
Anchomenus parvumpunctatus 596.
Anchusa sempervirens 27, 205.
 " *Ancient Inhabitants of Ireland*" 187.
Ancylus fluviatilis 280, 366.
A. lacustris 266, 370, 430, 519.
 Anderson, Thomas—" *Geology of Dublin District*" 184.
Andrena fuscata 596.
A. trimmerana 596.
 Andrews, Miss E.—" *Day in Maghera*" 591, " *Donegal Folklore*" 437.
 Andrews, Miss M. K.—" *Derbyshire Toad-stones*" 70.
Andromeda Polifolia 61.
Aneura latifrons 502.
Annual Meetings 101, 213, 321, 458, 548, 665.
Anodonta cygnea 309, 430, 600.
Anomodon viticulosus 502.
Anser brachyrhynchus 523.
Antennaria dioica 58, 59, 60, 362, 366.
Anthus pratensis 286.
Aphrodite aculeata 179.
Apium inundatum 254.
A. nodiflorum 148.
Aplozia cordifolia 35.
Arabis ciliata 295.
A. hirsuta 263, 362, 492.
Arca tetragona 362.
 " *Archæological Evidence of the Truth of Irish Records*" 312.
 " *Archæology of Surnames*" 408.
Arctium lappa 146.
Arctostaphylos Uva-ursi 205, 575.
Ardea cinerea 287.
Arenaria serpyllifolia 597.
A. trinervia 21, 137, 362, 364.

- Arenaria verna 60, 366, 381, 611.
 Argynnis aglaia 16.
 Arianta arbustorum 369, 381, 492, 519, 595.
 Arion ater 262, 369.
 A. hortensis 211.
Armadillidium nasatum (*pictum*) 137, 496.
 A. vulgare 150, 266, 370, 494, 596, 602.
 Armagh 9, 504.
Armeria maritima 134.
Artemisia maritima 405.
 A. vulgaris 597.
Asellus aquaticus 504, 519.
Asio otus 287.
Asplenium Adiantum-nigrum 146, 381.
 A. marinum 40, 146, 263, 273, 362, 405, 575, 601.
 A. Ruta-muraria 140, 263.
 A. septentrionale 598.
 A. Trichomanes 140, 146, 252, 263, 364, 366, 381, 606.
Astarte guenxii 388.
Asterella hemisphaerica 607.
Athyrium Filix-fœmina 140, 150.
Atriplex farinosa 150.
 A. portulacoides 405, 601.
Avicula contorta 37.
Axinella strigosa 180.
Azara microphylla 137.
Balanus balanoides 261.
Ballota nigra 601.
Ballyliffan 142.
Ballyshannon 260.
 "Bangor" 397.
Barbarea intermedia 423.
Barbula cylindrica 502.
 B. revoluta 502.
Beau Parc 603.
 "Beekeite" 91.
 "Beekeite or Cycloidal Chalcedony" 536.
Belemnitella mucronata 277, 278, 383, 386, 387.
Belemnites ultimus 274.
 Bell, Robert—"Beekeite" 91, "Notes on Palæolithic Deposits" 83.
Belturbet 500.
- Bennett, S. A.—"Chalk and its Formation" 532, "Exhibition of Plants" 532, "Lower Carb Rocks of N. Staffs. Coalfield" 435, "Plant Associations from Slemish" 573, "Vegetation of Calcareous Soils" 520.
 Beresford, D. R. Pack—"Fauna of Cavan" 519.
Bernicla canadensis 287.
 Berry, Major R. G.—"Norse and Irish Ships" 591, "Scandinavians in Ireland" 67, "Some Origins of the Irish People" 296, "Worship of the Magna Mater" 631.
Bertholletia excelsa 42.
Beta maritima 405.
Bidessus minutissimus 251.
Bienma corrigata 180.
 B. inomata 180.
 Bigger, F. J.—"Hints to Students of Archæology" 591, "Raths of Ancient Settlement between Bann and Main Rivers" 520.
 "Birds of Hillsborough" 283.
Blarney 30.
Blechnum Spicant 207, 606.
Bombus agrorum 152.
 B. cullumanas 152.
 B. hortorum 152.
 B. lapidarius 152.
B. latreillellus 152.
 B. lucorum 596.
 B. terrestris 152, 596.
Bombyx cecropia 611.
Bos longifrons 430.
 "Botanists of the North of Ireland" 615.
Botaurus lentiginosus 523.
Botrychium Lunaria 59, 61, 318.
 "Boulder-Clay with Foraminifera" 449.
Brachythecium populeum 502.
Brassica alba 21.
 "British Violets and Pansies" 574.
Briza media 146, 369.
 Browne, F. Balfour—"Brit. Assoc. Del. Reports" 310, 453, 533, 663, "Discussion on Dispersal" 444, "Fauna of Cavan" 519, "Life History of Water-Beetle" 189, "Method in Biological Research" 195, "Natural History of Dragon-Fly" 535, "Relation of Plant to Soil" 528, "Zoological Notes" 400.

- Brown, John—"Stewart Memorial" 433.
Bryum pallens 502.
Buncrana 141.
Buteo lagopus 287.
Butomus umbellatus 148, 430, 599.
Bythinia leachii 14, 45.
B. tentaculata 148.
- Cæcilioides acicula* 596.
Cakile maritima 146.
Calamagrostis Hookeri 511.
Calceolaria polyrhiza 137.
Caltha palustris 134, 140.
Calystegia Soldanella 494.
Camerspongia fungiformis 274, 387.
Campanula rapunculoides 603,
Campylopus pyriformis 502.
Cancer pagurus 180.
Capulus hungaricus 362.
Carabus granulatus 596.
Cardamine amara 137.
Cardinia listeri 388.
C. ovalis 388.
C. scutula 243.
Carduelis elegans 286.
C. spinus 286.
Carduus acanthoides 369, 505, 603.
C. crispus 369, 505, 603.
C. pratensis 146.
C. pycnocephalus 601.
Carex acuta 140, 364, 501, 502, 505.
C. arenaria 146.
C. binervis 140.
C. dioica 140.
C. limosa 207.
C. pallescens 134.
C. paniculata 369.
C. pendula 207, 269, 505, 605.
C. Pseudo-cyperus 502.
C. remota 148.
C. riparia 140, 252, 603.
C. strigosa 269.
- Carex vesicaria* 140.
C. vulpina 148.
Carlina vulgaris 295.
Carmody, Rev. W. P.—"Kitchen Middens in Dingle Bay" 524.
Carpenter, Prof. G. H.—"Recent Advances in the Evolution Theory" 528.
Carrothers N.—"Exhibition of Plants" 532, "Plants of Cave Hill" 318.
Catharinea rhystophyllæ 207.
Cavan 497.
 "Celtic Misnomer" 203.
Centaurea Scabiosa 295, 597.
Centhorhynchus assimilis 596.
Cephalozia connivens 502.
C. leucantha 502.
Cerastium arvense 295, 624.
C. semidecandrum 361.
Cerithium semele 388.
Certhia familiaris 286.
Ceterach officinarum 27, 61, 137, 252, 263, 501, 601, 603.
 "Chalcedony of Ballyboland" 316.
 "Chalk and its Formation" 532.
Chamærops excelsa 137.
Charadrius pluvialis 288.
Chelidonium majus 21, 252, 364.
Chelidon urbica 286.
Chenopodium Bonus-Henricus 146, 150, 252, 597.
C. polyspermum 625.
Chlora perfoliata 295.
Choisya ternata 137.
Chrysanthemum Parthenium 501.
Chrysis ignita 596.
Chthonius rayi 370, 596, 602, 604, 608.
C. tetrachelatus 602.
 "Church Island" 192.
Cichorium Intybus 150.
Cidaris edwardsii 388.
Cinclidotus fontinaloides 502.
Cinclus aquaticus 286.
Ciræa alpina 60.
Cladina rangiferina 511.

- Cladium Mariscus 295, 505.
 Clausilia bidentata 21.
 Cleland, A. McL.—“Gorges of the Tarn” 633.
 Climacium dendroides 502.
 Clogher Head 601.
 “Close of an Ice Age” 441.
 Cloyne 21.
 “Cluster-cups and Microscopic Fungi” 62.
 Cnicus lanceolatus 381.
 “Co. Antrim Basaltic Plateau” 577.
 Coccinella 7-punctata 596.
 Cochlearia danica 575.
 Cochllicopa lubrica 21.
 Coenonympha tiphon 16.
 Cole, G. A. J.—“Close of an Ice Age” 441.
 Coleraine 10.
 “Colour and Superficial Appearance of Flint Implements” 85.
 Columba oenas 288.
 C. palumbus 288.
 Comatula rosacea 180.
 “Common Fungi” 178.
 Conium maculatum 146.
 “Conjectures regarding recent Sand-Dune Finds at Dundrum” 84.
 “Connemara Plants” 294.
 Conversazioni 41, 153, 279, 389, 510, 610.
 Cookstown 9.
 Corallinia officinalis 262.
 Coremia ferrugata 596.
 Cornuspina involvens 294.
 Cornus sanguinea 364.
 Cortunix communis 288.
 Corvus frugilegus 287.
 C. monedula 287.
 Cotyledon Umbilicus 258, 263.
 Cotile riparia 286.
 Crambe maritima 150.
 Craspedosoma rawlinsii 608.
 Crataegus Oxyacantha 281.
 Crenella marmorata 180.
 Crepis virens 146.
 Crex pratensis 288.
 Crithmum maritimum 273, 405.
 “Crossing of Ferns” 319.
 Cucullæa hettangiensis 388.
 Cuculus canorus 287.
 Cunningham, C. M.—“Discussion on Dispersal” 445.
 Cuscuta Epithymum 485.
 Cygnus olor 287.
 Cysticlus convexus 15, 262, 494, 496.
 Cynoglossum officinale 494.
 Cypræa europæa 362.
 Cyprina islandica 362.
 Cypselus apus 287.
 Cystopteris fragilis 381, 492, 606.
 Dabeocia polifolia 295, 597.
 Dafila acuta 287.
 Dakin, W. J.—“Plankton Studies” 449,
 “Toxic Effects of Fresh Water on Marine Animals” 292.
 “Darwin Centenary” 196.
 “Dawn of History in Ireland” 198.
 “Day in Maghera” 591.
 Deane, Arthur—“Dispersal of Seeds” 98,
 “Forest Trees” 522.
 “Dendrites and Picture Stones” 297.
 “Derbyshire Toadstones” 70.
 Deronectes griseo-striatus 366, 381.
 “Determination of Specific Gravity” 191.
 Dewhurst, Thomas—“Determination of Specific Gravity” 191, “Volcanoes and Volcanic Action” 79.
 Diadema lobatum 576.
 Diatoma vulgare 301.
 Dichodontum pellucidum 502.
 Dickson, John M.—“Celtic Misnomer” 203.
 Dicranella cerviculata 502.
 Dicranum scottii 627.
 “Differences between Mosses and Hepatics” 448.
 Digitalis purpurea 269.
 Dipsacus sylvestris 11, 239.
 Discina Holdeni 388.
 “Discussion on Means of Dispersal” 443.
 “Dispersal of Seeds” 98.
 Ditrichum flexicaule 502.

- Dobbs, Miss M. E.—“Archæological Evidence of Truth of Irish Records” 312,
“Dawn of History in Ireland” 198.
- Donaldson, George—“Exhibition of Plants” 532, “Stewart Memorial” 432, “Zoological Notes” 400.
- Donax vittatus* 362.
- Dondia epipactis* 137.
- “Donegal Folklore” 437.
- Draba incana* 348, 492.
- D. muralis* 239.
- Drosera anglica* 59, 295, 366, 501.
- D. intermedia* 295.
- D. rotundifolia* 381, 597.
- Drumlane* 498.
- Dryas octopetala* 60, 295, 381, 611.
- Dumortiera irrigua* 511.
- Dwerryhouse, A. R.—“Discussion on Dispersal” 444, “Glacial Lakes and their Overflow Channels” 439, “Some Geological Features of Scotland, &c.” 628, “Water Supply from Underground Sources” 517, “With the Brit. Assoc. in Canada” 303.
- Dytiscus circumcinctus* 519.
- D. lapponicus* 400.
- Echinoconus conicum* 37.
- Echinocorys gibbus* 278.
- Echinus sphæra* 180.
- Echium vulgare* 151.
“Ecology of Plants” 289.
- “Economic Value of Birds to the State” 157.
- “Elementary Outline of Zoology” 51.
- Eleocharis uniglumis* 150.
- Elodea canadensis* 148.
- Eluma purpurascens* 389.
- Emberiza citrinella* 287.
- E. milliaria* 287.
- E. schoenielius* 287.
- Empetrum nigrum* 40, 59, 366, 381, 492.
- Epilobium angustifolium* 59, 60, 381, 492.
- E. hirsutum* 146.
- E. palustre* 146.
- E. parviflorum* 146.
- Epipactis latifolia* 27, 140, 148, 269, 364.
- E. palustris* 206.
- Equisetum palustre* 146.
- E. sylvaticum* 140.
- Erica Mackaii* 295.
- E. mediterranea* 295, 296.
- Eriocaulon septangulare* 295.
- Eriophorum latifolium* 295.
- Eritacus rubecula* 285.
- Erodium moschatum* 151.
- Erophila vulgaris* 361, 492.
- Eryngium maritimum* 146, 150, 151, 494.
- Etheridgia mirabilis* 274, 275.
- Euchloe cardamines* 596.
- Eucryphia pinnatifida* 137.
- Euonymus europaeus* 364, 502, 608.
- Eupatorium cannabinum* 21, 505, 603,
- Euphorbia exigua* 599.
- E. hiberna* 146.
- E. paralias*, 151.
- E. Pepis* 621.
- Euphrasia Salisburgensis* 210.
- Eurhynchium rusciforme* 502.
- E. tenellum* 502,
“Evening with Diatomaceæ” 300.
- “Evening with the Microscope” 589.
- Exchanges of Proceedings 107, 218, 326, 463, 553, 670.
- Excursions:—Ardglass 509, 590. Armagh 367, 504. Ballycastle 133, 576. Ballymena 270. Ballymurphy 576. Ballywalter Park 378. Baronscourt 494. Belvoir Park 136. Boyne Valley 249, 601. Bundoran 258. Carlingford 148, 595. Carrickfergus 384, 590. Castle-rock 361. Cavan and District 497. Cave Hill Quarries and Carr's Glen 576. Cloughfin 274. Coast of Louth and Boyne Valley 601. Colin Glen 507. Cork 27. Derryadd Bay 252. Dromore 363. Dundrum 151. Ellis's Cut 503. Giant's Causeway 133, 576. Glendun 34. Glenoe 594. Glenshesk 507. Greyabbey 32, 378. Hillsport 493. Inch Abbey 263. Irish Hill 135. Islandmaheen 22. Kells and Connor 506. Kilelief and Killard Point 493. Kilcoan 386. Knockdhu and Sallagh Braes 380. Lagan Canal 147. Larne Harbour 37. Lissanoure Castle 138.

- Loughgall 504. Lough Swilly District 141. Lyle Hill 248. Magheralin 385. Magheramorne 491. Mallusk and Roughfort 590. Moira 275. Orlock Point 272. Parkmore 365. Portrush 382. Richhill 266. Roe Valley 255. Rosapenna 371. Rossmore Castle 607. Roughan Park 19. Rowallane 597. Scawt Hill 254. Scrabo 358. Slemish 24. Slieve-na-griddle 630. Soldiers-town and Aghalee 599. Squire's Hill 277. St. John's Point 405. Tardree, Sandy Braes and Carnearney 359. Tollymore Park 606. Toome Bridge 598. Torr Head 491. Woodburn Glen 275.
- Exhibition of Plants 404, 532.
- Exogyra columba* 281.
- E. conica* 274, 275.
- Extraerinus briarius 388.
- Extraordinary General Meeting 493.
- "Facts about the Distribution of some Animals and Plants" 393.
- Falco candicans* 523.
- F. gyrfalco* 523.
- F. islandus* 523.
- F. tinnunculus* 287.
- "Fauna of Cavan" 518.
- Fennell, W. J.—"Bangor" 397, "Great Burial Mounds of Lough Crew" 48.
- "Ferns of Ulster" 305.
- "Fertilization of Flowers" 185.
- Filago minima* 151.
- Floscalaria campanulata* 279.
- Foeniculum officinale* 150;
- F. vulgare* 11.
- "Fogous and other Cornish Antiquities" 451.
- "Folklore connected with the Ulster Raths" 15.
- Fontinalis antipyretica* 21.
- "Foraminifera" 293.
- "Foraminifera from Magheramorne and Limavady" 449.
- "Forest Fires" 292.
- Foster, N. H.—"Birds of Hillsborough" 283, "Discussion on Dispersal" 444, "Elementary Outline of Zoology" 51, "Fauna of Cavan" 518, "Isopods of Cork" 53, "Talk about Birds" 518, "Zoological Notes" 397.
- Fringilla coelebs* 286.
- F. montifringilla* 286.
- Fulica atra* 288.
- Fuligula cristata* 288.
- F. ferina* 288.
- F. marila* 288.
- Galium boreale* 366.
- G. Cruciatia* 205.
- G. Mollugo* 599.
- G. sylvestre* 11, 42.
- Gallinago coelestis* 288.
- G. gallinula* 288.
- Gallinula chloropus* 288.
- Gallway, W. H.—"Archæology and Scenery of Cork" 55, "Summer's Dredging in Belfast Lough" 179.
- Gammarus pulex* 519.
- Garrulus glandarius* 287.
- Gentiana campestris* 150.
- G. verna* 295.
- "Geological Aspects of Coast Erosion" 531.
- "Geology of Dublin District" 184.
- "Geology of Weymouth" 305.
- Geophilus longicornis* 608.
- G. proximus* 608.
- Geranium lucidum* 204, 252, 492, 595, 603.
- G. molle* 204.
- G. perenne* 252, 269, 603.
- G. Phæum* 21, 364.
- G. pratense* 369.
- G. pusillum* 204.
- G. pyrenaicum* 252, 269, 603.
- G. striatum* 24, 60.
- Geum intermedium* 595.
- "Glacial Lakes and their Overflow Channels" 439.
- Glaucium flavum* 150, 151, 597.
- Glaux maritima* 134.
- Globigerina bulloides* 293, 294.
- Glomeris marginata* 492, 608.
- Gnaphalium sylvaticum* 606.
- Gomphosphaeria lacustris* 501.
- Gonepterix rhamni* 381, 389, 400.

- "Gorges of the Tarn" 633.
 "Gossiping Geological Speculation on Cave Hill" 211.
 Gray, William—"Gossiping Geological Speculation on Cave Hill" 211,
 "Evening with the Microscope" 589,
 "Stewart Memorial" 433, "Talk on Limestone" 445.
 "Great Burial Mounds of Lough Crew" 48.
 Green, W. A.—"People of the Dawn" 405.
 Gwynne-Vaughan, Prof.—"Discussion on Dispersal" 444.
Gymnadenia albida 27, 58, 60, 61, 318.
G. conopsea 27, 58, 61, 140, 366, 369.
Habenaria albida 27, 58, 60, 61, 318.
H. bifolia 24, 140, 598.
H. chlorantha 140, 146.
H. chloroleuca 369.
H. conopsea 27, 58, 61, 140, 366, 369.
H. intacta 210, 295.
H. viridis 59, 61, 206, 318.
Haematopus ostralegus 405.
Halichondria panicea 180.
 Hamilton, John—"Stewart Memorial" 433.
Haplophthalmus mengii 262, 400, 506.
Haplophragmium globigeriniforme 294.
 Harbison, John H.—"Hydra: its Movements and Reactions" 74.
Helicella barbara 40, 494, 596.
H. intersecta 362, 596.
H. itala 310.
Helix aculeata 258.
H. acuta 40, 494, 596.
H. aspersa 384, 405.
H. hortensis 27, 266, 280, 362, 496, 605.
H. lamellata 138, 262, 430, 588.
H. nemoralis 21, 280, 309, 405, 492.
H. personata 431.
H. pisana 602.
H. pulchella 269, 369.
H. rotundata 21, 143.
H. rupestris 262, 381, 608.
H. virgata 40.
Helleborine longifolia 206.
Hieracium anglicum 366, 606.
H. crocatum 606.
- Hieracium stenolepis* 366, 381.
H. sylvaticum 381.
H. umbellatum 423.
H. vulgatum 606.
 "Hints to Students of Archaeology" 591.
Hirundo rustica 286.
 Hobson, Mrs.—Brit. Assoc. Del. Report 87, 181, "Fogous and other Cornish Antiquities" 451, "Leicester" 86.
 "Holiday Trip to West Kerry" 72.
Hottonia palustris 627.
 "How Caves are formed" 589.
Hyalinia alliaria 608.
H. cellaria 14, 280.
H. excavata 258, 496.
H. fulva 269.
H. nitida 21, 505.
 "Hydra: its Movements and Reactions" 74.
Hydrobius fuscipes 131, 189, 245.
Hydrocharis Morsus-ranae 254.
Hygromia fusca 366, 381, 519, 595, 607.
H. hispida 405.
H. rufescens 505, 596.
Hypericum perforatum 603.
H. tetrapterum 146.
Hypnum cupressiforme 502.
Idastræa endothecata 350, 436.
Inchigeela 30.
 "Indigenous Trees in our Woodlands" 527.
Inoceramus crispis 274, 275, 278, 383, 387, 388.
Inula Helenium 501.
 "Irish Medallists" 591.
 "Irish Spectres" 591.
 "Irish Tokens" 591.
Iulus albipes 492.
I. niger 608.
 Jackson, J. L. S.—"Mammoth Cave at Buttevant" 54.
Juncus bufonius 381.
J. glaucus 150, 269, 369, 501.
J. maritimus 146.
Juniperus nana 146, 295.

- Kantia Sprengelii 502.
 Kells 604.
 Kells Abbey 66.
 Kilmore 497.
 Kilroe, J. R.—“Outlines of Geological Observations in North-East London-derry” 634.
 Kingena lima 274.
 Kinsale 31.
 “Kitchen Middens in Dingle Bay” 524.
- Labulla thoracica 519.
 Lacerta viridis 611.
 Lactuca virosa 575.
 Lamb, Miss—“Notes on Early Christian Ornaments in Italian Churches” 89.
 Lamium album 252, 369, 597.
 Lamna appendiculata 387.
 “Land Shell Deposits on Horn Head Sand Hills” 201.
 Lanius collurio 523.
 Larus argentatus 288.
 L. canus 288.
 L. fuscus 288.
 L. philadelphia 523.
 L. ridibundus 288.
 Lastrea æmula 27, 258.
 L. dilatata 140.
 L. Filix-mas 620.
 L. Oreopteris 146.
 L. spinulosa 207.
 Lathraea squamaria 27, 61, 318.
 Lathyrus palustris 486, 503, 511, 611.
 “Leicester: its Scenery and Antiquities” 86.
 Lemma trisulca 502.
 Lemanea Batrachospermum 595.
 Leontodon hirtus 150.
 Lepidium campestre 60.
 L. Draba 11, 60.
 Lett, Rev. Canon—“Botanists of the North of Ireland” 615, “Differences between Mosses and Hepaticas” 448.
 Leucobryum glaucum 502.
 Lichena pygmaea 511.
- Liemophora flabellata 301.
 “Life History of Insects” 528.
 “Life History of the Water Beetle” 189.
 Ligia oceanica 134, 149, 596.
 Ligurinus chloris 286.
 Ligusticum scoticum 11, 273.
 Lima gigantea 388.
 L. terqueni 388.
 Limnaea auricularia 505, 600.
 L. palustris 21, 148, 253, 381.
 L. peregra 148, 244, 381.
 L. prætenuis 14.
 L. stagnalis 21, 148, 309, 370.
 L. truncatula 366.
 Linnias ceratophylis 504.
 Limax arborum 366, 384.
 L. cinereo-niger 588, 611.
 L. flavus 258.
 L. maximus 369.
 Linaria sepium 11.
 Lineus marinus 261.
 Lingula scotica 437.
 “Links in Man’s Ancestral Chain” 45.
 Linota cannabina 286.
 L. flavirostris 286.
 L. rufescens 286.
 Linotœnia maritima 596.
 Lisburn 10.
 Listera cordata 57, 61, 366.
 L. ovata 263, 366.
 Lists of Members 111, 222, 330, 467, 556, 674.
 Lists of Officers 2, 119, 120, 122, 229, 230, 233, 234, 337, 338, 341, 342, 474, 475, 479, 480, 563, 564, 567, 568, 683, 684.
 Lithobius crassipes 588.
 L. variegatus 608.
 Lithospermum officinale 318, 505.
 Lithothamnion polymorphium 262.
 L. vesicalatum 262.
 Lithostrotion basaltiformis 368.
 L. Portlockii 351.
 Littorina littorea 261.
 L. ruditus 150.
 Lobelia Dortmanna 146, 295.

- "Local Botanical Field Work in 1907" 56.
 "Local Fossils and their Correlation to Recent Types" 527.
 "Local Plant Gleanings" 204.
Locustella naevia 253, 286.
 Londonderry Municipal Museum 143.
Lonicera xylosteum 595.
Lotus pilosus 140.
 "Lower Carboniferous Rocks of North Staffs. Coalfield" 435.
 "Lower forms of Plant Life" 76.
Loxia curvirostra 287.
Lunularia cruciata 502.
Lutaria elliptica 362.
Lychnis diurna 137, 146.
Lycopodium alpinum 366.
L. clavatum 61, 366, 606.
L. Selago 146, 366.
Lycopus europaeus 148.
Lycosa ruricola 519.
Lysimachia Nummularia 502.
L. vulgaris 273, 502, 503, 603.
- Macroom* 29.
Madotheca platyphylla 502.
Malva moschata 206.
M. rotundifolia 150.
M. sylvestris 146.
Marchantia polymorpha 502.
Mareca penelope 287.
Margaritana margaritifera 496.
 "Markings of Nestling Birds" 82.
Marsupella emarginata 606.
Matricaria discoidea 601.
 Mayes, William—"Irish Medallists" 591.
 May, Robert—"Conjectures regarding recent Sand-Dune Finds at Dundrum" 84.
 Maxwell, Joseph—"Evening with Diatomaceæ" 300, "Pond Life" 548,
 "Rotifers: where and how to find them and how to mount them" 588,
 "Zoological Notes" 401.
 M'Kean, E. J.—"Holiday Trip to West Kerry" 72, "Irish Spectres" 591.
Meconopsis integrifolia 137.
- Meconopsis Wallichii* 137.
Medicago falcata 604.
M. lupulina 140, 269.
Megaceros hibernicus 42.
Melampus bidentatus 150.
Melampyrum pratense 58, 59, 146, 258, 606.
Melicerta ringens 279, 504.
Meligethes ænus 596.
M. flavipes 596.
M. viridescens 596.
Mendion circulare 301.
Menyanthes trifoliata 21, 140, 369.
Mercurialis perennis 269, 595.
Mertensia maritima 15.
Meta merianæ 519.
M. segmentata 579.
 "Method in Biological Research" 195.
Metoponorthus melanurus 389.
M. pruinosis 15, 496, 506, 519.
Micraster cor-anguinum 387.
Milax gagates 369, 405, 596.
M. sowerbyi 405, 596.
Modiola minima 37.
 Milligan, Alex.—"Ancient Inhabitants of Ireland" 187, "Archaeology of Surnames" 408, "Lower Forms of Plant Life" 76, "Study of Fungi" 440.
Mintiaghhs 143.
Mitopus morio 520.
Molinia caerulea 140.
Motacilla lugubris 286.
M. melanope 286.
M. raii 253.
Mullaghmore 259.
Musicapa grisola 286.
Myriophyllum spicatum 146, 253.
Mysis relicta 451.
Mytilus edulis 646.
Nassa pygmaea 362.
Nasturtium officinale 148, 501.
N. palustre 253.
 "Natural History of the Dragon Fly" 535.
Navicula lyra 301.

- Nemastoma lugubre 520.
 Nekera pumila 501.
 Neottia Nidus-avis 61, 137, 366.
 Nettion crecca 287.
 Neotinea intacta 210, 295.
 Nomada alternata 596.
 N. ruficornis 596.
 Nonionina depressula 9.
 "Norse and Irish Ships" 591.
 "Notes on Early Christian Ornaments in Italian Churches" 89.
 "Notes on Palæolithic Deposits" 83.
 Numenius arquata 288.
 Nuphar luteum 148.
 Nyctea scandica 523.
 Nycticorax griseus 43.
 Nymphaea alba 140.
- Obisium cambridgi 588.
 O. lubricum 588.
 Ædemia perspicillata 523
 Ænanthe fistulosa 503.
 Æ. Lachenalii 146, 273.
 Æ. Phellandrium, 148.
 Oniscus asellus 134, 137, 140, 149, 519, 596.
 "Onyx of Spanish Bay" 401.
 "Opal Deposits of Sandy Braes" 200.
 Orchestia littorea 134.
 Orchis incarnata 140, 146, 263, 366, 597.
 O. latifolia 146.
 O. maculata 263.
 O. pyramidalis 11, 61, 206, 318, 368, 575, 599, 611.
 Origanum vulgare 11, 273.
 "Origin and Formation of Zeolites in Basalt" 92.
 Orobanche minor 150.
 O. rübra 318, 485, 494, 611.
 Orr, H. L.—"Discussion on Dispersal" 445,
 "Exhibition of Plants" 532, "Pinus sylvestris &c." 573, "Zoological Notes" 401.
 Orr, James—"Local Fossils and their Correlation to Recent Types" 527.
 Orthis resupinata 436.
- Orthotrichum affine 502.
 O. disphanum 21.
 O. Lyellii 502.
 Osmunda regalis 30, 146, 254.
 Ostrea acuminata 388.
 O. carinata 37, 387.
 O. liassica 388.
 O. semiplana 275, 387, 388.
 O. verticularis 386.
- "Outline of Geological Observations in N.E. Londonderry" 634.
- Paludestrina jenkinsi 15.
 P. ventrosa 405.
 Papaver glaucum 150, 151, 597.
 Pardosa amentata 504, 519.
 P. pullata 519.
 Parietaria officinalis 151, 252, 384.
 Parnassia palustris 40, 150, 492.
 Parus ater 286.
 P. cœruleus 286.
 P. major 286.
 Passer domesticus 286.
 P. montanus 262.
 Patella vulgata 261.
 Patten, Prof. C. J.—"Links in Man's Ancestral Chain" 45.
 Patterson, Robert—"Birds of Cork" 53,
 "Economic Value of Birds to the State" 157, "Markings of Nestling Birds" 82.
 Pecten æquicostatus 275.
 P. orbicularis 274.
 P. quinquecostatus 274, 387.
 Pellia calycina 511.
 Pentacrinites basaltiformis 388.
 "People of the Dawn" 405.
 Perdix cinerea 288.
 Petasites fragrans 318.
 "Petrological Types of Basalt in Co. Antrim" 290.
 Phalaenocorax carbo 287.
 Phalangium ophilio 504.
 Phasianus colchicus 288.
 Phillipsia derbiensis 437.
 Phillips, W. H.—"Crossing of Ferns" 319,
 "Ferns of Ulster" 305.

- Philoscia muscorum* 134, 150, 519.
Phragmites communis 369.
Phyllobius viridæsis 596.
Phylloscopus rufus 285.
P. trochilus 285.
Physa fontinalis 148, 266.
Physeia estanea 511.
Pica rustica 287.
Pieris rapae 596.
Pimpinella Saxifraga 606.
Pinguicula lusitanica 59, 150, 295.
P. vulgaris 381 597.
" *Pinus sylvestris*, &c." 573.
Pirata piraticus 504.
Pisidium amnicum 504.
P. nitidum 381.
P. pusillum 381.
P. subtruncatum 381.
Pittosporum Mayii 137.
" *Plankton Studies*" 449.
Planorbis albus 21.
P. carinatus 148, 253, 405.
P. contortus 370.
P. cornutus 611.
P. crista 496.
P. fontanus 370.
P. glaber 262, 600.
P. marginatus 253.
P. vorticulus 510.
Plantago media 205.
" *Plant Associations from Slemish*" 573.
" *Plant Communities*" 516.
" *Plant Life in a Bog*" 315.
" *Plant Life in a Marsh*" 435.
" *Plant Life in a Wood*" 396.
" *Plants of Cave Hill*" 318.
Plegadis falcinellus 43.
Pleurophyllidia loveni, 129, 180.
Pleurotomaria perspectiva 387.
Plunkett, Thomas—" *Tombs, Temples and Pyramids of Egypt*" 63.
Poa nemoralis 61, 140.
P. rigida 601.
- Podicipes cristatus* 289.
P. fluviatilis 289.
P. nigricollis 523.
Pollan Strand 142.
Polygala grandiflora 381.
Polygonum amphibium 273.
P. Raai 151.
Polytrichum attenuatum 502.
Polypodium Phegopteris 150, 366, 606.
P. vulgare 146, 595.
" *Pond Life*" 548.
Porcellio dilatatus 15, 137, 506.
P. laevis 269.
P. pictus 150, 370, 506, 519, 608.
P. scaber 134, 137, 140, 150, 519, 596.
" *Possibilities arising from Nature Study*" 525.
Potamogeton lucens 140, 254.
P. perfoliatus 502.
Poterion cretaceum 276, 386.
P. patera 276, 386.
Praeger, R. Ll.—" *Discussion on Dispersal*" 443, " *Rock Gardens*" 208, " *Stewart Memorial*" 422, " *Study of Native Vegetation*" 297, " *What do we mean by a 'Native' Species?*" 573, 587.
Pratincola rubetra 285.
P. rubicola 285.
Primula Cockburniana 137.
P. japonica 137.
P. pulverulenta 137.
P. Sieboldi 137.
P. Sikkimensis 137.
Productus longispinus 436.
P. semireticulatus 436.
Prolecanites compressus 436.
Prunus insititia 502.
P. Padus 21, 258.
Psamma arenaria 146, 152, 309.
Psithyrus barbitellus 596.
Ptilidium ciliare 207.
Ptychodus latissimus 274.
Pupa anglica 143, 262, 362, 430, 608.
P. cylindracea 381.
P. muscorum 494, 596.

- Purpura lapillus 261, 310.
Pyramidula rupestris 262, 381, 608.
Pyrola media 58, 59, 61, 318.
P. minor 59, 61, 318.
P. rotundifolia 511.
P. secunda 348, 381.
Pyrrhula europaea 286.
Pyrus Aria 268.
- Queenstown 31.
- Rallus aquaticus* 288.
Ramondia pyrenaica 137.
Ranunculus Baudotii 597.
R. circinatus 253, 599.
R. hederaceus 21.
R. heterophyllum 140.
R. Lingua 503, 599.
R. peltatus 24, 60, 502.
R. pseudo-fluitans 60.
R. sceleratus 24.
R. trichophyllum 21, 24, 60, 361, 368, 423.
"Rare Birds in Municipal Collection" 522.
"Rare Old Chester" 457.
"Raths of an Ancient Settlement between Bann and Main Rivers" 520.
"Recent Advances in Evolution Theory" 528.
Regulus cristatus 285.
"Relation of Plant to Soil" 528.
Reniera varidus 180.
Reports—
Annual 3, 123, 235, 343, 481, 569.
Archaeological Section 12, 130, 245, 354, 590.
Botanical Section 10, 126, 239, 347, 485, 573.
Delegate to Brit. Assoc. 87, 181, 310, 453, 533, 663.
Geological Section 8, 128, 240, 349, 486, 576.
Junior Section 488, 588.
Librarian's 7, 125, 238, 347, 485, 573.
Sub-Committee (Prizes) 16, 130, 245, 354, 489, 591.
Sub-Committee (Reduction of Club's Stock) 354.
- Sub-Committee (Stewart Memorial) 356.
Zoological Section 13, 129, 244, 353, 487, 587.
Rhynchonella limbata 387.
R. plicatilis 386, 387.
R. robusta 275.
Riccia glaucecea 35.
"Rock gardens" 208.
Rosa arvensis 140, 601.
R. canina 281.
R. hibernica 419, 511.
R. spinosissima 59.
Rostellan 31.
"Rotifers: where and how to find them and how to mount them" 588.
Rubia peregrina 604.
Rubus saxatilis 263, 381.
Rules 104, 215, 323, 460, 550, 667.
- Sabellaria alveolata* 261.
Sagina nodosa 146, 150, 381.
Sagittaria sagittifolia 148, 503.
Salamandra maculosa 611.
Salix Caprea 501.
S. pentandra 140, 258, 502.
S. repens 146.
Salsola Kali 151.
Sambucus Ebulus 501.
Samolus Valerandi 273, 501.
Sanicula europaea 59.
"Sandhills: their Formation, Fauna and Flora" 514.
Saponaria officinalis 21.
"S. A. S." 434.
Saxicola oenanthe 285.
Saxifraga aizoides 492.
S. Cotyledon 127.
S. granulata 576.
S. hypnoides 134, 263, 366, 381, 492.
S. oppositifolia 611.
S. Sternbergii 210.
S. tridactylites 252, 362.
Scalaria communis 362.
"Scandinavians in Ireland" 67.

- Scaphander lignarius* 179.
Schizodus wheeleri 437.
Schoenus nigricans 501.
Scilla verna 362.
Scirpus lacustris 140, 435.
S. maritimus 146.
S. sylvaticus 608.
Scolopax rusticola 288.
Scolopendrium vulgare 21.
Scrophularia aquatica 146, 603.
Scutellaria minor 295.
Scyllium canicula 43.
Sedum Rhodiola 146.
S. spathulæfolum 137.
Selaginella selaginoides 150, 295, 366, 381, 597.
Senebiera coronopus 150.
S. didyma 134, 150.
Senecio Jacobæa 309.
S. sylvaticus 601.
Serphula filiformis 274.
Sesleria cærulea 295.
Sherardia arvensis 140.
Silene acaulis 263, 611.
S. anglica 60.
S. maritima 146.
Silphia subrotundata 596.
Sisymbrium Alliaria 595.
S. Thalianum 318, 361, 492.
Sisyrinchium angustifolium 61.
Sitones lineatus 596.
Sium angustifolium 501.
Skillen, Joseph—"Church Island" 192,
"Kells Abbey" 66.
"Slugs and Snails" 589.
Smerinthus ocelatus 530.
S. populi 530.
Solaster endeca 180.
Solidago Virgaurea 258, 366, 381.
"Some Geological Features of Scotland
and their relation to Structure of
North of Ireland" 628.
"Some Origins of the Irish People" 296.
Sparganium simplex 148.
Speers, Adam—"How Caves are formed" 589.
Sphaerium corneum 138, 148.
S. lacustre 266, 405, 504, 600.
Sphagnum cuspidatum 501, 502.
S. medium 501, 502.
Spiranthes Romanzoffiana 56, 61, 207, 485,
503, 511.
Spirifera glabra 436.
Spirilina vivipara 294.
Spiralis retroversus 362.
Spondylus spinosus 387.
Statice occidentalis 601.
Stelfox, A. W.—"Discussion on Dispersal"
444, "Fauna of Cavan" 519, "Slugs
and Snails" 589, "Zoological Notes"
401.
Stendall, J. A. S.—"Irish Tokens" 591,
"Life History of Insects" 528, "Possi-
bilities arising from Nature Study" 525,
"Rare Birds in Municipal Collection"
522, "Rare Old Chester" 456.
Stephanoceros eichornii 279, 457, 504, 610.
Sterna fluviatilis 288.
Stewart Memorial Meeting 410.
Stomius marginata 492, 608.
Strachan, James—"Beekite" 536, "Chalce-
dony of Ballyboland" 316, "County
Antrim Basaltic Plateau" 577, "Col-
ours and Superficial Appearances of
Flint Implements" 85, "Dendrites
and Picture Stones" 297, "Onyx of
Spanish Bay" 401, "Opal Deposits of
Sandy Braes" 200, "Origin and For-
mation of Zeolites in Basalt" 92,
"Petrological Types of Basalt" 290.
Strix flammea 287.
Strongylocentrotus lividus 261.
"Structure and Life History of Sea-
Squirts" 588.
"Study of a frog" 589.
"Study of Fungi" 440.
"Study of Native Vegetation" 297.
Sturnus vulgaris 287.
Suberites carnosa 180.
S. domuncula 180.
Succinea elegans 253.
S. putris 21, 148.
"Summer's Dredging in Belfast Lough" 179.

- Swanston, William—"Stewart Memorial" 433.
- Sylvia cinerea 285.
- Symphytum officinalis 24, 146.
- "Talk about Birds" 518.
- "Talk on Limestone" 445.
- Tanacetum vulgare 269.
- Taxus baccata 295.
- Tellia crassicornis 37.
- Terebratula carnea 275, 278, 387.
- T. semiglobosa 275, 387.
- Termonfeckin 601.
- Testacella haliotidea 608.
- Thalictrum dunense 151.
- T. flavum 60, 253, 503, 603.
- Thera variata 596.
- Thyone papillosa 180.
- T. portlockii 180.
- Tigenaria derhamii 519.
- "Tombs, Temples and Pyramids of Egypt" 63.
- Tomlinson, W. J. C.—"Connemara Plants" 294, "Darwin Centenary" 196, "Geological Aspects of Coast Erosion" 531, "Geology of Weymouth" 305, "Local Botanical Field Work in 1907" 56, "Local Plant Gleanings" 204, "Plant Communities" 516.
- Tory Island 374.
- Totanus calidris 288.
- T. hypoleucus 288.
- "Toxic Effect of Fresh Water on Marine Animals" 292.
- Tragopogon pratensis 603.
- Treasurer's Statement 18, 132, 247, 357, 490, 593.
- Trichoniscoides albidus 405.
- Trichoniscus pusillus 140, 149, 519, 596.
- T. pygmæus 15, 80, 82, 364, 370, 381, 506, 519, 602, 603.
- T. roseus 15, 137, 262, 494, 496, 506, 519, 603, 608.
- T. stebbingi 608.
- Trichostomum crispulum 502.
- Trifolium medium 368.
- Tringa fusicollis 523.
- Tringites rufescens 523.
- Trochus lineatus 261.
- Troglodytes parvulus 286.
- Turdus iliacus 285.
- T. merula 285.
- T. musicus 285.
- T. pilaris 285.
- T. viscivorus 285.
- Turitella communis 362.
- Turtur communis 288.
- Typha angustifolia 503.
- Uraster rubens 180.
- Vaccinium Oxyccoccus 207.
- V. Vitis-Idæa 59, 61, 207, 366, 381.
- Valeriana officinalis 603.
- Vallonia pulchella 269, 369.
- Valvata cristata 266.
- V. macrostoma 510.
- Vanellus vulgaris 288.
- Vanessa urticae 596.
- "Variation due to Environment" 309.
- "Vegetation of Calcareous Soils" 520.
- Ventriculites cribrosus 274.
- V. gibosus 275.
- V. radiatus 387.
- Venus fasciata 362.
- Verbascum Thapsus 603.
- Vermicularia concava 274.
- Veronica Anagallis 146.
- V. montana 137, 595.
- Vertigo lilljeborgi 262.
- V. moulinsiana 86.
- V. pusilla 202.
- Verucaria nitida 511.
- Vespa germanica 401.
- Viburnum Opulus 59, 60, 258, 502, 598.
- Vicia Orobus 58, 60, 205.
- V. sylvatica 60, 348, 369, 492.
- Viola canina 575.
- V. epipsila 575.
- V. palustris 575.

- Viola sylvestris* 575.
Virgularia mirabilis 179.
Vitrea cellaria 14, 280.
V. hibernica 14, 280.
V. scharffii 280.
Vitrina elongata 28.
V. hibernica 251, 604.
V. pellucida 28, 405.
“Volcanoes and Volcanic Action” 79.
Volvox globator 253, 279.
- Waddell, Rev. C. H.*—“British Violets and Pansies” 574, “Common Fungi” 178, “Ecology of Plants” 289, “Exhibition of Plants” 532, “Indigenous Trees in our Woodlands” 527, “Plant Life in a Bog” 315, “Plant Life in a Marsh” 435, “Plant Life in a Wood” 396, “Stewart Memorial” 410.
- “Water Supply from Underground Sources” 517.
- Wear, Sylvanus*—“Cluster-Cups and Microscopic Fungi” 62, “Exhibition of Plants” 532, “Fertilization of Flowers” 185.
- Webera nutans* 502.
- “Week with Field Club Union” 52.
- Weisia curvirostris* 501, 502.

- Welch, Robert J.*—“Discussion on Dispersal” 445, “Facts about Distribution of some Animals and Plants” 393, “Geology of Cork” 54, “Land Shell Deposits” 201, “Sand Hills: their Formation, Fauna and Flora” 514, “Stewart Memorial” 429, “Variation due to Environment” 309, “Zoological Notes” 401.
- “What do we mean by a ‘Native’ Species?” 573, 587.
- Whitehouse, R. H.*—“Structure and Life History of Sea-Squirts” 588, “Study of a Frog” 589.
- Wilson, Alec. G.*—“Kitchen Middens in Dingle Bay” 524.
- “With the Brit. Assoc. in Canada” 302.
- “Worship of the Magna Mater” 631.
- Wright, Joseph*—“Boulder-Clay with Foraminifera” 449, “Foraminifera” 293, “Foraminifera from Magheramorne and Limavady” 449.
- Xema sabini* 523.
- Youghal* 29.
- Zannichellia polycarpa* 419.
- Zonitoides excavatus* 258, 496.
- Z nitidus* 21, 505.
- “Zoological Work—Notes on” 399.



LIST OF ILLUSTRATIONS.

- | | |
|------|--|
| Page | 1. Robert Patterson, F.L.S., M.R.I.A.
" The Patterson Museum.
14. Lough Nagarriva, the Home of Pisidium hibernicum.
56. Spiranthes Romanzoffiana, on Shores of Lough Neagh.
96. Junction of Basalt with Natrolite.
121. Stone Circle at Ballymarlow.
231. The Fairy Bridges, Bundoran.
261. Falls of Assaroe, Ballyshannon.
265. The River Quoile at Inch Abbey.
269. Richhill Castle.
299. Dendritic Oxide of Manganese, on Porous Cortex of Flint.
339. Cliffs of Horn Head from the sea.
356. In Memoriam—Samuel Alexander Stewart.
371. Lough Salt and Loughsalt Mountain.
374. Tau Cross, Tory Island, and Seaweed drying for Kelp.
378. Old Lint-Wheel or Flax-Bruiser, Mulroy Bay.
" Roche Moutonnée at Melmore Head.
401. Basalt from Spanish Bay, Giant's Causeway—typical section.
" Junction of Basalt (Spanish Bay) with Opal (Onyx), showing
layer of Hullite between the rock and mineral.
410. Samuel Alexander Stewart, A.L.S., F.B.S.E.
477. Cloughwater Castle or "Bedell's Tower" from the South.
497. Ancient Doorway from Trinity Abbey. Now in Kilmore
Cathedral.
517. Exterior of <i>Exogyra columba</i> from Chloritic Sands, Colin
Glen; coated heavily with Beekite.
" Typical microscopic appearance of Beekite by reflected light. |
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PRESENTED

16 OCT. 1913



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