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PORCELLIO RATHKII

A WOODLOUSE NEW TO THE IRISH FAUNA.

BY WALTER E. COLLINGE, D.SC., F.L.S.

IN their very thorough account of the Woodlice of Ireland¹ Messrs. Pack-Beresford and Foster remark, under the genus *Porcellio*, "The two species (*Rathkii* and *Ratzeburgii*) which have not yet occurred in Ireland are, however, included in the following table, as they are very likely to be eventually taken here."

In the preparation of my forthcoming Monograph on the Woodlice of the British Isles, I have sought the aid of various friends and correspondents in obtaining examples of Irish specimens, and in a small collection recently obtained from a garden near Dublin, I was pleased to find two examples of *Porcellio Rathkii*, Brandt, which has not hitherto been recorded for Ireland.

I have elsewhere pointed out² that this species may easily be confused with forms of *P. pictus*, Br. The lateral cephalic lobes, however, in *P. pictus* are larger than in *P. Rathkii* and terminally more truncate; the median lobe is less prominent and broadly rounded, and the proximal joint of the flagellum of the antenna is the longer one.

¹ *Proc. Roy. Irish Acad.*, 1911, vol. xxix., pp. 165-190, pl. viii.

² *Scott. Nat.*, 1917, p. 137.

P. Rathkii, especially female specimens, is subject to a considerable range of colour variations, and also in the extent to which it is tuberculated. Webb and Sillem¹ wrongly state that it "has a smooth body." Sars² says that the dorsal face is rather convex "and slightly tuberculated," but I have in my collection many specimens, from various localities, in which the tubercles are both large and numerous.

In Great Britain this species has been obtained in the Isle of Wight and the Channel Isles, and the following counties:—Oxford, Bucks, Suffolk, Stafford, Salop, Pembroke, Derby, Cheshire, Lancashire, Durham, Northumberland, Cumberland, Dumbarton, Kinkardine, and the Orkneys. In all probability it will be found to be equally common in Ireland.

Examples of any species of Irish Woodlice will be welcomed and gratefully acknowledged by the writer.

The University. St. Andrews.

ACULEATE HYMENOPTERA FROM THE COUNTIES OF ARMAGH AND DONEGAL.

BY REV. W. F. JOHNSON, M.A., M.R.I.A.

It is much to be regretted that the records of Irish Aculeate Hymenoptera are so scanty as to make it impossible to form any adequate idea of what species exist in this country or how they are distributed. No one now seems to take any interest in the ants, bees, and wasps of Ireland except myself, and my attempts are but spasmodic. These insects are among the most interesting of all insects and well repay

¹ "The British Woodlice," 1906, p. 34.

² "Crustacea of Norway," 1898, vol. ii., p. 180.

attention, and not being very numerous in genera and species are not so difficult to study as other sections of the insect world. There are excellent works on the subject, including Saunders' "Aculeate Hymenoptera of the British Islands," Sladen's "Humble Bee," and Donisthorpe's "British Ants." The student will find in these works all the information he requires on the subject, with admirable figures and descriptions. The position of the Irish list is at once shown by the fact that out of 316 British species only 167 have been recorded from Ireland.

In the following list the captures at Coolmore, Co. Donegal, were made in August, and those at Portnoo, Co. Donegal, in September :—

Formica fusca Latr.—Portnoo, workers and winged females on the sandhills.

Myrmica ruginodis Nyl.—Portnoo, workers among heather.

Pompilus spissus Schiodte.—Poyntzpass, a female taken in the avenue of Acton House among grass in June. New to Ireland.

P. pectinipes V. de L.—Coolmore, a male taken on a grassy bank at side of a lane.

Salius exaltatus Fab.—Coolmore, a female.

Passaloeocus insignis V. de L.—Poyntzpass, a female taken on the road between my house and the village. New to Ireland. It makes its nest in bramble stems or decaying wood.

Mellinus arvensis L.—Portnoo, on sandhills and roadside.

Crabro elongatulus V. de L.—Poyntzpass, taken on a window at Acton House in August. New to Ireland.

Sphecodes dimidiatus V. Hag.—Coolmore, a female taken in hedgerow of lane.

Haliectus longulus Smith.—Coolmore, males.

H. pauxillus Schenck. }
H. minutus Kirby. } Coolmore, females.

Andrena denticulata Kirby.—Coolmore, a female.

Bombus jonellus Kirby.—Portnoo, among heather.

B. ruderatus F. —Poyntzpass, a female taken in my garden at flowers in June.

B. derhamellus Kirby.—Coolmore, a female, in a lane.

Psithyrus distinctus Perez.—Poyntzpass, a female taken in a window of my house in June.

Poyntzpass.

NOTES ON LEPIDOPTERA FROM EAST TYRONE
IN 1917.

BY THOMAS GREER.

ALTHOUGH the winter of 1916-17 was the most severe that has been experienced for a great number of years, it seems, so far as I can judge, to have had little or no adverse influence on the insect life of this neighbourhood. On April 11th the heaviest fall of snow of the whole winter occurred, the roads in many places being quite impassable owing to the heavy drifts; yet on the 15th the first insects of the year were observed at sallow bloom, and larvae of *Melitaea aurinia* were noticed on the move outside their winter webs; though there was plenty of snow still lying about.

At the shallows, insects were in great force, *Taeniocampa gracilis* (of which 90 per cent. were red forms), *T. munda* (usually in small numbers here), *T. opima* in its special locality, and four *Panolis piniperda* turned up, an insect unknown hereabouts before; at this time a single *Polyploca flavicornis* was bred from larvae found last July.

At the end of the month the first *Pieris napi* was observed, and during May the insect was flying in clouds over some low-lying meadows, near the house, the males quartering the ground in search of the freshly emerging females, pairing taking place in many instances before the wings of the female were fully expanded. By watching these antics of the male I secured a fine variable series of the female, with little or no exertion, for an English correspondent. Later in the season the second brood was equally abundant. These same meadows at the time of writing are several feet under water, and will remain so for most of the winter; how the thousands of pupae of this and other species which are lying exposed on the surface of the ground survive this treatment is a mystery. The males of *Euchloe cardamines* were now flying in the sun but were much less numerous than in other years, so that

the females were almost as common, about 60 per cent. having yellowish hind wings.

On paying a visit to the mountains in early June for larvae of *Dasychira fascelina* I found that many acres of heather were brown and dead having been killed by the severe frosts, and it was only in sheltered spots that it still survived; but there was no trace of my quarry; although the larvae of *Lasiocampa quercus* var. *callunae* were in abundance and collected in little groups, here and there, wherever the heather showed any signs of life.

The first *Melitaea aurinia* was observed on the wing on June 11th, somewhat later than last year, but from a nest of the larvae found earlier in the year, were bred a number of interesting forms; among others:—the var. *praeclara*, Kane; a tawny red form not unlike the English var. *artemis*; a form approaching the var. *signifera*, Kane; and several of the handsome form *virgata*, Tutt; and last but not least, a number of fine dark forms, quite distinct from the form figured as *scotica* in Kane's "Lepidoptera of Ireland."

When on a visit to Dublin, I spent some time in Mr. Halbert's company, in comparing these forms with various types in the national collection; and we found that a number of these forms agree with certain specimens labelled as *hibernica* from Cromlyn Bog, Co. Westmeath; but as there appears to be a great deal of misapprehension as to what is the true var. *hibernica* Birchall, I am at present, at any rate, unwilling to state anything more definite concerning these local forms.

Towards the middle of the month a visit was paid to the bogs which lie around Lough Neagh and from small birch bushes a fine lot of *Drepana falcataria* were beaten out, and on the way home, cocoons of *Odonestis potatoria* were found spun up among the grass and heather.

At Washing Bay on 29th June, the males of *Lycaena icarus* were flying in some abundance, being of a large size and in fine condition; and likewise a few days later, on the low sandy hills which surround the town of Coalisland; I was lucky to get here on the 4th of July a gynandromorphous specimen, in perfect condition, this was captured

in almost the only gleam of sunshine that appeared that day; but the largest and most brilliant forms occurred on the steep slopes of a remote glen in the mountains surrounded by miles of moorland and bog.

About this time a large number of *Acronycta menyanthidis* were bred from larvae found at Lough Neagh; and an afternoon spent on the mountains showed *Plusia interrogationis* to be flying in numbers among the dead heather stems; and at dusk *P. festucae* was equally abundant at yellow Iris and Ragged Robin, one of the latter captured, having the gold dashes on fore wings united, forming a gold blotch across both wings. At Bladder Champion (*Silene Cucubalus*) *P. iota* and *Hecatera serena* were common, as well as several *Eupithecia venosata*, and among *Lychnis diurna* numbers of *Emmelesia affinitata* and *E. decolorata*. In the meadows *Epinephele hyperanthus* and *Zygaena lonicerae* flew in swarms.

At Killymoon in early August I obtained a single example of *Eupithecia succentaureata* by beating Mugwort; and on the moors in certain spots the males of *Stilbia anomala* were flying in plenty at dusk.

Thanks to the kindness of Rev. C. R. N. Burrows, who examined the genitalia of a series of local Hydroeciae, I am able to record *H. crinanensis* from Co. Tyrone; several of these were taken at Lough Neagh last autumn (see *Irish Nat.*, vol. xxv., 1916, page 163); also a small number captured this year; in all twenty-two specimens were sent him; seventeen of which prove to be *crinanensis*, and the remainder *H. lucens*.

The feature of the autumn months was the wonderful abundance of *Vanessa io* and *V. atalanta*, the former appearing everywhere, even far out on the bogs and high up on the mountains.

The usual ivy-frequenting insects were abundant, up to the late autumn spell of snowy and cold weather.

THE CHARACEAE OF THE ROSSES :
WEST DONEGAL.

BY REV. CANON. G R. BULLOCK-WEBSTER, M.A.

LAST year I reported on the results of a visit to the Fanad Peninsula where I spent a fortnight investigating the Characeae of the lakes around Kindrum.

This year I found an opportunity for paying a visit to the Rosses of West Donegal where the many and various lakes seem to offer a very favourable field for the characeologist.

My headquarters were on the little island of Iniscoo about a mile off the coast, near Burton Port ; and my companion, Bishop Montgomery, himself a keen naturalist and a student more especially of bird life.

The weather during our week's sojourn (July 26-31) was all that could be desired and we made the most of the opportunity. Iniscoo itself provides a small lake, and this was carefully examined. On the mainland northward we visited (I quote in all cases the nomenclature of the one inch Ordnance Survey) Garry Lough and Sally's Lough, Loughs Waskel and Mullaghderg ; to the southward towards Dunglow, we visited Loughs Leckenagh, Meela, Dunglow, and Adrihidbeg ; and to the south-west of Dunglow we visited L. Nageeragh, the adjacent lough unnamed in the map, L. Beg and Maghery L. This last, and Sally's Lough first mentioned, have cuttings which connects them with the shore and provides admission of sea water at certain states of the tide. For this reason they suggested likely localities for such species as *C. connivens*, *C. canescens* and *C. baltica* which are to be found in brackish waters. But the water proved to be more saline than brackish and seemed to yield little or no fresh water vegetation.

The result of these explorations can be summed up in a few words. Of the twelve lakes visited nine gave no signs whatever of Chara vegetation. The tenth, the

unnamed lough adjoining L. Nageeragh, yielded one solitary piece of *N. translucens*, Agardh. The little lough on Iniscoo yielded some excellent specimens of *N. translucens* and *C. fragilis*, Desv.

The twelfth and the one lough which repaid search was L. Mullagher. The rock end of this lake is in close proximity to the sandhills which run along the coast line and it has in consequence a sandy bottom on this northern shore. Here *C. fragilis* and *C. aspera*, Willd., were growing in great abundance, as also another little Chara which seems to be an unusual variety or form of *C. contraria* Kuetz. Growing with these was a *Nitella* long past its prime but retaining its heads of ripe fruit which showed it to be either *N. flexilis*, Agardh, or *N. opaca*, Agardh. Near by, in a pool among the sandhills, grew some few specimens of *C. hispida*, Linn., and *C. vulgaris*, Linn. This embraced the extent of our Chara finds, and certainly does not add much to previous records. *N. translucens* is, I think, new to W. Donegal, and so are *C. aspera* and *C. fragilis*.

The area which goes by the name of the Rosses is all of granitic formation and large granite rocks and boulders lie scattered over the country giving it a peculiarly bare and desolate appearance. Similar rocks and boulders form the beds of many of the lakes. This makes dredging a serious difficulty. The drag is constantly liable to become wedged between immovable masses of stone, and the danger of losing this most indispensable implement makes the collector nervous in his use of it. Even with due care and a chary employment my drag became immovably fixed on two occasions and could only be released, once by means of a boat, another time by means of a long cord carried round to an opposite shore of the lake.

To imply that a thorough examination of the above mentioned lakes was made would be misleading. Boats were not available on most of the lakes, and, as I said, dredging from the shore was attended by considerable risk. But the margins of the lakes were inspected with some care and note made of the character of the vegetation thrown up on their banks as giving some indication of the

growth in the deeper and more inaccessible water. I very much doubt whether the locality yields many other species. At any rate there must be numerous localities of Ireland still unexplored which would repay search far more generously. These notes may serve as a warning to botanists who may be attracted by the promising appearance of the neighbourhood as portrayed in the Ordnance Survey map.

The poor results of my visit to the Rosses impelled me to turn aside on my return journey to Derry and pay another visit to Fanad where several records of the previous year needed some confirmation. I spent a week at Kindrum and was able to collect some fruiting specimens of the little *Nitella* growing in Kindrum Lough referred to in my previous paper as probably *N. batrachosperma*, Braun (*N. Nordstedtiana*, H. and J. Groves). A careful examination of the membrane of the oospore confirms the accuracy of Mr. James Groves' opinion. The plant proves to be undoubtedly *N. batrachosperma*, and the discovery must be regarded as a very interesting link between its two previously recorded stations—the one in the Orkneys, and the other in County Kerry.

The curious variety of *N. flexilis* (if such it be) growing along the margin of L. Shannagh suggested that other treasures might be found on the lake with the aid of a boat. I was able with some difficulty to obtain the use of a curragh and the services of a boatman skilled in the management of this rather frail form of craft. But the lake yielded nothing further so far as I could discover, not even specimens of the *Nitella flexilis* beyond the thick bank of growth reachable from the shore which I had found last year. Here I found it still growing and fruiting in great abundance and maintaining its distinctive and abnormal characteristics. This plant and the variety of *C. contraria* from L. Mullaghderg seems to call for some special notice, and I hope that Mr. James Groves and I shall be in a position to make a communication on the subject in the course of a few months.

I was able to collect some fruiting specimens of the *Tolypella* (referred to in Mr. James Groves' and my note

to the *Irish Naturalist*, August, 1917) growing in L. Ballylar which may serve to elucidate the question of a possible species or variety intermediate between *T. glomerata*, Leonh., and *T. nidifica*, Leonh.

I was also able to add another species to the list of Characeae growing in L. Kindrum, viz., *N. opaca* in good fruiting condition, unless indeed the plant proves to be *N. flexilis*. In either case it adds another to the yield of the lake. It seems impossible to discriminate between *N. flexilis* and *N. opaca* otherwise than by the monoecious character of the former and the dioecious character of the latter. In plants of advanced growth where the antheridia have dispersed this one distinctive and determining characteristic disappears. This is the case with the specimens both from L. Mallagherd and from L. Kindrum. The doubt can only be settled by collecting plants at an earlier period of the year.

All Hallows Lane, London, E.C.

NOTES.

ZOOLOGY.

The Purple Sea-Urchin at Inishkeel, Co. Donegal.

The island of Inishkeel lies on the south side of Gweebarra Bay opposite the villages of Naran and Portnoo. It can be reached on foot at spring tides by walking across the neck of sand which connects it with the mainland. On the northern side are extensive rock pools, and it was in these that Mrs. Johnson first noticed the Purple Sea-Urchin (*Strongylocentrotus lividus* Lamk). She brought me to the spot and I found the urchins present in considerable numbers, just as I had seen them at Bundoran and Gortmore. I could not, however, find that they had bored holes in the rock such as I had seen at Bundoran, and I only conjecture that they had not been there long enough to make these borings. I sent a specimen to the National Museum, and Mr. A. R. Nichols, M.A., was kind enough to confirm by identification and to

inform me that Inishkeel is a new locality for this echinoderm, whose distribution is thus carried further north. In his paper on the Echinodermata in the Clare Island Survey Mr. Nichols mentions three colour varieties, purple, olive green, and reddish. Of these I noticed examples of the first and last.

W. F. JOHNSON.

Poyntzpass.

Great Increase of Butterflies and Moths in Ireland.

The summer just past has from all accounts been a most wonderful one for Butterflies and Moths all over Ireland; and I think those readers who are interested in this subject ought to put on record their experiences so that we might have in *Irish Naturalist* a history of this wonderful Butterfly year for future reference.

It would be interesting to know if this great increase was observed all over Ireland: whether these Butterflies were bred in this country or migrated to it. If they were bred here why should this be a specially good year, and where did the stock come from to make it such? Why should rare species like Peacocks suddenly appear in great numbers round this district?

At Rostrevor large numbers were seen on flowering shrubs round the hotel, and at Dunmurry a Privet bush in flower in Mr. Richardson's garden used to be so covered with various species, including Peacocks, that the flowers were hardly visible. Various Hawk-moths were also common, and a friend saw both the *Convolvulus* and Humming-bird Hawks, both of which I understand are rare in the north-east corner of Ulster.

Trusting that the above note may interest and induce some of the many entomologists amongst us to relate their experiences for the benefit of those like myself not well versed in this science. I am sure Sir Charles Langham and the Rev. Mr. Foster could give us some interesting information on the subject.

W. H. WORKMAN.

Windsor, Belfast.

Irish Psychid Moths.

In response to my request for Psychid material from Ireland, Mr. Thomas Greer of Stewartstown, Co. Tyrone, was kind enough to look for cases during the past season, and on July 26th of this year I received from him a few, which he had found in the neighbourhood of Lough Neagh. It was evident that these belonged to the "casta" group, but it was too late in the season to hope for imagines. Knowing the habits of these insects I kept two cases separate and in due course they produced numerous larvae. The time for hibernation is now arrived, and in

spite of the difficulty in rearing, a considerable number still survive and with attention will, I hope, safely pass through the winter. They feed carnivorously—and herbaceously—on dead moths, flies, Knot-grass and rose leaves. They are indeed probably content with anything eatable. The "Casta" group do not appear to be very successful in building up their cases in confinement, generally commencing the business by robbing the mother-case. My little Irish family have made a little use of snippings of my beard, but have not attempted, although material is provided, to construct the characteristic "faggot."

It is not possible, under these conditions, to attempt to name the species. I am hoping to get some of them through, and also to have Mr. Greer's assistance with further material next year. There are a considerable number of these "faggot-like" cases recognised as new by continental collectors. Very little is known of them in Great Britain and Ireland, and it is quite possible that there are several good species "lumped" together by us, under the name of *casta* Pallas—or the older names of *nitidella*, *roborecolella*, and *intermediella*. I shall be exceedingly grateful to any Irish collector of Lepidoptera who will help me in the investigation of this Psychid family.

C. R. N. BURROWS.

Mucking Vicarage, Stanford-le-Hope, Essex.

The *Convolvulus* Hawk-Moth in the Counties of Antrim and Down.

In August Major A. Bingham Crabbe wrote to me that a specimen of *Sphinx convolvuli* had been brought to him at Antrim Castle, having been captured in the neighbourhood. It was a good deal battered but quite recognisable. In October I met Mr. Wakefield Richardson, of Moyallen, Co. Down, who told me that he had observed specimens of this moth in the greenhouse at Moyallen. I see by a note in the "Ent. Mo. Mag." that specimens have been seen in Yorkshire, Lancashire, and Cheshire. It is evident from these observations that there was a considerable migration of this Hawk-moth from the continent.

W. F. JOHNSON.

Poyntzpass.

A Late Wasp.

I have to-day, November.20th, taken a male of the Common Wasp (*Vespa vulgaris*) which flew into the window of a room where I happened to be. It is very unusual to see a male on the wing so late in the year, and as we had quite sharp frosts last month it is the more remarkable.

Poyntzpass

W. F. JOHNSON.

Sphinx convolvuli attacked by Larvae of Dipteron.

During the month of September last (1916) I was given a specimen of *S. convolvuli* which was captured in a garden near Inchicore, Dublin. It was just caught, and seemed unable to move. This struck me as very strange, as it is always very lively, and a powerful flier, as I well know now having caught several specimens in bygone years in my garden here. I kept it in a box intending to set it, and the next time I looked at it, it was surrounded by tiny chrysalides, which I thought at the time were some species of ichneumon. Most, if not all of them, emerged in time. They numbered in all 76!

I think that they are some species of dipteron, as they are unlike ichneumons. Fancy the poor moth, doing its best to live, and devoured internally by such a number of hungry enemies. I have not read of a case of this kind before. It seems wonderful that the larva was able to pupate (perhaps, however, the pupa was stung), and besides that to emerge in to life in the imago state, while 76 internal foes were preying on its body. I have sent some of the specimens to my friend, Mr. Halbert, for identification.

WILLIAM W. FLEMYNG.

Coolfin, Portlaw, Co. Waterford.

The insects bred from the above mentioned Hawk-moth are all referable to a single species, a small two-winged fly belonging to the genus *Phora*, so that Canon Flemyng is right in supposing them to be Diptera. Unfortunately only one of the specimens is in a good state of preservation, the others are spoiled by a white powder through being kept loose in a box with the puparia from which they emerged. This specimen has been sent to Mr. Collin for examination. I have little doubt, however, that the fly is a species called *Phora rufipes* Meigen, an identification which I hope to have verified as soon as Mr. Collin has time to examine the insect.

Phora rufipes is recorded by Walker (*Insecta Britannica: Diptera*) as a very abundant fly in England, Scotland, and Ireland. According to Schiner ("Fauna Austriaca") the larva is parasitic on Lepidoptera, and is also found in rotten potatoes and in fungi. The same authority states that the life-histories of several species of *Phora* are known; the larvae live in decayed vegetable matter, and some are parasitic on other insects. The genus *Phora* is numerous in species; more than thirty kinds are included in Mr. Verrall's "List of British Diptera" (1901).

National Museum, Dublin.

J. N. HALBERT.

Sunfish at Larne Harbour.

It may interest readers of the *Irish Naturalist* to know of the capture of a Sunfish, *Orthogoriscus mola* Schn. off Larne Harbour on September 17th. It weighs just over two cwts. and was exhibited in the shop of Messrs. Rangepcroft, Ltd., Corn Market.

J. A. SIDNEY STENDALL.

Belfast.

Stray Bird Notes, Autumn, 1917.

My experiences coincide very much with those of Mr. C. B. Moffat and Mr. Burkitt. First as to the arrival of the migrants. My earliest date is Swallow, April 23, followed by Chiff-chaff, April 25, and Willow Warbler, April 26, Sand Martin, April 30. These were the only migrants noted in April, but the Cuckoo and Corncrake were both observed on May 1. The Wheatear, which generally arrives here about the end of March, I could not find at its usual haunt, and only observed one on September 27! The Spotted Flycatcher was only seen by me on June 11, whilst our rarer visitors, the Grasshopper Warbler, the Quail and the Turtle Dove were not observed at all. I spent July and August in England, and in the first week of July at Stoke Ash near Ipswich, in the small lawn at the Parsonage I observed the Blackcap, the Garden Warbler, Chiff-chaff, Willow Warbler, Whitethroat, the Tree Pipit and the Turtle Dove, but not until August 11 did I, for the first time in the year, note the Gold-crest.

Some of the folk names of the birds in England are very curious, such as the "Groundoven" for the Willow Warbler, and the "Hayjack" for the Linnet. The "Thricecock" Mr. Warde Parke thinks may mean the "Mistle Thrush," but I have never yet met anyone who could explain the meaning of the "Swiney," by which porcine appellation the Meadow Pipit is always known in Balbriggan.

CHARLES W. BENSON.

Balbriggan, October 10.

Green Sandpiper in King's County.

It may be of interest to you to know that I identified a Green Sandpiper, *Totanus ochropus*, adult, sex unknown, seen on the wing on Ballyheishall bog, near Edenderry, King's County, on November 15th, 1917. I hope to meet with it again later in the year. I have not hitherto seen any of these birds in this locality.

HELEN M. RAIT KERR.

Fiathmoyle, Edenderry.

Woodcock marked in Ireland and recovered in Shetland.

In the *Irish Naturalist*, August, 1917, I recorded that a Woodcock having a ring on its foot endorsed "T. H. Sligo 4," had met with its death in Shetland. As the result of that note, Mr. J. P. Burkitt advised me to communicate with Mr. T. C. Bracken, Temple House, Ballymote, who has informed me that the bird was one of four ringed at Temple House on the 12th of May, 1914, and that it was about a fortnight old when marked. It is impossible to give any satisfactory explanation for the presence of an adult Irish-bred Woodcock in Shetland on the 7th of July.

Royal Scottish Museum, Edinburgh.

WM. EAGLE CLARKE.

Sandwich Terns breeding in Co. Galway.

Twenty terns of this species were counted in one group on Mutton Island, Co. Galway, on June 12th, 1917, and on June 17th there were five nests containing eggs. I am indebted to Mr. Glanville for this interesting information. This is, I believe, the first occurrence of the Sandwich Tern nesting in Galway which is the third county on the west coast of Ireland in which it is known to breed.

Bloomfield, Hollymount, Co. Mayo.

ROBERT F. RUTTLEDGE.

Owls and Sparrow Hawks clapping their Wings.

I have read with much interest Mr. J. P. Burkitt's remarks on the Long-eared Owl (vol. xxvi., pp. 161-163), and with reference to his comments upon the habit these birds have of clapping their wings, I may say that I have noted this upon several occasions during the past thirty or forty years. It is, I have no doubt, a normal phase of the nuptial flight, and the sound produced by the striking together of the wings above the back can be distinctly heard at a distance of at least twenty or thirty yards. I am almost certain that both sexes indulge in the habit, just as in the case of Pigeons for example, but at any rate I can answer for it that upon one occasion it was a female Long-eared Owl that clapped.

But the habit is not confined to one species only. I have repeatedly heard and seen the Tawny Owl clap its wings in precisely the same manner. Upon one occasion, too, I saw a female Sparrow-Hawk do it, when indulging in the rather owl-like flight which is the habit of her sex at the pairing season, her mate meanwhile soaring overhead; while the Nightjar is well known to clap its wings during its love-flights.

When, as boys, we used to keep pigeons, it was customary to speak of the slow-flapping flight of a bird, during which the wings are often loudly clapped, as "owling." The origin of the expression, or of its application, I do not know, but it descended to us from previous pigeon-keepers, and was no new invention. Possibly it may be in common use through the country. In that case may it not have originated, in times long past, from a knowledge possessed by its coiners of the fact that Owls clapped their wings in similar leisurely fashion?

Alston, Cumberland.

GEORGE BOLAM.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 14.—The Club met at Leinster House, the President (N. COLGAN, M.R.I.A.) in the chair.

Prof. G. H. CARPENTER showed a preparation of the male reproductive organs of the Warble-fly (*Hypoderma bovis*) and a section through the testes. In the latter some of the details of the spermatogenesis could be distinguished, and chromatic cytoplasmic inclusions such as the mitochondria were recognisable.

D. M'ARDLE exhibited *Dicranella heteromalla*, Schp. showing the pale yellow seta and capsule with rostrate lid, peristome with large red teeth, cleft to the middle into two or three divisions. He also showed the male plants which are seldom seen, and were collected recently on the Dublin Mountains at Killakee; they are smaller and stouter, and their leaves are less falcate, and form a terminal coma around the conspicuous oval inflorescence. In this stage they may be passed over by the student for a species of *Pleuridium*, and would require to be dissected for the antheridia. A drawing of *Pleuridium alternifolium* was shown for comparison. This interesting silky-leaved moss is common in Ireland, easily identified by the yellow seta when in fruit.

H. A. LAFFERTY exhibited the oospores of a species of *Phytophthora* parasitic on Tomato, Aster, Petunia and Wall-flower seedlings, the disease being recognised by the falling over of attacked plants. Up to the present the oospores have only been obtained in pure cultures and their method of formation is identical with that described for *Phytophthora erythroseptica*, the oogonium (female) entering the antheridium (male) at its base, growing up through it, eventually bursting out at the top where it swells out forming its oosphere and later its oospore. Pure culture studies and infection trials have proved that the fungus is quite distinct from any of the previously described species of *Phytophthora*.

W. F. GUNN exhibited a slide of *Tubifera ferruginosa*, a species of Mycetozoa. It was found in August last, in the plasmodium stage, on a decaying fir-stump near Rathdrum, and was then of the less usual yellow colour. The plasmodium is usually of a watery white colour, but, in rare cases, bright yellow. As in some other genera of this group of fungi the sporangia combine to form a sort of compound colony known as an aethalium. The slide showed a vertical section, and clearly exhibited the brown sporangia, with their iridescent walls and contained spores, seated upon the white spongy hypothallus.



Yours very truly
Edward Hull

EDWARD HULL

M.A., LL.D., F.R.S.

THE death of Professor Edward Hull on October 18th, 1917, in his eighty-ninth year, severs one more link with the pioneers of geological science in the nineteenth century. To the last he retained mental and considerable bodily vigour, and he often recalled pleasant memories of his public life in Ireland. His career and sympathies are well represented in his "Reminiscences of a Strenuous Life" (London: H. Rees, 1910), published when he was already over eighty years of age. His works on "The Coal-fields of Great Britain, with descriptions of the Coal-fields of our Indian and Colonial Empire and of other parts of the world" (fifth edition, 1905), and on "The Physical Geology and Geography of Ireland" (2nd edition, 1891) have made his name known to many who never enjoyed his courteous friendship. His "Treatise on the Building and Ornamental Stones of Great Britain and foreign countries," published in 1872, has long served as a work of reference for architects and engineers.

Edward Hull was born at Antrim on May 21st, 1829, when his father was curate in charge of Antrim parish. While at school at Lucan in Co. Dublin, it was proposed that he should enter the ministry of the Church of Ireland, and he attended in consequence a class in the Irish language, as well as studying Hebrew and the more usual classics. Perhaps we owe the discriminating Irish work of his daughter Eleanor in some measure to this early range of study. But Hull's attention became fixed on science through the lectures of Surgeon Lover, who, in days that we are apt to look on as dark ages for education, brought apparatus out from Dublin and inspired the boys at Lucan with a love for natural philosophy. A career in engineering was thus opened, and again a brilliant teacher, Dr. Thomas Oldham, at Trinity College, Dublin, directed the bent of a receptive and industrious mind. As Hull writes with unaffected gratitude, in place of engineering, "Providence had some-

thing better in store for me." Oldham recommended him to De la Beche, who had organised the Geological Survey of Great Britain and Ireland, and his first official work was with J. Beete Jukes, in 1850, among the mountain ridges of North Wales.

From the outset he was thus fortunate in his friends, and he clearly inspired them with confidence. Much of his time in England and Scotland was spent on areas of Carboniferous rocks, and this led to his serving on two successive Royal Commissions on our coal-reserves (1871 and 1901). The comparatively early death of Jukes in 1869 left a vacancy in the directorship of the Irish branch of the Geological Survey and also in the professorship of geology in the Royal College of Science for Ireland. Sir Roderick Murchison recommended Hull for both positions, and he held them until his retirement in 1890. The collections of the Geological Survey were during most of that period housed in the building occupied by the College in St. Stephen's Green, and the long association of the two branches of official geological work, educational and exploratory, is recorded in the excellent series of diagrams and sections illustrating Irish geology in the possession of the Royal College of Science.

In the winter of 1883-4, Hull was chosen by the committee of the Palestine Exploration Fund to investigate the geology of Sinai and southern Palestine, and his report appeared in 1886. In 1884 he published a narrative of the expedition, under the title of "Mount Seir, Sinai, and Western Palestine." These observations served to intensify his interest in biblical history and research.

More than 150 contributions to scientific journals, from 1855 onwards, are recorded under Hull's name in the Royal Society's Catalogue of Scientific Papers. He was elected a Fellow of the Royal Society, before reaching the age of forty, in 1867. His success in organising the completion of the one-inch geological map of Ireland, with the accompanying memoirs, before the date of his retirement, led to a certain brevity of treatment in some of the later memoirs; his artistic taste, however, which was evidenced in landscape-sketches in his youth, guided

the map-colourists in a manner that remains unexcelled, and it is to be regretted that zeal for uniformity has introduced the cruder tints of British maps in later years. Irish geology has from time to time been the victim of obsessions. Just as Jukes in his last years sought to overthrow the Devonian system, and succeeded in impressing his views on G. H. Kinahan, so Hull felt drawn towards marking out, on very shadowy indications, a line between a Dingle Series and an Old Red Sandstone throughout the south. Undated "revisions" were thus made in a large number of sheets, the bibliography and collation of which will prove a complete puzzle to librarians. Fortunately, these changes are purely of stratigraphical interest, and in no way affect the economic and practical value of the sheets concerned. It is well, however, that the southern maps as originally issued should be preserved for comparison with those of later date.

Hull took a keen interest in Glacial problems. In common with many geologists trained in England and profoundly influenced by Lyell, he regarded the deposits of drift as aqueous rather than as directly due to the melting of stagnant continental ice. But he rightly urged that Ireland revealed evidence of an interglacial epoch, and his work on the correlation of the sands and gravels of the eastern coast tends to be strengthened and confirmed by later observations.

In his "Reminiscences," Hull gives an agreeable picture of life in Dublin when Sir Robert Kane, Dr. Johnstone Stoney, and Sir Robert Ball—to name no others—were prominent in the scientific life of the metropolis. Work has since tended to be more specialised and perhaps more truly "strenuous"; but it is pleasant to think that many of the institutions to which he refers still serve as grounds of meeting, and that the Scientific Club still brings together in social converse workers in very diverse fields.

Hull married in 1857 the daughter of Dr. C. T. Cooke of Cheltenham, and had four daughters and two sons, most of whom survive him.

GRENVILLE A. J. COLE.

LUSITANIA AND KERRY : A BOTANICAL
PARALLEL.

BY NATHANIEL COLGAN, M.R.I.A.

THE flora of Portugal, the classic Lusitania, has had a peculiar interest for Irish botanists ever since Edward Forbes in his well-known Geological Survey Memoir of 1846 drew attention to those western and south-western Irish plants, which are usually spoken of as the Lusitanian group. The existence of this interest coupled with the fact that the Portuguese language and literature are almost completely neglected in this country may be pleaded as sufficient excuse for giving here a short abstract of the results yielded by a botanical exploration of the highest mountain region of Portugal made so long ago as 1881. With the *Relatorio* or report of this survey, a copy of which recently came into my possession, most Irish botanists are probably unfamiliar. It is a folio brochure of 133 pages, in the Portuguese vernacular, printed at Lisbon in 1883, and drawn up by Dr. Julio Augusto Henriques, Professor of Botany in the University of Coimbra, and one of the native botanists who carried out the survey. The region dealt with is the Serra da Estrella, the mountain chain, chiefly granitic, which stretches north-eastward from Coimbra for about 50 miles, and attains a height of rather more than 6,500 feet under $40\frac{1}{2}$ degrees of north latitude.

The survey, which included botanical exploration amongst its objects, was carried out under the auspices of the Lisbon Geographical Society, and dealt very exhaustively with the natural history of the region. The interpretation given to that essentially flexible term, Natural History, was even freer than it received in our happily accomplished Clare Island Survey; for in addition to the usual branches of botany, zoology, geology, meteorology, and anthropology, the Portuguese survey had sections dealing with chemistry, hydrography, lake soundings,

zootechnics (cattle-breeding) and—ophthalmology. The *personnel* of the expedition included a major of engineers and an infantry lieutenant in charge of camping arrangements, a cook, scullions (*adjutantes de cozinha*), a bugler, and a police force, consisting of an officer and six infantry men. Wild as West Ireland may be it seems clear that the Serra da Estrella is a good deal wilder, or, at all events, was so in 1881. No doubt the pastoral population of its upper regions have little claim to be considered gentle shepherds.

The Botanical Report, which is a very full one, is made up of three sections. The first gives a short sketch of the progress of botanical research in the Serra; the second defines the vertical zones and describes their floral characteristics; and the third forms a catalogue, with localities, of all the species which ascend above the lowest zone. The precise limits covered by the survey, though nowhere definitely stated, appear from the various localities mentioned to have included both slopes of the Serra from Coimbra to the summit, or, roughly, 720 square miles. This corresponds very closely with the combined areas of Districts I., II., III., and IV. of Mr. Scully's recently published *Flora of County Kerry*, and the very full details given both by Mr. Scully and by Dr. Henriques, especially as to vertical range of species, enables us to compare the flora of the extreme south-west mountain region of Ireland with that of the northern mountain region of Portugal, lying some 12 degrees of latitude further southward. As might have been expected, the continental and more southern region has the richer flora, the Serra da Estrella giving a total of 1,230 phanerogams and vascular cryptogams to a South Kerry total of 750.¹

Dr. Henriques divides his area into six vertical zones, the three lower agrarian, the three upper alpine. These zones which are determined by their characteristic plants are not of equal extent. They vary from 100 to 700 metres,

¹ The Characeae, which are not included in the Portuguese report, have been excluded from the South Kerry total.

the Agrarian Zones, Lower, Middle, and Upper (I., II., and III.) together ranging from sea-level to 1,500 metres, or say, 5,000 feet, the three Alpine Zones (IV., V., and VI.), Lower, Middle, and Upper, occupying the remaining 1,500 feet up to the summit.

It is chiefly with the Alpine Zones we are concerned here, yet a few words may be given to the Agrarian Zones in which the great bulk of the Serra da Estrella flora is found. The Lower Agrarian ranging from sea-level to 1,300 feet, is the home of the Mediterranean flora, and in its total of 1,030 species of phanerogams and vascular cryptogams are included the sub-tropical American aliens the Agave and the Nopal or Indian Fig (*Opuntia*) which flourish up to nearly 1,000 feet and form hedges round the vineyards and olive groves. This is the zone of the Orange, the Lemon, the Vine, the Olive and the Fig. Here, too, in the lowest levels Rice is largely cultivated, to the great detriment of the public health, as Dr. Henriques says (*com grande detrimento da saude publica*). In the Middle Agrarian Zone (II.) ranging from 1,300 to 2,600 feet, the Castanheiro or Edible Chestnut prevails, Millet (*Panicum miliaceum*) is largely cultivated and wide tracts are covered with various species of *Cistus* or Rock-rose. In this zone our rare *Asplenium lanceolatum* finds its upper limit at 1,650 feet, and many familiar Irish and Kerry species exhaust their vertical range at about 2,300 feet, e.g., *Radiola linoides*, *Trifolium arvense*, *Peplis Portula*, *Leontodon hispidus*, *Solanum Dulcamara*, *Lycopus europaeus* and *Scirpus Savii*. In the Upper Agrarian Zone (III.), ranging from 2,600 to about 4,900 feet, the Common Bracken and the culture of Rye cease at about 4,800 feet, and a monotonous aspect is given to the landscape by the dominance of the prostrate, ashen-grey vegetation of *Halimium occidentale*, one of the Cistineae. The Arbutus, the Crouncahinye of Kerry, the Madronheiro of the Portuguese, and Madroño of the Cantabrian highlanders, ascends into this zone, and so attains at least 2,600 feet, though its precise limits are not given in the report. Here, too, potato cultivation reaches its upper limit at 3,250 feet, and one of the economically valuable Esparto grasses, *Macrochloa arenaria*, becomes

abundant. Amongst the common Irish species which exhaust their vertical range in this zone at about 3,200 feet are *Viola sylvatica*, *Sambucus nigra*, *Senecio sylvaticus* and *Crepis virens*.

Passing into the Lower Alpine Zone (IV.), 4,900 to 5,750 feet, we find that the flora has fallen from 1,030 species in Zone I. to a total of 114, with the result that the Irish or Northern element in the vegetation begins to emerge, chiefly in such alpine or bog or marsh plants as *Allosorus crispus*, *Alsine verna*, *Saxifraga stellaris*, *Drosera rotundifolia*, *Hieracium murorum*, *Menyanthes trifoliata*, *Juniperus nana*, and *Molinia caerulea*. Three of our most exclusively calcifuge species, *Digitalis purpurea*, *Luzula maxima*, and *Blechnum Spicant*, which range in Kerry respectively to 2,900, 3,400, and 3,150 feet, here find their upper limit at 5,000 feet, while the Birch (*Betula pubescens*) ranging in Kerry to 1,050 feet, here ceases at 5,100. The Iberian and Mediterranean heaths now become dominant, appearing in the following ascending order, *Erica umbellata*, *E. arborea*, *E. aragonensis*, and *E. lusitanica*. The last of these, accompanied by our common Ling (*Calluna*), spreads up to 5,800 feet, and the Dwarf Juniper (*J. nana*), the Zimbro of the Portuguese, is conspicuous, rooting in rocky ground, and spreading in dense, flat sheets over a sward which is formed almost exclusively of our familiar calcifuge mountain grass, *Nardus stricta*. An aquatic species, *Sparganium natans*, frequent in our mountain lakes from Kerry to Donegal, but apparently confined in Portugal to the Serra da Estrella, makes its first appearance in this zone, and re-appears higher up in Zone V. in the Lagoa da Salgadeira at 5,900 feet. Confined to Zone IV., are two alpine Narcissi peculiar to the Peninsula, *N. nivalis* Graells and *N. rupicola* Dufour.

In the Middle Alpine Zone, V., 5,750 to 6,100 feet, two other Irish and Kerry species, *Alchemilla alpina* and *Hieracium vulgatum* make their first appearance in the Serra, and four others, our common Male Fern, *Sedum anglicum*, *Carex echinata* and *Deschampsia flexuosa* reach their upper limit at about 5,800 feet. The most characteristic of our

Irish Lusitanian species, *Saxifraga umbrosa*, so protean in its Kerry hybrids, re-appears in this zone after a long interval at its upper limit of 5,800 feet. Frequent with us at sea-level in Kerry and Mayo, it is quite sub-alpine in the Peninsula, and in the Serra Dr. Henriques places its lower limit at 2,300 feet. Two Gentians here make their first appearance, the alpine *G. lutea* which finds its upper limit in this zone, and *G. Pneumonanthe* which ascends into the Summit Zone VI., where it is one of the most characteristic and abundant species and has been observed by every visitor to the Serra (*observado por todos os que tēem visitado a Serra*).

† In the Summit or Upper Alpine Zone (VI.), 6,100 to 6,500 feet, the flora is reduced to forty-five species, and of these no less than nineteen or 42 per cent. are Irish, eighteen being South Kerry species. The nature of the soil is well shown by the fact that ten of these nineteen species are strongly marked calcifuges, such as *Polygala serpyllacea*, *Viola palustris*, *Cotyledon Umbilicus*, *Saxifraga stellaris*, *Juncus squarrosus* and *Nardus stricta*. In the combined floras of the two upper zones, V. and VI., the proportion of Irish species is quite as large. It is thirty-nine out of ninety-one, or almost 43 per cent., only one of the thirty-nine, *Allosorus crispus*, the Parsley Fern, being absent from South Kerry.

The influence of increase of elevation expressing itself through climatic change is shown not only in the substitution of northern for southern plant types, but in the rate of impoverishment in the flora. Taking the upper 1,500 feet or so of the Kerry highlands and of the Serra da Estrella, the areas lying above 2,000 feet in Kerry and above 5,000 feet in Portugal, we find a remarkably close agreement in the rate of diminution of the floras when compared in each case with the floras of the immediately preceding lower zone. A rise of 1,414 feet in Kerry reduces the flora from 173 to forty-eight species, a loss of 125 or 72.2 per cent.: a similar, or not greatly dissimilar rise (1,570 feet) in the Serra reduces its flora from 166 to forty-five, a loss of 121 or 72.9 per cent. In other words, taking impoverishment in floral diversity as a criterion of climate, the climate

of the Kerry Highlands between 2,000 and 3,414 feet finds its counterpart in the climate of the Serra da Estrella between roughly 5,000 and 6,500 feet.

In the Portuguese report the distribution of the species through the chief Natural Orders is given, and this enables us to compare the systematic constitution of the southern flora with that of extreme South-west Ireland. In the following table the numbers and percentages to the total floras of the species in the ten largest orders of South Kerry, Districts I., II., III., and IV. of Mr. Scully's Flora, are given along with the corresponding numbers and percentages of the same orders in the Serra da Estrella, the serial numbers 1 to 10 denoting the order of magnitude for each region. The contrast between the two floras, one northern and insular, the other southern and continental, comes out clearly in this table. In the continental flora Leguminosae take third place in magnitude, in Kerry they take tenth. On the other hand, Cyperaceae and Filices standing respectively third and fifth in Kerry, sink to the ninth and tenth places in the Serra.

PROPORTIONS OF THE PRINCIPAL NATURAL ORDERS TO THE
TOTAL FLORAS IN SOUTH KERRY AND IN THE
SERRA DA ESTRELLA.

	SOUTH KERRY				SERRA DA ESTRELLA.			
	Species.	Per Cent.	Species.	Per Cent.	Species.	Per Cent.	Species.	Per Cent.
1. Compositae	60	8.0	148	12.0	148	12.0	148	12.0
2. Gramineae	55	7.3	113	9.0	113	9.0	113	9.0
3. Cyperaceae	55	7.3	35	2.8	35	2.8	35	2.8
4. Caryophyllaeae	30	4.0	47	3.82	47	3.82	47	3.82
5. Filices	28	3.7	21	1.7	21	1.7	21	1.7
6. Cruciferae	28	3.7	44	3.58	44	3.58	44	3.58
7. Umbelliferae	27	3.6	53	4.3	53	4.3	53	4.3
8. Scrophularineae	26	3.46	45	3.66	45	3.66	45	3.66
9. Labiatae	24	3.2	44	3.58	44	3.58	44	3.58
10. Leguminosae	21	2.8	100	8.1	100	8.1	100	8.1

The increase in vertical range in the Serra da Estrella of certain species which exhaust their upward range in Kerry is shown in the following table :—

		KERRY.	SERRA.
		Feet.	Feet.
<i>Viola palustris</i>	.. ..	3,120	6,500
<i>Ilex Aquifolium</i>	.. ..	1,800	5,800
<i>Pyrus Aucuparia</i>	.. ..	2,300	5,900
<i>Drosera rotundifolia</i> ¹	.. ..	2,050	6,200
<i>Epilobium palustre</i>	.. ..	1,425	6,200
<i>Conopodium denudatum</i>	.. ..	1,450	6,200
<i>Carum verticillatum</i>	.. ..	1,450	2,350
<i>Wahlenbergia hederacea</i>	.. ..	1,000	6,200
<i>Arbutus Unedo</i>	.. ..	525	3,600
<i>Sibthorpia europaea</i>	.. ..	1,700	2,350
<i>Simethis bicolor</i>	.. ..	400	1,900
<i>Cystopteris fragilis</i>	.. ..	3,150	6,200
<i>Osmunda regalis</i>	.. ..	1,200	2,600
<i>Juniperus nana</i>	.. ..	1,800	6,100

There is one noteworthy defect in this Report—the total absence of any reference to Ireland, although the general European distribution of each species is given in the Catalogue. At a first glance it would seem that the frequently recurring word “Inglaterra” is intended, in a slipshod way not unusual with Continental writers, to include the British Isles. Further examination, however, shows that this explanation is hardly admissible, since under *Juniperus nana*, “Escocia” and “Inglaterra” are distinguished. In the distribution of *Simethis bicolor* and *Arbutus Unedo* not even Inglaterra is mentioned; so one is forced to conclude that the author was quite ignorant of Irish botany. This defect must detract from the value and interest of this excellent report for the compatriots of Dr. Henriques, though of little consequence to Irish botanists.

Sandycove, Co. Dublin.

¹ According to Dr. Henriques this species occurs in all three Alpine Zones wherever Sphagnum grows (*Em todos os logares onde vive o Sphagnum*)

NOTES ON MYRIAPODA. VIII.¹

RECENT ADDITIONS TO THE IRISH FAUNA.

BY HILDA K. BRADE-BIRKS, M.SC., M.B., CH.B., L.R.C.P.,
M.R.C.S., AND THE REV. S. GRAHAM BRADE-BIRKS, M.SC.

IRISH naturalists very kindly continue to place material at our disposal from time to time, and in the course of diagnosis we have recently met with one centipede and two millipedes previously unrecorded for Ireland, namely:—

CHILOPODA :

Geophilus insculptus Attems.

DIPLOPODA :

Brachyiulus (Microbrachyiulus) littoralis Verhoeff.

Brachydesmus superus mosellanus Verhoeff.

Geophilus insculptus Attems.

We recently recorded this species as new to Britain (2), and it has been sent to us from Ireland by Mr. Nevin H. Foster, who took a female in Hillsborough Park, Co. Down, 4 iii. 1916. The same collector has also sent an example from Hillsborough, collected in July, 1917. We must withdraw our own Irish record of *G. proximus* from Sugarloaf, Bray, Co. Wicklow (3), as this animal afterwards turned out to be *G. insculptus*.

We think it probable that most Irish records of *G. proximus* will need the same correction. Dr. Henry W. Brölemann, the eminent French zoologist, *in litt.* referring to Mr. Evans's reference (5) to his note in the *Irish Naturalist* (4) seems to doubt the validity of his own diagnosis of *G. proximus*, as it was evidently made at a time when he was not familiar with *G. insculptus*; so, until authenticated examples of *G. proximus* are definitely recorded for the British Isles, we are afraid that this species must be regarded

¹An earlier paper in this series, the third, also appeared in this journal in August, 1916, the other papers have appeared in various other scientific periodicals.

as belonging more particularly to the central states of Europe, though Dr. Brölemann says, *in litt.* " May be, after all, *proximus* occurs in your country."

Attems gives excellent figures of his species (1).

Brachyiulus (Microbrachyiulus) littoralis Verhoeff.

This species is probably not uncommon in the British Isles, where it appears to have been much confused with *Julus pusillus* Leach.

A male was collected at Gawley's Gate, Co. Antrim, by Mr. Foster, on May 30th, 1917. Three females, probably referable to the same species, had been taken by Mr. A. W. Stelfox and Mr. Foster two days earlier, at Ballymagee, Co. Down.

Brachydesmus superus mosellanus Verhoeff.

We have received specimens of this variety, which will probably prove to be common in these islands, collected in considerable numbers by Mr. Foster in May, 1917, and by Mr. Stelfox in November, 1917, at Ballymagee, Co. Down, where it constitutes a pest in the latter's garden. Mr. Foster also took it at Gawley's Gate, Co. Antrim, on May 30th, 1917.

This variety occurs in England (2), and is figured by Dr. Verhoeff (6 and 7).

We have also received several interesting specimens of Diplopoda from Ireland, which we have been unable to identify in the absence of adult males.

Since our former note in this Journal (3) we have examined the following tubes of material bearing on the subject of that paper:—

656. **Lithobius lapidicola**, one female, Murray's Wood, Coalisland, Co. Tyrone, 3. vi. 1916, Mr. N. H. Foster.
- 704 **L. lapidicola**, two females, one male, near Lough Dan, Co. Wicklow, 6. x. 1913, Miss J. Stephens. [Nat. Mus., Ireland, material].
712. **L. Duboscqui**, one female, Antrim Churchyard, Co. Antrim, 2. ix. 1916, Mr. N. H. Foster.
720. **L. lapidicola**, one female, two males. The Spa, Ballynahinch, Co. Down, 8. v. 1915, Mr. N. H. Foster. [Nat. Mus., Ireland, material: 109—1915].

721. **L. lapidicola**, six males, Gleniff, Co. Sligo, 17. iv. 1914. Mr. N. H. Foster. [Nat. Mus., Ireland, material: 373—1914].
919. **L. lapidicola**, one example, Ballymagee, Co. Down, 28. v. 1917, Messrs. A. W. Stelfox and N. H. Foster.
945. **L. Duboscqui**, one male, Hillsborough Park, Co. Down, July, 1917, Mr. N. H. Foster.

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3. BRADE, HILDA K. AND BIRKS, S. GRAHAM.—“ Notes on Myriapoda, III.—Two Irish Chilopods ”; *Irish Nat.*, vol. xxv. (1916), pp. 121 *et seq.*
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16 Bank Street, Darwen, Lancashire.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

DECEMBER 5.—PUBLIC LECTURE in the Royal Dublin Society's Theatre, Sir F. MOORE (President) in the chair. Prof. A. FRANCIS DIXON, Sc.D., lectured on “ The Gorilla and its Place in the Animal Kingdom,” indicating clearly the probable relationships between the genera of the large Apes. The audience was numerous and appreciative.

Recent gifts include a pair of Ring Doves from Mr. R. Cunningham. Two Lion cubs have been born in the Gardens, “ Red Hugh ” and “ Maive ” being the parents.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 12.—N. COLGAN (President) in the chair.

R. C. TAYLOR showed sections of lignite from Carrig-a-pulliar, Portrush. It occurs in a layer 10-12 feet thick interbedded between the two great basaltic masses of Co. Antrim, provisionally termed the “ upper and lower basalts of our geological maps.”

Prof. G. H. CARPENTER showed preparations of the jaws of the nymph of a mayfly (*Ecdyurus*) demonstrating the details of structure in the maxillae and labium.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 20.—Rev. A. ADAMS, B.A., gave a lecture entitled "Prehistoric Settlements on the Shores of Lough Neagh," with reference to the northern shore. The lecturer exhibited a series of stone implements found from time to time during the past twenty years along the northern shore of Lough Neagh, from Glenavy to Toome Bar. The Neolithic settlers occupied sites especially near the mouths of the Crumlin, Sixmilewater, and Maine rivers. The relics found at the Maine River comprised flint flakes dressed as scrapers, knives, picks, and chisels; also some waterworn specimens which had been rechipped in later time. The most extensive and important site was Toome Bar, for here at this ford proofs were obtained of Neolithic, Bronze, and Early Iron Age workers. The most unique implement from Toome was a socketed and looped iron axe. A letter was read from Dr. Robert Munro, the author of "The Lake Dwellings of Europe," drawing special attention to the importance of this axe and the similar one from Loughmourne crannog, as showing how the first iron axes were evolved from the socketed and looped Bronze Age type. The lecturer also exhibited for comparison the Loughmourne axe, these being the only two of their kind known in Ireland. In the discussion which ensued Mr. May, Mr. Dickson, Dr. Charlesworth, and Mr. Cleland took part, the meeting terminating with the election of four new members.

DECEMBER 18.—Professor GREGG WILSON, of Queen's University, gave a lecture on "Crabs," illustrated by fine lantern slides. The Vice-President (Mr. Cleland) occupied the chair. The lecturer said some of our commonest crabs illustrated excellent adaptation to environment. For example, one of our swimming crabs harmonises in colour with the sandy bottom in which it is found; spider crabs on rocky bottoms secure inconspicuousness by decorating themselves with fragments of sponges, zoophytes, &c.; the masked crab seeks safety by burrowing below the sand of the sea bottom, and has its antennae modified to form a long breathing tube; and the pea crabs live in apparent comfort inside the fortress provided by the shell of a cockle or a mussel. Among the many devices for dealing with enemies the habit of self-mutilation by discarding a leg was perhaps the most striking. Many species of crab had a breaking-point near the base of the legs, and could cast off a mutilated member or one that had been seized by an enemy. There was an effective arrangement which secured the stopping of bleeding at the point of fracture, and in course of time a new limb was regenerated. At the conclusion of the lecture the Chairman and Dr. Charlesworth made a few remarks.

DUBLIN NATURALISTS' FIELD CLUB.

OCTOBER 27.—EXCURSION TO KINGSTOWN.—A party of twenty met at Kingstown at three o'clock and proceeded to the shore at Sandycove, where favoured by a low spring tide, the President gave a short demonstration on some of the Mollusca and Crustacea abundantly represented on the rocks. The members then went to Queen's Park, Monkstown, where Mrs. Bennett hospitably entertained them at tea and showed a large and beautifully preserved series of skulls, horns, and skins of African mammals. Robert Stokes was elected into the Club at a short business meeting.

NOTES.

BOTANY.

Sedum Drucei.

Under this name, given by Dr. Graebner to the plant which in the British Isles has been called *S. acre*, a description by the botanist named was published by Mr. Druce, Bot. Exchange Club Report for 1912. In *Journal of Botany*, August, 1917, Mr. Praeger writes that having cultivated in one border *S. Drucei* as collected in the West of Ireland in company with Dr. Graebner, and as collected or received from various places in Ireland, England, and Scotland, and a series of wild and cultivated plants of *S. acre* from many European countries, differences of even varietal rank do not exist between them. In subsequent numbers of the *Journal of Botany* Mr. H. S. Thompson and Dr. C. H. Ostenfeld of Copenhagen write confirming this view, and agreeing in regretting the bestowing of specific names upon trivial variations from type.

Notes on Birds in King's County.

In reference to my note on the appearance of a Green Sandpiper (*Totanus ochropus*) seen by me in King's Co. (*Irish Nat.*, January, p. 14 *supra*) I have been informed by Mr. E. Rait Kerr that about eight years ago one of these birds was shot in a field *here* in August or September; sex unknown, plumage adult. It was taken to the late Captain Longworth-Dames of Greenhill, Edenderry, and was identified by him. These two records are of some interest, as Mr. Ussher gives none for this bird in King's Co.

It may also be of interest to record that yesterday, January 10th, I heard the following birds singing here, weather very mild after hard frost:—Blackbird, Song Thrush, Chaffinch, Great Tit, and Coal Tit. This is the earliest record I have of the Chaffinch's song.

Rathmoyle, Edenderry.

HELEN M. RAIT KERR.

Migration on Lough Mask.

While fishing on Lough Mask at the southern end, between the dates August 19th to 23rd, 1917, I noticed several species of birds which were, I think, almost certainly migrating. The first species was the Sand-Martin. On August 20th I observed hundreds flying south, the movement being particularly noticeable in the morning, falling off in the afternoon, and had practically ceased by about 5 p.m. On some bare rocks at the very south of the lake they were collecting in hundreds while many passed on over the mountains. On the same day I saw a Ringed Plover flying fairly high, and at great speed towards the south and on beyond the lake. On the 21st the movement of the Sand-Martins was still in progress, especially about 11 a.m. and again from 2 p.m. until 3.30 p.m. Many passed our boat during the latter period. The movement was not so great nor so decided as on the previous day. The third species noticed was the Turnstone. Five were noted at about 3 p.m. on August 20th, and on the following day from 2 p.m. until 2.30 p.m., during a heavy shower with a high wind, two rested on some rocks quite close to our boat. At about the same time my brother, who was in another boat, at some distance, noticed three Turnstones on rocks much further south. During the above mentioned shower I noticed a swift flying south and very low. Evidently the Turnstones and other species were availing themselves of the lakes which form a chain from Killala Bay to Galway Bay.

ROBERT F. RUTTLEDGE.

Bloomfield, Hollymount, Co. Mayo.

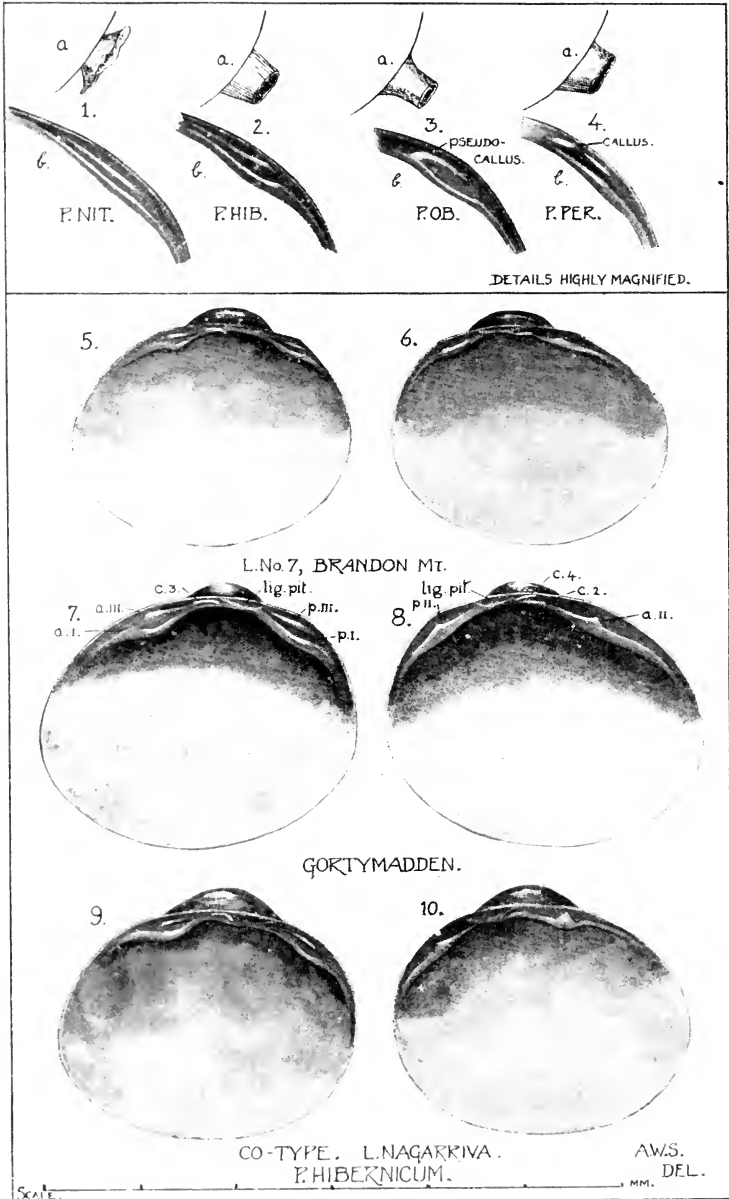
REVIEW.

DECORATIVE GARDENING.

Plant Materials of Decorative Gardening. 1. The Woody Plants.
By WILLIAM TRELEASE, Professor of Botany in the University of Illinois.
Pp. 204. Sm. 8vo. Urbana, 1917.

This little book, which will easily fit the pocket, gives in a very practical and condensed form an account of the shrubs and trees from all parts of the world which are cultivated for their beauty or interest in the eastern United States. As may be surmised, the contents of the volume apply almost equally to our own country. Simple language and simple keys are provided; and it should be easy for anyone with a smattering of systematic botany to run down a plant. The number of species dealt with is 782, and a large number of varieties are also included. For those who love shrubs, and cannot afford Mr. Bean's invaluable but expensive work, this booklet should have a very definite value.

R. LL. P.



PISIDIUM HIBERNICUM, &C.

RECENT EXTENSIONS OF THE RANGE OF *PISIDIUM HIBERNICUM*.

BY R. A. PHILLIPS, M.R.I.A., AND A. W. STELFOX, M.R.I.A.

(PLATES I., II.).

TWENTY-FOUR years have now passed since Dr. Scharff collected the original specimens of this fresh-water bivalve mollusk in Lough Nagarriva, South Kerry,¹ and forwarded them to the great Swedish conchologist, the late C. A. Westerlund, who described them as new to science under the name of *Pisidium hibernicum*.²

The shell was again taken in L. Nagarriva in 1907³ and discovered in two neighbouring tarns in West Cork—Lough Namaddra and a small unnamed tarn on Barraboy Mountain. In more recent years Loughs Nagarriva and Namaddra have been visited and specimens obtained by Fleet-Surgeon K. H. Jones, R.N., Mr. H. C. Huggins, and one of the writers (R. A. P.). While collecting in the Dingle promontory in 1910 a shell was taken abundantly in many tarns by A. W. Stelfox and Robt. J. Welch which was thought at the time to be *P. hibernicum*, and notes of its occurrence in that district were inserted in the "Irish List"⁴ then in the press. At the last moment, however, these were deleted in deference to Mr. B. B. Woodward's opinion that all the shells referred to were forms of *P. obtusale*, with the exception of the statement on p. 126 that *P. hibernicum* was "known to inhabit several lakes in South Kerry," which was overlooked. At the time of publication this appeared to be a mistake, L. Nagarriva being the *only* recorded station for the species in South Kerry. Subsequent study of the

¹ R. F. Scharff, *Irish Nat.*, vol. iv., p. 335, 1895. [Here the lake is wrongly stated to be in Co. Cork].

² *Nachricht. Deutsch. Malakozool. Gesellschaft*, 26^{ter} Jahrg., p. 205, 1894.

³ J. N. Milne and A. W. Stelfox, *Irish Nat.*, vol. xvi., p. 288. Plate 35 in this volume shows the original habitat of the species.

⁴ *Proceedings R. I. Acad.*, vol. xxix., Sect. B., No. 3.

Dingle shells has shown us that the original opinion was correct and that they are referable to forms of *P. hibernicum* and not to *P. obtusale*.

P. hibernicum was next recognised—by Mr. B. B. Woodward—among shells collected during the Clare Island Survey in L. Gowlanagower, on Inishbofin, West Galway. By 1913, when his Catalogue¹ was published, Mr. Woodward had also found it amongst shells from Tullaghnafrankagh L., South Galway, and was able to record it from the Täkern See in Östergotland, Sweden. In 1914 we began to study critically the numerous “locality sets” of *Pisidia*, which we had accumulated during some years of assiduous collecting throughout Ireland. This material, representing our own gatherings from upwards of five hundred localities, had been laid aside to await a favourable opportunity for study and in the expectation that with Mr. Woodward’s monograph before us, the identification of our specimens would prove a more easy task.

Our first additional specimens were discovered while working out the fossil mollusca which occur in the shell-marls of the White Bog, near Killough, Co. Down, Mr. Woodward subsequently agreeing with our identification of the shells from these deposits. Soon afterwards we detected it in gatherings from many localities and came to regard it as a widely distributed shell in Ireland, a conclusion which, we think, is fully justified on perusal of the list of Irish records given below.

The first specimen to come to light from England was one collected in 1908 by A. W. S. in a ditch by the Thames at Kew Gardens, Surrey, but as it was considered improbable that *P. hibernicum* should occur there, it was relegated for a time to the position of “? *P. nitidum*.” Other specimens, however, soon put in an appearance, as amongst a large series of shells received from Mr. J. E. Cooper, two sets were found to contain *P. hibernicum*—one from Gaerwen, Anglesey, and

¹ *Cat. of Brit. Species of Pisidia, &c.* [Afterwards referred to herein as “Cat.”].

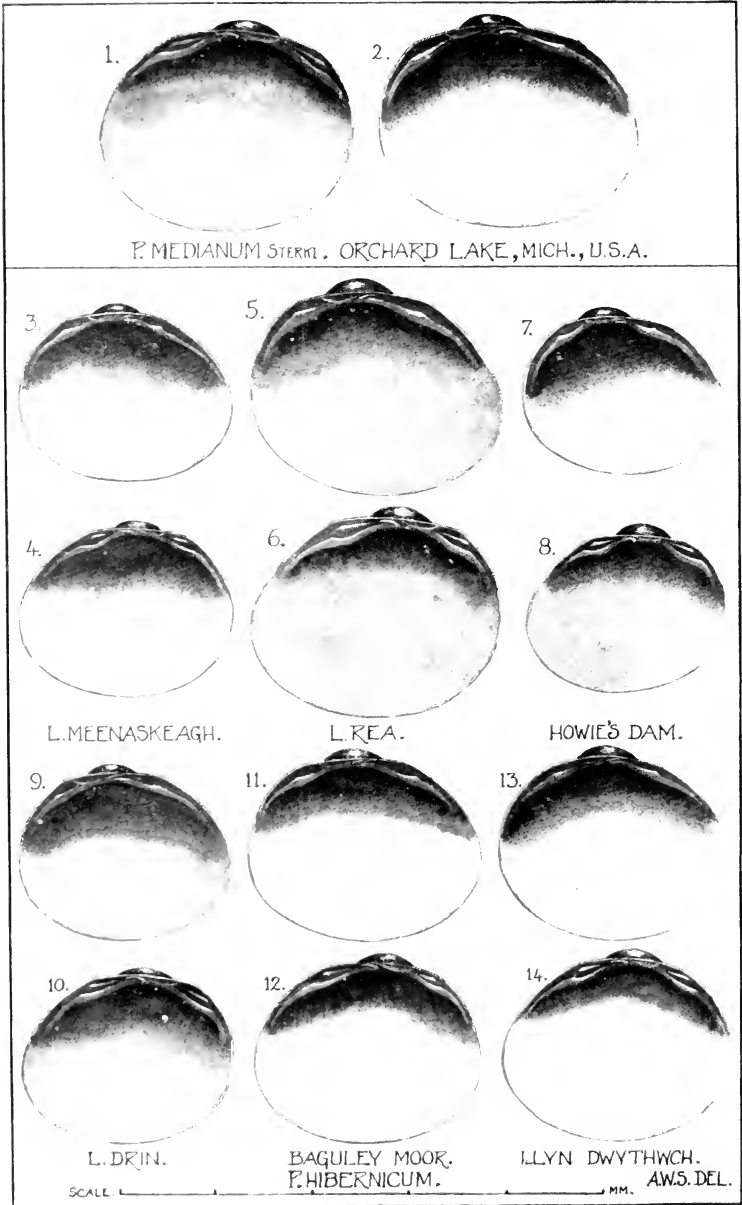
the second from Iver, Bucks. It was next recognized from some of the various tarns in the Snowdonian range, in North Wales, amongst shells collected by Mr. Charles Oldham; and it was found to be well represented in Mr. H. Overton's gatherings from the Sutton Coldfield district in Warwickshire. Numerous other English and Welsh records have since come to hand, as well as one from the Isle of Man and one from Norway.

Owing to the fact that the original habitat was a mountain tarn, *P. hibernicum* has become associated in most conchologists' minds with an alpine fauna; but as a matter of fact it has occurred to us in almost all conceivable habitats as the following lists show. It is worthy of notice, however, that it has not been observed to inhabit the type of habitat—often dry for long periods—so associated in one's mind with *P. personatum*, and that in rivers of large size it would appear to be rare. It occurs at all altitudes from sea-level to the highest tarns in Ireland and Wales; in the "peatiest" of lakes and in those whose waters are most saturated with lime; but it would appear to reach its finest condition under the latter environment, the shell from Crow's Lough, Gortymadden, South Galway, being the most perfect development of the species we have yet seen (Plate I., figs. 7 and 8). Some of Dr. Scharff's original examples are the largest that have been taken anywhere, and no subsequent visitor to L. Nagarriva has obtained, from there, specimens of equal size. As pointed out by Mr. Woodward (Cat., p. 118), the specimens from the type locality "represent an abnormally swollen form" and, we would add, are rather depauperate, except in size, owing no doubt to the very peaty nature of their habitat. The more normal and usual lowland form is more elliptical, with smaller and more prominent umbones and is less tumid. Most of the English and Welsh examples are of the last form. Mr. Woodward (*loc. cit.*) says "Westerlund's measurements are:—Long. 3.5, Alt. 3.5, Crass. 3.5 mm., but a larger specimen in the National Museum, Ireland, is Long. 4.5, Alt. 4 mm. The West Galway [L. Gowlanagower] specimens were smaller and less globose: 2.8 × 2.5 × 1.8 mm." The majority of our specimens come nearer the latter measurements.

The systematic position of the present species is, like that of most of our *Pisidia*, not easy to determine. In striation its shell comes between *P. obtusale* and *P. nitidum*;¹ the siphonal tube of the animal resembles that of *P. obtusale*, but not that of *P. nitidum*; the general hinge characters of the shell are more nearly allied to *P. nitidum*, though in the case of depauperate shells they may simulate those of some forms of *P. obtusale*. The fry of both *P. nitidum* and *P. obtusale* are as a rule distinctly ovate and have a longer and straighter hinge-line than those of *P. hibernicum*, which in outline are markedly quadrate. If we select any one of these characters its affinities can readily be fixed, but when all are considered in conjunction the problem becomes difficult. *P. hibernicum* is generally most difficult to separate from small tumid forms of *P. nitidum*, though when the two species are taken in association they will not often be confounded, as their general appearance, even if the siphons cannot be examined, should prove sufficient to separate them. It may also at times resemble forms of *P. obtusale* or *P. milium*, and has even been mistaken for *P. personatum* and *P. lilljeborgi*. In this connection it is interesting to state that the specimens of Jenyns' *P. obtusale*, var. β , preserved at Bath are, in Mr. Oldham's opinion referable to *P. hibernicum*. Jenyns' diagnosis of this variety well fits normal forms of *P. hibernicum*, and his reference to its ochraceous colour is decidedly appropriate since the animals of most living examples which we have examined were either deep yellow, pinkish-yellow or rose-pink. This coloration can as a rule be seen distinctly, even when the shells are exteriorly encrusted. The following table of characters may be useful to other students of the group, when taken in conjunction with the figures on the accompanying plates.

P. hibernicum Westerlund :—SHELL—equilateral. UMBONES—small, prominent. FRY—squatrose. STRIATION—regular, close and well marked. SIPHON—narrow, margin simple (Pl. I., fig. 2a.). LIGA-

¹ *P. nitidum* of Jenyns, which probably equals the *P. pusillum* of Mr. B. B. Woodward's Cat., as pointed out by A. W. S. in *Journ. of Conch.*, vol. xv., pp. 235-239, 1918.



PISIDIUM MEDIANUM AND PISIDIUM HIBERNICUM.

MENT PIT—short, broad and distinct. C. 3—long, straight or but slightly curved. C. 3 (the posterior portion of)—usually slightly thickened. C. 2—very long and straight. P. III.—parallel to p. I. (Pl. I., fig. 2b).

P. nitidum Jenyns :—SHELL—slightly inequilateral. UMBONES—broad, not very prominent. FRY—oval. STRIATION—regular, wide. SIPHON—funnel-shaped, with crenate margin (Pl. I., fig. 1a.) LIGAMENT PIT—short, but not so broad nor so distinct as in *P. hibernicum*. C. 3—short, usually distinctly curved or crescent-shaped. C. 3 (the posterior portion of)—sometimes thickened and even faintly bifurcate. C. 2—short and straight (usually only $\frac{1}{2}$ or $\frac{2}{3}$ the length of that of the associated *P. hibernicum*). P. III.—parallel to p. I. (Pl. I., fig. 1b).

P. milium Held :—SHELL—slightly or considerably inequilateral. UMBONES—broad. FRY—oval. STRIATION—irregular, very strong. SIPHON—very narrow and very long. LIGAMENT PIT—long, narrow and indistinct. C. 3—long and fairly straight. C. 3 (the posterior portion of)—slightly thickened. C. 2—long. P. III.—parallel to p. I.

P. obtusale (Lam.) Jenyns :—SHELL—almost always inequilateral. UMBONES—broad. FRY—usually oval. STRIATION—irregular, very close, but distinct. SIPHON—narrow, margin simple (Plate I., fig. 3a). LIGAMENT PIT—short, but rather indistinct. C. 3—short and curved. C. 3 (the posterior portion of)—thickened and “hooked.” C. 2—very short (upper portion sometimes bent outwards; see B. B. Woodward, Cat., p. 121). P. III.—coalescing with p. I. (or only tending to in peaty-water forms), and forming a “pseudo-callus” (Pl. I., fig. 3b).

P. personatum Malm. :—SHELL—equilateral. UMBONES—broad. FRY—very oval. STRIATION—almost imperceptible. SIPHON—broad and short (Pl. I., fig. 4a). LIGAMENT PIT—long and broad as in *P. casertanum*. C. 3—short and curved. C. 3 (the posterior portion of)—thickened and “hooked.” C. 2—long and usually curved. P. III.—parallel to p. I. (but above p. III. is a separate callosity: the callus of B. B. Woodward, see Cat., p. 55) (Pl. I., fig. 4b).

From *P. lilljeborgi* of equal size *P. hibernicum* may be at once distinguished by its short and broad ligament-pit, the pit of *P. lilljeborgi* being longer and narrower than that of any other species we have examined. Young shells of the two species in which the ligament pit is not easily discernible may, in cases, be extremely difficult to separate. Neither the globular form nor the twisted lateral teeth of the hinge referred to by Mr. Woodward as the chief diag-

nostic characters of *P. hibernicum* (Cat., p. 118) can be relied on, in our opinion, to separate it from certain forms of *P. nitidum*, *P. obtusale* or *P. milium*.

In the report of the Land and Fresh-water Mollusca of the Clare Island Survey,¹ A. W. S. suggested that the present species might be an "American" one: that is to say, that it might belong to the same faunistic group as the sponge *Heteromeyenia ryderi*—with which it is frequently associated in the West of Ireland—and that its distribution might correspond with that of the plants *Eriocaulon septangulare*, *Naias flexilis* and *Spiranthes Romanzoffiana*, which outside North America live only in a few stations in N.W. Europe. The occurrence of *P. hibernicum* in Wales, England, Norway and Sweden suggests, however, that it is probably a widely distributed Palaearctic form. Recently we have acquired a collection of *Pisidia* received by Mr. J. R. le B. Tomlin from Mr. Bryant Walker of U.S.A.—all of which are said to have been identified by Dr. Sterki. Amongst these are shells labelled "*P. medianum* Sterki" (Plate II., figs. 1 and 2), and others "*P. medianum*, var. *minuta* Sterki," which bear a remarkable resemblance to forms of *P. hibernicum*. To say that they are *P. hibernicum* would be impossible in such a group as the *Pisidia*, but had these shells been found in Ireland, we think that they would have been referred without doubt to that species.

The only fossil examples of *P. hibernicum* which we have seen come from Irish shell-marls and are of post-Glacial age; but it will not surprise us if the species proves to have been overlooked in some of the pre-Glacial deposits in England or on the continent.

We have to thank numerous workers for assistance in accumulating the information given in the following lists: Messrs. P. T. Deakin, N. G. Hadden, H. C. Huggins, J. W. Jackson, J. N. Milne, J. E. Cooper (for allowing us to examine his large series of shells named "*P. nitidum*" by Mr. B. B. Woodward, in which were detected two sets of

¹ *Proceedings R. I. Acad.*, vol. xxxi., part 23.

P. hibernicum), H. Overton¹ (who sent us no less than ninety carefully localized gatherings of *Pisidia*, mainly from his own district), C. Oldham (for permitting us to examine his collection of *Pisidia* from the Welsh tarns), Hans Schlesch of Hellerup, Denmark (for permission to study his collection from Iceland and Scandinavia), and Robt. J. Welch for placing the whole of his collection at our disposal. The specimens in the National Museum in Dublin have also been available to us through Dr. R. F. Scharff's kindness.

IRISH RECORDS FOR *P. HIBERNICUM*.

Contractions used:—H.C.H. = H. C. Huggins; K.H.J. = K. H. Jones; J.N.M. = J. N. Milne; H.O. = H. Overton; C.O. = C. Oldham; J.W.J. = J. W. Jackson; R.F.S. = R. F. Scharff; N.H.F. = N. H. Foster; R.J.W. = R. J. Welch; H.T. = late Major Trevelyan; D.M. = in Dublin Museum; R.A.P. & A.W.S. = the writers.

NOTE.—The REMARKS refer to *P. hibernicum* alone and not to the associated species of *Pisidia*.

SOUTH KERRY.

- LOC.—Lough Nagarriva, a large tarn with bed of rocks and peaty mud. COLL.—R.F.S., J.N.M., A.W.S., R.A.P., K.H.J. and H.C.H., 1893-1913. ALT.—1,200 feet. ASSOC.—*P. lilljeborgi*, *P. milium* and *P. obtusale*. [Species other than *Pisidia* are not referred to since they can scarcely be said to be "associates"]. Pl. I., figs. 9, 10.
- LOC.—Lough Tooreenmartin, Dingle Promontory, a large, shallow tarn, with clear water and stony bed. COLL.—A.W.S., Sept., 1910. ALT.—1,200 ft. ASSOC.—*P. nitidum* and *P. lilljeborgi*, collected at the roots of *Isoetes*. REMARKS—Recorded by A.W.S. as *P. obtusale* in *I. Nat.*, vol. xxiv., p. 33.
- LOC.—Tarns in Coumaknock, on Brandon Mt., Dingle Promontory. These tarns are mostly lying in rock-basins and have clean, very cold water and little mud or silt. COLL.—A.W.S. and R.J.W., Sept., 1910. ALT.—650 to 2,300 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, and *P. obtusale*. REMARKS—Recorded by A.W.S. as *P. obtusale* in *I. Nat.*, vol. xxiv., pp. 21 and 33. Pl. I., figs. 5, 6.
- LOC.—Clogharee Lough, in valley north of Connor Pass, Dingle Promontory, a small shallow lake with stony bed. COLL.—A.W.S., Sept., 1914. ALT.—100 ft. ASSOC.—No other *Pisidia* seen.

NORTH KERRY.

- LOC.—Lough Crincaum, Cromaglaun Mt., near Killarney. COLL.—E. Collier, July, 1898. ASSOC.—No other *Pisidia* seen. REMARKS—Recorded by R. Standen as *P. nitidum* in *I. Nat.*, vol. vii., p. 226.

¹ We learn from Mr. Overton that, some years ago, he suspected that some of his shells might be referable to *P. hibernicum*, but he was unable to obtain confirmation of this. [Note added in press].

WEST CORK.

- Loc.—Lough Namaddra, north of Glengarriff. COLL.—J.N.M. and A.W.S., July, 1907. (Also H.C.H., 1914). ALT.—1,200 ft. REMARKS—No other *Pisidia* seen.
- Loc.—Pool below L. Namaddra. COLL.—H.C.H., 1916. ALT.—1,000 ft.
- Loc.—Lough Avaul. COLL.—H.C.H., 1914; R.A.P., Aug., 1908. REMARKS—In peaty mud.
- Loc.—Unnamed tarn on Barraboy Mt., north of Glengarriff. COLL.—J.N.M. and A.W.S., July, 1907. ALT.—1,350 ft. ASSOC.—*P. lilljeborgi* and *P. obtusale*.
- Loc.—Lough More. COLL.—H.C.H., 1914. ALT.—About 600 ft. REMARKS—In peaty mud.
- Loc.—Pool at Derryconnery. COLL.—H.C.H., 1916. ALT.—100 ft. REMARKS—In peaty mud.
- Loc.—Pool above Barley Lake. COLL.—H.C.H., 1916. ALT.—About 1,100 ft. REMARKS—In peaty mud.

WATERFORD.

- Loc.—In the great marsh south of Waterford Town. COLL.—A.W.S., April, 1912. ALT.—About 25 ft. ASSOC.—*P. milium*, *P. subtruncatum* and *P. obtusale*. REMARKS—Mr. B. B. Woodward has identified these as *P. obtusale*.
- Loc.—River Suir at Carrickbeg. COLL.—R.A.P., Aug., 1917.

SOUTH TIPPERARY.

- Loc.—River Suir at Carrick-on-Suir. COLL.—R.A.P., Aug., 1917.

LIMERICK.

- Loc.—River Shannon, near Limerick. COLL.—R.A.P., March, 1916.

NORTH TIPPERARY.

- Loc.—Peat-holes in Carrigahorig Bog. COLL.—R.A.P., April, 1917.

CLARE.

- Loc.—Inchiquin Lake (in drift). COLL.—R.A.P., 1916.

WEXFORD.

- Loc.—Marshes along coast near Curraghcloe. COLL.—A.W.S., April, 1912. ALT.—About 25 ft. ASSOC.—*P. nitidum*, *P. milium* and *P. obtusale*.
- Loc.—River Slaney, near Enniscorthy. COLL.—R.A.P., 1917. ALT.—About 30-40 ft. ASSOC.—*P. annicum*, *P. nitidum*, *P. pulchellum*, and *P. subtruncatum*.

CARLOW.

- Loc.—River Barrow, at Tinnahinch (in drift). COLL.—A.W.S., April, 1912.

SOUTH GALWAY.

- Loc.—Lough Derg, near Portumna. COLL.—R.A.P., July, 1917.
 Loc.—Lough Rea. COLL.—R.A.P., July, 1917. Pl. II., figs. 5, 6.
 Loc.—Crows Lough, Gortymadden. COLL.—R.A.P., July, 1917. Pl. I.,
 figs. 7, 8.
 Loc.—Lough Atorick. COLL.—R.A.P., May, 1912.
 Loc.—Peat-holes in bog near Ballinasloe. COLL.—R.A.P., July, 1912.
 Loc.—Stream at Kilmacduagh. COLL.—R.A.P., May, 1911.

WEST GALWAY.

- Loc.—Lough Gowlanagower, Inishbofin. COLL.—A.W.S., June, 1911.
 ALT.—About 40 ft. ASSOC.—*P. nitidum* and *P. milium*. REMARKS
 —Identified by Mr. B. B. Woodward and recorded in Cat., p. 119.
 Loc.—Lough Fawna, Inishbofin. COLL.—A.W.S., June, 1911. ALT.—
 About 100 ft. ASSOC.—No other *Pisidia* seen. REMARKS—*P.*
obtusale, *vide* Mr. B. B. Woodward. Recorded as such by A.W.S. in
Proc. R. I. Acad., vol. xxxi., part 23, p. 37.
 Loc.—Lough Nagrooaun, Inishbofin. COLL.—A.W.S., June, 1911. ALT.—
 About 40 ft. ASSOC.—*P. nitidum* and *P. obtusale*. REMARKS—*P.*
obtusale, *vide* Mr. B. B. Woodward.
 Loc.—Cregmore Lough, near Roundstone. COLL.—R.A.P., Oct., 1909.
 Loc.—River Corrib, near Galway. COLL.—R.A.P., Nov., 1917.

NORTH GALWAY.

- Loc.—Lough Callow. COLL.—R.W., 1900.
 Loc.—Ballindooly. COLL.—R.A.P., Aug., 1908.

WICKLOW.

- Loc.—Marshes along the coast south of Arklow. COLL.—A.W.S., April,
 1912. ALT.—About 10-15 ft. ASSOC.—*P. casertanum*, *P. milium*,
 and *P. obtusale*.

WESTMEATH.

- Loc.—Lough Drin, near Mullingar. COLL.—A.W.S., March, 1910. ASSOC.
 —*P. milium* and *P. nitidum*. REMARKS—This set was divided by
 Mr. B. B. Woodward into "*P. milium*" and "*P. liljeborgi*." See Cat.
 p. 115. Pl. II., figs. 9, 10.

WEST MAYO.

- Loc.—Sraheens Lough, Achill Island. COLL.—A.W.S., April, 1909.
 ALT.—About 60 ft. ASSOC.—*P. liljeborgi*. REMARKS—*P. obtusale*, *vide*
 Mr. B. B. Woodward. See Cat., p. 125; also A.W.S., *Proc. R. I. Acad.*,
 vol. xxxi., part 23, p. 29.
 Loc.—Lough Gall, Achill Island (in drift). COLL.—A.W.S., June, 1911.
 ALT.—About 20-30 ft. REMARKS—*P. pusillum*, *vide* Mr. B. B.

Woodward, and recorded as such by A.W.S. in *Proc. R. I. Acad.*, vol. xxxi., part 23, p. 29.

Loc.—Lough Nakeeroge (East), Achill Island. COLL.—A.W.S., June, 1911. ALT.—15 ft. Assoc.—*P. nitidum*.

Loc.—Creevaghau Lough, near Newport. COLL.—A.W.S., June, 1911. ALT.—About 30-50 ft. Assoc.—*P. nitidum* and *P. milium*. REMARKS—*P. obtusale*, *vide* Mr. B. B. Woodward. See Cat., p. 125.

SLIGO.

Loc.—Lake in sand-dunes at Rosses Point, a shallow lake with sandy bed. COLL.—A.W.S., July, 1904. ALT.—About 10-20 ft. Assoc.—*P. nitidum*. REMARKS—Recorded in *I. Nat.*, Sept., 1904, as *P. obtusale* by A.W.S.

LOUTH.

Loc.—Lake near Dundalk. COLL.—R.A.P., Sept., 1917.

MONAGHAN.

Loc.—Ulster Canal south of Monaghan Town. COLL.—A.W.S., 1909. Assoc.—*P. nitidum*, *P. milium* and *P. subtruncatum*.

EAST DONEGAL.

Loc.—Lough Acapple. COLL.—D.M. (H.T.). REMARKS—Identified by Mr. B. B. Woodward as *P. steenbuchii* Möller. See *Irish Nat.*, vol. xx., p. 46, 1911. [I understand that this record has been withdrawn by Mr. Woodward and for it *P. lilljeborgii* has been substituted.—A.W.S.]

Loc.—Lough Meenaskeagh. COLL.—D.M. (H.T.). REMARKS.—Identified and recorded by Mr. B. B. Woodward as *P. personatum* Malm. See *Irish Nat.*, vol. xxi., p. 96, 1912. Pl. II., figs. 3, 4.

WEST DONEGAL.

Loc.—Mullaghderg Lough, north of Burton Port. COLL.—A.W.S., Sept., 1905. ALT.—About 15-20 ft. Assoc.—*P. nitidum*, *P. milium*, *P. subtruncatum*, and *P. lilljeborgi*. REMARKS—Recorded in *I. Nat.*, vol. xv., p. 66, as *P. obtusale*, by A.W.S.

Loc.—Dunmore Lough, Carrickfin Peninsula, Bunbeg. COLL.—A.W.S. Sept., 1905. ALT.—About 30-40 ft. Assoc.—*P. nitidum*, *P. milium*, and *P. subtruncatum*.

Loc.—Carnboy Lough, Carrickfin Peninsula, Bunbeg, a large lake with sandy bottom. COLL.—A.W.S., Sept., 1908. ALT.—About 10-20 ft. Assoc.—*P. nitidum*, *P. milium*, *P. subtruncatum* and *P. obtusale*.

TYRONE.

Loc.—Washing Bay, Lough Neagh (in drift). COLL.—A.W.S., Feb., 1906. ALT.—46 ft.

ARMAGH.

Loc.—Newry Canal near Poyntzpass. COLL.—A.W.S. ALT.—About 60 ft. ASSOC.—*P. milium* and *P. subtruncatum*.

DOWN.

- Loc.—Mill-race at Ballyholme and stream two miles inland. COLL.—A.W.S., April, 1916. ALT.—About 30 and 50 ft. ASSOC.—*P. nitidum*, *P. milium* and *P. subtruncatum*. REMARKS—Animals bright rose colour.
- Loc.—Mill dam in Strickland's Glen, near Bangor. COLL.—A. W. S., Sept., 1917. ALT.—About 30 ft. ASSOC.—*P. nitidum* and *P. subtruncatum*. REMARKS—Animals bright rose colour.
- Loc.—Pond in Belvoir Park, near Belfast. COLL.—A.W.S., April, 1911. ALT.—About 50 ft. ASSOC.—*P. nitidum* and *P. milium*.
- Loc.—Small lake near Monlough, a small peaty lake, filled with dense vegetation. COLL.—A.W.S., April, 1912. ALT.—About 400 ft. ASSOC.—*P. nitidum* and *P. casertanum*.
- Loc.—Portavoe Demesne, near Donaghadee. COLL.—H.O., Sept., 1912. ALT.—About 40 ft. ASSOC.—*P. nitidum*, *P. milium*, and *P. subtruncatum*.
- Loc.—Old flax hole near Dromara. COLL.—A.W.S. and N.H.F., Aug., 1917. ALT.—About 450 ft. ASSOC.—*P. casertanum* and *P. milium*. REMARKS—Animals bright rose-pink.
- Loc.—Carrickmannon Lough, near Saintfield. COLL.—J.N.M. ASSOC.—*P. nitidum*.
- Loc.—In entrance stream to lake, Hillsborough Demesne. COLL.—N.H.F. June, 1917. ALT.—About 300 ft. ASSOC.—*P. nitidum*, *P. milium*, and *P. subtruncatum*.
- Loc.—Lady Alice's Pond, Hillsborough Demesne. COLL.—N.H.F., June, 1917. ALT.—About 300 ft. ASSOC.—*P. nitidum* and *P. subtruncatum*. REMARKS—Animals bright salmon-rose colour.
- Loc.—Dick's Hole, Hillsborough Demesne. COLL.—N.H.F., June, 1917. ALT.—About 300 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. subtruncatum*. REMARKS—Animals bright salmon-rose colour.
- Loc.—Moynes Lough, east of Hillsborough, a small lake, almost filled up with vegetation. COLL.—N.H.F., July, 1917. ALT.—About 350 ft. ASSOC.—*P. nitidum*, *P. milium*, and *P. subtruncatum*.
- Loc.—McKee's Dam, near Hillsborough. COLL.—N.H.F., July, 1917. ALT.—About 300 ft. ASSOC.—*P. nitidum* and *P. subtruncatum*.

ANTRIM.

- Loc.—Howie's Dam, Belfast. COLL.—The late H. C. Hyndman, 1856. ALT.—About 200 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. subtruncatum*. REMARKS—In the Hyndman Collection, Belfast Mun. Museum, labelled "From a Scaup Duck's stomach shot

on Howie's Dam—a bird not often seen on fresh water." (Pl. II., figs. 7, 8).

- Loc.—Mouth of Antrim River, Lough Neagh, in about 10 ft. of water, just where river opens into lake. COLL.—A.W.S. and R.J.W., August, 1907. ALT.—46 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. subtruncatum*. REMARKS—An abundance of *Sphaerium lacustre* and *S. corneum* also occurs in this habitat.
- Loc.—Lough Duff, Sallagh Braes, near Larne, a very shallow tarn on the basaltic plateau. COLL.—A.W.S. ALT.—1,050 ft. ASSOC.—*P. nitidum* and *P. subtruncatum*.
- Loc.—In old watercourse by the second lock of the Lagan Canal above Belfast. This habitat is quite dry in summer time as a rule. COLL.—A.W.S., 1916. ALT.—About 30 ft. ASSOC.—No other *Pisidia* seen. REMARKS—The shells were very small and stunted.
- Loc.—Ditch by the River Lagan, Malone, above Belfast. COLL.—H.O., May, 1913. ALT.—About 50 ft.
- Loc.—One of the lakes on Fair Head (clear peaty water, with stony bottoms). COLL.—H.O., May, 1913. ALT.—About 500-600 ft. ASSOC.—*P. nitidum*.
- Loc.—Woodburn Reservoir, Carrickfergus. COLL.—J. Reilly, 1898, per R.J.W.
- Loc.—In the River Main near Galgorm, above Ballymena. COLL.—A.W.S., April, 1912. ASSOC.—*P. nitidum*, *P. milium* and *P. subtruncatum*.
- Loc.—Tarn $\frac{1}{3}$ mile N.W. of Little Trosk and $\frac{1}{8}$ mile N.E. of L. Fad, N.W. of Carnlough, a shallow tarn on basaltic plateau. COLL.—A.W.S., April, 1912. ALT.—About 1,000 ft. ASSOC.—*P. nitidum* and *P. lilljeborgi*.

DERRY.

- Loc.—Mill-dam one mile S.E. of Magherafelt (in drift). COLL.—A.W.S., April, 1910. ALT.—About 100 ft.

WELSH RECORDS FOR *P. HIBERNICUM*.

(Communicated by MR. CHARLES OLDHAM, F.L.S.).

DENBIGHSHIRE.

- Loc.—Llyn Aled, in the Hiraethog Mts., a large tarn with stony bed. COLL.—C.O., June, 1917. ALT.—1,740 ft. ASSOC.—No other *Pisidia* seen. REMARKS—B.B.W. agrees with identification.

CARNARVONSHIRE.

- Loc.—Llyn Ogwen, in the Snowdonian Mts. COLL.—C.O., Sept., 1911. ALT.—984 ft. ASSOC.—*P. lilljeborgi*. REMARKS—Recorded as *P. obtusale* by C.O., *J. of C.*, vol. xiii., p. 353; and by B. B. W., *Cat.*, p. 124.

- Loc.—Llynau Mymbyr, in the Snowdonian Mts. COLL.—C.O., Sept., 1911.
ALT.—588 ft. ASSOC.—*P. lilljeborgi*. REMARKS—Recorded as *P. pusillum* by C.O., *ibid.* pp. 353-4; and by B.B.W., Cat., p. 65.
- Loc.—Llyn Dwythwch, in the Snowdonian Mts. COLL.—C.O., July, 1916.
ALT.—920 ft. ASSOC.—No other *Pisidia* seen. REMARKS—See *J. of C.*, vol. xv., p. 232. Pl. II., figs. 13, 14.
- Loc.—Llyn Padarn,¹ in the Snowdonian Mts. COLL.—C.O., June, 1917.
ALT.—340 ft. ASSOC.—*P. casertanum* and *P. subtruncatum*.
- Loc.—Llyn Peris,¹ in the Snowdonian Mts. COLL.—C.O., June, 1917.
ALT.—340 ft. ASSOC.—*P. lilljeborgi* and *P. obtusale*.
- Loc.—Llyn Anafon (Aber Lake). COLL.—C.O., June, 1917. ALT.—1,630 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. lilljeborgi*.
- Loc.—Llynau Diwaunedd, Moel Siabod. COLL.—C.O., Sept., 1911.
ALT.—1,208 ft. REMARKS—Referred by B.B.W. to his *P. pusillum*. See Cat., p. 65.
- Loc.—Llynau Mymbyr, Capel Curig. COLL.—C.O., Sept., 1911. ALT.—588 ft. REMARKS—Referred by B.B.W. to his *P. pusillum*. See Cat., p. 65.

MERIONETHSHIRE.

- Loc.—Fairbourne, near Barmouth, running water in a ditch behind the sea-wall. ALT.—Sea-level. ASSOC.—*P. subtruncatum*. REMARKS—B.B.W. (*in litt.*) refers these to his *P. nitidum*.
- Loc.—Llyn Lliwbran, in the Aran Mts. COLL.—C.O., June, 1917. ALT.—1,500 ft. ASSOC.—No other *Pisidia* seen. REMARKS—B.B.W. (*in litt.*) refers these to his *P. nitidum*.
- Loc.—Llyn Cyri, Cader Idris. COLL.—C.O., June, 1917. ALT.—1,200 ft. ASSOC.—*P. nitidum*. REMARKS—B.B.W. (*in litt.*) refers these to his *P. nitidum*.
- Loc.—Llyn Dulyn, near Llanddwywe, in the Ardudwy Mts. COLL.—C.O., June, 1917. ALT.—1,740 ft. ASSOC.—*P. obtusale*. REMARKS—B.B.W. (*in litt.*) agrees.
- Loc.—Llyn Irddyn, in the Ardudwy Mts. COLL.—C.O., June, 1917. ALT.—1,029 ft. ASSOC.—*P. casertanum* and *P. milium*. REMARKS—B.B.W. (*in litt.*) agrees.
- Loc.—Llyn Y Bi, in the Ardudwy Mts. COLL.—C.O., Oct., 1916. ALT.—1,400 ft. ASSOC.—*P. casertanum*. REMARKS—B.B.W. (*in litt.*) refers these to *P. obtusale*.
- Loc.—Llyn Cwm Mynach (a peaty tarn), in the Ardudwy Mts. COLL.—C.O., June, 1917. ALT.—950 ft. ASSOC.—*P. casertanum*. REMARKS—B.B.W. (*in litt.*) agrees.
- Loc.—A nameless tarn on Y Garn, near Dolgelly (peaty), in the Ardudwy Mts. COLL.—C.O., July, 1917. ALT.—1,800 ft. ASSOC.—*P. casertanum*. [End of C.O.'s notes].

ANGLESEY.

- Loc.—Gaerwen. COLL.—J. E. Cooper.

¹ The Llanberis Lakes.

MANX RECORD FOR *P. HIBERNICUM*.

ISLE OF MAN.

- Loc.—Marshes near the Point of Air. COLL.—F. Balfour Browne, July, 1910. ALT.—Sea level. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. subtruncatum*.

ENGLISH RECORDS FOR *P. HIBERNICUM*.

SURREY.

- Loc.—Ditch in field near Merton Abbey station, London, S.W. COLL.—A.W.S., April, 1907. ALT.—About 30 ft. ASSOC.—*P. henslowanum* and spp.
- Loc.—Ditch by the towing path, Kew Gardens. COLL.—A.W.S., May, 1907. ASSOC.—*P. milium*, *P. subtruncatum*, and *P. henslowanum*.

HERTFORDSHIRE.

- Loc.—Fishpond, Aldenham Abbey (this pond is connected with the River Colne). COLL.—C.O., May, 1917. ASSOC.—*P. amnicum*, *P. nitidum*, *P. subtruncatum* and *P. henslowanum*. REMARKS—Mr. B. B. Woodward agrees with this determination.
- Loc.—Brook at Cassio Bridge, Watford. COLL.—C.O., Aug., 1917. REMARKS—Mr. B. B. Woodward (*in litt.* to C.O.) says, "To my mind these are *P. nitidum*."

BUCKINGHAMSHIRE.

- Loc.—Iver. COLL.—J. E. Cooper.
- Loc.—Canal at Denham Lock. COLL.—J. E. Cooper.

CAMBRIDGESHIRE.

- Loc.—"Wicken Fen. Ex. F. Taylor." REMARKS—In possession of Mr. J. W. Jackson.

NORTHAMPTONSHIRE.

- Loc.—River Nene at Northampton. COLL.—C.O., Aug., 1917. ASSOC.—*P. amnicum*, *P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, and *P. henslowanum*.

WARWICKSHIRE.

- Loc.—Stream near Windmill, Yardley Wood. COLL.—H.O., Sept., 1911. ASSOC.—*P. nitidum* and *P. subtruncatum*.
- Loc.—Longmoor Pool (7a. 3r. 16p.), Sutton Park (very muddy and peaty, caused by dead leaves, &c.). COLL.—H.O., 1894. ASSOC.—*P.*

casertanum, *P. nitidum*, *P. milium*, *P. pulchellum*, *P. subtruncatum* and *P. henslowanum*.

Loc.—Bracebridge Pool (16a. 1r. 29p.) (gravelly or muddy bottom, containing much weed). COLL.—H.O. ASSOC.—*P. nitidum*, *P. milium*, *P. subtruncatum* and *P. henslowanum*.

Loc.—Blackroot Pool (12a. or. 17p.), Sutton Park (very muddy). COLL.—H.O., Sept., 1895. ASSOC.—*P. amnicum*, *P. casertanum*, *P. nitidum*, *P. milium*, *P. pulchellum*, *P. subtruncatum*, and *P. henslowanum*. REMARKS—"Taken from where the brook runs into the pool."—H.O.

Loc.—Hill Hook, near Sutton Coldfield. COLL.—H.O. [also N. G. Hadden, June, 1913.] ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, *P. henslowanum*, and *P. obtusale*. REMARKS—"I think these came from both the stream and the pit; the former is gravelly, the latter has marly-mud."—H.O.

Loc.—Windley Nursery (water-cress bed), Sutton Coldfield. COLL.—H.O. ASSOC.—*P. casertanum* and *P. nitidum*. REMARKS—"A small overgrown pit, dug by the side of the stream, from which it is fed."—H.O.

Loc.—Spademill Pool, Sutton Park (28a. 2r. 34p.). COLL.—H.O., April, 1895. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, and *P. henslowanum*. REMARKS—"Fairly muddy, but little weed."—H.O.

Loc.—The Moat, New Hall, near Sutton Coldfield. COLL.—H.O. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, and *P. henslowanum*. REMARKS—"Fair quantity of mud and weed."—H.O.

Loc.—A shallow grassy ditch in Crystal Palace grounds, Sutton Coldfield. COLL.—H.O., 1893. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. pulchellum* and *P. subtruncatum*.

Loc.—Skinner's Pool (2r. 12p.), Sutton Coldfield. COLL.—H.O. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, *P. henslowanum* and *P. obtusale*. REMARKS—"Very muddy; contained very large *Unio tumidus*, now filled up."—H.O.

Loc.—Olton Reservoir, near Birmingham. COLL.—H.O., June, 1910. ASSOC.—*P. nitidum*, *P. milium* and *P. subtruncatum*.

Loc.—Keeper's Pool (2a. or. 37p.), Sutton Park. COLL.—H.O., 1893. [Also P. T. Deakin, May, 1882]. ASSOC.—*P. nitidum*, *P. milium*, *P. pulchellum*, *P. subtruncatum* and *P. henslowanum*. REMARKS—"Mud, rushes, and much *Menyanthes trifoliata*, but I think these came from the side of the wood where there is mud and decayed leaves."—H.O.

WORCESTERSHIRE.

Loc.—Near Sare Hole Mill (Birmingham). COLL.—P. T. Deakin, June, 1890. ASSOC.—*P. nitidum*, *P. subtruncatum* and *P. henslowanum*.

STAFFORDSHIRE.

- Loc.—Park lime-pits, Walsall. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum* and *P. henslowanum*. REMARKS—"Old workings (in Wenlock Shale), about 2 acres in extent, into which the water broke through many years ago. Not much vegetation."—H.O.
- Loc.—Pool in Gt. Barr Park, near Walsall. COLL.—H.O., Nov., 1911. ASSOC.—*P. nitidum*, *P. milium* and *P. henslowanum*. REMARKS—Mr. B. B. Woodward has referred these to *P. obtusale*. See Cat., p. 124.

CHESHIRE.

- Loc.—Baguley Moor. COLL.—C.O., Oct., 1894. [Also J. W. Jackson, March, 1902]. REMARKS—"B.B.W., Cat., p. 55, refers these to *P. personatum*, but in Nov., 1917, when I submitted them to him again, he agreed that they were *P. hibernicum*."—C.O. Pl. II., figs. 11, 12.

LANCASHIRE.

- Loc.—Ditch, Haweswater, Silverdale. COLL.—J. W. Jackson, May, 1904.
- Loc.—Haweswater, Silverdale. COLL.—J. W. Jackson, 1909. ASSOC.—*P. nitidum*, *P. milium*, *P. subtruncatum*, *P. lilljeborgi* and *P. obtusale*.

[No specimens have been seen from Scotland.]

EX-BRITANNIC RECORDS FOR *P. HIBERNICUM*.

- Mr. B. B. Woodward, Cat., p. 119, records this species from the Täkern See, Östergötland, Sweden; while we have seen several specimens from Tönset, Norway, in the Schlesch collection of the Hull Municipal Museum.

IRISH FOSSIL RECORDS FOR *P. HIBERNICUM*.

CLARE.

- Loc.—In shell-marl from bank of River Fergus, near Ennis. COLL.—R.A.P., April, 1917. ALT.—About sea-level. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium* and *P. obtusale*. REMARKS—These shell-marls are post-Glacial, and the uppermost beds possibly date from what is known as the "climatic optimum."
- Loc.—In shell-marl from near Corrofin. COLL.—R.A.P., June, 1917. ASSOC.—*P. nitidum*, *P. milium*, and *P. obtusale*.

DOWN.

- Loc.—In shell-marl, and peat above same, White Bog, Killough. COLL.—A.W.S., 1912-1917. ALT.—30 ft. ASSOC.—*P. casertanum*, *P. nitidum*, *P. milium*, *P. subtruncatum*, *P. lilljeborgi* and *P. obtusale*. REMARKS—Occurs in the marl from the oldest to the uppermost layers, as well as in pockets of marl in the overlying peat.

Loc.—In shell-marl from site of old lake near Legacurry, Hillsborough.
 COLL.—Per N.H.F., 1910. ALT.—About 200 ft. ASSOC.—*P. nitidum*
 and *P. milium*. REMARKS—*P. obtusale*, *fide* Mr. B. B. Woodward.
 See Cat., p. 126.

ANTRIM.

Loc.—In shell-marl from Maglaberry (near Moira), on site of old lake.
 ALT.—About 70 ft. ASSOC.—*P. nitidum*, *P. milium*, *P. subtruncatum*
 and *P. obtusale*. REMARKS—Recorded by Messrs. Kennard and Wood-
 ward as *P. obtusale*. See *Proc. Geol. Association*, vol. xxviii., p. 146.

DESCRIPTION OF PLATES.

PLATE I.

Figs. 1*a* and 1*b*.—Siphon and posterior lateral teeth of hinge of *P. nitidum*
 Jenyns (= *P. pusillum*, B. B. Woodward, Cat., pl. 1, fig. 8), from
 Dick's Hole, Hillsborough Demesne, Co. Down.

Figs. 2*a* and 2*b*.— Do. of *P. hibernicum* West., taken in association
 with the last.

Figs. 3*a* and 3*b*.— Do. of *P. obtusale* (Lam.) Jenyns, from a disused
 mill-race a few yards from the above habitat.

Figs. 4*a* and 4*b*.— Do. of *P. personatum* (Malm.) B. B. Woodward,
 taken in association with the last.

[The siphon of *P. milium* Held is not figured: it is somewhat like
 that of *P. obtusale*, but is much longer and very narrow. The posterior
 laterals of *P. milium* are similar in some ways to those of both *P. nitidum*
 and *P. hibernicum* and are not figured in consequence.]

Figs. 5 and 6.—Interior view of pair of valves of *P. hibernicum* from
 "Lough No. 7," 2,250 ft. alt., Coumaknock, Brandon Mt., South
 Kerry. A very thin and tumid form!

Figs. 7 and 8.— Do. from Crow's Lough, near Gortymadden, South
 Galway. The most perfect specimen we have yet seen!

Figs. 9 and 10.— Do. from Lough Nagarriva, South Kerry: one
 of Dr. Scharff's original specimens. A very tumid and abnormal
 form, but unfortunately the type of the species!

PLATE II.

Figs. 1 and 2.—Interior view of pair of valves of *P. medianum* Sterki
 from Orchard Lake, Mich., U.S.A., for comparison with figures
 of *P. hibernicum* from L. Rea.

Figs. 3 and 4.—Interior view of pair of valves of *P. hibernicum* West, from
 Lough Meenaskeagh, East Donegal.

Figs. 5 and 6.— Do. from Lough Rea, South Galway. A thickened
 form: the nearest we have seen to the American *P. medianum*
 figured above!

Figs. 7 and 8.—Interior view of pair of valves of *P. hibernicum* West, from the stomach of a Scaup Duck, shot on Howie's Dam, Belfast, Co. Antrim, in 1856.

Figs. 9 and 10. — Do. from Lough Driu, near Mullingar, Co. Westmeath.

Figs. 11 and 12.— Do. from Baguley Moor, Cheshire. Representing a normal English form!

Figs. 13 and 14.— Do. from Llyn Dwythweh, 920 ft. alt., near Llanberis, Carnarvonshire. A form typical of the Welsh tarns!

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 15.—Rev. K. Dunbar gave a lecture entitled, "The Life History of Some British Lepidoptera," illustrated by a series of lantern slides. There were four distinct stages in the life history of lepidoptera—ova, larva, pupa, and imago. The ova were for the most part laid on or near the food plant, and either singly or in clusters. Lepidopterous larvae were almost exclusively vegetarian. During the larval stage the skin was cast three or four times, the last moult revealing the pupa. Brief summaries were then given of the life histories of some local species—among butterflies, *V. urticæ*, *E. cardamines*; among moths, *S. convolvuli*, *C. potatoria*, *A. caja*, and *D. vinula*. Mr. Foster and Mr. Stendall took part in the discussion which followed.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 23.—ANNUAL GENERAL MEETING.—The President, Prof. G. H. Carpenter, M.Sc., in the chair. The Annual Report and Statement of Accounts for 1917 were submitted and adopted. A vote of thanks to Mr. C. J. Bateman, who had acted as Hon. Treasurer for some years, proposed by R. Ll. Praeger and seconded by the President, was passed. The names of the officers and committee for 1918 were announced as follows:—PRESIDENT—J. de W. Hinch; VICE-PRESIDENT—Prof. A. Henry, M.A., F.L.S.; HON. TREASURER—G. C. May, B.L.; HON. SECRETARY—Mrs. T. Long; COMMITTEE—Prof. Carpenter, Prof. Cole, N. Colgan, D. W. Freeman, Miss J. Gilmour, Mrs. Harford, Rev. J. Hamilton, Miss Kate Murphy, R. Ll. Praeger, Miss J. Stephens, Alexander Williams.

The incoming President J. de W. HINCH, delivered an inaugural address, dealing with "The development and decay of the Irish Sea Glacier," which will be published in the *Irish Naturalist*. R. Ll. Praeger, N. Colgan, Prof. Carpenter, Prof. Henry and W. B. Wright took part in a discussion on the address.

FEBRUARY 14.—J. de W. HINCH, President, in the chair. The business of the meeting was a discussion on "The present state of opinion on the Darwinian theory." Prof. CARPENTER, who opened the discussion, dealt with the developments of opinion regarding the origin of species since 1859, and pointed out the essential facts of the theories of Weismann, Hutton, Mendel, and De Vries. The discussion was continued by W. F. Gunn, Prof. Henry, N. Colgan, and L. Gubbins.

CORK NATURALISTS' FIELD CLUB.

MAY 17.—EXCURSION TO BALLYVOLANE.—Professor Isaac Swain conducted a large party to the gravel pits and glen in this vicinity and described many features of geological interest. The stream flowing through the glen gives the name of "Watercourse" to what was formerly a large industrial area in the district, and a small lake known as "the pool" gives the name of "Blackpool" to the suburb. The glen was well wooded until recent years and is immortalized by song and story in local literature as "The Groves of the Pool."

MAY 29.—ANNUAL MEETING.—The report was read and a vote of thanks passed to James Noonan, Honorary Secretary, who retired after a long and active association with the Club. Mr. Holland was appointed as his successor.

SEPT. 27.—EXCURSION TO WOOD-HILL.—Owing to the inclemency of the weather, only a small party visited this interesting house and grounds by kind permission of Sir Keith Fraser. The house possesses many historic associations connected with art and literature. Some remarkably fine trees on the grounds were examined. Two fine avenues of oaks were observed in the neighbourhood, one of which is reputed to have been planted by Sir Walter Raleigh, who lived for a short time in the district.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 8.—The Club met at Leinster House, the President (N. COLGAN) in the chair.

H. A. LAFFERTY showed microscopic preparations of germinating spores of *Ustilago hordei*, the fungus which causes "covered" smut of Barley. These preparations clearly showed that the spores on germination produce a promycelium which bears conidia. By means of these conidia the seedling plants are infected.

Prof. G. H. CARPENTER and F. J. S. POLLARD showed the anterior spiracles of the Horse Bot larva (*Gastrophilus equi*) and of the Ox Warble Maggot (*Hypoderma bovis*). In the former these spiracles are functional being provided with numerous small openings, as described by Enderlein (*Sitzb. K. Akad. Wien*, cviii., 1, 1899), whereas in the latter they are vestigial and useless, the spiracular trachea being plugged with a solid chitinous core.

NOTES.

BOTANY.

Fuligo septica var. candida.

In the month of September last when at Woodlawn, Co. Galway, I gathered on moss on a decaying tree-stump a dark cushion-like mass about an inch and a half in diameter. On looking at it with a lens I saw that it was a Myxomycete. The specimen was somewhat weathered and the cortex partly dispersed. On microscopical examination I found it was a species of *Fuligo*, but as it differed in some respects from *F. septica* notably in the colour of the lime knots of the capillitium, and did not agree with the characters of *F. cinerea* (which I had never seen) I sent it to Miss G. Lister who very kindly wrote as follows:—"I am very pleased to see your specimens. If No. 1 was a puzzler I am not surprised. I call it *Fuligo septica* var. *candida* (Pers. as sp.) a new record for Ireland. The spores are rather darker than is typical for *F. septica* and measure 7 to 9 μ : the character of the long slender lime knots and abundant straight hyaline threads is right for *F. septica*. We have often been puzzled with forms intermediate between var. *candida* and *F. cinerea* var. *ecorticata*, but your specimen lies comfortably on the *F. septica* heap, I think.

W. F. GUNN.

Rathgar, Dublin.

ZOOLOGY.

Abundance of Lepidoptera in 1917.

With reference to Mr. Workman's note in the January *Irish Naturalist* (p. 11, *supra*), it may be of interest to note that in this immediate neighbourhood the past year showed a very marked increase in several species of Lepidoptera. The Silver-washed Fritillary (*Argynnis paphia*) and the Small Heath (*Coenonympha pamphilus*), both new to me in the district, were observed, the former in very large numbers. The Grayling (*Satyrus semele*) was much more numerous than usual and the same applies to the Painted Lady (*Vanessa cardui*) and the Small Copper (*Chrysophanus phloeas*). Among Moths the Six-spot Burnet (*Anthrocera filipendulae*), of which I had only one record prior to this year, was found on several occasions positively swarming. A specimen of the Convolvulus Hawk Moth (*Sphinx convolvuli*) was taken on September 2nd, this being the second occurrence in the neighbourhood of late. The first was taken on October 6th, 1915. Both were captured at the rectory, the first hovering round a plant of tobacco in the garden, the second in the house.

T. W. L. KEANE.

Ardmore, Co. Waterford.

THE DEVELOPMENT AND DECAY OF THE IRISH
SEA GLACIER.

BY J. DE W. HINCH.

(Presidential Address to the Dublin Naturalists' Field Club,
23 January, 1918.)

A CONSIDERABLE number of glaciers coalesced to form the great ice-sheet which in Quaternary times occupied the basin of the Irish Sea, and spread inland over many districts along its margin both in Ireland and in Britain. The most important of these local glaciers were the ice of the Clyde area in the earlier stages, and later the ice-sheet which had its origin in north-central Ireland. When the Clyde area had become greatly congested by ice from the Scottish Highlands, a lobe of the Clyde Glacier debouched through the North Channel into the Irish Sea basin, crossing in the course of its advance north-east Ulster on the west and Galloway on the east. On reaching the Irish Sea the Clyde Glacier began to unite with ice from the southern uplands of Scotland, from the Cumberland hills, from Wales, and later from the centre of Ireland.

We now reach a point where a modern speculation regarding the growth and movements of continental ice-sheets may be mentioned. Up to very recent times discussion on the Ice Age has been hampered and confined by evidence drawn from the very restricted glaciers of Switzerland and the Himalaya as we know them at the present day. This type of evidence has had a rather unfortunate effect on certain controverted questions in glacial geology as the movements of the diminutive glaciers of modern times are clearly controlled by local gravity and the contours of the surrounding surface features. Now glacial geologists have been compelled by the evidence in the field to ask for a type of ice-sheet, which in earlier times moved across great tracts of country without any special regard for elevations of moderate height or depressions of moderate depth. According to the earlier view,

the alleged movements of the Irish Sea Glacier would require an elevated ice-cap, lying over the northern parts of the British Isles, to explain its advance, and there is very little evidence to support the existence of this ice-cap. Now it has been pointed out by G. W. Lamplugh that a great glacier, deployed in the direction of the maximum precipitation, might grow so quickly by deposition of snow upon the surface of its outer margin that eventually the ice-sheet would begin to create its own local climatic conditions and methods of growth, so that finally breaking loose from the control of the hills and the control of local gravity, it would move forward with very little regard for the lesser contours of the ground over which it passed.¹

The application of this speculation to the ice of the Clyde area and afterwards to the Irish Sea Glacier would help us out of some of the difficulties, and the recent investigations of Nansen and Scott in Greenland and Antarctica appear to lend support to the theory.

The Irish Sea Glacier during its development and decay created glacial deposits on both sides of the Irish Sea and on the south coast of Ireland, and by these deposits, with arctic shells and northern erratics, we are able to trace the progress of the ice-sheet from district to district. Over a considerable part of Antrim and Down the northern ice-sheet passed, laying down the boulder-clay and gravels, with the typical Scottish erratics and arctic shells. These glacial deposits of north-east Ulster are widely developed, as far west as the Bann, and have been investigated by S. A. Stewart and Joseph Wright, and later by Madame Christen. Both S. A. Stewart and Joseph Wright have always been staunch upholders of that earlier theory of submergence which has been recently challenged, but we cannot withhold a tribute to the great accuracy of their field-work and the notable contributions which they have made to Irish glacial geology.

The next important locality where the deposits of the Irish Sea Glacier are extensively developed is the Isle of Man, where Lamplugh and Kendall have proved that the

¹ *Glacialists' Mag.*, vol. i., no. 11, p. 231 (1894).

ice-sheet passed from north-west to south-east over the higher land of the island, laying down the boulder-clay and gravels, which have yielded typical northern erratics and many important arctic shells and remains of other animals. The Geological Survey Memoir on the Geology of the Isle of Man, which was written by Lamplugh and published in 1903, has had great influence on research in glacial geology in the Irish Sea area, challenging as it did, the accepted theory of an interglacial submergence, and stimulating extended work in the field on the subject.

Turning from the Isle of Man to the eastern coast of Ireland, deposits of the Irish Sea Glacier have been found by the writer at various points south of Dundalk. At Glaspistol, south of Clogher Head, in Louth, there occurs in the floor of the present beach a patch of boulder-clay containing northern erratics and shells. South of the Boyne, at Benhead, where the cliffs are formed of boulder-clay, similar erratics and shells have been found by the writer and inland north of Gormanstown, gravels with erratics and shells, were discovered by W. B. Bruce, to whom the writer is indebted for the report. During the Natural History Survey of Lambay, Prof. Seymour, who acted as geological director, found that the Irish Sea Glacier had overridden the island, laying down boulder-clay containing northern erratics, and in the boulder-clay at Saltpan Bay, on the northern shore of the island, a number of shell-fragments were found by the writer.¹ On the mainland at Skerries shell-fragments and erratics are reported from the sands and gravels near the railway station, while at Corballis, on the southern shore of Portrane promontory, shell-fragments have been obtained by the writer from the boulder-clay.

The district in the middle of which the city of Dublin stands was the first area surveyed by the Geological Survey for the new Drift maps, and from many localities in this area arctic shells and northern erratics have been obtained.²

¹ H. J. Seymour, "Geology [of Lambay]," *Irish Naturalist*, vol. xvi., pp. 3-13 (1907).

² *Geological Survey Memoir*, Geology of Dublin, 1903.

Previous to this special Drift survey many observers had been at work in the Dublin area, and a number of localities had already been noted for their arctic shells and northern erratics. During the earlier decades of last century Weaver, Scouler, Kelly and Oldham had worked at some of the Drift deposits in the district and usually supported the theory of a marine origin of both boulder-clay and sands and gravels. In the sixties and seventies that great leader in Irish glacial geology, the Rev. Maxwell Close, had investigated the deposits at Caldbeck Castle and Ballyedmonduff, and from these deposits had obtained many species of mollusca and crustacea.¹

In the years 1894-95 Prof. Sollas and R. Ll. Praeger had investigated the Kill-of-the-Grange and Killiney Bay deposits, and many new records were obtained. Fifty-seven species of mollusca were discovered; and the presence of fossils from the Lias of Ulster or Scotland, as erratics, was noted. In addition to the new field records, a change of opinion regarding the origin of the deposits was foreshadowed.²

The southerly occurrence in the Drift of the Ailsa Craig riebeckite had also already been observed by Prof. Cole and Prof. Seymour. During the Drift survey many deposits with shells and erratics were discovered, and from one of these at Larch Hill, on the northern slopes of Tibbradden, at 650 feet above sea-level, thirty-five species of mollusca were obtained.³

Since the survey of the Dublin district was concluded many further records have been made, two of which may be noticed. In a boulder-clay near the upper edge of the

¹ Rev. Maxwell Close, "The Elevated Shell-bearing Gravels near Dublin," *Journ. Roy. Geol. Soc., Ireland*, vol. xiv., pp. 36-40 (1873-77).

² W. J. Sollas and R. Ll. Praeger, "Notes on Glacial Deposits in Ireland," *Irish Naturalist*, vol. iii., pp. 161-66, pp. 194-98 (1894), vol. iv., pp. 321-329 (1895).

³ J. de W. Hinch, "A Contribution to the Glacial Geology of County Dublin," *Irish Naturalist*, vol. xi., pp. 229-36 (1902).

Killakee valley, at 1,270 feet, shells and erratics have been found, and this locality is believed to be the highest elevation at which they have been found in Ireland.¹

Two reports are available from the valley of the Liffey, where W. B. Wright and the writer found shell-fragments in gravels at Astagob, east of Lucan, and in Lucan demesne, between Lucan and Leixlip. These records of shell-fragments from the valley of the Liffey are the most westerly obtained up to the present.

In County Wicklow a number of localities may be cited as having yielded evidence of the passage of the glacier across the district. Last year W. H. Hinde, the engineer-in-charge of the construction of the new Bray Head tunnel, discovered shells and erratics in the boulder-clay and sand through which the tunnel was being cut. As the shells were found over 1,000 feet from the entrance and nearly 100 feet below the surface, this discovery is most interesting. A number of arctic shells and northern erratics have been obtained by W. H. Hinde and the writer up to the present, and further investigations are to be continued during the present year. South of Bray Head, towards Greystones, shell fragments and erratics have been found by W. B. Bruce and the writer in a number of localities, while inland, on the eastern slopes of the Great Sugarloaf, the gravel deposits have yielded satisfactory results.

It is now necessary to turn from the western shore of the Irish Sea basin in order to follow the course pursued by the Irish Sea Glacier after it had crossed the Isle of Man. The evidence shows that the ice-sheet, having reached the northern coast of Wales, divided into two great lobes in order to avoid the Snowdon range, over which it was not powerful enough to pass, as in the case of the Isle of Man. The eastern lobe swept inland over the low-lying Cheshire plain as far south as Shrewsbury in Shropshire, and from many localities far inland from the sea arctic shells and erratics have been obtained. The western lobe of the ice-sheet turned west and south across Caernarvon and

¹ J. de W. Hinch, "The occurrence of high-level shelly-drift, in the Killakee Valley, Co. Dublin," *Irish Naturalist*, vol. xvii., pp. 99-100 (1908).

Anglesey, and at Moel-Tryfaen, in gravel deposits at 1,350 feet above sea-level, both erratics and arctic shells have been found in great abundance. The great pebble ridge at Aberystwyth in Cardigan Bay, yields many large boulders of Ailsa Craig riebeckite and chalk-flints, and Prof. Fleure, of University College, Aberystwyth, considers that these northern erratics have been derived from glacial deposits recently destroyed by the action of the sea. At St. David's Head, in Pembrokeshire, there is evidence of the passage of the Irish Sea Glacier, and as far south as the Scilly Isles deposits with erratics occur, which may be derived from the ground-moraine of the Irish Sea Glacier, although G. Barrow, of the Geological Survey, inclines towards the view that floating ice from the north was the agency by which these deposits were brought to their present position.

Having traced the advance of the Irish Sea Glacier along the eastern coast of the Irish Sea basin, the progress of the ice-sheet may now be followed south from Wicklow. Here the ice-sheet relieved from the restriction imposed by the mountain-ranges on both sides of the Irish Sea, began to fan out towards the south-west. The widely-spread series of deposits known as the Wexford Beds are the result of this fanning out, and prove that having extended inland in north Wexford up to heights of from 200 to 250 feet above sea-level, the ice-sheet travelled south-westward across south Wexford and Waterford into east Cork as far as Power Head, outside Cork Harbour. These widely-spread deposits of marly boulder-clay with overlying gravels have lately been investigated by Prof. Cole and T. Hallissy, and in addition to the numerous arctic and Pliocene mollusca already known to occur, the authors report an extraordinary series of erratics. Anthracite and bituminous coal, lignite and chalk flints occur in such abundance that the authors consider that they have been derived from submarine deposits out in the neighbouring sea to the east.¹ An interesting fact about the marly boulder-clay of the Irish

¹G. A. J. Cole and T. Hallissy, "The Wexford Gravels and their bearing on Interglacial Geology." *Geol. Mag.*, n.s., decade vi., vol. i., pp. 498-509 (Nov. 1914).

Sea ice is that where it is found in contact with the boulder-clay of the ice-sheet from the centre of Ireland, the marly boulder-clay is always overlaid by the boulder-clay of the ice from central Ireland. The significance of this fact will be seen later when the relative ages of the individual ice-sheets come to be discussed.¹

Having traced the development of the Irish Sea Glacier, with its varying deposits, we now turn to some of the problems connected with its decay. For practically half a century glacial geology in the British Isles was dominated by the theory that at least one interglacial period had occurred and that during this interglacial period these islands had been submerged to at least the upper level of the shelly drift, that is to say, the upland glacial deposits of the Irish and Welsh hills marked the shore-lines of the interglacial sea; and that the eskers in the plain were sand-banks created by the currents of the same sea. Let us recall some of the opinions put forward by those holding this view. Thus we have Prof. Hull, the Director of the Geological Survey of Ireland for many years:—"As its name imports, it [*i.e.*, the Middle Sand and Gravel] consists of stratified sand and of water-worn pebbles, sometimes of large size; and, as it contains marine shells in various places, may be regarded as a formation of marine origin, which has been strewn over the bed of a comparatively shallow sea." . . . "These facts lead us to infer a great general depression of the land extending over the northern portion of the British Isles . . . and . . . assuming the greatest depression to have reached 1,500 feet below the existing level, the Irish area must have presented the appearance of an archipelago of islands."² And further, we have Mr. T. Mellard Reade when writing of "The high and low-level shelly drifts around Dublin and Bray":—"A story is nothing without a moral, and a geological paper without conclusions. . . . The phenomena . . . appear to me to lend no support to the Irish Sea Glacier hypothesis. . . . The

¹ *Geol. Survey Mem.*, Geology of Cork, p. 106 (1905).

² É. Hull, "Physical Geology of Ireland," pp. 112-116 (1891).

general drift of the materials has been from the north-west, and they have been swept from the limestone plain far on to the granite mountains. . . . The whole of the phenomena, in my judgment, points to submergence."¹

Now is there any such very strong evidence for this theory of an interglacial period with at least one considerable submergence? There can be no *a priori* objection to the theory, as in the European Alps the glaciers withdrew more than once during the Glacial period far into the upper valleys of the mountains, and from such undoubtedly interglacial deposits as the Hötting breccia there is the evidence that the climate of that interglacial period was rather warmer than that of the present day.²

When we examine the deposits of sand and gravel which were supposed to prove the occurrence of an extensive submergence, we find they display none of the well-known characteristics of a sea-beach, with its definite local fauna and with typical shore pebbles, and there is the further difficulty that while the sands and gravels of the Irish Sea basin, with their contained exotic shells and erratics, may be found at levels varying from 1,200 feet to sea-level, their distribution is restricted to definitely limited districts and they are wholly absent from neighbouring areas quite as favourable to the development of marine deposits. So far from the evidence pointing to submergence and deposition from drifting ice-bergs, all the evidence in the Irish Sea basin points to the existence of some geological agent sufficiently rigid in its motion and direction to control the distribution of shells and erratics in definite directions and of a sufficiently prolonged existence to have produced such recent surface features as the Scalp, the Dingle and the Montpelier gap. In many places, however, there appear sections of glacial deposits which tend to support the interglacial and submergence theory, and when they had been generalized into diagrams it became correct to accept the

¹T. Mellard Reade, "The High and Low-level Shelly Drifts around Dublin and Bray," *Irish Naturalist*, vol. iii., p. 152 (1894).

²A. Penck u. E. Brückner, "Die Alpen im Eiszeitalter," Band I., pp. 383-93 (1901-09).

view that a Lower and Upper Boulder-clay with intermediate Sands and Gravels was proven, and the efforts to fit in observed facts in the field with this dominant theory confused and hampered field-work for many years. The most important section in the Irish Sea area is that of Killiney Bay, lying between Dalkey and Bray. For many years these deposits were accepted as affording definite proof of the three-fold nature of the Drift, and it was only in 1896 that opinion began to move away from that standpoint. During the years 1894 and 1895 Prof. Sollas and Mr. R. Ll. Praeger worked at the glacial deposits of this district and brought forward the importance of the part played by ice from the north and north-east. Attention was drawn to the abundance of shells, fossils and erratics (basalts, chalk, flints, Ailsa Craig rock) of northerly origin, and while the authors retained a modified view of submergence to account for the broken condition of the shells, they considered the main mass of the material present to have been brought by ice from the north and north-east rather than from the north-west, as early investigators had asserted.

For some years opinion on the subject drifted about from point to point in a state of indecision. In 1901 the new Drift Survey of Ireland was undertaken by the Geological Survey of Ireland, and under the Directorships of Mr. G. W. Lamplugh and Prof. Cole a selected number of districts have been surveyed. These investigations destroyed the earlier theory of a considerable submergence and reduced the interglacial period to the local uncovering of a area—an interglacial period such as may have taken in the South of Ireland during the time which elapsed between the decay of the western lobe of the Irish Sea Glacier and the advance of the ice-sheet from the interior of Ireland.

The theory advanced by Lamplugh that the glaciation of western Europe proceeded successively from east to west, so that an easterly ice-sheet might have begun to decay before a more westerly ice-sheet had reached its maximum, gives a certain amount of assistance in solving this question. According to this theory the maximum development of the ice-sheet of central Ireland would be later in time than the

glacier of the Irish Sea basin.¹ In the districts north of Dublin the facts as known up to the present rather tend to support the opinion that the deposits of the Irish Sea Ice have been largely swept away by a later advance of the ice from the centre of Ireland towards the south-east. The successive movements in time and space of ice-sheets are of course extremely hard to prove, but up to the present we may safely say that there is no evidence which supports an inter-glacial period in Ireland of the type known to have taken place in the European Alps during the Ice Age.

The origin of the sands and gravels has yet to be faced. The submergence theory was clearly not satisfactory and has been abandoned. That the sands and gravels had their origin during the later stages of the individual ice-sheets may be assumed. The number of sections where the sands and gravels obviously overlies the boulder-clay are so numerous as to place this beyond question. It must also be assumed that the Irish Sea Glacier had reached its maximum development and that as a result of an amelioration of climate, decay was already setting in. The ice was charged with the debris of the ground over which it had passed, and as the melting of the ice proceeded great quantities of sand and gravel were released. The assumption has also to be made that the ice-sheet became stagnant over practically the whole Irish Sea basin, and then melted where it stood, and that the agents of destruction were at work simultaneously over all the area occupied by the ice. As decay proceeded the higher ground of the mountains in the Irish Sea basin became uncovered and then accelerated differential melting took place, both by the direct melting of the ice along the landward margin of the ice-sheet and by the effects produced by the streams of running water just above freezing point, when they left the ice-free land and came in contact with the stagnant ice-sheet. In these streams, flowing both from the ice-free land and across the glacier, the sand and gravels would be swept into the temporary lakes which had been formed between the margins of the ice-sheets and the higher levels of the land. By this

¹ G. W. Lamplugh, "British Drifts and the Interglacial Problem," *British Assoc. Report*, pp. 545-546 York, 1906.

theory we get a possible explanation of the extraordinarily high angles which the bedding of the upland sand and gravel deposits display and which cannot be solved by invoking either marine or river action. The deposits of many of these temporary lakes of glacial times occur in the Irish Sea basin, and we need only mention the deposits of Lake Belfast in Ulster and Lake Andreas in Man as examples.

Such has been, in broadest outline, the history of the Development and Decay of the Irish Sea Glacier. Many aspects of this history have not been touched upon, and on every point which has been mentioned more extended information from the field is to be desired. It may be that, just as the submergence theory has been discarded, so the Irish Sea Glacier theory may, in the light of fuller knowledge, be also relegated to the limbo of lost scientific causes. Whatever may be the final decision on the matter, much work remains to be done before a decision can be reached, and in this work the most desirable attitude which can be adopted is an attitude of very active scepticism as regards both observation and theory.

National Library of Ireland.

NOTES.

BOTANY.

Some Cork Aliens.

Writing under this title in the *Irish Naturalist*, January, 1895 (Vol. iv., p. 20), Mr. R. W. Scully mentions that in the summer of 1891 he came across the following aliens growing in a rubbish heap beside the river Lee, in the City of Cork:—*Alyssum calycinum* L., *Sisymbrium ɤannonicum*, Jacq., *Erysimum orientale*, R. Br., *E. repandum*, L., *Camelina sativa* Cratz, *Lepidium perfoliatum* L., *Thlaspi arvense* L., *Anthemis arvensis* L., *Bromus tectorum* L. As he remarks that "it will be interesting to note how long the above will hold their ground, and whether they will spread to neighbouring localities," I went over the ground this year (twenty-two years after) and found all those mentioned, with the exception of the two first-named, all thriving well, some being particularly vigorous specimens. Many have spread in the immediate vicinity and further down the river on waste patches near the Marina and Blackrock. I may add that coals from the north of England and Wales are deposited near the rubbish heap and may have been the medium of transit.

M. HOLLAND.

Cork.

Possible Hunting-Grounds for the Characeae.

It is to be hoped that Canon Bullock-Webster's want of success in finding Characeae in the Rosses will not prevent his further visits to that district of Donegal. To the north of Burton Port lies several lakes with sandy bottoms all of which, so far as my recollection serves me, shelter these plants. Canon Bullock-Webster seems to have been unaware of these lakes and appears to have stopped his quest at Mullaghderg, just as he was approaching them. The lakes I refer to are those on Cruit Island, which is a peninsula at half-tide, and Carnboy Lough on the Carrickfin peninsula opposite Bunbeg.

North of these there lies in the dunes near Derrybeg another lake known by the inhabitants as Lough-na-Carrickagh, which is the Lough Acartan of the Ordnance map. In Co. Sligo the lakes at Rosses Point are, I think, choked with Charas; and still further southward is the great series of lakes that lie in the dunes along the Mayo coast between Clew Bay and Killery Harbour. During the Clare Island Survey this last district was left practically untouched, except by the conchologists, but might yield surprising results if carefully worked.

If during his researches Canon Bullock-Webster comes in contact with any facts which might throw some light on the conditions under which were deposited the enormous masses of "shell marl" or "chara marl" underlying many of our Irish peat-mosses, those of us who are interested in these deposits would be grateful if he would record these facts in the *Irish Naturalist*. Personally I have been led to think that these deposits, which yield an abundant molluscan fauna—though not rich in species—were laid down during a period in which there were exceedingly dry and hot summers and possibly cold winters. The basement layers of some would seem to date from a very early post-Glacial period, though deposition may have gone on for long ages. Whether any such marls are forming now is, I fancy, a matter of doubt, though Mr. Welch is confident that such a state of affairs exists in certain favourable localities. Owing to the lowering of the level of some lakes the old deposits of marl are being eroded and re-deposited in deeper water; therefore, great care should be taken to ascertain that these re-depositions are not mistaken for an original marl in the course of formation. Whether any species of Chara is attractive to any species of mollusk I cannot, unfortunately, say; but if it were possible for Canon Bullock-Webster to make observations on this subject, some interesting geological points might be discovered. It is certain that in the days when marl was in general formation some of the mollusca, now extremely local, were abundant and widespread, e.g., *Planorbis glaber*. This may be due to the fact that the conditions which suited the Characeae also were favourable to the snail, but there is the possibility that the presence of the plants may have been desirable, though, of course, not necessary, for the sustenance of the snail.

May I add that I should be very much obliged if any reader of this note would forward to me any samples of this marl which he may come

across. If dried it is extremely light and easily packed, and half a pound would be an ample amount. The sample should be carefully selected and free from possible admixture from higher or lower levels, and an exact description of its mode of occurrence should accompany it. I would report in this Journal as to its contents.

A. W. STELFOX.

Ballymagee, Bangor, Co. Down.

ZOOLOGY.

Notodonta bicoloria in Co. Kerry.

Mr. L. H. Bonaparte Wyse, at the conclusion of his interesting notes on this insect (*Irish Nat.*, vol. xxvi., no. 10), mentions a specimen taken by a friend of mine in the South of Ireland. As a matter of fact the friend in question, Rev. G. Foster, when on a holiday in the Kenmare district in June, 1913, was lucky to capture two examples of this rare moth; both of these were beaten out of a small alder wood, in the day-time; no birch in the locality. Very little is known about the habits or life history of this moth in this country, and perhaps the larva feeds upon both alder and birch.

THOMAS GREER.

Stewartstown.

Lepidoptera of Lambay.

Will you grant me the space necessary to put on record the following two additions, observed this year, to the Lepidoptera of Lambay:—*Sphinx convolvuli*, and *Gonepteryx rhanni*. *Vanessa atalanta*, *V. io*, and *V. cardui* were remarkably abundant this year.

CECIL BARING.

Bishopsgate, London, E.C.

Pigeons in Belfast.

The heavy carting of grain through Belfast from the docks to the mills several miles away has led to an enormous increase in the number of pigeons in the city. There are more now, I venture to say, in our streets than used to be in St. Mark's Square, Venice, and they are quite as tame. They freely alight on the pavement at the very feet of passers by, dodging vehicles of all sorts and all speeds without apparent injury. Every public building affording any nesting accommodation is taken full advantage of, church towers, spires, ledges, cornices and tympanums being favourite resorts almost to the extent of nuisance. The people, even the boys, are now so accustomed to them and so pleased to see their graceful flights that molestation is quite unusual.

F. J. BIGGER.

Ardrigh, Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 30.—ANNUAL GENERAL MEETING.—Held (by kind permission) in the Royal Dublin Society's Theatre, the President (SIR FRED. MOORE) in the Chair.

The Secretary (Prof. G. H. CARPENTER) presented the Annual Report and moved its adoption, which was seconded by Dr. COSGRAVE and carried. The following is a summary :—

The Council desires to express gratitude for all the support received in the difficult task of keeping up, so far as conditions allow, the activities of the Society.

During the year 1917 there were 9,430 members' and ticket admissions, while the number of entrants paying at the gate was 127,190, yielding a total cash receipt of £1,600 2s. 3d. In 1916 the number of paying entrants was 130,043, and the cash received £1,426 14s. 7d. For the first time, therefore, under war conditions the gate receipts show a decided increase, though wounded soldiers are now admitted free, and avail themselves largely of the privilege. This increase of £173 7s. 8d. in the receipts is very encouraging.

Altogether fourteen life-members and twenty-eight annual members have been admitted, besides nine garden subscribers.

The total income from subscriptions and entrance fees has been £659 14s. during 1917, as compared with £556 12s. in the previous year, an increase of £103 2s.

The increased payments for admission and by members, together with a gift of £100—due to the generosity of the Zoological Society of London—have brought the income during 1917 within £60 of the expenditure, so that while the year began with an adverse balance of £224 16s. 2d., it closes with one of £285 1s. 9d. The Council are glad to have avoided an appeal to the members for special gifts, such as were asked for and liberally given both in 1915 and 1916. By careful economy the expenditure has been kept at the lowest possible point, despite the abnormally high prices of provisions and fuel.

No changes have taken place among the officers of the Society during the year, but the Council wishes to express the deepest regret at the death in November of their colleague, Prof. A. E. Mettam, Principal of the Royal Veterinary College of Ireland. He had acted as honorary prosecutor to the Society since 1902, and had served on the Council continuously from 1905. His constant help in maintaining the animals in health, treating them in sickness, and furnishing valuable reports on the causes of their deaths will be very greatly missed.

The stock of animals has now, after more than three years of increasingly restricted imports, become seriously reduced. Only £2 has been spent in the purchase of new specimens, which are almost unprocurable in the present suspension of trade. The Council can only ask the indulgence of

the members and visitors to the Gardens until such time as there may be opportunity of replenishing the stock. The Lion House and the Monkey House, however, still contain many inhabitants of interest.

The death of the Gorilla "Empress" in May is the most serious loss sustained for many years. Yet it is a matter of great satisfaction that she had lived in the Gardens for three years and four months—by far the longest time during which a Gorilla has ever lived in the British Isles, and only exceeded in the records of European collections by the seven years' residence of a female in Breslau. An account of "Empress" was published in the *Irish Naturalist* for August, 1917. At the end of the year, the apes were happily still represented by the two Chimpanzees "George" and "Charlie," and by the Hoolock Gibbon. There has been considerable mortality among the stock of monkeys, mostly on account of the very severe weather of mid-December. Both the Anubis and Hamadryas Baboons and two Bonnet monkeys died then; the Douroucouli and one of the Woolly Monkeys had been lost earlier in the year. In October died the last of the Ruffed Lemurs. It will probably be impossible to replace these specimens until after the war.

Five of the stock of lions have died during the year: the old lion "Conn" at the end of December, the Uganda lioness "Mitze" and three cubs. These have been balanced by five births—two males and a female, from "Red Hugh" and "Nigeria," born on June 17th, and two females from "Oseni" and "Sheila," born on July 4th. The collection, therefore, still consists of twenty animals, nine males and eleven females.

A young Leopard, sent from West Africa under great difficulty by Dr. Barker, unfortunately died a few weeks after arrival, and two of the Pumas died in February. In May two Canadian Black Bears were deposited in the Gardens by the 100th Canadian Infantry; these animals are intended as regimental pets for the 1st and 2nd Battalions of the Leinsters. They are now in excellent condition. The death of the larger Elephant "Roma" in July was much regretted, and the losses of the male Zebra (April), the Manchurian Stag (October), the Tapir (June), and the Hyrax (February) are all serious. The families of Canadian Bison and Bornean Zebus continue to flourish, and form noteworthy exhibits. The rare Hutia from the Bahamas died in July, and was naturally transferred to the National Museum. The deaths of the Wallaroo (in July) and of the last Wallaby (in December) have deprived the collections of all representatives of the Kangaroo family.

The collection of Birds has been fairly maintained by gifts, but the last of the Rheas or American Ostriches died in November, as the result of an accident due to a violent fright, probably caused by an aeroplane flying over the Park. For some time after such flights became common, many of the birds showed great fear, but they are now somewhat accustomed to the presence of these new invaders of the air. On account of transit difficulties it was found impossible to stock the Fish-hatchery in January last.

The President and Honorary Officers were re-elected. Messrs. C. Wisdom Hely, G. Knox-Peebles, and Cecil Pim were elected to fill vacancies on the

Council. The Society's silver medal was presented to Rev. J. A. Walker, of the Christian Brothers' Schools, North Richmond Street, Dublin, in recognition of an excellent set of photographs taken in the Lion House.

Prof. J. A. SCOTT delivered a lecture on the Horse family and allied beasts, with a beautiful series of lantern illustrations.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 13.—The Club met at Leinster House, N. COLGAN (President), in the Chair.

E. J. SHEEHY exhibited a culture of soil Protozoa consisting chiefly of small Amoebae. The culture had been prepared by inoculating saline egg albumen with soil from flower-pots.

Dr. G. H. PETHYBRIDGE showed a piece of wood (said to be a portion of the "true cross") preserved in the Domnach Airgid Shrine, which has recently been described in the *Proceedings* of the Royal Irish Academy by E. C. R. ARMSTRONG. The section showed that the wood was probably part of a small twig or young branch of a tree or shrub, and that it belonged to the region next to the pith. The portion of wood was too fragmentary to enable the species of plant from which it came to be identified.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 19.—J. A. S. Stendall delivered an address on "Allotments and Allotment Economics." The Vice-President (Mr. Cleland) referred to the death of Mr. W. H. Patterson, one of the original members of the Club, he having been the first secretary and also the first president of the society. A vote of condolence was passed by the members. Mr. Stendall's address dealt with the composition of soils and the use and abuse of water; the lecturer emphasised the necessity of taking precautions against allotment manure heaps becoming the nurseries for countless potential disease-carrying house-flies. Mr. Stendall called attention to the all-important subject of food values, and all holders were urged to study this matter for themselves. It was possible to largely increase the food value of the yield from any garden by growing just those vegetables which give good value and eliminating such an article of diet as the vegetable marrow, which is lacking greatly in food constituents, at the same time taking up a large amount of space which might be more profitably used. Artichokes and parsnips were strongly recommended in place of so many turnips, which cannot compare with the former from a nutritive standpoint. In conclusion, garden friends and foes were dealt with, reference being made to the exhibits of interest to the war-time gardener now displayed in the Municipal Museum.

IRISH FOSSIL MOLLUSKS.

BY R. LLOYD PRAEGER.

A VERY valuable paper¹ dealing with the post-Pliocene Land and Fresh-water Mollusca of Ireland, which has been in preparation for many years, has recently been published by Messrs. Kennard and Woodward. As the subject has a direct bearing on both faunistic and floristic studies in this country, some account of its nature and scope may be acceptable to readers of the *Irish Naturalist*, especially since the Journal in which it appears is not readily accessible to many Irish workers.

This paper is without question one of the most important contributions to our knowledge of the Irish non-marine Mollusca which has as yet appeared. While it represents to a great extent pioneer work, on account of the present incompleteness of the study of the smaller fossils of recent deposits, particularly in Ireland, it contains at the same time a great body of detailed information, and forms a wide foundation on which further study can be based. The authors have wisely recognised its preliminary nature, and have avoided to a great extent hazardous generalizations based on the present materials; the major part of the paper is taken up with detailed records of sections and of their contained fossils. It should be noted at once that the responsibility of the authors stops with the determination of material which was sent to them, and with a discussion of the origin of the Irish non-marine molluscan fauna; neither of the authors claims to have studied the Irish fauna, either living or extinct, on the ground. For the material, both geological and zoological, on which the paper is based they acknowledge their indebtedness to a large number of collectors; it may be said without injustice to the rest that for the description of sections and the collection of the fossil fauna Mr. Welch is mainly responsible, as are Mr. Phillips and Mr. Stelfox for

¹ A. S. KENNARD and B. B. WOODWARD: The Post-Pliocene Non-marine Mollusca of Ireland. *Proceedings of the Geologists' Association*, vol. XXVIII., pp. 109-190, 1917.

most of the information regarding the present fauna, its characters and its distribution. Apart from the labour of working out the mass of material, the authors' most valuable contribution is the comparative knowledge which they were able to bring to bear, linking up the Continental and English forms with those of Ireland.

The special importance of the land mollusca in distributional studies has long been recognised ; this is due to their comparatively sedentary character and to their specialization as regards habitat. It was for this reason that Dr. Scharff commenced some thirty years ago the detailed study of their Irish distribution, which resulted finally in the production of Mr. Stelfox's well-known census, published in 1911. The authors of the paper under review are careful to emphasize the same fact. The fresh-water species appear on the whole to possess much greater means of dispersal, and are therefore of somewhat less value for distributional studies : at the same time, the best sections as well as the most numerous, are those of old lake deposits ; sections yielding land species, such as those found among sand-dunes, in caves, raised beaches, or river deposits, being less frequently met with, or less easy to work, or less satisfactory from a stratigraphical point of view. Although the present paper is a record of much accomplished, it is clear that as regards the study of both land and water deposits only a beginning has been made, and it is to be hoped that now that the living fauna is so well known, Irish conchologists will concentrate on the study of the past history of the group, which when fully elucidated ought to provide invaluable evidence bearing on the much-debated question of the age and origin of the fauna and flora of our country.

In the present paper results are given of the examination of 78 sections, which are classified as follows :—

Crannoges	..	..	..	2
Kitchen middens	..	..	..	5
Raised beaches	..	..	..	5
River deposits	..	..	..	4
Caves	..	..	..	5
Old land surfaces	..	..	..	27
Chara marls	..	..	..	30

The first two groups are mostly of recent date and of little palaeontological importance. The third, from its nature, cannot yield much non-marine material. It is to the fourth and sixth especially that we must look for evidence of value, since the cave deposits are often difficult to zone owing to disturbance by burrowing animals. Old land surfaces are most important, but those hitherto examined have been mostly in sand-dunes, where there is great risk of derived material.

Following on the descriptions of sections and lists of their molluscan contents, our authors devote 25 pages to "Notes on some of the molluscan Genera and Species." There is much valuable critical matter here, but Irish conchologists will not agree with some of the conclusions reached, and some of the statements made are misleading—for instance, "*Truncatellina minutissima* (Hart.) is said to occur in Ireland from a single specimen (since lost) from North Kerry," the fact being, as I am informed by Dr. Scharff, that two specimens collected by J. R. Hardy at Killarney are in the Dublin Museum. The authors have in this section occasionally "let themselves go" on points which have no reference to the proper subject of the paper, e.g., the criticism of Mr. Taylor in connection with *Vitrina pyrenaica* on pp. 159-161.

The final section of the paper—"The Origin of the Irish Non-marine Molluscan Fauna"—is very interesting, and also the most debatable, but I am not qualified to discuss it, from the point of view of the Mollusca. The authors recapitulate three theories, which they aptly name the *Edward Forbes theory* (with which readers of this Journal are well acquainted), the *Pan-Germanic theory* ("recently advocated by J. W. Taylor, that our non-marine molluscan fauna originated in Germany . . ."), and the *Glacial extermination theory*, as ably advocated by Clement Reid in these pages (vol. xx., p. 203 *et seq.*). They discuss all three, pointing out that the first was founded on a study of the fauna and flora both fossil and recent, the second on a consideration of the living non-marine mollusca, and the third on palaeobotanical and geological evidence. As regards the second, our authors unhesitatingly reject it on the grounds

that many species of mollusca are found in older strata in England than in Germany, and that a good many British species, both recent and fossil, are unknown in Germany in either a fossil or recent condition—considerations which appear fatal to this theory, even without appeal to much evidence derived from other groups which is equally opposed to it. The “Glacial extermination theory” affects us more nearly, since we are compelled to admit the strength of the local geological evidence for a very widespread destruction of the fauna and flora during the Ice Age, however much we may believe that the zoological and botanical evidence points in an opposite direction. Of the many difficulties which the naturalist encounters in this theory, our authors lay special stress on the very shadowy character of the post-Glacial land-bridge which it postulates, and consider that even its assumed existence will not account for the presence of such forms as *Geomalacus maculosus*, *Limnaea involuta*, and *L. praetenuis*; while the absence from Ireland of snakes, voles, etc., is equally difficult to reconcile with the theory of a post-Glacial connection. Admitting its absence, we might, like Clement Reid, invoke winds, currents and birds to sow our country with seed from which the present flora arose (though in the wildest flights of imagination I cannot conceive it); but what about the Irish post-Glacial and existing mammalian fauna?—not to mention sensitive and delicate invertebrates quite unsuited to aerial or marine adventures.

Our authors, then, reject what we may call, from its latest and most able exponent, the Clement Reid hypothesis—very properly, to my mind. For, in addition to the difficulties offered by such considerations as the above, I feel compelled to traverse much of the positive evidence which that writer brings forward in support of his contentions. He states, for instance, that a study of the habitats and range of the Lusitanian plants convinces him that they are very recent arrivals, rapidly spreading from local centres of dispersal which can still be fixed. I believe that an unbiassed study of the question will lead the observer to a precisely opposite conclusion. He quotes the “small-seededness” of the same group as strong evidence of the

case of their carriage over long distances. I question if they are, as a group, more small-seeded than any other natural group, or group selected at random, within the native flora. But here I get beyond the bounds of the present notice; I shall hope to return to this portion of the evidence on a future occasion.

There remains, then, the "Edward Forbes theory," and this Messrs. Kennard and Woodward adopt in the present paper, as they have done on previous occasions, as best accounting for the facts of the past and present nature and distribution of the molluscan fauna; this, of course, involves the presence of the existing fauna in the country in pre-Glacial times, and its survival through the Ice Age. They refrain from expressing any opinion as to how this survival was effected. As regards the post-Glacial history of the molluscan fauna, they find, especially in the sand-dune deposits, evidence of a climatic optimum in Neolithic times, such as has been previously postulated locally from studies of the marine mollusca and other groups, and which is widely accepted in northern Europe.

To one who, like myself, is not a special student of the Mollusca, the study of the present paper is rendered difficult by the nomenclature which is employed. It is true that as regards this vexed question the authors claim to have adopted a moderate middle course—they adhere to the "modern school" as represented by Hyatt and Grabau, and adopt Hannibal's definition of a species—"a number of related individuals, having a similar genetic history and possessing a tendency to evolve along strictly analogous lines." They neither "lump" according to the "Jeffreysian school" nor "split" according to the "French school," and so far one has no cause for grumbling; but the names which they use for their species are in many cases unfamiliar to all but the few who follow with avidity the search for the oldest name—a search which results in the continual changing of names. If a paper like the present is to be used by any but the small coterie referred to, it must be intelligible to the general worker at natural history; and until something approaching finality is reached, it is much better to stick to a familiar nomenclature, even at the risk of being

out of the fashion. In a paper like the one under notice, which appeals strongly to all workers at faunistic and floristic studies, as well as to geologists, within our islands, the use of unfamiliar names merely detracts from its value.

The table of distribution which concludes the paper shows the recent and fossil range of the non-marine mollusca of Ireland, Great Britain, France, Germany, Denmark, Spain and Portugal and North Africa. The Irish recent fauna is set down as numbering 126 species, of which 85 in all have so far been definitely recognised as Irish fossils.

It is as refreshing as it is unusual to find, in a paper hailing from the other side of the Channel, Irish place-names correctly spelled; cases are not very rare in which Irish records are rendered useless by the impossibility of translating the place-names into designations which any one in Ireland ever heard of; in the present paper such names are a model of accuracy.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Badger from Mr. H. B. Warren, a pair of Wood Pigeons from Mr. H. A. Smith, a pair of hybrid Egyptian Geese from the Board of Public Works, a pair of Mandarin Ducks, a pair of Japanese Fowl, and three Golden-Amherst Pheasants from Lady Blake, two cock Golden-Amherst Pheasants from Mrs. Morgan, and a Swan from Mrs. E. Darley. A Murine Opossum has been bought for the collection.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 19. The Vice-President (A. M'L. CLELAND) in the chair. S. A. BENNETT gave a lecture on the "Distribution of some of our Local Plants." The paper was illustrated by lantern slides, maps, and specimens. In the discussion which followed the Rev. C. H. Waddell, B.D., J. Stendall, and the Vice-President took part. Three new members were elected.

DUBLIN MICROSCOPICAL CLUB.

MARCH 13.—The Club met at Leinster House. The President (N. COLGAN, M.R.I.A.) exhibited a series of slides illustrating the sclereids or stone-cells occurring in the pulpy fruits of certain genera of Ericaceae. These bodies varied in form from rods of slender, angulated outline to plates of rounded or elliptic contour, suggestive of the dermal deposits of the holothurians or sea-cucumbers, though in all cases destitute of the perforations so characteristic of the "deposits" in this group of echinoderms. While fairly constant in the range of outline for each species, many different types of these deposits occurred in the genus *Vaccinium*, of which seven North American species were examined. In the closely allied genus *Gaylussacia*, the American Huckleberry, two species, *G. frondosa* and *G. resinosa*, were found to have these cells not only distributed through the pulp of the berry, but forming a dense scaly coat round the seeds. A very distinct type occurred in the berry of *Pernettya*, a South American genus of Ericaceae; and forms resembling those of the North American *Vaccinium erythrocarpum* and *V. crassifolium* were found in the fruits of the Mediterranean *Arbutus Andryache* and *A. Unedo*. Even the smallest, those of *Vaccinium pallidum*, displayed their striae quite clearly under a half-inch objective. There is obviously a wide field open here for further investigation.

Prof. G. H. CARPENTER showed mounts of larval flat-fishes illustrating the translation of the eye from the one to the other side of the head during transformation.

J. N. HALBERT showed an undescribed *Lasioseius*, a genus recently established by Dr. Berlese in his revision of the *Seius*-group of the family Gamasidae. The following is a brief description of the male, of which a single specimen was found by Mr. A. D. Michael on the seashore at Swanage some years ago, and a second specimen occurred recently under decaying seaweed on the rocky shore at Malahide.

The shape is ovate and the size about $768\mu \times 537\mu$; the dorsal surface is finely punctured and reticulated. The species is chiefly remarkable for the seven pairs of long spines on, or close to, the side margins, and there are two more on the front margin of the body. These spine-like hairs are very stout and smooth except at their extremities, which are flattened and distinctly spinous. The V-shaped sternal plate has three pairs of sharp side-processes and ends in a point; the anal plate is small, with emarginate sides and a long terminal hair. The peritreme is markedly sinuate and opens a little in front of the last pair of legs. The mandibles are small, with short side-processes. The legs, with the exception of the first pair, are remarkably stout, and are armed on their upper surfaces, with spines like those on the body; the hairs on their under surfaces are sharply pointed. This distinct species may be called *Lasioseius fucicola*. It will shortly be described in detail in a paper to be communicated to the Royal Irish Academy.

COSMOS CLUB.

NOVEMBER 5. A discussion took place, opened by W. B. WRIGHT, on "Possible Migrations of the Poles."

DECEMBER 3.—The evening was spent in discussion as to the programmes of future meetings, the scope of the Club, and several questions of scientific interest.

JANUARY 14.—Discussion on the Scientific Literature available in Dublin: how it may be made more available to workers, and more fully representative in the various subjects: opened by R. Lloyd Praeger. As a result, a committee was appointed to carry out the suggestions contained in the title given.

FEBRUARY 11.—Discussion on the Determination of Sex, opened by J. R. D. HOLTBY, M.B.

MARCH 11.—Discussion as to whether a National Union of Scientific Workers is desirable. A vote taken at the close resulted in a tie.

APRIL 13.—DR. W. J. CRAWFORD of Belfast gave an account of his physical experiments on the spiritualistic phenomenon of "levitation." A discussion ensued.

OBITUARY.**WILLIAM HUGH PATTERSON.**

By the death of W. H. Patterson on February 5, the Belfast Field Club lost one of its few remaining original members. Joining the Club at its inception in 1863, Mr. Patterson acted as Secretary for the year 1864-65, and occupied the Presidential Chair during the two years 1883-84 and 1884-85. He had a wide interest in archaeological and natural history studies, and though he did not publish much he added materially to our knowledge of the fauna, flora and antiquities of the north of Ireland by collecting and observing, and furnishing his results to others. Linguistic studies also attracted him, and he compiled a Glossary of Words in use in the Counties of Antrim and Down, which was published in book form by the English Dialect Society in 1880. He was an ex-President of the Belfast Natural History and Philosophical Society, and for forty-five years a member of the Royal Irish Academy.

LIMNAEA GLABRA IN IRELAND ?

BY J. WILFRID JACKSON, F.G.S.

Hon. Secretary, Conchological Society of Great Britain and Ireland.

THE occurrence of *Limnaea glabra* in Ireland is a matter of some dispute among conchologists. A. W. Stelfox, in his "List of the Land and Freshwater Mollusks of Ireland" (*Proc. R. I. Acad.*, xxix., 1911, pp. 65-164), says: "There are several old records for this shell—Cork, Dublin, and Belfast—but no specimens are forthcoming" (*op. cit.*, p. 129). It has been suggested that the "*Limneus glaber*" of these early records (of Thompson, Humphreys, and others) is perhaps the young of a slender form of *L. palustris* found living in marshes and known to occur in the neighbourhood of Cork and Belfast (Stelfox, *op. cit.*, p. 112). It is of some interest, therefore, to record that undoubted examples of *L. glabra* from Cork exist in a collection of British Shells formed by the late Lord de Tabley. This collection was acquired after his death (c. 1895) by Mrs. Gresham, of Knutsford, and has recently been presented to the Manchester Museum. It would appear that Lord de Tabley, at one time, had the intention of publishing a work on "British Mollusca."

The De Tabley specimens of *L. glabra*, like most of the other species, are in small pill-boxes, with the name and locality—Cork—written on the lid. They are quite unlike any variety of *L. palustris* known to me. The largest example measures 16 × 5.5 mm., and all the shells agree closely with English specimens of *L. glabra*.

Other Irish shells contained in the De Tabley collection are *L. involuta*; *L. truncatula* (Limerick); and *Succinea oblonga* (Cork). There are no other examples of *L. glabra* in the collection.

NOTE BY R. A. PHILLIPS.

The evidence that *Linnæa glabra* lives or lived in the neighbourhood of Cork is unsatisfactory and incomplete, and Mr. Jackson's note, though interesting, leaves the matter still in doubt.

Jeffreys, in 1831 (*Trans. Linn. Soc.*, vol. xvii., p. 520), stated that it was found in "Ireland (Rev. James Bulwer)," but gave no locality. William Thompson, apparently doubtful, wrote Bulwer and Jeffreys. Bulwer replied that the "shell so noticed was considered by him to be but a variety of *L. palustris*." Jeffreys replied in a letter dated 8th June, 1840, that he had recorded the shell on the authority of "the late Dr. Goodall," who had received the shells from Mr. Bulwer. He also added in his letter, "I have, however, two or three undoubted specimens among a collection of Irish shells which I purchased from Mr. John Humphreys of Cork—the tray which contained them was labelled "Cork."

Thompson next wrote to Humphreys, who replied that he had not identified the species, but that the note of locality appended to the shells alluded to by Mr. Jeffreys was strictly correct.

Humphreys, in his list of Cork mollusca, published 1845, records *L. glabra* as—"Found once near Cork, I believe near Blarney," a very indefinite statement, considering his reply to Jeffreys. In an old manuscript list of Cork shells which I have seen it is stated that Mr. Humphreys could not remember where he had found this species. The old records for Dublin and Belfast are not supported by the existence of specimens or other satisfactory evidence.

During and since Humphreys' time many conchologists have collected in the neighbourhood of Cork, but none seem to have found *L. glabra* there or elsewhere in Ireland. Whether the shells alluded to by Jeffreys were really collected near Cork, or whether they might have got transferred by accident or otherwise from one tray to another, does not seem clear from the above history. It is, therefore, to be regretted that the label on the specimens in the De Tabley

collection is equally vague and throws no further light on the subject.

Further search may reveal the presence of this interesting mollusk in the Cork district, but the evidence at present available is, in my opinion, too imperfect to be accepted by students of the distribution of species as proof that *L. glabra* is a native of Ireland.

Cork.

NOTES.

Natural History Societies in Derry and Cork.

I have lately come across, among the pamphlets preserved in the National Library, an Annual Report (for 1871) of the Natural History and Philosophical Society of Derry, and another (for 1854-55) of the Cork Cuvierian Society. I should much like to have further information concerning the history of these two local societies, and to see further issues of their publications. Possibly some reader of the *Irish Naturalist* may be in a position to assist me.

R. LLOYD PRAEGER.

Dublin.

Scarcity of the Fieldfare and Redwing.

The scarcity of the Fieldfare appeared to be very noticeable in England last winter (*Brit. Birds*, xi., p. 231), but so far I have seen no reports of its numbers in Ireland. As far as this district is concerned I have not seen a single bird this season, though I have very carefully watched for it almost every day. Redwings also appear to me to be very scarce. I saw a few, not more than half a dozen birds altogether, for about a fortnight in December, but none before or since. The scarcity of a species in one particular district may be a matter of small importance, but should it be general throughout the country it would be a pity to allow the fact to pass unnoticed. This can only be determined by means of local reports.

Ballylinan, Athy.

W. M. ABBOTT.

Woodchat-Shrike on Migration, obtained at Tuskar Rock.

I am very much obliged to Mr. J. McGinley, light-keeper on Tuskar station, for informing me of the occurrence of a Woodchat-Shrike on Tuskar Rock. In his letter to me he states that, on his arrival on the rock on May 26th last, he noticed a strange bird, and, on looking up the books, pronounced it to be a Woodchat-Shrike. It was collected the same day by the Principal Keeper, Mr. Callaghan. When I was in

Dublin on February 22nd last Mr. W. Williams very kindly allowed me to examine the mounted skin, and told me that he had received the specimen in the flesh for the National Museum from Mrs. Barrington on June 6th, just a fortnight after it had been collected. I was thus enabled to confirm the identity of the bird so accurately determined in the first instance by Mr. J. McGinley. Mr. Williams said that this Shrike was in a very emaciated condition, and Mr. McGinley stated, in his letter to me, that it looked very tired when he discovered it on the rock. I should have been glad had the bird in the flesh passed through my hands in the first instance, to enable me to make a thorough anatomical investigation of the body. Anyone who has read the previous papers which I have published dealing with rare *casual visitors*, collected at light-stations, will notice what a store of valuable information may be obtained by anatomical investigation in regard to the probable peregrinations of such migrants and concerning other problems on migration. May I, therefore, be permitted to appeal, through the medium of the *Irish Naturalist*, to light-keepers and their friends who may happen to see this note, to send me any rare birds which may be obtained at light-stations; especially those from Tuskar, Rockabill, Maidens, Inishtrahull, and Tearaght, at which places I have made a special study of bird-migration? I have no wish to keep the birds in question, my sole aim being to send them, or see that they are sent, to the National Museum, Dublin, their rightful destination, where I have sent all rare birds (from light-stations) which have passed through my hands.

The occurrence of this Woodchat-Shrike is highly interesting, for on looking up the literature of the subject I find that only one other specimen has been found in Ireland. This was taken at Blackwater Bank lightship, Co. Wexford, on the night of August 16th, 1893, nearly twenty-five years ago. Unfortunately only its leg and wing were preserved. (*Vide Migration of Birds at Irish Light-Stations, Analysis of Reports, 1881-97, p. 8, R. M. Barrington*). The bird from Tuskar is, therefore, the first whose entire skin has been preserved and mounted; it is also the first taken on a rock light-station.

C. J. PATTEN.

The University, Sheffield.

Meaning of "Swiney" and "Thricecock."

In Kirke Swann's "Dictionary of English and Folk-names of British Birds" (1913), *Swinepipe*, of which *Swiney* may be only an abbreviation, is stated to be the Redwing, and *Thrice Cock* the Mistle-Thrush, meaning literally the Thrush-Cock. The Rev. C. W. Benson gives *Hayjack* as a provincial name for the Linnet, but in Norfolk this word signifies a Whitethroat, or a Blackcap, in allusion to their nests made of bents.

J. H. GURNEY.

Keswick Hall, Norfolk.

THE CONVULVULUS HAWK-MOTH IN IRELAND.

BY J. N. HALBERT, M.R.I.A.

THE season of 1917 was remarkable for an abundance of insect life and in no groups was this more noticeable than amongst the butterflies and moths. The occurrence of the *Convolvulus Hawk-Moth* (*Sphinx convolvuli*) in unusual numbers is interesting, as it is an uncommon insect during most years in these countries. Towards the end of August it was often noticed in the vicinity of Dublin and records of its occurrence were received from various Irish localities.

It is now known that this fine moth was generally common in Great Britain last year in late summer and early autumn, having been observed in many places ranging from the Isle of Wight and Cornwall to the Shetlands and the Hebrides. No doubt it was also common throughout Central and Southern Europe, though of this there are no available records, but the appearance in numbers of this insect in Britain is always preceded by its abundance abroad.

Birchall¹ remarks that it was very common in Dublin and the adjoining counties in the year 1859, and the same appears to have been the case last August and September. The Killiney and Swords districts were specially favoured. Mr. W. Ruttledge writes that at Lissen Hall in the latter locality it was first noticed on August 24th when one flew into a room; a few days later "as many as four or five moths could be seen at the one time on the flowers of the tobacco plant (*Nicotiana*). The moths seemed to be very tame and they could be caught with no better weapon than a hat! and when disturbed they came back again very soon." For more than a week they were observed in numbers every night, but owing to a change of weather they then disappeared.

In order to give an idea of the prevalence of the moth in the Dublin district I may mention that it was observed at Rush, Swords, Malahide, Howth (in a house on the south side), Lambay² (caught by Mr. Baring), Killiney, Bally-

¹ "Catalogue of the Lepidoptera of Ireland," p. 5.

² *Irish Naturalist*, xxvii., p. 65.

brack, Loughlinstown, Foxrock, Rathfarnham (drowned in a conservatory tank), Dundrum, Blackrock, Merrion, and the Glasnevin Botanic Gardens (caught in one of the green-houses), and a few were captured in city and suburban roads.

Further afield it was observed in Co. Donegal at Rathmullen and Greencastle, where Mr. A. R. Nichols caught one in the porch of the Fort Hotel on the 2nd September. It has already been recorded from the counties of Antrim and Down by the Rev. W. F. Johnson.³ A number of large hawk-moths which Mr. T. Greer believes were this species were reported to him as having been common in gardens at Cookstown in Co. Tyrone. It was also found at Killala in Co. Mayo, and in a cornfield near Drogheda in Co. Louth.

In the midlands, as Mr. Pack-Beresford tells me, many specimens were seen near Athlone flying to the flowers of Sweet-scented Tobacco (*Nicotiana affinis*), a plant which is known to have great attractions for this moth. Mrs. M. E. Morris writes that one was captured and several observed in a garden at Bessborough in Co. Kilkenny. In the south it visited the suburbs of Wexford town as well as Ennis-corthy and Courtown in the same county. Mr. F. W. Keane reports⁴ that a specimen was caught hovering over tobacco plants in a garden near Youghal in Co. Waterford.

The earliest date of capture was 10th August, but the majority were taken during the last week of August and in the early part of September, the latest date being the 6th October. Most of the specimens were considerably the worse for wear, though a few were in a good condition, notably one found clinging to the window netting of Killiney Parish Church by Mr. W. Rigby on the 26th August.

The question has been asked: Were these hawk-moths native bred or were they travellers engaged in a great migration from warmer countries? There can be little doubt that for the great majority, if not all of them, the latter is the true explanation of their occurrence. This insect is of well-known migratory habits, and one need but admire its large and powerful wings and trim-built body

³ *Irish Naturalist*, xxvii., p. 12.

⁴ *Irish Naturalist*, xxvii., p. 52

to realize its capacity for rapid and sustained flight. It is not surprising to find that this moth has spread over a great part of Europe, Asia, and Africa, and has even reached the Australian region where it is represented by a variety differing slightly from the typical form. It appears to be absent from the American continent, but an allied species is recorded from there.

It has been argued that the fresh condition of many of the British specimens is strong evidence in favour of their having been reared in these countries. This does not follow, however, for given fine weather and a favourable wind such barriers as the North Sea and the Irish Sea offer small obstacles to such an insect.

Then if the moth breeds to any extent in these islands one would expect that the caterpillar and the pupa would be more frequently observed; as a matter of fact the records of these early stages are noticeably few when compared with the relative frequency of the moth. When Mr. C. G. Barrett⁵ wrote of this species in 1895 he doubted if there were records of the finding of twenty caterpillars in the British Isles. Mr. J. W. Tutt,⁶ writing in 1904, gave a complete and interesting list of about fifty occurrences, though none of these refer to Ireland.

With regard to the breeding of this moth in Ireland Mr. W. F. de V. Kane⁷ remarks "it appears probable that it breeds in Ireland in fine seasons," but he does not say if the caterpillar or pupa was actually found. There is no doubt, however, that the insect occasionally attempts to establish itself in this country, for the caterpillar was found by Mr. T. Stawell at Mallow, Co. Cork, during the summer of 1902, an occurrence which was recorded by Professor G. H. Carpenter.⁸ The caterpillar seems difficult to rear successfully, and this one died before reaching the pupal stage. A coloured drawing which I made at the time shows that it belonged to the entirely green type

⁵ "The Lepidoptera of the British Islands," vol. ii., p. 27.

⁶ "British Lepidoptera," vol. iv., p. 343.

⁷ "A Catalogue of the Lepidoptera of Ireland," 1901, p. 19.

⁸ *Irish Naturalist*, xi., p. 46.

with faint side lines of darker colour and black spiracles, the tail-horn was yellow with a black tip, a known form of this variable caterpillar.

There are also other reasons for believing that the insect seldom breeds in Britain. Mr. J. W. Tutt⁹ states there is evidence that the late moths are "killed off by the cold without depositing their eggs, and that they are exterminated every winter following their appearance in this country." He goes much further than this when he suggests that it rarely survives the winter in the greater part of Europe and Northern Asia, the specimens taken in those regions being almost all immigrants or the direct descendants of immigrants from warmer climates. Nevertheless the moth is probably increasing in many northern localities, and we may yet see it established as a breeding species in Britain.

In view of last year's invasion by this hawk-moth it is likely that the caterpillar or pupa may be found in Ireland during the coming season and consequently a short note on the life-history may be of some use.

The eggs are said to be laid on the food plants which, in these countries, are the common bindweeds *Convolvulus arvensis* and *C. sepium*. The caterpillar may be sought for in June and July; it is a large creature measuring four inches when fully grown and the colour may vary from a uniform light green to a dark brown with yellow and grey markings. The tail-horn may be black, or fawn, or yellow tipped with black. When full-fed it enters the ground and changes to a large reddish-brown pupa which may be recognised as the species by the separate proboscis sheath which projects well below the head. It remains buried for about four weeks and the moth usually emerges in August. The pupa has been frequently dug up in potato fields where the bindweed is common. It was at one time thought that the caterpillars were in the habit of concealing themselves amongst earth or dead leaves during the daytime, coming out at night to feed. Professor Poulton and other entomologists have published interesting accounts of the rearing

⁹ "British Lepidoptera," vol. iv., p. 376.

of this moth and no such tendencies were noted, although the caterpillars were surrounded with suitable materials for their supposed "digging in" habits. On the contrary they are lethargic showing neither a disposition to wander away from their food-plants nor an aversion to daylight. It has been stated, however, that the caterpillar is skilful in concealing itself amongst foliage, and it does not assume the sphinx-like attitude so noticeable in the Privet Hawk-Moth and allied species.

A point in this life-history which will occur to the naturalist is that if the eggs are laid on the bindweed in the autumn what becomes of them when these annual plants lie down? It may be suggested that the eggs are laid in the following summer by moths which have survived the winter months, but there is no evidence in support of the belief that this moth hibernates in the imago stage. A more probable explanation is that the eggs are laid on the food plants in the summer by females which have survived the winter as pupae. Possibly some additional light may be thrown on what really does occur in these countries as a result of last year's immigration.

It has already been mentioned that this moth was common in 1859, and Mr. Kane says it was very numerous in the fine dry summer of 1887, while it occurred in many Irish localities in the years 1882, 1891 and 1892.

The abundance last year of the common white butterflies was very noticeable. The species of *Vanessa* were also abundant, more especially the Peacock Butterfly (*Vanessa io*), and hibernated specimens of this insect duly made their appearance in the spring. It may also be of interest to record the occurrence of the Clouded Yellow (*Colias edusa*). I saw a fresh example of this beautiful butterfly flying over the sandhills at Malahide, at the end of August. In endeavouring to account for this abundance of lepidoptera during the summer and autumn of last year it should be remembered that the previous winter was prolonged and fairly dry; it was also colder than usual, at least in the British Isles. Such conditions often herald a "good" insect year.

National Museum, Dublin.

NOTES ON SOME ALIEN PLANTS OF
COUNTY DUBLIN.

BY NATHANIEL COLGAN, M.R.I.A.

THE discrimination of native from introduced species is one of the most difficult of the problems which confront the compilers of local floras, and this difficulty is to a great extent insurmountable, since it arises mainly from the defect of early records for alien plants. If systematic botany were not what it is, a creation of yesterday, if some tenth century Linnaeus had arisen to lay thus early the foundations of the science and render possible the production on modern lines of a twelfth century Flora of Co. Dublin, how profoundly would our views as to the standing of certain species be altered. How conspicuous would be the absence from such an early Flora of a host of denizens and colonists now fully domiciled in the country, what a striking poverty of species we should find, and how convincing a proof we should have of the far-reaching effects of unconscious human agency in the enrichment of a flora. If we regret the want of such early historical records as would give precision and certainty to our judgments on the standing of doubtfully native species that is all the more reason why we should endeavour to supply the future local botanist with trustworthy materials. It is not enough to note the first appearance of immigrant species. Their varying fortunes should be followed up by continuous observation, and the object of these notes is mainly to record the result of such observation applied to a few aliens whose first appearance or apparent establishment was recorded in the "Flora of Co. Dublin" fully thirteen years ago. The numbers prefixed to records here refer to the botanical districts as set out in the Flora.

***Sisymbrium pannonicum*, Jacq.**

5. Half-a-dozen plants at Howth railway station, 1915. **7.** Two plants at Ballsbridge, 1917. **8.** Several plants in Pembroke Park, 1907; a few plants on the railway line at Dalkey station, one at Killiney station, fully 150 on the abandoned railway line south of Killiney, and

about two dozen of plants on Victoria Wharf, Kingstown, all in 1917. In the last station the plant was undoubtedly introduced with fodder for army horses which was stacked here in large quantity during the Easter week insurrection of 1916.

First noticed in Co. Dublin at East Wall, Dublin Harbour, in 1894.

S. Columnae, Jacq.

2. One plant below the Windmill, Skerries, 1913. 4. A few plants by the roadside between Lucan and Woodlands, 1915. 8. Two plants on Pigeon House road, 1907, and six plants in 1909; one plant by Pigeon House gate, 1913; thirty plants in Pembroke Park, 1907, and several still there in 1913. Two plants on the railway at Killiney station, 1917.

First noticed in Co. Dublin in association with the preceding species in 1904. The ultimate establishment of both species in Co. Dublin seems not unlikely.

Lepidium ruderales, Linn.

8. In July, 1917, I found twenty-five fruiting plants of this species in association with *Sisymbrium pannonicum*, *Diptaxis muralis*, and *Linaria minor* on the abandoned railway line near the Shanganagh River, south of Killiney.

An alien of rare appearance in Co. Dublin, as I can find no previous record of more recent date than that for Kilbarrick in *Flora Hibernica*, 1836.

L. perfoliatum, Linn.

8. Seven fruiting plants found on the abandoned railway track south of Killiney in July, 1917, associated with the preceding species.

This is the first Co. Dublin record for this plant, a native of south-eastern Europe. It has been already recorded as a casual from Co. Kildare, from Cork City, and from Belfast.

Melilotus parviflora, Desf.

7. About fifty plants found in 1915 growing in association with *Matricaria discoidea* on the footpath of a new road leading to Inchicore brick-works. A native of south-eastern Europe here first recorded for Co. Dublin. Previously recorded as a casual from Newry, Belfast, and near Waterford.

Matricaria discoidea, DC.

The rapid spread of this American alien in Co. Dublin and in Ireland since its first detection in 1894 offers a parallel amongst land plants to the spread of the aquatic *Elodea canadensis* or Water Thyme. The following is a selection from notes on its Dublin distribution made during the interval 1910-1917:—2. About five dozens of plants on the Dorn, Skerries, 1910, and about as many more in 1912 in adjacent waste ground, the site in the preceding year, of a travelling circus; very abundant along

the steep road north of Skerries leading from Sea Mount to the Hill, also scattered thence for half a mile along the road to Milverton demesne, and appearing again at Balcunnin and at a cross-roads near Skerries, 1914.

3. On the railway at the northern end of Donabate railway station, 1914.

4. Many hundreds of plants on the railway siding and in waste ground by the Royal Canal, Cross Guns, in profusion by a cottage higher up the canal, frequent at Liffey Junction, some dozens of plants at the Eighth Lock and several hundreds thence at intervals for more than a mile by Cabra road to Phibsborough, all in 1915.

5. Widespread over the north and east sides of Howth Head in 1915 : *e.g.*, fully 1,000 plants on the road from the police barracks to the village, swarming in the school playground at Ball of Glass, and many hundreds along the road thence to Waldron's, at intervals along the road from Waldron's to the Hut, and along the bye-road by Waverley Hotel, a few plants at the entrance to Light-house Road, and scattered thence along the road to the Summit tram station. A few plants by the roadside at Baldoyle and by the road from Coolock to Raheny, with about fifty plants at Raheny village, all in 1915.

7. In several stations by the Grand Canal in 1915 : *e.g.*, By Canal Harbour, Dolphin's Barn, by the Third Lock, and abundant by a cottage between that and the Second Lock. Fully 100 plants by a new road leading to Inchicore Brick-works, 1915. Abundant in one spot by the Tallaght road, near Green Hills, and sparingly near Drimnagh, and in a gravel pit at Robin Hood, 1916. A few plants in Chapelizod village and about 100 on the Ballyfermot road, 1915. In fair quantity round Mrs. Healy's farm yard, Bohernabreena, 1917.

8. A few plants on Victoria Wharf, Kingstown, 1910, and about fifty in the Harbour yard there, 1912; fully 100 plants on the Ballycorus road, and frequent by a cottage near Bride's Glen; about 200 plants on the main road, Loughlinstown, and swarming round a cottage there, and by other cottages on the Commons, 1915. In Blackrock Park, 1917.

This annual species now established in Ireland for a quarter of a century is highly fertile in Co. Dublin, as it is no doubt throughout the island. A well-grown plant bears about fifty fruiting heads, and an average of ten of these gave 167 ovules per head, of which the perfect seeds averaged 133. It grows most vigorously on limestone drift soils. On some of the higher bye-roads of Howth Head where quartzite comes to the surface the plants become very stunted.

***Artemisia Absinthium*, Linn.**

7. The chief Dublin station for the Wormwood has hitherto been in the heart of the city on the extensive rubbish mounds left by the demolition of tenement houses on the making of the new thoroughfare of Lord Edward Street in 1886. A clearance made for a garden plot in 1916 has greatly reduced the plant in this station, where it was previously abundant, and in the adjacent station of St. Nicholas' graveyard it has been quite exterminated by the throwing down of the old wall in 1917. A new and much wilder station, however, yielding fully fifty large plants and many

seedlings was discovered in a gravel pit near Robin Hood, Drimnagh, in 1916.

A. *Stelleriana*, Besser.

5. The North Bull station for this alien has of late years undergone a great change due to the shifting of the sands by westerly gales. The ground occupied by the plant in 1902, when it spread over a distance of a mile and three-quarters, was a low, flat shelf of sand a few feet above high tide level and on the outside of the line of dunes which marks the eastern limit of the Bull. In 1914 a second line of dunes was found to have drifted up on the seaward side of this shelf, running parallel with the older line of dunes and forming with it a valley, from 8 to 10 feet deep, stretching north and south for more than a third of a mile. A firing of the Psamma in 1905 burnt up much of the *Artemisia*, and the shifting sands buried large masses, so that in 1916 only a few plants were visible in this sand dune trough or valley. In September, 1917, however, the plant appeared in abundance towards the northern end of the dunes, emerging from the drifted sands and sending up a single flowering stem. No doubt many of the plants now missing from the earlier stations lie buried alive and await only a further displacement of the loose sands to display once more their broad cushions of silvery foliage.

***Senecio Cineraria*, DC.**

8. This handsome Mediterranean alien is spreading rapidly by wind-borne seeds southward along the sea cliffs of Killiney Bay, which it invaded from a neighbouring garden about forty years ago. Its present extension from Sorrento Point opposite Dalkey Island to its southern limit, the old stone pier about 100 yards north of the ninth milestone on the railway line, is fully one-third of a mile, and as the form of the coast continues favourable for about an equal distance southward, the plant will probably in course of time double its present range.

In addition to the cliffs running from Sorrento Point to near Vico bathing-place, which for many years have been densely clad with the plant, it has now become fully established to the southward in four of the steep-walled coves formed by the jutting out of rocky capes. The coast line here was carefully examined in February of the present year with the following result: the first cove with its adjacent banks just beyond the steps of the old bathing-place had about fifty large plants; the second, almost directly below Sunnyside on the Vico Road, 150; the third, a little further south, sixty; and the fourth, a little north of the stone pier, ninety-five. Many of these were old plants, with numerous stout recumbent stems forming masses of silvery-white foliage a yard in diameter, and when grouped together on the cliffs conspicuous at half-a-mile distance.

The extension of range here detailed has been almost altogether effected within the last ten years; for in 1907 scarce half a dozen plants were

to be seen on the line of cliffs from Vico bathing-place to the present southern limit of the species. The extension is not confined to the granite sea cliffs and their capping of drift. Twenty-six full-grown plants were counted on the rock cuttings of the railway beyond Strawberry Hill in February of this year, and seven others had crossed the Vico Road and established themselves on the gorse-clad slopes within the grounds of Killiney Castle.

Last summer near the Vico tunnel, where the rail runs right along the top of the steep sea bank, a spark or live coal from a passing engine set fire to a thick grove of the oldest plants, so that hundreds were destroyed. Nevertheless, vigorous seedlings appeared here in profusion in January of the present year, as many as fifty being counted streaming down-hill from the burnt stump of one old plant, while an area of 9 square feet in another spot yielded sixty seedlings.

The hybrid *S. albescens* (*S. Cineraria* × *S. Jacobaea*) is frequent throughout the range wherever both parent species occur. Two plants were seen on Dalkey Island in 1908 and four in 1915, and in April of this year a seedling was found at a height of fully 300 feet on the seaward slope of Killiney Hill. As is usual with hybrids, this plant appears in numerous forms presenting many varied shades of pubescence, all of duller tone than the silvery-white of the Mediterranean parent.

Sandycove.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

APRIL 23.—FIFTY-FIFTH ANNUAL MEETING.—Previous to the election of A. M'L. CLELAND as President F. A. HERON occupied the chair. The various reports having been read and adopted, the election of office-bearers for 1918-19 was then proceeded with. The election of six new members of Committee then followed. Suggestions for places to be visited on the summer excursions were placed before the meeting.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 14.—The President (J. de W. HINCH) in the chair. There were a number of exhibits by members. The President showed Boulder-clay and marine shells from the Dublin mountain drift deposits; R. LL. PRAEGER, discontinuous variation in Ferns; N. COLGAN, Brazilian species of *Eriocaulon* (Pipe-wort); W. D. HAIGH, crystalline forms of calcite; Prof. A. HENRY, branch of *Pinus tuberculata* with numerous persistent cones; A. WILLIAMS, copper ore from Beauparc.

MAY 4.—EXCURSION TO RUSH BULB FARM.—The excursion season of the Club opened auspiciously with a visit in typical May weather to "Holland in Ireland," the flourishing bulb farm of Messrs. Hogg and Robertson. A party of nineteen members and friends, leaving Dublin by the 1.35 p.m. train, arrived at Rush station about 2 o'clock, and after half an hour's walk reached the outskirts of the village and the first section of the farm which "rushes red on the sight" as one tops the rise in the main road from the hollow of Whitestown. Here the party was received by the conductress, Miss Crosbie, manager of the farm, who led the way through the quadrangle of densely massed blooms of Darwin and Cottage tulips, crimson, yellow, violet, vermilion, pink, maroon, orange, and many subtler tints. Each tint was carefully segregated, and every plant fully justified its existence: all were in perfect bloom; there were no "blind" bulbs, as the conductress put it in the forcibly figurative language of horticulture. An interesting survival from the Irish vernacular is found here in the word *CLAMP*, still applied locally to the furrows which drain and mark off one from the other the numerous tulip beds.

Two other sections of the farm, each like the first a chequered mass of bloom and with a soil of almost pure sand, were visited by the party, and the fine display of double Anemones was quite as much admired as the more formal Tulips. In one of these sections a bed of green tulip blooms was pointed out, not as a thing of beauty, but as a triumph of horticultural art.

Refreshed by an excellent tea in Mrs. Dunne's thatched cottage near the bulb farm, the party returned to Rush station in time for the 6.12 p.m. train to Dublin, each of the nineteen members bearing a huge bouquet of tulips and anemones generously presented by Messrs. Hogg and Robertson.

DUBLIN MICROSCOPICAL CLUB.

APRIL 10.—The Club met at Leinster House. The President (N. COLGAN, M.R.I.A.) in the chair.

W. F. GUNN exhibited an example of a reputed $\frac{1}{50}$ -inch objective made by Siebert of Berlin. Although in the latter half of last century these high power lenses were often used on test objects, they are now superseded by the modern achromatic and apo-chromatic immersion objectives, which allow much longer working distances, with greater penetration and defining power.

MAY 8.—The Club met at Leinster House. W. F. GUNN was elected President and H. A. LAFFERTY Vice-president for the session 1918-19.

Prof. G. H. CARPENTER and F. J. S. POLLARD showed sections through the vestigial lateral spiracles and their solidified tracheal connections, recently detected in the fourth-stage larva of the Warble-flies (*Hypoderma*), and previously shown to the Club. These interesting structures have now been fully described and figured by the exhibitors (*Proc. R. I. Acad.*, vol. xxxiv., B, No. 4, 1918).

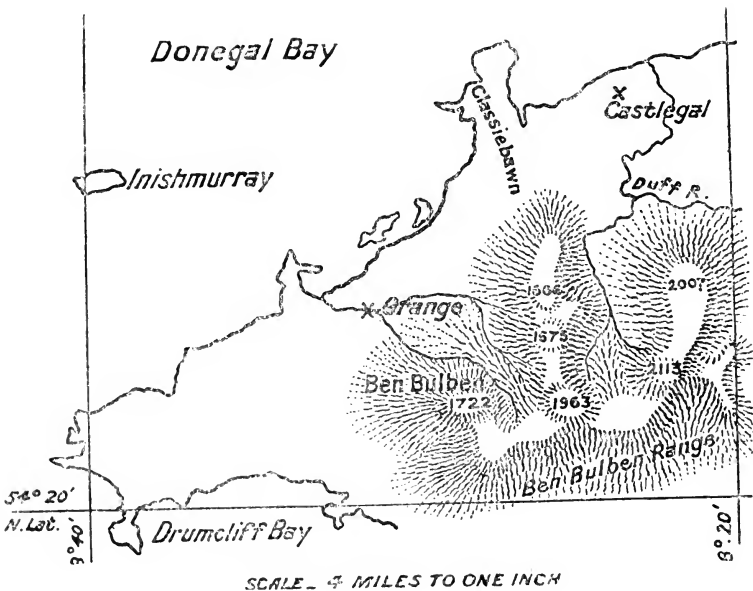
THE MIGRATION OF WOODCOCK.

SOME NOTES ON AN ARTICLE BY CAPTAIN DOUGLAS.

BY W. H. WORKMAN, F.Z.S., M.B.O.U.

CAPTAIN S. R. Douglas has written a most interesting article¹ on the migration of Woodcock in Ireland from which I propose making some notes for the benefit of those Irish ornithologists who may have not had the pleasure of reading this valuable paper.

The experiments were carried out at the instigation of Col. W. W. Ashley, M.P., at the Palmerston estates, County Sligo. The property consists of a strip of country lying



between the Ben Bulbin range and the southern shore of the Bay of Donegal in County Sligo. In the accompanying map an idea of the locality will be obtained, and I would

¹ *Proc. Zool. Soc. London*, 1917, vol. i., part 2

draw attention to Classiebawn and Castlegal which mark the position of the property.

The estate seems to be a splendid one for Woodcock, and it affords excellent sport; for instance, in January, 1892, 92 and 98 Woodcock were shot on consecutive days. A very interesting point brought out in the article is a comparatively recent regular nesting in these parts of this species. It appears quite certain that Woodcock nests were considered the greatest rarity before the year 1875. Since that date they have become more and more numerous and on the particular breeding ground on this property Woodcock nests were practically unknown before the year 1900.

In this connection from the records of Thompson² and of Moffat³ we may draw a general conclusion that Woodcock did not breed in Ireland before 1833, gradually extending their range till now it is reported from every county as a breeding species. The case of Tollymore Park, County Down, mentioned by Thompson, is very similar to the rapid extension on Col. Ashley's estate. In 1835 one nest was found, in 1837 three nests, 1842 nine nests, 1843 twenty-two nests, and from 1847 to 1849 not less than thirty nests each season.

One or two interesting facts are reached by Captain Douglas's investigations. He states that no definite proof of Woodcock raising two broods in the year has been obtained, but all the keepers on the estate are of the opinion that this occasionally happens. Readers of Thompson will remember that the keeper in Tollymore Park, County Down, considered that Woodcock nested twice in the season, for he observed them on their nests from February to July. It would be interesting if Captain Douglas would give this point his careful consideration and publish the result of his observations in his next paper.

Ringling experiments were commenced in the year 1910, and have been carried on every year since. Since 1912

² Natural History of Ireland, vol. iii., page 272.

Irish Naturalist, 1899, page 109.

fifty birds were marked each year. On looking over the first table in the article the most striking fact is the large number of birds which have been recovered on the estate, the actual number being 48 out of a total of 55 birds recovered, and of these no fewer than 33 were obtained in the immediate vicinity of the breeding ground. Of the seven birds obtained in other situations 3 were shot within a radius of 10 miles in a southerly direction.

One was shot at Castledearg, County Mayo, which is about 40 miles to the south-west. One was noticed in the market-place of Bilbao having been shot at Morgo, Province of Biscay, Spain, within six months of being marked, the distance in a direct line being about 800 miles, this is, I think, the most interesting of the recoveries, and it shows that there is a tendency for the northern-bred birds to migrate south during the winter, but I think we must come to the conclusion from these observations that Woodcock bred in temperate climates like our own do not as a general rule leave them during the winter. The birds, which come in great rushes to this country, as well as to other European countries, during hard winters are, I believe, birds bred in northern Europe, and are driven south by the fearful severity of the weather and want of food.

A curious point was brought out with regard to the weight of Woodcock. On two occasions when a considerable number of ringed birds had been taken and the weight of these nine marked birds had been carefully compared with the eight unmarked birds obtained on the same day, the average weight of the nine ringed birds was 11.97 ozs. and the average weight of the eight unringed birds was 11.3 ozs. Again, on January 15th, 1917, eight ringed birds averaged 12.7 ozs., and 16 unringed birds averaged 12.3 ozs. The following day 31 unringed birds gave the average weight of 12.1 ozs. From this observation we would conclude that the birds bred at the estate were much better fed than those which came in from northern regions, and which had probably been driven south by want of food.

The data collected in this paper points to there being three classes of Woodcock in this part of the west of Ireland, namely :—

- (1) Woodcock that are hatched out and remain in this locality sometimes for years, that is "Resident Birds."
- (2) Woodcock that are hatched out in this locality and that migrate in a southerly direction.
- (3) Woodcock that arrive from the north during the winter months.

I trust the above notes on Captain Douglas's valuable paper may be of interest, and we Irish ornithologists will welcome particulars of a further instalment of this Woodcock experiment. I may here say that Captain Douglas in a letter to me, hopes that others who have shootings both in Ireland and other parts of Great Britain would follow Col. Ashley's example so that more information could be collected regarding the migration habits of Woodcock.

Windsor Avenue, Belfast.

NOTES.

BOTANY.

***Cardamine amara* in East Tyrone.**

In addition to Mr. Greer's records for *Cardamine amara* in East Tyrone (*I. Nat.* December, 1917, vol. xxvi., p. 196) it might be well to note that on the excursion of the Belfast Naturalists' Field Club to the Torrent River valley on 3rd June, 1916, the plant was found near the aqueduct which carries the canal over the Torrent River.

SYLVANUS WEAR.

Belfast.

Arenaria ciliata.

In the *Nyt Magazin for Naturvidenskaberne*, 1917, pp. 215-225, Drs. Ostenfeld and Dahl discuss the northern segregates of this species, which in the British Isles is found only on the Ben Bulbin range in Ireland and (as *A. norvegica* of British floras) in Shetland. They divide the northern forms into three sub-species:—1. *hibernica*, (*A. ciliata* of British authors), the Irish plant; 2. *pseudofrigida*, occurring in Norway, Lapland, arctic Russia, Spitsbergen, and Novaja Semlia; and *norvegica* (*A. norvegica* Gunnerus and British authors), found in Norway, Sweden, Shetland, Iceland, Greenland, Ellesmereland, Labrador? and Canada.

ZOOLOGY.**Early Arrival of Spring Migrants.**

The Chiffchaff was observed here on 23rd March, exactly one month earlier than last year. My previous earliest date is 25th March in 1907.

On 1st April I saw one Swallow—my earliest date for its arrival being 5th April.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

A Magpie's Flight.

The Magpie is a very common bird about here. It suffers only a small amount of persecution, and seems right able to maintain itself in spite of the gamekeeper's gun. Abundance of wood, and a neighbourhood of trees is what the Magpie delights in. Its powers of flight depend a good deal on its surroundings. Hereabouts it has only opportunity to fly short distances. It finds perching facilities everywhere. I was surprised therefore during my holiday last September at Tramore (about 14 miles from here) to see a Magpie performing a very long flight. The day was a lovely one, very calm and clear with bright sunshine, and hardly a breath of wind. And for a long distance before the bird came near I could see it winging its flight in the upper air. Afterwards when it passed over where I stood I watched it flying a long distance till it became out of sight. It is only a rough computation, but I imagine its flight must have exceeded two miles. It is doubtful, and more than doubtful, according to my late friend, Mr. Barrington, whether the Magpie could attempt a migration, for he says:—"Its non-migratory character is sufficiently evinced by the fact that it has never been reported from a lightship, nor from such rock stations as the Fastnet, the Tuskar, or the Maidens." On a few occasions I have seen large flocks of Magpies, but never could ascertain what it was that had brought them together.

W. W. FLEMING.

Portlawn.

Corncrake in Trinity College Park.

On May 9th, at 10.15 p.m., when walking along Nassau Street, Dublin, I distinctly heard a Corncrake in Trinity College Park. In order to make quite sure, I went over and listened at the railings, and there is no doubt whatever as to the observation, which is surely worthy of record.

J. MACKAY WILSON.

Currygrane, Co. Longford.



W. FRANCIS DE VISMES KANE.

WILLIAM FRANCIS DE VISMES KANE.

By the death of W. F. de Vismes Kane, who passed away suddenly at his country house, Drumreaske, near Monaghan, on April 18th, at the age of seventy-eight, we lose the last of that generation of Irish naturalists to whom most of those now working looked for help and guidance in their early studies. Unhappily no life-long comrade of our departed friend can be asked to place on record the facts and lessons of his career, but we had the privilege of association with him at different times during the last thirty years, and his daughter, Miss Rhoda de Vismes Kane, has kindly furnished many interesting details from family records, including an unfinished autobiographical sketch of his own.

Kane was born at Withycombe, near Exmouth, Devon, in the year 1840. His father, Joseph Kane, the eldest son of Colonel Nathaniel Kane, a Dublin man, had migrated, on account of delicacy, to the south-western district of England, where he met and married the only daughter of the Comte de Vismes, a French nobleman resident in England, whose wife was a sister of Dr. Salt, British consul-general in Egypt, well known as a traveller and a collector of Egyptian antiquities. Sprung thus from a strain in which Irish, French and English lines were blended, Kane passed his early boyhood in a district of great scenic beauty with abundant opportunity for natural history studies; while still quite young he began to make collections of shells and insects and to accompany the south Devon fishermen when they put to sea.

After his father's death Kane went to a small boarding-school in London, "where he was badly fed and taught and was very miserable." A clergyman's house in Gloucestershire, where a few private pupils were taken, provided a more satisfactory educational environment; thence he passed to Cheltenham College, and later took his University courses in arts and engineering at Trinity College, Dublin, his home after his settlement in his father's native country being the house of his uncle, John Kane, in Co. Leitrim.

Immediately after completing his college course in 1862, Kane married the only daughter of Rev. Charles J. Hamilton, vicar of Kimberworth, near Rotherham, and settled at Drumreask House, Monaghan, a mansion and demesne near the family property which he had inherited. Here he took an active part in local government, and twice served as High Sheriff of the county. Fishing was his favourite recreation, and he became famous in the district through his prowess as a salmon-catcher. In 1876 an affection of the throat compelled him to seek a milder climate, and he spent some time in the south of France, Italy, and Switzerland. During this continental residence he visited the "Causses" country of Aquitaine, saw the famous Cro-Magnon caves and became interested in the study of pre-historic Man. But the most important activity of these years in relation to his later scientific work was the collection of butterflies, which he carried on systematically at Hyères and in Switzerland, thus laying the foundation of his wide knowledge of the Lepidoptera and gathering material for the useful small and portable collector's book, "The Butterflies of Europe," which he published in 1885. This book is remarkable for the condensed diagnoses of the species and for the excellent illustrations reproduced from photographs of perfect and beautifully set specimens by the isochromatic process, then recently introduced—"a new departure in entomological publication."

In 1879 Kane returned to Ireland, and for the next sixteen years lived partly at Drumreask and partly at Monkstown, on Dublin Bay. He now began to study in earnest the Lepidoptera of Ireland, visiting widely separated parts of the country and amassing a large collection which illustrated the great range of variation shown by so many of the Irish moths. His discoveries of melanic varieties in western Irish localities were especially noteworthy, and his almost black *Campptogramma bilineata* from the Blasquets, Co. Kerry, described in 1896, caused a sensation among entomologists.

At Monkstown the neighbouring sea attracted him, and he acquired a small yacht, the "Linda," in which he made frequent voyages around the coast, exploring the cliffs of

Co. Waterford and the Saltees, and combining in his natural history studies, marine zoology, ornithology and entomology, often landing in the evening after a day's sail to "sugar" in the woods. Once when working at flowering ivy in an old churchyard with lantern, sheet and net, he heard scratching and panting as of some one trying to climb the wall, which was high from the field below, but low on the inside. He flashed his lantern on the perspiring face of a policeman appearing above the coping. "I thought you were the devil," groaned the constable, while a comrade below ejaculated, "It could be nobody else!"

In 1886 Kane joined the dredging expedition on the "Flying Falcon" off the south-west of Ireland, organised by a band of naturalists, of whom W. S. Green, afterwards Inspector of Irish Fisheries, was the leader. The interest in marine zoology thus aroused led to a paper on parasitic Copepods, published by the Royal Irish Academy in 1891; and the study of Entomostraca became later a prominent aspect of Kane's activities. His work on the Irish Lepidoptera had now been carried so far that in 1893 he began in the *Entomologist* the "Catalogue," which may be regarded as his principal work; it was not concluded until 1901; after the completion of its serial publication it was issued as a separate volume. The old Irish list of Birchall was treated by Kane with a critical sympathy, doubtful records being withdrawn or corrected, and a sure foundation laid for future workers. In 1896 Kane gave up his house at Monkstown and spent his time chiefly at Drumreask, where he became busy at fruit and bee culture and landscape-gardening, importing many flowering shrubs from Japan and elsewhere to beautify his grounds. In 1897 Kane suffered heavy bereavement in the loss of his only son, and again in 1901 when his wife died.

He had been an original member of the Dublin Naturalists' Field Club in 1886; in 1901 he was elected President, a compliment which gave him considerable gratification. In 1902 he contracted a second marriage with the widow of Col. Green Wilkinson; for the next few years he divided his time between residence in Drumreask and Kent and foreign travel, ranging as far eastward as Egypt and the

Holy Land. In 1904 he made over his great collection of Lepidoptera to the National Museum, Dublin, and thenceforth devoted his zoological activities to the study of the Crustacea, in which he derived much pleasure through association with the late Canon A. M. Norman of Durham, and correspondence with Dr. Vejdovsky of Prag and other authorities. The latter named in his honour the type species (*de Vismesi*) of *Bathyonyx*, a new genus of Amphipoda discovered by him along with *Niphargus kochianus* in Lough Mask. During his last years he renewed his early interest in archaeology and published in 1909 and 1917 two papers of importance on the "Black Pig's Dyke"—the ancient boundary fortification of Ulster—in the *Proceedings* of the Royal Irish Academy. His love for Irish antiquities was deep; at the International Zoological Congress at Cambridge in 1898, we recall how in a friendly argument with the late Judge Kane he claimed the chieftainship of his clan.

His vigour and energy to the very end of his long life astonished all his friends who knew his age, and up to the week of his death he was active in promoting the agricultural and other industries of his neighbourhood, as well as in the cultivation of his own demesne, his archaeological and zoological studies, and the work of the Church of Ireland, of which he was a devoted member, serving not only on the Council of his diocese but on the General Synod and the Representative Body. To quote his daughter's words: "His endless activities gave the impression that he would live many years longer. This, however, was not to be; he saw his beloved trees and shrubs in their spring beauty once more, and, after only a few hours' illness, passed quietly away."

The wide interests of his life made him a large circle of friends, all of whom learned to appreciate some features at least of his many-sided character. He was a delightful companion in natural history field-work, knowing much about many subjects and ready to convey information to all who consulted him; in a day's heavy hill-tramping he could outstay many younger men. When dealing with the groups that he studied most closely—the Lepidoptera and small Crustacea—he never became a narrow specialist; the

broad aspects of biology appealed to him more strongly than the minute varietal and sub-specific distinctions which modern systematists love, and indeed his naturally conservative mind was somewhat intolerant of the growing elaboration in recent years of zoological, and especially entomological nomenclature. Had he restricted his studies more closely to one of the lines that attracted him he might have won for himself a more prominent name in the world of science. But we who treasure his memory realise that in the life of his country he filled to admiration the part for which he was eminently fitted—an Irish gentleman and a true naturalist.

GEO. H. CARPENTER.

LIST OF THE MORE IMPORTANT WRITINGS OF
W. F. DE VISMES KANE, M.A., M.R.I.A.

Compiled by J. N. HALBERT, M.R.I.A.

Many of the short notes on Irish Lepidoptera contributed by Mr. Kane to the *Entomologist* and the *Entomologists' Record and Journal of Variation* are not included in this bibliography; nor are his short notes in the pages of the *Irish Naturalist*, which are indexed in the last number of volume xxv. With few exceptions, the records contained therein were incorporated in his valuable "Catalogue of the Lepidoptera of Ireland." The first instalment of the "Catalogue" appeared in the *Entomologist* in 1882. On its completion in 1901 it was reprinted as a separate volume by West, Newman & Co.

CRUSTACEA.

1892. On a New Species of Lernaepoda from the West Coast of Ireland. *Proc. R. I. Acad.* (3), vol. ii., p. 205.
1900. Entomostraca from Lough Ree. *Irish Nat.*, vol. ix., p. 12.
1901. Notes on Irish Cladocera. *Irish Nat.*, vol. x., p. 112.
1903. A Contribution to the Knowledge of Irish Fresh-water Entomostraca. Cladocera. *Irish Nat.*, vol. xii., p. 210.
1903. Rare blind Amphipod from Lough Mask. *Irish Nat.*, vol. xii., p. 273.
1904. Further captures of *Mysis relicta* in Ireland. *Irish Nat.*, vol. xiii., p. 107.
1907. Additional Records of Fresh-water Entomostraca in Ireland. *Irish Nat.*, vol. xvi., p. 305.

INSECTA.

1882. Report on the Entomology of certain districts in Ulster. *Proc. R. I. Acad.* (2), vol. iii., p. 784.
1882. Causes of Abundance or otherwise of Lepidoptera. *Entomologist*, vol. xv., p. 244.
1883. Remarks upon certain Causes of Scarcity of Lepidoptera. *Entomologist*, vol. xvi., p. 52.
1884. Variation of European Lepidoptera. *Entomologist*, vol. xvii., p. 97.
1884. Influence of Meteorological Conditions upon Lepidoptera. *Entomologist*, vol. xvii., p. 25.
1884. Report on Irish Lepidoptera. *Proc. R. I. Acad.* (2), vol. iv., p. 105.
1886. Report on Researches on the Macrolepidoptera at Killarney, &c. *Proc. R. I. Acad.*, (2), vol. iv., p. 588.
1885. A Handbook of European Butterflies. Macmillan & Co., London.
1885. Scientific Nomenclature and Dr. Lang's "European Butterflies." *Entomologist*, vol. xviii., p. 45.
1886. The Tephrosia Discussion. *Entomologist*, vol. xix., p. 209.
1886. Some Notes on the Comparative Study of British and Continental Rhopalocera. *Entom. Month. Mag.*, vol. xxiii., p. 244.
1891. The generic position of *Dianthoecia Barrettii*. *Entom. Record*, vol. i., p. 260.
- 1893-01. A Catalogue of the Lepidoptera of Ireland. *Entomologist*, vols. xxvi.-xxxiv. Issued separately in 1901 (West, Newman & Co.).
1893. The Melanism Controversy. *Entomologist*, vol. xxvi., p. 307.
1893. Irish Entomology. *Irish Nat.*, vol. ii., p. 32.
1894. The New Entomology. *Entomologist*, vol. xxvi., p. 185.
1895. The Lepidoptera of the Galway Excursion. *Irish Nat.*, vol. iv., p. 263.
1895. On the Variation of *Melitaea aurinia*, Rott. *Entom. Record*, vol. vii., p. 230.
1895. The Resting Habit of Insects as exhibited in the Phenomena of Hibernation and Aestivation. *Entom. Record*, vol. vii., p. 243.
1896. Observations on the Development of Melanism in *Campptogramma bilineata*. *Irish Nat.*, vol. v., p. 74. (See also vol. vi., p. 44).
1897. *Leucania unipuncta*, Haw., in Co. Cork. *Irish Nat.*, vol. vi., p. 104.
1898. Lepidoptera of Achill. *Irish Nat.*, vol. vii., p. 135.
1900. Mr. Donovan's captures in Co. Cork. *Entomologist*, vol. xxxiii., p. 197.
1907. Lepidoptera of Lambay. *Irish Nat.*, vol. xvi., p. 44.

VERTEBRATES.

1892. Sharks in Irish Waters. *Field*, vol. lxxx., p. 917.
1893. Is the Frog a native of Ireland? *Irish Nat.*, vol. ii., p. 95.
1893. The Eagle Owl (*Bubo maximus*) in Ireland, and former scarcity of the Magpie (*Pica rustica*). *Irish Nat.*, vol. ii., p. 113.

1894. The Reddish-grey Bat (*Vespertilio Nattererii* Kuhl) in Co. Galway. *Irish Nat.*, vol. iii., p. 116.
1896. Pine Martens recently taken in Ireland. *Irish Nat.*, vol. v., p. 28.
1905. Wild Cats formerly indigenous in Ireland. *Irish Nat.*, vol. xiv., p. 165.
1916. The Crossbill and its Diet. *Irish Nat.*, vol. xxv., p. 53.

ARCHAEOLOGY.

1870. Account of Two Antiquities presented to the Academy. *Proc. R. I. Acad.*, vol. xv., p. 2.
1885. Notes on Crannoges in Co. Leitrim. *Roy. Hist. and Arch. Soc. Ireland*, vol. xvii., p. 407.
1911. The Black Pig's Dyke: The Ancient Boundary Fortification of Uladh. *Proc. R. I. Acad.*, vol. xxvii., C. p. 301.
1915. The Dun of Drumsna. *Proc. R. I. Acad.*, vol. xxxii., C. p. 324.
1917. Additional Researches on the Black Pig's Dyke. *Proc. R. I. Acad.*, vol. xxxiii. C. pp. 539.

GENERAL.

902. Recent progress in Irish Natural History. Presidential Address. *Irish Nat.*, vol. xi., p. 53.

BOTANICAL NOTES FROM INISTIÖGE.

BY R. LLOYD PRAEGER.

I. WATER-BORNE FLORA OF POLLARD WILLOWS.

JUST below the bridge at Inistiöge, and about a mile below the spot where the River Nore ceases to be affected by the tide, the stream is fringed with pollard willows. The rise and fall of tide here averages about three feet, and while the tops of the willow stumps are about six or more above the water when the tide is down, a spring tide, or a combination of flood and tide, submerges them occasionally in autumn and winter, and seeds and mud are deposited among the branches. Mosses help to fix these materials, and a varied epiphytic flora results. That water rather than wind is the transporting agent is clear from the subjoined list, in which will be found many plants that are not light-seeded. The flora of the willow-tops is generally

cut off from that of the ground by several feet of bare trunk. An examination of a dozen willows gave the following list:—*Ranunculus acris*, *R. repens*, *R. Ficaria*, *Cardamine pratensis*, *C. sylvatica*, *Acer Pseudo-platanus*, *Vicia sepium*, *Trifolium repens*, *Spiraea Ulmaria*, *Rosa canina*, *Sanicula europaea*, *Chaerophyllum sylvestre*, *Angelica sylvestris*, *Oenanthe crocata*, *Heracleum Sphondylium*, *Hedera Helix*, *Galium saxatile*, *Lonicera Periclymenum*, *Valeriana sambucifolia*, *Achillea Millefolium*, *Senecio aquaticus*, *Taraxacum officinale*, *Campanula Trachelium*, *Veronica Chamaedrys*, *Origanum vulgare*, *Plantago lanceolata*, *Fagus sylvatica*, *Carex sylvatica*, *Festuca ovina*, *Brachypodium sylvaticum*, *Polypodium vulgare*.

2. TIDAL INFLUENCE ON VEGETATION.

Where the rise and fall caused by the tide is four or five feet, *Caltha palustris* still abounds near the lower limit, and may be seen at high tide flowering abundantly under a yard of water. The flowers appear uninjured by this semi-diurnal drowning, and the seed follicles were swelling. Several of the plants which root on the bottom also appeared to be not discommoded by these rapid fluctuations of level—for instance, *Nuphar luteum* and *Potamogeton lucens*. Saline influence is first observable about two miles below the “top of the tide,” where the river is already very muddy and estuarine, and the rise and fall almost that of the full amplitude of the tide. Here *Scirpus maritimus* and *S. Tabernaemontani* fringing the mud-banks are the first halophile species to appear, growing among *Caltha palustris*, *Rumex crispus*, *Alisma Plantago*, and *Callitriche* sp. But the foreshore here exhibits no trace of marine influence as regards either its flora or its fauna.

3. FLORISTIC NOTES.

In connection with these notes the following broad features of the area should be borne in mind. The River Nore, which, as far south as Thomastown (six miles N.W.

of Inistioge) flows through a limestone valley with a rich calcicole flora, at that point passes into Old Red Sandstone and then Silurian rocks, which at Inistioge are succeeded by mica schist with granite on the higher grounds: through these rocks the river has cut a beautiful richly wooded gorge.

Ranunculus Lingua L.—By the Nore a mile below Inistioge.

Sisymbrium Thalianum J. Gay.—About Inistioge.

Linum angustifolium Huds.—Gravel pit below Inistioge.

Vicia angustifolia Roth.—In several stations.

Prunus Padus L.—Wood near Inistioge. New to Co. Kilkenny.

Sedum spp.—No native species of *Sedum* was seen in the district, but naturalized species are unusually abundant; *S. album* occurs in many places, and *S. rupestre*, *S. sexangulare* and *S. spurium* were also seen growing "wild."

Centranthus ruber DC.—Abundant, and almost entirely in the handsome crimson form. In gravel-pits as well as on rocks and walls.

Primula officinalis Jacq.—Unusually abundant for a district where limestone is absent.

***Polygonum Bistorta** L.—By the river below Inistioge bridge. New to Co. Kilkenny.

Colchicum autumnale L.—So far as my observations go, this local plant has a very defined habitat. It haunts flat damp meadows by the river, but above the limits of floods. The wetter meadows, with *Caltha* and *Iris*, are devoid of it, as are the drier pastures which rise from the river-flat.

Polypodium vulgare L.—The prevailing plant is the broad-leaved form (up to 8 inches across the frond) with slightly serrated lobes which one rather associates with limestone areas.

Lastrea spinulosa Presl.—Springing on Mount Alto, 1½ miles south of Inistioge, at 700 feet elevation. Second Kilkenny record.

Osmunda regalis L.—Many fine plants by a stream on Brandon Hill. I had previously (in 1898) found a few plants on another part of this mountain.

National Library, Dublin.

SOME MORE IRISH ICHNEUMONIDAE AND
BRACONIDAE.

BY REV. W. F. JOHNSON, M.A., F.E.S., M.R.I.A.

LAST year was not particularly good for Ichneumon Flies owing to the broken weather, especially in the autumn, for these insects are lovers of sunshine, and in dull or wet weather they are not to be seen. My holiday in Donegal was on this account not nearly as productive as usual. I broke new ground at Portnoo, so have a lot of common species to record from thence. I found it a very promising locality. It is situated on the south side of Gweebarra Bay about nine miles from Glenties, which is the nearest railway station.

A good many of the species mentioned in the following list have not, as far as I know, been previously recorded from Ireland, but as our knowledge of these insects in Ireland is too imperfect to admit of an attempt at an Irish List, it is not necessary to specify them. I do, however, bring forward an addition to the Britannic List in *Spilocryptus mansuetor* Tschek, but with some doubt, as to its determination, I have had to depend on Dr. O. Schmiedknecht's revision of the Cryptinae in the *Entomologischen Nachrichten* for 1890, in which there is no detailed description.

Some of these insects pass the winter in the perfect state like the Wasps, Humble Bees, and certain Butterflies. Mr. Foster's specimen of *Ichneumon suspiciosus* was in this condition, and my specimen of *I. extensorius* was probably just awakened out of its long sleep, as it was jumping about on the road in a most absurd manner, and I caught it with my hand. The variety of *Glypta genalis* which I took here is a very handsome creature, the red colour showing up brilliantly against the deep black of the rest of the body.

I was very pleased to meet with *Lissonota basalis* at Coolmore and Portnoo, and I dare say it will prove to be as common as its close ally *L. sulphurifera*.

As the summer draws on, Ichneumon Flies become more plentiful, for then their victims are ready for them. It

must be remembered that these creatures live on other insects, attacking them either in the larval or pupal stage, and when their host should emerge they emerge instead, and prepare for a fresh campaign. Thus, the little Ichneumons which attack the White Cabbage Butterfly are now preparing to emerge so as to be ready to assail the larvae as soon as they appear, and so assist the grower of cabbages, who would be very badly off indeed without the help of these tiny allies.

The Coolmore specimens were taken in August, unless otherwise stated, and those at Portnoo in September.

I have once more to thank Mr. Claude Morley, F.E.S., for most kind assistance with several critical species. He is always most ready and generous in placing his great knowledge at my disposal.

ICHNEUMONIDAE.

ICHNEUMONINAE.

- Craticheumon fabricator** F.—Coolmore, in August, on roadside among willows. A variety of the male, with the head entirely black.
- C. pallidifrons** Gr.—Antrim, in August; taken by J. J. F.-X. King.
- Melanichneumon monastagon** Gr.—Portnoo, among willows, rare.
- Barichneumon anator** Fab.—Newcastle, Co. Down, in June; taken by J. J. F. X. King.
- B. vacillatorius** Gr.—Coolmore, in a window, a male.
- B. albicinctus** Gr.—Portnoo, among willows, and at flowers of Wild Carrot; males.
- Ichneumon xanthorius** Förster var. **flavoniger** Gr. Portnoo, among willows.
- I. sarcitorius** L.—Portnoo, among willows.
- I. latrator** Fab., var. **means** Gr.—Coolmore, in September, among herbage in a lane; a variety with the fourth segment entirely red and the sixth white marked.
- I. melanotis** Hlgr.—Portnoo, at Wild Carrot, uncommon.
- I. suspiciosus** Wesm.—Drumagullion, near Stewartstown, Co. Tyrone. Taken by Mr. N. H. Foster under a stone in a field on March 25th; a female in hibernation.
- I. extensorius** L.—Portnoo, at flowers. Poyntzpass, I took a small form of the female of this species running on the road on April 2nd.
- I. submarginatus** Gr.—Coolmore, among willows, a male.
- I. cessator** Müll.—Portnoo, among willows.
- Chasmias motatorius** Fab. }
Platylabus pedatorius Fab. } Poyntzpass, in fields, males, in July.
Phaeogenes argutus Wesm. }

Phaogenes ophthalmicus Wesm.—Portnoo, on sandhills.

P. rusticatus Wesm.—Portnoo, among sallows.

CRYPTINÆ.

Microcryptus perspicillator Gr.—Portnoo, at flowers.

M. subguttatus Gr.—Coolmore, a male, among sallows.

M. improbus Gr.—Coolmore and Portnoo, among sallows.

M. graminicola Gr.—Coolmore, in house; Portnoo, at flowers.

M. nigrocinctus Gr.—Coolmore, among sallows.

M. sperator Mull.—Portnoo, on sandhills.

Phygadeuon ovatus Gr.—Poynzpass, in a window, in June, a female.

P. inflatus Thoms.—Poynzpass, in fields, in August.

Pezomachus tristis Fab.—Coolmore, among sallows, a female.

Atractodes croceicornis Hal.—Portnoo, at flowers, a female. ¹Holiday records it as rare in Ireland, and Morley² records one specimen from Suffolk.

Exolytus laevigatus Gr.—Coolmore, among sallows.

Pycnocyptus peregrinator L., var. **analis** Gr.—A male, Newcastle, Co. Down, in August, taken by J. J. F. X. King.

Spilocryptus mansuetor Tschek.—Poynzpass, in my garden, in June, a female. New to the British List.

S. abbreviator F.—Portnoo, among herbage on roadside, a female.

S. nubeculatus Gr.—Newcastle, Co. Down, in July; taken by J. J. F. X. King, a female, rare.

Cryptus viduatorius Fab.—Newcastle, Co. Down, in August; taken by J. J. F. X. King.

C. minor Gr.—Coolmore, among sallows.

PIMPLINÆ.

Pimpla brevicornis Gr.—Portnoo, among herbage.

P. calobata Gr.—Portnoo, at flowers of Wild Carrot.

P. arctica Zett.—Portnoo, at Wild Carrot.

P. turionella L. } Portnoo.

P. alternans Grav. }

P. ovivora Boh.—Poynzpass, in June, a female, which I took on the wing at a plant of Black Bryony, which grows at the front on my house.

Glypta fronticornis Gr.—Coolmore, among sallows.

G. genalis Möll.—Poynzpass, in July, in my fields; a variety with the second segment of the abdomen in the female and the second, third and fourth segments in the male red or partly red. Mr. Morley tells me he has not met with this form before. The type has the abdomen entirely black.

Lissonota bellator Gr.—Portnoo.

L. variipes Desv.—Coolmore, in September, a specimen with the areolet pentagonal; Portnoo.

1. *Ann. Nat. Hist.*, 1839, p. 119. 2. "British Ichneumonans," vol. ii., p. 253.

- Lissonota cylindrator* Vill. } Portnoo; of the latter I took a female
L. sulphurifera Gr. } with the coxae red.
L. basalis Brischke. —Coolmore, Portnoo.

TRYPHONINAE.

- Homocidus caudatus* Thoms. }
Mesoleius semicaligatus Gr. }
M. bicolor Gr. } Portnoo at Wild Carrot.
M. nigricollis Gr. }
Dyspetes praerogator L.
Tryphon elongator Fab.
Perispudius sulphuratus Gr. }
Euryproctus atomator Müll.—Coolmore, at Wild Carrot.
Prionopoda glabra Bridg.—Poyntzpass, in July, in field.
Polyblastus rivalis Hlgr.—Portnoo, at shallows.
P. varitarsus Gr.—Antrim, in August, taken by J. J. F. X. King.

OPHIONINAE.

- Campoplex terebrator* Förster.—Newcastle, Co. Down, in July; taken by J. J. F. X. King.
Sagaritis postica Bridg.—Poyntzpass, in May, in a lane, at flowers of Hedge Parsley.
Limnerium ruffemur Thoms. }
Pyracmon obscuripes Hlgr. } Poyntzpass, July, in fields.
Nemeritis sordida Gr. }
Meloboris litoralis Hlgr.—Coolmore, in September, at Wild Carrot.
Ophion luteus L.—Newcastle, Co. Down, taken in July, by J. J. F. X. King.

BRACONIDAE.

- Rhogas irregularis* Wesm.—Poyntzpass, in July, in field.
Chelonus inanitus Linn.—Athlone, in July, taken by J. J. F. X. King.
Apanteles spurius Wesm.—Newcastle, Co. Down, reared from larvae of *Tyramis cardui*.
A. falcatus Nees.—Poyntzpass, in field, at Hogweed, in July and August. Coolmore, at *Daucus Carota*, on roadside. I erroneously recorded this as *Eubadizon flavipes* H l. in the *Irish Naturalist*, vol. xxiv., 1915, p. 133.
Microgaster globatus Nees.—Poyntzpass, in July, in field.
Meteorus lividus Ruthe. —Portnoo, on heather.
M. pulchricornis Wesm. —Portnoo, among herbage on roadside.
M. melanostictus Capron.—Poyntzpass, in June, among herbage.
M. punctiventris Ruthe.—Coolmore, on sandhills, in September.
Macrocentrus marginator Nees.—Poyntzpass, in July, in field.
Diospilus capito Nees. —Coolmore, in September, in window.
Poyntzpass, Co. Armagh.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Grivet Monkey from Lt. H. P. Murphy, a Blue-fronted Amazon from Mrs. Abdy, and a Grey-lag Goose from Mrs. Fitzgerald. A rare Guenon Monkey (*Cercopithecus neglectus*) has been received on deposit; Chacma and Yellow Baboons and two Vervet Monkeys have been purchased for the collection. Two male Lion-cubs (parents "Finn" and "Hassanatu") were born on May 13th, but did not survive. Egyptian and Canadian Geese have been hatched in the Gardens.

BELFAST NATURALISTS' FIELD CLUB.

EXCURSION TO SAINTFIELD.—The first excursion of the summer season was held to Saintfield on May 18 under the leadership of S. A. Bennett. The demesne of Saintfield House was visited and also "Rowallane" where the rock garden—just in its prime—was greatly admired. Tea was served here, after which the usual business meeting was held, six new members being elected.

NOTES.

BOTANY.

A New Station for *Lathraea squamaria* in Co. Dublin.

While taking a stroll early in May last I came across a plant of the above species beside the small stream which falls into the right bank of the Dodder a short distance above Bohernabreena bridge. It appears to be new to District 7 of Mr. Colgan's Flora of Co. Dublin.

J. P. BRUNKER.

Rathgar.

Draba muralis in Co. Down.

The only published record for *Draba muralis* in Co. Down is "Walls at Rogers' Nursery at Newry, '96, Lett!" A few weeks ago I found a small colony of this plant growing on wall by side of level crossing about a quarter of a mile north of Hillsborough railway station. Further search revealed it in numerous other places in the neighbourhood. In Agliscrope Nursery it is growing literally in thousands, and it may well be that it has been there introduced and from thence spread. In the nursery it is growing mainly in the beds and on the walks, and it is also growing along the adjoining roadside. It is common in the Downshire gardens, about a mile distant from the nursery. There is a small colony in my own garden (where

I believe it did not exist last year), and it may be noted that in this case the *Draba* is growing alongside a bed of curleys, the plants of which came from Aglesgrove Nursery last August.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

ZOOLOGY.

Bird Life at Currygrane, Co. Longford.

The following records of the dates on which some of our common migratory birds were first seen or heard during a series of twenty-nine years (1889-1917) may be of interest to ornithologists:—

SWALLOW (first seen)—1889, Apr. 19; 1890, Apr. 19; 1891, Apr. 19; 1892, Apr. 12; 1893, Apr. 5; 1894, Apr. 15; 1895, Apr. 12; 1896, Apr. 16; 1897, Apr. 19; 1898, Apr. 8; 1899, Apr. 24; 1900, Apr. 15; 1901, Apr. 14; 1902, Apr. 9; 1903, Apr. 25; 1904, Apr. 14; 1905, Apr. 12; 1906, Apr. 6; 1907, Apr. 22; 1908, Apr. 30; 1909, Apr. 8; 1910, Apr. 16; 1911, Apr. 18; 1912, Apr. 11; 1913, Apr. 21; 1914, Apr. 18; 1915, Apr. 22; 1916, Apr. 22; 1917, Apr. 23.

CUCKOO (first heard):—1890, Apr. 22; 1891, Apr. 24; 1892, May 1; 1893, Apr. 22; 1894, Apr. 18; 1895, Apr. 23; 1896, Apr. 22; 1897, Apr. 24; 1898, Apr. 21; 1899, Apr. 21; 1900, Apr. 25; 1901, Apr. 25; 1902, Apr. 21; 1903, Apr. 25; 1904, Apr. 29; 1905, Apr. 29; 1906, May 1; 1907, May 3; 1908, Apr. 30; 1909, Apr. 24; 1910, Apr. 30; 1911, Apr. 28; 1912, Apr. 25; 1913, Apr. 21; 1914, Apr. 19; 1915, Apr. 29; 1916, Apr. 29; 1917, May 1.

CORNCRAKE (first heard):—1890, Apr. 29; 1891, Apr. 30; 1892, May 5; 1893, Apr. 19; 1895, Apr. 23; 1897, Apr. 26; 1899, Apr. 23; 1900, May 3; 1901, Apr. 21; 1904, Apr. 28; 1905, Apr. 24; 1907, Apr. 25; 1908, May 1; 1909, Apr. 23; 1911, May 5; 1912, Apr. 22; 1914, May 5; 1915, Apr. 26; 1916, Apr. 28; 1917, May 1.

CHIFFCHAFF (first heard):—1893, Mar. 22; 1894, Mar. 21; 1895, Apr. 3; 1896, Mar. 22; 1897, Apr. 4; 1898, Apr. 10; 1899, Apr. 16; 1900, Apr. 17; 1901, Apr. 15; 1902, Apr. 4; 1903, Apr. 5; 1904, Apr. 14; 1905, Mar. 22; 1906, Apr. 5; 1907, Mar. 28; 1908, Apr. 7; 1909, Apr. 6; 1911, Apr. 11; 1912, Mar. 25; 1913, Mar. 25; 1914, Apr. 1; 1915, Apr. 5; 1916, Apr. 9; 1917, Apr. 22.

SPOTTED FLYCATCHER (first seen):—1892, May 11; 1912, May 15; 1913, May 7.

WILLOW-WREN (first heard):—1894, Apr. 7; 1895, Apr. 12; 1896, Apr. 5; 1897, Apr. 10; 1898, Apr. 11; 1899, Apr. 16; 1900, Apr. 24; 1901, Apr. 17; 1902, Apr. 12; 1903, Apr. 19; 1904, Apr. 14; 1905, Apr. 14; 1906, Apr. 8; 1907, Apr. 15; 1908, Apr. 17; 1909, Apr. 10; 1911, Apr. 17; 1912, Apr. 16; 1913, Apr. 7; 1914, Apr. 11; 1915, Apr. 19; 1916, Apr. 20; 1917, Apr. 30.

J. MACKAY WILSON.

Currygrane, Co. Longford.

Green Sandpiper in Co. Westmeath.

In the *Irish Naturalist* of January last (*supra*, p. 14) Mrs. Rait Kerr recorded an example of *Totanus ochropus* from King's County. It may be interesting to note that nearly a month later a specimen was secured near Killucan by a party whilst snipe shooting. This, killed on December 14, 1917, I am told was an adult male. It is being preserved by Williams, Dublin. As far as I can gather no other occurrences have been reported from Co. Westmeath within recent years.

FRED. S. BEVERIDGE,
Lt. 3rd Bn. Royal Scots.

The Barracks, Mullingar.

Snow Geese at Mutton Island, Co. Galway.

Mr. John Glanville, of Mutton Island lighthouse informs me that on December 5th, 1917, he observed 12 "White Geese" flying eastwards; and in subsequent letters about the birds he told me that they were slightly larger than Brent Geese and smaller than Barnacle Geese, and were pure white, except that at least one had black on the wing. The birds were under observation through a telescope for about ten minutes. There seems to be no doubt that they were Snow Geese (*Anser hyperboreus hyperboreus*).

WILLIAM RUTTLEDGE.

Hollymount, Co. Mayo.

Incubation Period of Birds.

I am very anxious to collect information as to the incubation period of those British Birds which nest with us, but so far, though I have consulted most available works, I have not seen any mention of this feature, except in one, which casually records that the incubation period of wild birds (*i.e.*, exclusive of the domestic fowl and duck) varies from ten days to as many weeks. I am myself studying to try to obtain the exact periods, but at present am unable to devote all the time I should like to observations, and therefore I would be very pleased if any reader who has already determined this question would (with your permission) inform me through the pages of this Magazine, of the results they have arrived at. I think that information of this kind would be of special value to those who are marking birds for the "British Birds" Scheme.

HETEN M. RAIT KERR.

Enfield, Co. Meath.

REAPPEARANCE OF LATHYRUS MARITIMUS
IN KERRY.

BY REGINALD W. SCULLY, F.L.S.

THE great rarity of the Sea Pea in Ireland and its disappearance from its only known station, the Castlemaine sand-hills of Kerry, for a period of almost three quarters of a century are enough to warrant more than a bald record of its reappearance there in the present year.

On July 28 last I was very agreeably surprised to receive from my friend Mrs. Jenner an accomplished Kerry

The Editors and Publishers regret the unavoidable suspension of this Magazine due to a dispute in the Dublin Printing Trade. It is purposed to issue another double number (for October-November) as early as possible to be followed by the December number with Index, completing the Volume.

... the English sea coast in this manner, in barren barren cliffs of rocks, and among pebbles where no earth is seen to give them nourishment, for the roots run to a great depth, to find the earth. In times of scarcity of provisions they have afforded great relief to the people of England, who lived near the sea coast, and who having never observed it, till necessity sent them to its stores, they then thought it was sent by miracle for their support."

The second notice occurs in a "Catalogue of Rare Plants found in Ireland," published in 1806 by that distinguished Irish botanist, James Townsend Mackay. He there states "I found this [*Lathyrus maritimus*] on the sandhills, bay of Castlemaine in August, 1804." Mr. William Andrews appears to have been the next to gather the

Green Sandpiper in Co. Westmeath.

In the *Irish Naturalist* of January last (*supra*, p. 14) Mrs. Rait Kerr recorded an example of *Totanus ochropus* from King's County. It may be interesting to note that nearly a month later a specimen was secured near Killucan by a party whilst snipe shooting. This, killed on December 14, 1917, I am told was an adult male. It is being preserved by Williams, Dublin. As far as I can gather no other occurrences have been reported from Co. Westmeath within recent years.

FRED. S. BEVERIDGE,
Lt. 3rd Bn. Royal Scots.

The Barracks, Mullingar.

I am very anxious to collect information as to the incubation periods of those British Birds which nest with us, but so far, though I have consulted most available works, I have not seen any mention of this feature, except in one, which casually records that the incubation period of wild birds (*i.e.*, exclusive of the domestic fowl and duck) varies from ten days to as many weeks. I am myself studying to try to obtain the exact periods, but at present am unable to devote all the time I should like to observations, and therefore I would be very pleased if any reader who has already determined this question would (with your permission) inform me through the pages of this Magazine, of the results they have arrived at. I think that information of this kind would be of special value to those who are marking birds for the "British Birds" Scheme.

HELEN M. RAIT KERR.

Enfield, Co. Meath.

REAPPEARANCE OF *LATHYRUS MARITIMUS*
IN KERRY.

BY REGINALD W. SCULLY, F.L.S.

THE great rarity of the Sea Pea in Ireland and its disappearance from its only known station, the Castlemaine sand-hills of Kerry, for a period of almost three quarters of a century are enough to warrant more than a bald record of its reappearance there in the present year.

On July 28 last I was very agreeably surprised to receive from my friend, Mrs. Jenner, an accomplished Kerry botanist, fresh specimens of this long lost plant which had just been sent her by the lucky finder, Miss Elsie Hilliard, who had discovered it growing in considerable quantity in its old station. Two days later I was informed by Mr. R. Ll. Praeger that he too had received specimens, in his case direct from the finder, and it is at his request that I have put together the following notes on *Lathyrus maritimus* in Ireland.

The first Irish record appears in Dr. Smith's "History of Kerry," published in 1756, where, on p. 380, he writes:—"Pisum maritimum Ger.—English sea peas. They grow annually on the S. point of Inch Island in the Bay of Castlemain in considerable quantities; they are also found on the English sea coasts in like manner, in barren naked cliffs of rocks, and among pebbles where no earth is seen to give them nourishment, for the roots run to a great depth, to find the earth. In times of scarcity of provisions they have afforded great relief to the people of England, who lived near the sea coast, and who having never observed it, till necessity sent them to its stores, they then thought it was sent by miracle for their support."

The second notice occurs in a "Catalogue of Rare Plants found in Ireland," published in 1806 by that distinguished Irish botanist, James Townsend Mackay. He there states "I found this [*Lathyrus maritimus*] on the sandhills, bay of Castlemain in August, 1804." Mr. William Andrews appears to have been the next to gather the

plant, as there is a specimen bearing his name in the Herbarium of Mr. Arthur Bennett, labelled "Rosbegh, Kerry, July, 1841"; whilst the latest known specimen—previous to Miss Hilliard's discovery—is to be found in the Herbarium of the late R. M. Barrington, and appears to have been gathered by a coast-guard named John Reilly, for some years stationed at Cromane, about four miles distant from Rossbehy, it is labelled "Sandhills, Killorclin Bay, July, 1845." From this date until the present year no one appears to have found this plant in Ireland.

Is this simply a case of the Sea Pea having been overlooked for a period of more than seventy years? I think not. Three of the records given above are rather vague and might refer either to the very extensive three-mile stretch of sand-hills on the Inch or north side of the bay, or to the much smaller two-mile range on the south side. But both these areas have been searched several times without success. The Rossbehy or south line of sand-hills moreover is very accessible and not being broad admits of easy examination. On two occasions at least the present writer has walked these dunes, and to his knowledge several other botanists have paid somewhat lengthened visits to this much frequented seaside resort. The only drawback indeed to the peaceful exploration of these wind-swept tracts lay in the danger of the botanist being mistaken for a moving target by the artillery which, for many years, made use of these sand-hills as a practice range.

Several instances are known in its English haunts of the Sea Pea disappearing for lengthened periods after a storm to reappear when some favourable shift in the surface took place, and to some such storm or storms this gap of 73 years in the Irish history of this plant—most probably including one or more unrecorded reappearances—is almost certainly due.

These Castlemaine sand-hills lie exposed at the head of the broad Dingle Bay to the full force of the Atlantic gales. A vivid description of the violence to which these storms attain is given by Dr. Smith in his "History of Kerry." "A few winters ago [he wrote in 1756] there happened a

great storm in this place [Inch sand-hills, Dingle Bay] whereby the sand was blown about so furiously, that a large herd of cows were driven off the peninsula, the poor animals chusing rather to betake themselves to the enraged ocean, where many of them were drowned, than to be overwhelmed on shore. Several of them swam across the bay, near two miles, through the highest waves imaginable, and saved their lives."

Comparison of the last two Ordnance maps issued for this district, one based on a survey made 1841-42, the other made in 1899, shows that these sand-hills have experienced very extensive changes even during this period of less than 60 years. Those on the Rossbehy side appear to have undergone an eastward movement varying from 100 yards to quite 200, while those on the north side of the bay have shifted about 100 yards to the west. Such changes as these would fully account for the temporary or even the permanent disappearance of this plant.

The Sea Pea is not a common species anywhere in the British Isles. It occurs, at long intervals, from the Orkneys, round the east coast, to Sussex and Dorset on the south. Elsewhere, it has a very wide range, chiefly northern, in Europe, Asia, and North America. In its Rossbehy station, which I purposely leave vague, Miss Hilliard reports that there are one or two good sized patches of the plant, and it is much to be wished that any future gatherer will be as sparing of the Sea Pea as its rarity and interest to Irish botanists fully warrant.

This most welcome proof of the persistence of *Lathyrus maritimus* in its only Irish station finds an interesting parallel in the history of *Rubus Chamaemorus* reported from the Tyrone mountains in 1826 and not seen again until refound there in 1892 by Messrs. Hart and Barrington, as recorded in this Journal (*vide* vol. i., p. 124).

Dublin.

SOME COUNTY DOWN PLANTS.

BY R. LLOYD PRAEGER.

IN 1902, a week spent in the Ardglass district¹ resulted in the extension to this portion of the coast of County Down of three local trefoils—*Trifolium striatum*, *T. filiforme*, and *Trigonella ornithopodioides*: the first and third each resting its claim for admission to the flora of the north-east on a single old unverified record, the second previously unknown in that area. *T. striatum* then proved to be still abundant in the old station referred to—Whitehead, in Co. Antrim—and to be of frequent occurrence in the Ardglass district. The Fenugreek (*Trigonella*) could not be refound in its old station (Kinnegar, Holywood): S. A. Stewart and others had previously failed to find it there, and it was set down as casual in “Flora of the North-east of Ireland”; but its occurrence in three places in the Ardglass district went to suggest that it had previously occupied the Kinnegar as a native. The third plant, *T. filiforme*, new to the north-east, was seen in only one station in the Ardglass district—a rocky knoll in Ardglass where the sceptical might doubt its being native, for it is certainly introduced in some of its Irish stations, being indeed an accepted constituent of seed-mixtures for lawns. In the following season (1893), in the adjoining area of the Ards, I hoped to extend the range of these plants, but no trace of any of them was seen. The season was, however, unfavourable, and my visit too late (end of July); but I wrote at the time that there was plenty of suitable ground there for them, and that I thought it probable that some of them—*T. striatum* at least—would yet turn up in the Ards.²

¹ Praeger: Some Plants of the North-east Coast. *Irish Nat.*, xi., 200. 1902.

² Praeger: Botanizing in the Ards. *Irish Nat.*, xii., 259, 1903.

Last July, in the course of a week spent at Portaferry, I made an attempt to determine the range along the coast of these rare trefoils. The season was again unfavourable. A severe drought had the country in its grip, and the rocky knolls which experience had shown to be the chosen habitat of these plants was occupied by brown dead vegetation, dry as tinder. *T. striatum*, on account of its comparatively large heads, was fairly easy to see, and it was found in five stations, growing either on glaciated knolls of Silurian rock or on raised beach gravels well turfed over. Its range is now extended as far as Kearney in the Ards, and probably other stations further north will be found linking up its Antrim station at Whitehead—Ballymacormick Point, for instance, would appear a very likely spot for it. The problem of finding the other two Trefoils was more difficult, on account of the state of the ground and their inconspicuous appearance, but by dint of hands-and-knees work the position of *T. filiforme* as an Ulster native was confirmed by the finding of three quite satisfactory stations on rocky ground amid a purely native flora. *Trigonella* alone defied all efforts to find it, but it seems likely enough that under more favourable circumstances it will be found.

For the rest, my observations on the plants of the area went to verify the facts set down in the two papers quoted above, without adding very much to them. Most of the rarer plants were seen in the stations there quoted, and some in fresh stations as given below. *Crambe maritima* is at present less abundant than formerly in South Bay, four large and six small plants forming this colony at present. *Glyceria festucaeformis* is as abundant as ever on the islets in Strangford Lough, and was seen also in the original station in Marlfield Bay¹ and in Mr. Waddell's station half a mile north of Portaferry.² With regard to the comparison made in my Ards paper on the floras of Ards and of Lecale, *Orchis pyramidalis* was added to the flora of the former, and *Geranium columbinum* to that of the latter.

¹ *Irish Nat.*, xii., 255.

² *Irish Nat.*, xiv., 19.

- Papaver Argemone** L.—Knockinelder and near Portaferry.
- P. Rhoas** L.—About Portaferry.
- P. somniferum** L.—Apparently naturalized on stony beach at Tara.
- Senebiera didyma** Pers.—Strangford Quay.
- Raphanus maritimus** Smith.—Abundant south of Kilclief Castle; at Cloghy, north of Kearney, and north of Newcastle (Ards).
- Erodium moschatum** L'Hérit.—A good colony at the base of Audley's Castle, Strangford.
- Trifolium striatum** L.—In Lecale N.E. of the corn mill in Mill Quarter Bay, and a quarter mile N.E. of Kilclief Castle. In the Ards a little N. and S. of Long Port, a quarter mile S.E. of Quintin Castle and a quarter mile S. of Kearney.
- T. filiforme** L.—On glaciated hummocks S. of Ballyedock Lodge (opposite Kilclief) and a quarter mile N. of Long Port; on turfed raised beach gravels at Ballyquintin Point. I think certainly native in these stations.
- Geranium columbinum** L.—Roadside bank a mile S. of Strangford.
- Anthriscus vulgaris** Pers.—Cloghy and Kearney.
- Crithmum maritimum** L.—In addition to its station north of Kearney, a small colony was found a quarter mile south of Kearney, on gravel.
- Petroselinum sativum** Hoffm.—Seems naturalized on stony beach at Tara.
- Hyoseyamus niger** L.—Still in Corry's station on north shore of Killard Point.
- Cuscuta** sp.—A Dodder, too immature to name, was found on seaside herbage in three places—on the top of the calcareous cliff of Benderg Bay, near Ballyedock Lodge (opposite Kilclief) and at Cloghy. Mr. Waddell has recorded (*I. N.*, xxi., 134) *C. Epithymum* from Killard, near the first-named station, and tells me he has collected the same plant at Cloghy, so probably my plants are all this. It appears to be naturalized in this district; all the stations are away from cultivated land.
- Atriplex farinosa** Dum.—Kilclief.
- A. portulacoides** L.—North and south of Portaferry, and a half mile north of Ballyquintin Point.
- Habenaria viridis** R. Br.—Abundant at Killard, and varying much in colour—green, yellow, brown, and almost red.
- Orehis pyramidalis** L.—Sparingly a little north and south of Quintin Castle, and a half mile north of Kearney.
- Juncus glaucus** Ehrh.—White Hills near Strangford.
- Typha angustifolia** L.—Ballyfinragh Lough.
- Chara polyacantha** Braun.—In the extensive marsh at White Hills near Strangford.

THE LIMNAEAE OF THE ALPINE LAKES IN THE
GLENGARRIFF DISTRICT, WEST CORK.

BY H. C. HUGGINS.

DURING the past few years I have on several occasions visited Glengarriff, West Cork; usually in the month of May; and my time has more especially been devoted to the study of the *Limnaea pereger* group of snails found in the neighbouring mountain tarns. Several of these have already been visited by Fleet-Surgeon K. H. Jones, Dr. R. F. Scharff, and Messrs. A. W. Stelfox, J. N. Milne, and R. A. Phillips, to all of whom I am indebted for information concerning the district. In the present year, however, owing to the exceptionally fine weather, I was enabled to work some of the lakes in the Caha mountains, which, to the best of my knowledge, have never previously been visited by collectors.

These lakes, which are situated on a mountain plateau overlooking both Barley Lake and the Coomarkane Valley, vary in altitude between 1,400 and 1,550 feet above the sea level. They are all deep, with stony bottoms, and contain scarcely any vegetation except a few stray reeds round their edges. In one only did I see some plants of *Potamogeton*, though the bottoms were in most cases partly covered with dead sheep-grass that had been blown or washed in during the winter. The water in all of them is decidedly peaty, and judging from the taste contains traces of iron in several cases, though not to the same extent as the water at Glengarriff itself, which has a rusty flavour which renders it most unpleasant to strangers.

As might be expected the shells of the *L. pereger* group found in them were, owing to the great altitude, the presence of the peat, and the depth and coldness of the water, of very extreme forms; two lakes contained specimens referable to *L. praetenuis*, but mostly with very low or intorted spires, and two more were inhabited by *L. involuta*.

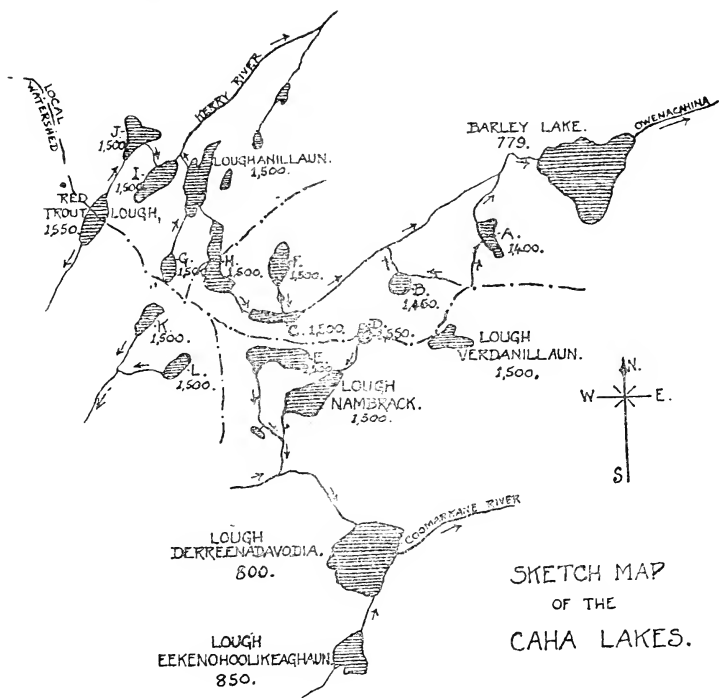
The shells of the neighbourhood fall roughly into three groups, a dark sluggish usually intorted one, small in size and moderately thick in shell, which includes the shells

previously called "*L. involuta*"; a much more active larger-shelled one, which has a higher spire and appears glistening whitish in the water, and from its extreme tenuity of shell may, for purposes of reference, be called "*L. praetenuis*," and a usually strongly spired, rougher, still thicker-shelled group which appears brown or dark yellow in the water, to which I shall refer as "*L. pereger*." The characters in these groups are not constant, "*L. involuta*" sometimes has a spire, and "*L. praetenuis*" in one locality is almost invariably intorted, though differing in no other respect from the shell described as that species from Lough Nagarriva.

I carefully examined each lake but on no occasion did I find *L. praetenuis* or *L. involuta* co-existing with *L. pereger* or each other, and as none of these three molluscs co-exist in any other locality I am of the opinion that *L. involuta* and *L. praetenuis* are simply extreme forms of a lacustrine race of *L. pereger*, though this may possibly prove to be a distinct species from the *L. pereger* found in streams and ditches. My idea is, I think, borne out by the fact that, though all the lakes appear of an exactly similar character, there are nevertheless some factors connected with each of them causing variation, as I am assured by the local fishermen that each contains a distinct race of trout; and the fish I had an opportunity of examining from five lakes bore out the statement. The fish from Lough Nambrack, pale green, oval, with a very few small black and pink spots, made a striking contrast with the thick copper-red ones from Red Trout Lough, only half a mile away; the latter being covered with large black and flaming crimson spots. If any collector who is also a fly-fisherman should visit the neighbourhood it might prove of interest to catch and compare the fish from each lake, possibly similar races of trout would be found to inhabit the *L. praetenuis* tarns, and corresponding races the localities for *L. pereger* and *L. involuta*.

Very few of the Caha lakes are named on the one-inch ordnance map, but I kept a note-book as I collected in which I marked the lakes A, B, C, etc., as in the accompanying map. Although the lakes themselves are

really situated on the watershed of the district, the majority of those I visited being within the 1,500 feet contour, nevertheless there is a ridge across the plateau dividing them into two systems. On the south-western side of the



SKETCH MAP
OF THE
CAHAL LAKES.

ridge Loughs "K," "L," and the main stream from Red Trout Lough (which lies in a hollow of the ridge itself) drain into the big lake system towards Castletown on the further side of Mount Glenlough. Lough "D," again in the ridge itself, drains into Lough Nambrack, the stream from the latter, joining the rivulet from Lough "E," plunges over the cliff into Derreenadavodia and thence drains into the Coomarkane valley.

On the north-eastern side of the ridge the smaller stream from the north end of Red Trout Lough drains into Lough "J," which again drains into Lough "I," the stream from which joins that from Loughanillaun (which in its turn drains Lough "G" and receives one of the two effluents

of Lough "H") and flows in a north-easterly direction into the Kerry River. The other stream from Lough "H" and also that from Lough "F" flow into Lough "C," and the stream from the latter after receiving the rivulets from the two isolated Loughs "B" and "A" flows into Barley Lake, the river from which, the Owenacahina, effects a junction with the Kerry River in the valley to form the main Glengarriff River.

It will be seen by reference to my list given below that the three "species" *L. involuta*, *L. praetenuis*, and *L. pereger*, are found on each side of the main ridge, and also that almost every lake of the Caha series is connected with at least one other. Having regard to the shortness of the distance traversed by these streams, and their size, it is quite certain that in rainy weather a fair number of molluscs must be washed from one lake into another, yet in none of them can two kinds be found together. This phenomenon is all the more striking as egg-capsules, which appear to be chiefly deposited on the loose fragments of dead sheep-grass mentioned above, must be washed from one pool to another with the slightest freshet, as the pieces of grass were running freely out of several of the pools on the day of my first visit, when we had had rain two days previously. It is idle to suppose that conditions can be so widely different in the lakes that it is physically impossible for one species to exist in a locality which supports abundantly members of another, yet to some such theory must anyone be driven who has examined the plateau unless he take the simple solution that *L. involuta* and *L. praetenuis* are "syntonic" forms of *L. pereger*, in which case the difficulty disappears at once. In a syntonic form, as defined by Messrs. Kennard and Woodward,¹ varietal characters are not inherited but remain constant so long as environment is unchanged, a resumption of normal conditions causing reversion to type. Thus *L. praetenuis*, if a syntonic form of *L. pereger*, would, on coming into a lough containing *L. pereger*, produce nothing but *L. pereger*.

¹"The Post-Pliocene Non-Marine Mollusca of Ireland." *Proceedings of the Geologists' Association*, vol. xxviii., p. 112, part 3, 1917.

One would expect, however, in the lower lakes where there was a constant influx of new blood that the local races would be more or less in a state of flux, and this is borne out by the facts, for on carefully going over my notes I find *L. prætenuis* is found in a lake very difficult of access from below, either an isolated lake, as Caha "A," which only communicates with Barley Lake some hundreds of feet below, or the top lake of a series like Caha "D." Similarly in Caha "B" I found a most remarkable glossy thin-shelled race of *L. pereger*, not an example exhibiting the slightest trace of variation, and as might be expected Caha "B" is again an isolated mountain basin, communicating only with Barley Lake. It is also interesting to note that Lough Nambrack receives only the stream from the *L. prætenuis* Lough "D" above, and the *L. involuta* found in this lake, though living at no greater height than those in Caha "C" scarcely half a mile away, are of a constant very highly specialised form, being as extremely intorted as those of Lough Crincaum and beautifully polished and striated. Those found in Caha "C," which receives the effluents from Loughs "F" and "H," lakes on the same level in which *L. pereger* abounds, are, on the other hand, rougher, much more coarsely striated, and display considerable variation, frequently having a rudimentary spire as in Barley Lake.

As the weather was hot I spent some time this year in watching the behaviour of the animals in their native places, and the three groups, "*L. involuta*," "*L. prætenuis*," and "*L. pereger*" each have somewhat different habits. *L. involuta* looks jet black in the water and sticks tight to stones like an *Ancylus*, usually with its tentacles projecting. It crawls very little and very slowly, clinging so firmly that the stone can be lifted from the water with the animal still adhering, and often it is hard to scrape it off without damaging the shell. *L. pereger* is more active and looks yellowish-brown, when a dark individual is seen in the water it has a bronze-golden lustre, absent in *L. involuta* (no doubt from the greater thickness of shell); while *L. prætenuis*, which has a glistening whitish appearance in the water recalling the sheen of a water-spider, is an

exceedingly nervous excitable mollusc, crawling actively about and frequently loosening its hold and floating to the surface, where it coasts about with its foot uppermost. I have often noticed this habit in *L. pereger*, but not to the same extent as in *L. praetenuis*. The latter mollusc is so sensitive that if a shadow come across the sun many individuals immediately retire beneath the stones, and if the sunlight fall on a spot hitherto shaded by the high rocks which surround a tarn specimens come crawling out in all directions where few were visible five minutes before. The difference in the habits of *L. praetenuis* and *L. involuta* has already been noticed by Fleet-Surgeon K. H. Jones,¹ but in his case the more active mollusc was seen climbing on weed in Lough Nagarriva, whereas there are few or no weeds in the Caha Lakes. I noticed one other point that may prove of interest; on reaching home I found that *L. pereger* had usually withdrawn far into its shell, *L. praetenuis* just to the lip, and *L. involuta* had rarely wholly retired. I do not, however, regard this difference in the habits of the three as being of more than racial importance, any more than I regard the different habits of the trout in the various lakes as any claim to specific rank; in one lake the trout will rise furiously to fly while in the next it will be useless to fish for them except with worm on a dull day.

The following is a complete list of the lakes I have visited round Glengarriff and of the Limnaeae inhabiting them; the heights are approximate, to the nearest 50 feet, for as can be seen from my description of the flow of the streams there are slight differences in the height of almost all of them.

BARLEY LAKE, Caha range, 779 feet, contains *L. involuta*, where it was discovered by Mr. R. A. Phillips some years back; it is not of such an extreme form as those from Lough Crincaum, Killarney. A few specimens have rudimentary spires.

LOUGH "A," Caha Lakes, 1,400 feet.—*L. praetenuis*, all extremely short-spired, quite fifty per cent. of the specimens being more or less intorted.

¹Journal of Conchology, vol. 13, p. 288.

LOUGH "B," Caha Lakes, 1,450 feet, is inhabited by a very beautiful race of *L. pereger*, extremely thin, glossy, and closely striated, with short, perfectly formed acute spires. A very clean and attractive shell.

LOUGH "C," Caha Lakes, 1,500 feet, contains *L. involuta*, almost exactly similar to the race in Barley Lake, but slightly more square-shouldered and deeply intorted.

LOUGH "D," Caha Lakes, 1,550 feet:—*L. praetenuis*, almost all intorted, with narrower mouth and less suture than the Lough Nagarriva form.

LOUGH VERDANILLAUN, Caha Lakes, 1,500 feet:—Nil.

LOUGH "E," Caha Lakes, 1,500 feet:—Nil.

LOUGH "F," Caha Lakes, 1,500 feet:—*L. pereger*, a rough, thicker, more coarsely striated form, many specimens were decollated and a few slightly intorted.

LOUGH NAMBRACK, Caha Lakes, 1,500 feet:—*L. involuta*, an extremely bright glossy form, many specimens were as deeply intorted as any I have seen from Lough Crincaum.

LOUGH "G," Caha Lakes, 1,500 feet:—Nil.

LOUGH "H," Caha Lakes, 1,500 feet:—*L. pereger*, a round short spired, somewhat glossy form; nearly all the specimens were decollated and several appeared to be naturally intorted.

LOUGH "I," Caha Lakes, 1,500 feet:—*L. pereger*, rough, not glossy, and coarsely striated, with a moderately raised spire, almost all showing signs of decollation.

LOUGH "J," Caha Lakes, 1,500 feet:—*L. pereger*, rough, not glossy and coarsely striated, with a moderately raised spire, almost all showing signs of decollation.

LOUGH "K," Caha Lakes, 1,500 feet
 LOUGH "L," Caha Lakes, 1,500 feet } *L. pereger*—similar to those found in Lough "J," inhabited both these tarns but owing to lack of time I did not take specimens.

LOUGHANILLAUN, Caha Lakes, 1,500 feet:—Nil.

RED TROUT LOUGH, Caha Lakes, 1,550 feet. Curiously enough the *L. pereger* in this, almost the highest lake of the series, were exceedingly high-spired in some instances. • Almost all the specimens were damaged

by decollation, but one or two of the perfect ones I took were the highest spired I have taken in any Irish pool, except some extraordinary ones from a pool on Inishmore in the Aran Islands, which Mr. R. A. Phillips jokingly remarked looked like a cross between *L. pereger* and *L. truncatula*. The shells were rough and coarse with no glossiness at all.

LOUGH DERREENADAVODIA, 800 feet, nil; I was very disappointed in this fine sheet of water.

LOUGH EEKENOHOOLIKEAGHAUM, 850 feet; this lake and Lough Derreenadavodia are situated in a high saddle at the end of the Coomarkane Valley, where the Caha mountains jut out to Slieve-na-Goil (sugar loaf). It contains a race of *Limnaea pereger* exactly similar to that found in Lough More, small, closely striated and glossy, with a deep suture and short spire, often slightly decollated. In a few instances perfect full-grown specimens had no projecting external spire, the specimens were not intorted but the top of the spire was flush with the next and subsequent whorls, giving a rounded top to the shell.

LOUGH AVAUL, 400 feet, on the Castletown Road, where the hills drop from Slieve-na-Goil to the sea. This interesting lake, partially drained last autumn, formerly contained (1914) two races of *L. pereger*; a round short-spired rough form inhabiting the lake itself, while a narrow, very smooth and glossy, bright reddish coloured one was abundant clinging to the rocks of the waterfall at its outlet. The lake specimens were perfect, the outlet ones almost all decollated.

LOUGH NAGARRIVA, 1,200 feet. In South Kerry. The historic locality where *L. praetenuis* was discovered by Messrs. Stelfox and Milne in 1907; the hills in which it is situated are a continuation of the same range as the Cahas; the specimens have higher spires than the Caha ones, but appear identical in habits, appearance in the water, and the diaphanous texture of the shell, which when fresh and wet can be pressed almost flat and inflated again like that of *Hygromia fusca*.

LOUGH NAMADDRA, 1,200 feet ; also contains *L. praetenuis*.

I noted the fact as lakes just as close together in the Cahah range contain different races.

LOUGH MORE, 400 feet, on the Bantry Road, contains a race of *L. pereger* exactly similar to that found in Lough Eekenohoolikeaghaum, except that specimens are rarely decollated, and I noticed none of the curious round-spined specimens mentioned above.

For a thorough comprehension of these alpine shells it must be borne in mind that such shells as "*L. praetenuis*" and "*L. involuta*" are by no means constant, even in their original type-locality. I do not attach an exaggerated importance to unsupported testaceological characters, but it must be noted that by judicious selection a series can be made grading from the lake form of "*L. pereger*" found in Cahah Lough "F" to the slightly intorted specimens found there, and thence through the "*L. involuta*" of Barley Lake down to the most extreme forms found in Lough Crincaum, without the slightest break in the chain. "*L. praetenuis*" exhibits the same variations ; Dr. R. F. Scharff tells me the Donegal specimens differ somewhat from the Kerry ones, and Mr. A. S. Kennard has shown me some from Donegal localities, of which some specimens are quite as thick as some of the Glengarriff "*L. pereger*," and others as extremely intorted as any "*L. involuta*" I have seen. Finally Dr. Scharff tells me that he was informed some years back that "*L. involuta*," bred in captivity, produced "*L. pereger*" in the second generation, but most unfortunately we do not know under what conditions this otherwise most valuable experiment was carried out, and hence must discard it for the present.

Since writing the above, I have been able, through the kindness of Mr. A. S. Kennard, to examine the specimens of "*L. praetenuis*" taken in the lakes of Donegal and Fernanagh by the late Major Trevelyan. Further examination has only confirmed my previous opinion that "*L. praetenuis*" is a myth, at least so far as testaceological characters go ; no specimens from any one locality resemble closely those from any other, and none agree with the description of the shell given in the Rev. E. W.

Bowell's original paper¹ either in size, shape, or tenuity. They also bear little resemblance to the Nagarriva specimens from which the description was made, but have, on the other hand, a strong family likeness to "*L. pereger*" collected by me in many localities in the west and south-west of Ireland.

I am sensible of the gravity of my omission in giving no anatomical details in this paper and can only say as an excuse that I am no anatomist myself and all those I know are at present otherwise engaged owing to the war. It was my first intention merely to write a short note recording my new captures in the Caha Lakes, and to continue my investigation of other lakes in those mountains in the future, waiting till after the war when I could have dissections made of specimens from each locality before publishing these notes, but private reasons render it unlikely that I shall be able to visit Ireland again in the near future and present publication imperative. I have a few specimens preserved in spirit for the future, and must be content with this, but wish to emphasise the fact that my conclusions are not based on a random collection of shells but on a careful investigation of local conditions which may at any rate have some value to future workers.

Syndale House, Sittingbourne.

OBITUARY.

ROBERT OLIVER CUNNINGHAM.

The announcement of the death of Dr. Robert O. Cunningham, at the age of 77 years, will be received with much regret by many Ulster naturalists who were associated with him during his thirty years' occupancy of the chair of Natural History at Queen's College, Belfast. He was born in 1841 at Prestonpans, Scotland, where his father was minister of the Free Church, and graduated in science and medicine at Edinburgh University. As a young man he was attached as naturalist to a scientific expedition to South America, and published on his return an account of the voyage in which he added to the knowledge of the natural history of Patagonia and Argentina. Shortly afterwards (in 1871) he was appointed to a comprehensive chair, whose occupant "professed" the three natural sciences of zoology, botany, and geology at the Queen's

¹ *Irish Naturalist*, vol. xvii., 1908, p. 46.

College, Belfast, where he faithfully carried out his arduous teaching duties until his resignation of the post in 1902. During his well-earned retirement, Dr. Cunningham lived in the south of England.

JAMES NAPIER MILNE.

On 13th June there passed away in Glasgow James Napier Milne, a naturalist in the truest sense. Born at Forres, in Elgin, in 1841, Milne's parents came to Ireland when he was quite a boy, and took up their residence in Navan, Co. Meath.

On the completion of his course as a teacher at the Training College, Dublin, he was appointed to the school at Armoy, Co. Antrim. Subsequently he became principal in the school at Waterside, Londonderry, leaving this to take charge of that at Culmore, where he remained for upwards of twenty years, until his retirement in 1903. During this time he was actively interested in entomology, conchology, and was a keen fisherman. On his coming to reside in Belfast entomology ceased to be a possible study, for, as he told me once, the sight of an elderly gentleman with a butterfly net skipping nimbly round a lamp-post after dark, attracted considerable attention, the last thing in the world Milne desired; while his investigation of the suburban lanes with treacle pot and lantern was resented by the lovers who frequented such places. Milne, therefore, turned his attention to the land and freshwater shells, assisting others to explore unworked districts in Mayo, Kerry, and Donegal, and at the same time steadily working at the local shells of the north-eastern counties.

A man of the most modest and retiring disposition, he recorded practically none of his finds, so that future workers will never realize the amount of field work accomplished by him. For a companion in the field his was an ideal nature; no discomforts produced a grumble, no failures damped his good humour. But it was as a raconteur of his experiences that he will be best remembered by his most intimate friends, to whom his quiet mirth and fund of anecdote were alone revealed. In his last years he suffered greatly from rheumatism, which prevented him from undertaking long excursions. Nevertheless he still continued his local work, until the death of his sister, Mrs. Hunter, with whom he lived necessitated his removal to Glasgow.

Like many keen naturalists he was gifted with remarkable sight and appreciation of detail; that vision which can not only see differences, but that much rarer gift, the faculty of seeing relationships between things of different habit and appearance.

I hope to collect and publish in the future some of Milne's most interesting finds in the realm of conchology, but of his entomological work I am not in a position to speak. To these two studies Milne's attention was by no means confined, as all animals and plants were of like interest to him.

A. W. STELFOX,

NOTES,

BOTANY.

Chrysomyxa abietis in Ireland.

On May 15th, 1918, Sir Frederick Moore sent me a specimen of Spruce from Kilmacurragh, Rathdrum, Co. Wicklow, affected with a form of "rust" on the needles which, on microscopic examination, turned out to be *Chrysomyxa abietis* Wallr. The "Needle Rust" of the Spruce is common in Switzerland and in Germany, but in the British Isles it was not until 1911 that it was first discovered by Dr. Somerville in Scotland. According to Borthwick and Wilson (*Trans. R. Scott. Arbor. Soc.* vol. xxix., July, 1915, p. 187) this rust has spread considerably in Scotland in recent years. Lately it has also been recorded (*Quart. Journ. Forestry*, vol. xi., 3, July, 1917, p. 191) for the north of England (North-umberland). Sir Frederick Moore's specimen is the first that has been observed in Ireland, and it seems desirable to record the first appearance of this parasitic fungus in Ireland in the pages of the *Irish Naturalist*.

GEORGE H. PETHYBRIDGE.

Royal College of Science, Dublin.

The Poisonous Properties of *Oenanthe crocata*.

In *Nature* for July 4 the question of the poisonous properties of the Water Dropwort is discussed, based on an observation communicated by C. B. Moffat to the effect that cattle in Co. Wexford were observed eating this plant without any injury resulting. It is pointed out that according to most authorities the plant is highly poisonous to cattle, as witnessed by numerous cases, but that at the same time well-confirmed observations exist of no ill effect following eating of the plant. It would seem that the plant is a dangerous poison in some districts, but not in others; and, as the Editor of *Nature* very properly observes, there is here a very interesting problem requiring investigation.

ZOOLOGY.

Black Terns on Lough Carra, Co. Mayo.

On September 2nd (1918), when fishing on Lough Carra, I observed two Black Terns flying low and at no great speed at a short distance from the boat; the white undertail coverts being clearly visible. The birds were flying in a south westerly direction.

W. RUTTLEDGE.

Hollymount, Co. Mayo.

Jays feeding on Wheat.

There is probably nothing very remarkable in the fact that Jays should visit the wheat-fields at this time of the year and partake of the harvest, provided that it can be done with safety. I have been much interested for the past fortnight (September 1-15) in watching these foraging expeditions almost daily, and the manner in which they are carried out seems very characteristic of the bird. A large field of wheat, which had been cut and was in "stooks," was the scene of all my observations. It sloped down rapidly to a river which was about twenty-five or thirty yards in width, and along the bank there was a row or two of very fine beeches, the lower branches of which were about nine feet from the ground. Close to these there were several "stooks" of wheat. Across the river on rising ground were the woods of Castlecomer Demesne, where I had frequently seen and heard Jays for some months past. The expeditions were always organized well in in these woods on the high ground. One or two birds there would utter their harsh cries for a few seconds, these would be answered from various parts of the wood, and by their cries I could make out that the birds were all making for the rendezvous. Then there would be a regular chorus lasting for a minute or two; then a dead silence, and I knew the birds had set out and I had better take cover. After a few minutes the party could be seen advancing from tree to tree, keeping in cover as well as possible and avoiding open spaces. The party nearly always flew singly, a bird would flap across an open space, and just as it regained cover a second would follow in practically the same line, and so on. On only two occasions did I see two birds crossing an open space at the same time. In this manner they worked their way across the river and into the beech trees over the wheat. Then the leader would drop down on a "stook," take a very careful survey around, and if all was right the other birds would follow. On one occasion I purposely allowed myself to be seen though I remained motionless. The leader as he dropped on the wheat spotted me. He perched on top of the "stook," very alert, for fully two minutes watching and then silently flew back into the branches overhead, and in a few minutes I saw the party, on this occasion consisting of eight birds, recrossing the river in single file. If, when feeding, they became aware of some danger at a distance they would recross the river, as I have described, silently, and in order, but if they were taken by surprise they retreated in haste and disorder, and generally uttered angry cries at first. The party varied in numbers; on one occasion I counted twelve birds, whilst on others there were only five or six. Once a single bird came but it was knocked over by a Sparrow Hawk, and had I not run to its assistance would have been killed. The regularity of the whole proceeding was what struck me most. First the assembling in the wood with harsh cries, then the absolutely silent passage between the wood and the field, the regular order of the advance and of the retreat if the birds were not frightened. I never saw any of the birds out at a distance

in the field, they only attacked the "stooks" of wheat close in under the beech trees. Practically the same line of flight was followed day after day; they appeared to me to meet in the same place in the wood, and certainly on each occasion when I have watched them they arrived in the same beech tree. Occasionally they uttered a few cries when they got safely back to the wood, but more often they remained silent.

W. M. ABBOTT.

Fermoy.

Scarcity of the Fieldfare.

Fieldfares were totally absent from this part of Co. Wexford during the whole of the late autumn and winter of 1917-18; but as we generally have our largest influx of that species in April at Ballyhyland I waited till that month was over before sending any report. The winter, in fact, had no sooner gone than these "winter-birds" began to arrive. I saw only one small party during the last week of March; but by April 12th they were fairly numerous, and they remained so until the 20th of that month, after which I saw them no more. I have never before known the Fieldfare to be an absentee during the entire winter; but it was at least cheering to see the spring passengers in something like their usual force and plenty.

C. B. MOFFAT.

Ballyhyland, Enniscorthy.

Owls clapping their Wings.

To the notes furnished on this subject by Messrs. Burkitt (*I. Nat.*, vol. xxvi., p. 161), and Bolam (vol. xxvii., p. 15) I should like to add that the Barn-Owl is also addicted to clapping its wings—chiefly, as in the case of both the other species referred to, during the excitement of the nuptial season. It is, of course, possible that both sexes of the Barn-Owl occasionally clap; but from frequently watching them at their time of first taking flight I can confidently say that one bird in each pair does it habitually, while the other, as a rule, takes its flight silently, so far as the wings are concerned. This, I have also found to be the case (from watching several pairs in the Ballyhyland woods), with the Long-eared Owl; but Mr. Burkitt has successfully shown as to that species that the clapping is not restricted to the male, so I can only say that the female bird goes in for it very much more sparingly than her mate. The same is true, in general, of the Nightjar.

C. B. MOFFAT.

Ballyhyland, Enniscorthy.

THE IRISH RED DEER.

BY R. F. SCHARFF, B.SC., M.R.I.A.

Three kinds of deer formerly inhabited Ireland, viz. :—the Reindeer (*Rangifer tarandus*), the Irish Giant Deer or Irish “Elk” (*Cervus giganteus*), and the Red Deer (*Cervus elaphus*). The first two became extinct so long ago that we do not even possess any evidence of their having existed in this country within historical times. It is quite different with the Red Deer which still survives in a semi-domesticated and not entirely pure strain in the forests of Killarney. The deer which we notice in the Phoenix Park, Dublin, and many other parks, belong to quite another species which never was indigenous in Ireland. They are Fallow Deer and are easily distinguished from the Red Deer by their flattened or palmated antlers.

The extinction of the Red Deer in Ireland as a wild animal is quite a recent historical event. There may still be people living who have actually seen wild Red Deer. William Thompson (1) states that when travelling in the west in 1834 he was informed that there were still thirteen Red Deer in Connemara and twelve in the barony of Erris. About this time a few were believed to survive in the Galtee Mountains in Tipperary, and also near Glengarriff in County Cork. According to Mr. George T. Macartney's note in the *Field* of 1874 an exceptionally heavy snowfall occurred in the year 1834 which seems to have led to the final extinction of the Erris herd of Red Deer. From another source it was reported that the last specimen in Erris was shot near Nephin Beg in 1830 by Thomas Lynn, but that in the year of the great snow (1834?) another came down into the lowlands and was killed by the country people with spades and pitchforks.

About the same period several country gentlemen in the west of Ireland, notably Lord Sligo and Major Knox, kept small herds of Red Deer in their parks. Occasionally it happened that some of these escaped and were shot in the mountains, and to this fact may be due the report that five deer were killed in Erris in the year 1850.

As regards the south of Ireland William Thompson (1) states that he was informed in 1850 by Lord Bantry's gamekeeper that some wild Red Deer still existed in the neighbourhood of Glengariff in County Cork. In Waterford and Tipperary the Red Deer seems to have become extinct at a much earlier period, for we are told by Mr. Ussher (2) that in the mountains of Knockmealdown which occupy a large area between these counties they were apparently on the verge of extinction in 1774, although, according to William Thompson (1) a few Red Deer still lived in the Galtee Mountains at the beginning of last century.

Earlier records of the existence of the Red Deer in Ireland are scattered about in various books and pamphlets but they lack detail. Sir William Brereton (3) writes in the year 1635 that in the large park near Carnew in County Wicklow there are plenty of both Red and Fallow Deer. References are made in the State Papers of Henry VIII. (4) to the number of people engaged in deer-hunting in Kilkenny and Tipperary in the year 1525. According to the Calendar of Close Rolls (5) Edward the First sent a messenger to Ireland in 1275 for the purpose of purchasing "brackets" (hounds) for stag-hunting.¹ Giraldus Cambrensis (6) during his travels in Ireland in the twelfth century speaks of the stags as being so fat that they lose their speed, and the more slender they are in shape the more nobly they carry their heads and branching antlers. It is quite certain that the Red Deer was indigenous in Ireland and must have been very abundant throughout the country for many centuries past. And yet we are told that when the Royal Forest at Glencree in County Wicklow was established in the thirteenth century eighty deer were sent from the Royal Forest at Chester in the year 1244 to stock this park. Mr. Le Fanu (7) to whom we are indebted for this information assumes that it is hardly likely such trouble and expense would have been incurred had there been no natural or artificial boundary to prevent the deer from straying away.

¹ I am greatly indebted to Mr. J. de W. Hinch for furnishing me with above particulars.

Anyone unacquainted with the fossil remains of Red Deer in Ireland might conclude from this introduction of foreign stock that deer could not have inhabited this country at that time. But there is no doubt whatever that Red Deer from the remotest time must have been extraordinarily abundant in Ireland. It seems strange therefore that Red Deer had to be brought from England to stock this Royal Forest. We meet with the bones and teeth of this deer in the superficial gravels, in bogs and marls. In the kitchen-middens all round the coast, and in the crannogs the bones of Red Deer may be picked up almost anywhere often associated with those of domestic animals. Implements of various kinds were manufactured in Ireland from the antlers of this deer. In almost all the Irish caves Red Deer remains have been found in profusion, sometimes along with those of Bear, Irish Elk, Reindeer and other extinct species. There is ample evidence therefore that the Red Deer lived in Ireland before the introduction alluded to. The only doubt that might possibly occur to anyone would be whether this deer might not have become extinct in the thirteenth century so as to need reintroduction. In that case it would have spread from Glenree Forest all over Ireland, and the existing semi-domesticated Killarney stock would be the descendants of English ancestors and not of the old Irish race.

During the last century Red Deer supposed to have descended from the old Irish stock were kept in other demesnes besides Killarney. Thus Lord Maurice Fitzgerald had a herd in Wexford and presented to the National Museum in Dublin a stag, hind and young, while a skeleton of a Red Deer from Sir Victor Brooke's park in Fermanagh was sent to the Museum in 1877. They still ornament the collection of Irish animals, and we are thus able to compare the modern Irish Red Deer with the old deer found in bogs and caves. If they show very close agreement we may assume that the old Irish Deer survived until the nineteenth century unimpaired by the occasional introduction of English and other stock.

The collection in the National Museum, Dublin, contains numerous antlers of Red Deer found in bogs, one pair with

no less than seventeen points, one complete skeleton of a stag from Boho, Co. Fermanagh, and the skull of a stag from Moate, Co. Westmeath. I shall give some measurements in millimetres of the skulls of the recent hind and the two fossil stags. The measurements correspond with those given by Dr. Stejneger (8) of some Scandinavian deer, and will enable us to compare them with one another. The skull of the recent Irish hind was figured by Prof. Lönnberg in his paper on the Red Deer of Scandinavia. (9)

	Recent Irish Hind from Co. Fer- managh.	Sub-fossil Irish Stag from Boho.	Sub-fossil Irish Stag from Moate.
1. Basicranial length	301 mill.	370 mill.	372 mill.
2. Distance from ant. tip of premax. to orbit.	187 "	224 "	224 "
3. Zygom. width at post. end of jugal.	135 "	167 "	172 "
4. Width of skull behind premax illaries.	56 "	65 "	72 "
5. Length of nasals	116 "	128 "	133 "
6. Greatest width of both nasals combined.	39 "	41 "	38 "
7. Vert. height of nose at post. end of premax.	44 "	60 "	60 "
8. Length of upper molar and pre- molar series.	98 "	98 "	99 "
9. Width of antorbital vacuity . .	17 "	20 "	22 "
10. Length of antorbital vacuity . .	47 "	52 "	54 "
11. Longest diam. of supraorbital foramen.	11 "	12 "	12 "
12. Height of maxillary above fore- most molar.	39 "	46 "	46 "
13. Height of maxillary above fore- most premolar.	55 "	67 "	67 "
14. Distance from lower orbit. rim to last molar.	42 "	49 "	54 "
15. Antlers, inside dist. betw. beams at base of subroyals.	—	620 "	685 "
16. Antlers, distance from burr to farthest point.	—	665 "	635 "

Some of these measurements seem to me of little value, and it is very difficult to indicate precisely how they were taken. However, on the whole, they give us a fair idea of the general proportions of the skull. Taking into consideration the fact that we are comparing quite a small modern Red Deer hind with large skulls of old stags which may be of great antiquity, there is a remarkable resemblance between them. As we should expect the two stag skulls are much larger in every respect. Yet the proportions between the nasals, for example, and the antorbital vacuity are about the same, while the lengths of the upper molar and premolar tooth series are practically identical. From the measurements given it would be impossible to prove that the recent hind is the genuine descendant of the old Irish stock of Red Deer, because the latter may not be distinct from the British stock, and I have no skulls available from England or Scotland.

In the paper already cited by Prof. Lönnberg two adult Scottish stags are referred to, and he states that their dimensions agree fairly well with that of the Irish recent hind in the Dublin Museum. Both, he remarks, are small-headed and short-nosed with small antorbital vacuities and large "foramina supraorbitalia." Although the Scottish skulls examined by Prof. Lönnberg belonged to fully adult Red Deer with antlers carrying five tines on each side they only had a basicranial length of 311 and 319 mill. respectively. They were therefore not much longer than the skull of the Irish hind and greatly shorter than the two Irish stag skulls given in my list. Nevertheless the length of the upper premolar and molar series in all these skulls varies from 92-99 mill. The size of the antorbital vacuity agrees in the three Irish skulls examined. Prof. Lönnberg only states that the antorbital vacuity in the Scottish skulls corresponds in size and shape with that of the Norwegian skulls which he tells us resembles that of the Irish hind. The dimensions of this vacuity in the Scottish skulls are about 48 mill. long by 18 mill. broad. The corresponding measurements in the Irish skulls are 50 mill. by 20 mill. The size of the antorbital vacuity therefore agrees fairly well in the Irish, Scottish, and Norwegian

skulls, whereas in the Swedish skulls it averages 60 mill. by 28 mill. One of the main differences between the Irish and Scottish as compared with the Norwegian skulls lies in the shape of the nasal bones. They are flattened in the Norwegian skulls according to Prof. Lönnberg (9). In the Irish and Scottish skulls they are curved, forming a longitudinal ridge from the tip to the base and being well visible when the skull is looked at laterally. In the other hand Dr. Stejneger (8) maintains that an adult male Norwegian skull in the United States National Museum agrees with the Irish and Scottish skulls in the possession of very convex nasal bones, and in his opinion (p. 464) the Scottish and Norwegian deer belong to the same race or geographic subspecies called by Prof. Lönnberg *Cervus elaphus atlanticus*.

We need not enter here into the interesting speculations concerning the origin of the Norwegian deer raised by Dr. Stejneger. One of the objects of my investigations was to show that the modern Irish Red Deer were the true descendants of the ancient Irish stock. Although I have been unable to prove this point by a comparative study of the skulls it is extremely unlikely that the Old Irish Red Deer became entirely extinct in Ireland and had to be reintroduced from England. We have learned from this study that there exists a close relationship between the Irish, Scotch, and Norwegian Red Deer. They belong to the same sub-species, whereas the Swedish Red Deer is sufficiently distinct to form a separate well-recognisable race.

There is one other point which deserves to be mentioned about the Irish Red Deer, viz., the colour of its fur, which never can be called red. It varies from yellowish brown in summer to greyish brown in winter, whereas the continental form is generally more distinctly reddish brown in colour.

As regards the antlers of the typical European Red Deer they terminate in a cup. This cupping in the crown of the antler seems to become simplified gradually as we proceed eastward where we meet with Deer which resemble Red Deer but are practically identical in their antler

structure with the Wapiti Deer of North America. A Wapiti (*cervus canadensis*) skull apart from the antlers is not much longer than that of a large Irish Red Deer. The zygomatic width at the posterior end of the jugal bone is about the same in both. A striking feature of difference is noticeable in the length and width of the nasal bones which are much longer and broader in the Wapiti than in the Irish Red Deer. The antorbital vacuity also is longer and broader in the Wapiti. Turning over the skull we further note that the series of molar and premolar teeth is considerably longer in the Wapiti than in the Irish Red Deer. The Red Deer has been known to cross with the Wapiti, as reported from Caledon Park, Co. Tyrone, and the two no doubt are nearly related to one another. The fact of their crossing, however, does not imply near relationship, since we know that the Red Deer and Japanese Deer are regularly producing hybrids in Powerscourt Park, Co. Wicklow. It is the structure and formation of the skull and teeth which are very similar in the Red Deer and Wapiti. Through the kindness of the Earl of Kenmare and his representative, Mr. Mathews, I am now being supplied with a series of Red Deer skulls from Killarney, and when these have been thoroughly cleaned I may be able to describe more clearly the structure of the surviving race of the Irish Deer.

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National Museum, Dublin.

SOME NOTES ON BIRDS, ESPECIALLY THE
WHITETHROAT.

BY J. P. BURKITT.

THAT some migrant birds return to the same neighbourhood is commonly held in regard to Swallows, but the more I study birds the more evident it is to me that individuals of many species, if not of most, return to exactly the same sites of previous years. In the more abundant species this might be hard to verify, but I can see it in the cases of Goldfinch, Long-tailed Tit, Redpoll, Whinchat, Nightjar, Grasshopper Warbler, Garden Warbler, and Whitethroat, specially clearly in the latter five cases.

A pair of Whinchats were at a site for seven years, until I let a man take the nest; thereafter the place was empty. The Nightjar, as I can corroborate, is known to nest for several years in the exact same spot if undisturbed. The Garden Warbler is unmistakable in returning to the exact spot; and I have frequently located a bird by my returning in the spring to where I had found an old nest in the winter. A Grasshopper Warbler has come to the same bush in a big waste scrub land for at least five years, omitting last year. And I can say just the same of other sites of this bird, though not observed for so long. In one case the same bush was occupied after a skip of two years.

With the Whitethroat I shall deal below. From observation of the last three species, I have come to realise that the return of the same birds is marked not only by coming to a particular spot, but by coming at a regular time, regularly late or regularly early. For example, with these three species I will always at certain spots find the tenant when no other of its kind has arrived, and at other very late spots the tenant will not appear till up to three weeks or more later.

THE GREATER WHITETHROAT.

A certain number of Whitethroats come to sites by roads near me, but they appear to come in a regular order.

The nest at one site for example will be well on within four days after the very first song has been heard in the country. The tenant of another site does not appear for about thirteen days later (though he thus risks being mateless, see below). Thirteen days is a long time with Whitethroats as they come in a wonderful rush. There is no mistaking the return being to the same spot ; there is the same favourite perch in the same bush in a hedge, or on the same identical inch of telegraph wire. This migration to the same site and at the same regularly early or late date suggests food for thought to those better up in migration than I am. Or is it already old ground ?

I have further interesting matter about the White-throat. In the *Irish Naturalist* of September, 1916, there was a note by me on what I then called dummy nests of Whitethroat and Garden Warbler. I found last year a male Whitethroat (A) building such a nest. That is to say there was no female, and when the outside framework was done he proceeded to decorate with, and pile on on one side masses of wool (otherwise always willow-down and catkin scales, see my note). About ten days after his frame nest had been made, eggs appeared to my surprise. He had found a mate ; and though it became a poor lopsided nest yet the young were brought up. I naturally suspected that I must have been in error about the original absence of a female, though I had followed the male up and down the hedges without a sign of her, and he showed the peculiarities of the lonely male builder mentioned below. So I waited till this year to see further. I also wanted to check a note in our great Ussher's book that a certain careful observer "invariably found the male the nest-builder without any assistance from the female, and singing as he built." From my experience of paired birds I found it hard to accept that. So I took pains to watch this year an early pair until I saw conclusively that that female did the building ; and I think the male does no building when he has a mate.

Then I watched for my (A) bird to arrive, which he did on the 20th May. Five days later I found the frame built and decorations in progress. There was no female.

These males build the frame in from one to one and a half days. It is a complete nest only that it never has the inside lining of fine roots or grass or hair. He kept on and off at this piling of willow-down till at least the 1st June. I found another such lonely male's nest (C) on the 3rd June. He was also at a last year's site. It must have been made for some time as I had known he was there, and it was well decorated with the usual willow-down. But what was my surprise to find him on the 7th with a second nest C₂, and "curiouser" still carrying the down from the first to the second; finally by the 11th stripping the first of every speck of decoration. On the 19th June I found all the decoration gone from C₂—plainly to C₃, but I did not find C₃. On the 24th, however, I found him beginning another nest, which would be at least C₄. On the 11th June I found another male (D) building, but he was lucky in getting a mate soon as there was an egg on the 17th. On the 19th June I found another such nest, B, well decorated, and it must have been there a long time as I had known of the male's presence for long. On the 23rd he began another, B₂. On the 24th June I found another male (E), building.

B₂, C₄, and E got little or no decoration as willow-down was now scarce. I was nearly tired of watching these various nests, but on July 3rd the bird A suddenly stopped the usual loud and ceaseless singing, and on July 5th I saw he had a mate, as I suspected. On the 7th July C had also got a mate, and on the same day I found B with four fresh eggs but laid in B₁, not B₂. The singing had all stopped. C brought out a brood, but circumstances prevented my getting the nest, it was not in C₁, C₂, or C₄, though close at hand. I could not be certain about A's brood. The final nest was probably cut away. A₁ was never occupied. A, B, and C thus all got mates in the last days of June. C₂ was 20 yards from C₁; C₄ was 35 yards from C₂; B₂ was 90 yards from B₁; A, C₁, and C₂ were in hedges; C₄, B₁, and B₂, D, and E were in weeds or the like.

These lonely males are most plainly distinguishable, as follows. They advertise their presence in the most public

way by singing lustily all day, with occasional rests of half an hour or so, and on to 9.30 p.m. from the topmost branches, as well as while down in the roots of a hedge, and in each interval between carrying building material. They make practically no concealment of building operations. There is seldom if ever any alarm or scold notes. They may sing even when they see one at the nest, and on one's moving away the building proceeds. This is all so totally different from when paired. They then are most wary and give the alarm at once. The arrival of a mate and eggs is at once indicated by the cessation of the song and by the call or the scold.

The above, then, would explain why Mr. Ussher's observer invariably found the male the builder without any assistance from the female—there was no female. I may here say that the true female's nest has seldom a speck of willow-down, and if she inhabits a male's nest she removes as much of the decoration as she can.

Now the birds which pair at the main arrival have their nests made by the end of the second or third week in May and are then silent (unless for a very rare low half song when feeding young). Nevertheless the whole country resounds with Whitethroats' song on through June—the last I heard being two on July 11th. I have proved abundantly, at least to my own satisfaction, that every one of these late singers is a lonely male. A, B, C were three *consecutive* birds along a road by my place, thus exemplifying the great number of these males. It thus appears plain that the whole country is swarming at the end of May and through June with these lonely males, and all building away at a series of nests. A few pick up mates comparatively early, but the main body do not till the last days of June. The silencing of A, B, C corresponded with the rest of the birds in the country. Where do the mates come from? Well, I should guess that the late ones like A, B, C—apparently in large supply—come from a breaking up of the early pairs, as the young are seen looking after themselves just about the end of June. The original males, perhaps, being tired of married life. But where do the less late females come from? Is it from a late female migration? And above all, why is there such a

huge preponderance of males after the first week or so from the first arrival?

WREN.

The well known unlined "Cocks" nests of the common Wren led me to expect parallel information from Saunders.

He says of the Wren "imperfect nests are frequently found near an occupied one, and owing to the notion that they are built by the male bird for his lodging at night, they are commonly known as 'cocks' nests." I have had a piece of unsought-for good luck in elucidating this. When sheltering at a roadside on 24th May a Wren was building. It frequently sang, so presumably it was a male. He did not mind my presence at a couple of yards away. No alarm. No mate seen. The outside of the nest was formed. On the 11th June, nearly three weeks later, there was no lining (of the usual feathers). Here is at least one proven cock's nest; and note the exact parallel to Whitethroat in the manner of male and in absence of nest lining. On the bare chance of the parallel being completed by subsequent occupation of the nest, I went there on the 23rd July and was delighted to find that it had been lined, occupied, and an infertile egg left behind. (I have noticed this occurrence of an infertile egg in a couple of the late Whitethroats' nests, while the brood seems not five, but four, or oftener three). So that now we appear to have the same problems about the Wrens as about the Whitethroats. Is it not strange that all this was not known long ago about such ubiquitous birds?

GARDEN WARBLER.

The numerous beginnings of nests by the Garden Warbler (see my note, September, 1916) seem to me to be similar strivings by the male preparatory to the female's arrival, if arrive she does. It would be hard in the case of the Garden Warbler to prove definitely no mate, but as in the other cases I find he takes little notice of me, keeps up his singing, and makes no alarm, all of which is totally opposite to when the female is there. Perhaps a preponderance of males is general among our songsters, and accounts for the lengthened period of song to which we are treated.

GADWALL.

I found on March 14th six males and four females in the lakes near the seashore at Mullaghmore, south of Donegal Bay (see map in Mr. Workman's paper on the Woodcock in the *June I. Nat.*). It was my first acquaintance with the bird, and I was puzzled by there being no particle of a white wing-spot on any of the males and only on one of the females. On 6th April there were four of each sex there (presumably the same flock) all evidently paired, but only one of the drakes showed the white wing-spot and only one more of the females showed a small spot. On May 3rd there were two pair—possibly a third, and all had wing-spots distinct. On the 14th May I saw none. This absence of the wing-spot in both sexes at certain seasons seems either unnoticed by or contradictory to "the books." As there is any amount of reeds and unwalkable swamp at one part of the area I had hoped they were going to breed; though I had never seen them near the reed area, but feeding in open shallows or asleep.

WIDGEON.

At the same place on May 22nd I was surprised to see a male Widgeon feeding with Shoveller and Mallard drakes, whose mates would be nesting in the vicinity. It was not a winged bird, and a mate might be suspected; but for a casual visitor to attempt to seek for her would have been futile. When he was disturbed he seemed to fly to the hedge area and was not visible in the open. The keeper, Mr. Bracken, told me that a young Widgeon had been shot in August a couple of years ago. The place is full of Widgeon in the winter. For several days in August, but not after the 18th, I saw what was probably the same Widgeon. In plumage it was then distinguishable at a distance on the water mainly by the white shoulder strip and glimpses of the white lower breast, and in flight by the white splash on the wings.

POCHARD.

On 16th August I saw at the same place one Pochard. During the remainder of August I could detect neither the Widgeon nor the Pochard, nor even any sign of comrades. Therefore such instances may only mean non-breeding birds.

LONG-TAILED DUCK.

I saw a pair apparently in full plumage on 14th March. They were in what is, I believe, their usual place—just outside the surf. I mention it because its Irish visits seem to be irregular and seldom in the spring.

WHITE-FRONTED GOOSE.

These birds seem commonly grazing at Mullaghmore and if risen from one spot fly to another. There were three on the 14th May and the keeper says the 20th is his latest observation. These correspond to the very latest cases heard of by Mr. Ussher.

BRENT GOOSE.

On 3rd May one of these birds grazing in the open let me get within 44 yards.

WHITE WAGTAIL.

On 3rd May I saw three birds at this place, very tame; two of which seemed paired. On the 14th I saw one male near the same spot. With the usual perversity, the bird disappeared at the only moment I took my glasses off it. I therefore dare not suggest breeding.

DUNLIN AND TURNSTONE FLOCKING WITH GOLDEN PLOVER.

Ussher mentions "an instance" of Dunlin flying with Golden Plover. At this place I have often seen the Dunlin with them, as regular companions and disappearing with them into the clouds. I saw Turnstone as similar companions, and though not feeding when on the grass, they came and went with the Plover. The Dunlin is the only bird I know which will place its nest on ground so frequently flooded that the grass is quite short and much discoloured.

QUAIL.

I find that last year in the south of this county in a district of much low-lying meadow land and cut-away bog Quails came in great numbers and could be heard everywhere. The note was heard a couple of times this year and the same about six years ago; otherwise they have not been known for thirty years when they were often shot. I have no acquaintance with the bird.

SWALLOW.

Was the Swallow extraordinary late elsewhere as here? Though I saw one on the 4th April and another on the 13th, there was no real arrival till the last day of April. Its complete absence after the Corncrake and Cuckoo had come was very remarkable.

GRASSHOPPER WARBLER.

I noted in the *I. Nat.* of October, 1917, the peculiar complete absence here in 1917 of this bird. I have had further confirmation in respect to this county. Mr. Moffat suggested to me that as with him it might be disappearing from diminution of suitable habitat. But our disappearance was too sudden. I wish there had been some other notes from Ireland, because this year the bird is back in full force. This bird at the arrival period makes itself very evident, so that to a bird-observer it can hardly be missed. At that period it sings freely, at all hours of the day as well as at night, and at all kinds of places which are not its permanent abode. You next hear them singing at suitable sites, but my experience is that out of half a dozen singers only a couple seem to stay, unless it be that the mated birds soon cease to sing. I have often noticed that the song is kept up on disturbance, like the Sedge Warbler. I have watched the male rise and sing out of a very low bed of dead brambles only about eight yards by two, and as I went to one end and beat it with a stick he crept and sang at the other. Quick as I ran from point to point, he seemed to enjoy the game and sang away, quite outlasting me.

With reference to the exterminating winter of 1916-17 I have now and again seen the Gold-crest, but the Long-tailed Tit seems the worst hit. I have only seen one pair in the past eighteen months. In reference to Mr. Abbot's note in the *Irish Naturalist* for May (*supra* p. 79), I did not notice a single Fieldfare last winter.

DERC-FERNA: THE CAVE OF DUNMORE.

BY R. LLOYD PRAEGER.

A GOOD many years ago—in 1901, to be precise—Prof. Haddon, Prof. H. J. Seymour, Mr. J. N. Halbert and I spent a December day in exploring the Cave of Dunmore. Our intention at the time was to make a complete survey, including a map, an account of the cave fauna, and a report on the human remains, to the abundance of which previous writers have drawn attention. With reference to the last item, Prof. Haddon examined the remains which strew the floor of the cave in several parts, but could come to no definite conclusion regarding them. As to the cave fauna, Mr. Halbert and Prof. Carpenter have published already anything there was to be said. An accurate map of the cave could not be completed on one visit. There remains an account of the history of the cave which I wrote at the time, and which, as it has a certain permanent interest, is printed here.

The Cave of Dunmore, which lies six miles due north of the City of Kilkenny, has a literary history which carries us far behind the era of scientific cave-hunting. In the “Annals of the Four Masters,” under date A.C. 928, we read:—

Godfrey, grandson of Imhar, with the foreigners of Ath-Cliath [Dublin], demolished and plundered Dearc Ferna, where one thousand persons were killed in this year, as is stated in this quatrain:—

Nine hundred years without sorrow, twenty-eight it has been proved,
Since Christ came to our relief, to the plundering of Dearc Ferna.

And again, in the ancient Irish “Triads” as edited and translated by Kuno Meyer,¹ which enumerate, among proverbs and wise sayings, three of each of the most remarkable natural or artificial objects in Erin, it is stated that the three “dark places” of Ireland are Uam Chnogba, Uam Slangae, Derce Ferna. We have the authority of

¹ R. I. Academy, Todd Lecture Series, xiii., 1906, p. 4.

O'Denovan,¹ Wilde,² and Joyce³ for identifying the Dearc Fearná, or Cave of Alders, of the above MSS., with what is now commonly named the Cave of Dunmore; it is important to note that those who should know best—the local peasantry—still call this cavern by its ancient designation—Dearc Fearná. An interesting reference to the cave occurs in Broccan's Poem in the "Book of Leinster":—*Ro shallair for in luchthigern i ndorus derci Ferna*: the full passage in English reads as follows⁴:—

Aithbel, she was a jewel of a woman, mother of Ercoil, the wife of Midgna,
Who killed the ten Fomorians in the strand at Tonn Chlidna,
Who burned the seven wild men in the glen at Sliabh Eibhlenn,
Who scattered the black fleet against which the men of Ireland failed,
Who hunted the red hag that drowned her in the midst of the Barrow,
Who trampled on the luchthigern in the door of Derc Ferna.⁵

The *luchthigern*, "lord of the mice" which this formidable person treated so badly was a gigantic cat that lived in the Cave of Dunmore, and of whose prowess wonderful tales are told; a Sabre-toothed Tiger could scarcely have been more terrible.

From these references belonging to the period of tradition we pass somewhat abruptly to those of the period of scientific observation. In the year 1709, Dr. Thomas Molyneux, well known in connection with his discourse on the "Irish Elk," visited the cave, and his picturesque description, as preserved in his journal, was long afterwards given to the world by the Kilkenny Archæological Society (11). Dr. Molyneux was much struck with the "dreadfull Romantick appearance" of the entrance; and well describes how "from the top the water distilling in a 1,000 places, and trickling down the sides, was petrified, so that the inside of ye Cave is almost entirely covered with

¹ "Annals of the Four Masters," *loc. cit.* ² "Beauties of the Boyne and Blackwater," p. 150, 1850. ³ "Irish Names of Places," 2nd ed. I., p. 437, 1895.

⁴ See T. O'N. Russell: *Fíor Chlairseach na h'Eireann*: "The True Harp of Erin," pp. 121, 125; 1900.

⁵ Mr. Russell translated this "Cave of Ferns"; but Dr. Joyce informed me there can be no doubt that the reference is to the Cave of Dunmore.

this petrified substance." He mentions a colony of Rabbits in that part of the cave which is still called the Rabbit Burrow; and describes the bottom of the well, and the adjoining part of the cave beyond the Rabbit Burrow, as being "full of human bones, but especially the well, in which there are several skulls"—the first reference to the abundant human remains that so much exercise the minds of the later writers.

The next reference to the cave which we find is in an anonymous pamphlet entitled "A Tour through Ireland, in several Entertaining Letters . . ." Dublin, 1746 (17); written as we learn from the Advertisement, by "two English gentlemen." These visitors surpass Dr. Molyneux in thrilling description. The approach to the cave is guarded by

"a monstrous Flight of different Species of Birds, whose Numbers darken the Air as you come near the Mouth, and their different Voices seemed to tell us we were going to view something extraordinary. . . . When you enter the Mouth, a sudden Chilness seizes all parts of the body, and a Dimness surrounded our lights, as if the Place was filled with a thick Fog. . . . Our Faces, through this Gloom, looked as if we were a Collection of Ghosts, and the Lights in our Hands seemed as if we were making a Visit to the infernal Shades. . . . The Shining of the petrified water (for I think we may justly call it so) forms so many different Objects, that it is not unpleasing; and by the Help of a little Imagination, we might make out Organ pipes, Pillars, Cylinders, Pyramids inverted, and ten thousand various Things in Art. . . . In several Places were Skulls and human Bones, as it were set in this crystalline Substance. . . . We were informed, that two miles from the Mouth was a Well of Wonders; but indeed, my Lord, none of us had Curiosity or Courage enough to travel so far. . . . When we came out, we thought we had abandoned the Regions of the Dead, to draw the Air of Paradise. They tell you many romantick Legends of this Cave."

The next visitor who recorded his impressions was Adam Walker, physicist, lecturer, and inventor, who explored the cave in 1771, and thought it of sufficient interest to form the subject of a letter to Charles Morton, then Secretary of the Royal Society, who had it duly published in the *Philosophical Transactions* (19). Compared to the graphic and enthusiastic outbursts of previous writers, Mr. Walker's account is somewhat wanting in imagination,

though he rises to the occasion when he speaks of the spectator standing in the cave as “in the mouth of a huge wild beast, with ten thousand teeth above his head, and as many under his feet.” His suggestion that the stactitic deposits are formed by the evaporation of water charged with carbonate of lime show that we are approaching the period of unromantic modern science. Colonies of Pigeons and Jackdaws are mentioned as inhabiting the cave, and “the bones of at least a hundred of the human race” were seen in the cavern. The fossils of the Carboniferous limestone are described, with the assurance that they are “real shells”; and with a hint that he has further notes of the kind for this “respectable Society,” the writer remains your most obedient humble servant.

An anonymous work entitled “A Trip to Kilkenny from Durham by way of Whitehaven and Dublin, in the year 1776,” (18) the writer describes the cave merely from hearsay, and without adding anything to our knowledge.

Much less appreciative than Adam Walker is Thomas Campbell, who published “A Philosophical Survey of the South of Ireland” in 1778 (2). “Even beauties too highly extolled, before you see them, seldom answer your expectations. I will not, however, rank this among beautiful objects, for to me it had nothing to recommend it.” He began the descent to the cave’s mouth, but finding it “damp and slippery,” returned, and held the horses while his servant explored the cavern. “I cannot conceive that the exhibition would reward the trouble. Do not, however, imagine that I lost my day with this bawble.”

William Tighe, commissioned by the Dublin Society to report on Co. Kilkenny under their “Statistical Surveys” scheme (16) publishes his observations in 1802, and briefly describes the cavern. He gives the English, Irish, and Latin names of the plants which festoon the entrance, mentions the wild pigeons, the human remains, stating that some of the skulls found were enveloped in calcareous spar; he wonders that the stalagmitic deposits are not worked up into ornaments, and refers to the occurrence of clay coloured by carbon.

The “Post Chaise Companion,” 3rd. ed., ? 1806 (13)

mentions the cave, the description being a hash-up of the accounts of older writers, made without acknowledgment or personal knowledge, in true guide-book style.

In 1825 the Cave of Dunmore makes, so far as I am aware, its first and last appearance in fiction. In "Crohoore of the Billhook," by Michael Banim (1), part-author of the well-known Tales by the "O'Hara Family," Chapter viii. opens with a description of the cavern, and closes with a tragedy perpetrated in its depths.

In the *Dublin Philosophical Journal and Scientific Review* for February, 1826 (8), John Hart, first restorer of the skeleton of the "Irish Elk," publishes the first accurate description of the cave, with measurements. He found abundance of human bones, but none of any other animal—not even of the Rabbits, which still colonize the earthy floor. He points out that the burying ground of the Church of Mothel stands within sixty perches of the entrance, and believes that the human remains were washed into the cave from that spot.

Thomas Kitson Cromwell, in his anonymous work "Excursions through Ireland," vol. iii., 1828 (3), considers the cave as "somewhat too greatly celebrated"; he failed to see all the wonders of the "Post-Chaise Companion," but mentions that the extent of "this excavation" is such that there English officers, venturing in without guides, were lost there for twenty-four hours, till finally rescued by their friends.

The *Dublin Penny Journal*, storehouse of local description, publishes in 1832 (12) the first illustration of the cave, a wood-cut portraying the entrance, with a description (over the signature "P"), which is mainly a quotation from "Crohoore of the Billhook."

The next notice of the cave will be found in the Proceedings of the Geological Society of Dublin for 1848 (10), where the President, Robert Mallet, discusses the composition of the stalagmites, pointing out the existence in them of phosphoric acid, and the fact that between the layers fine bands of charcoal occur.

On March 31st, 1854, Mr. J. G. Robertson read a paper on Dunmore Cave before the Kilkenny Literary and

Scientific Institution (14), his communication consisting mainly of notes made by Mr. William Robertson, architect, some years previously. The discussion on the paper having brought out the fact that these notes referred only to the eastern (southern or Market Cross) branch of the cave, the northern or Rabbit Burrow branch, in which the well and human bones are found, was visited by Mr. J. G. Robertson in company with Rev. James Graves, late Bishop of Limerick, and Mr. John G. A. Prim, and the results of their exploration appear in a supplementary paper read on April 28th (15). Both papers fortunately achieved publication by the agency of the *Natural History Review*. Though fully describing the cavern, they do not throw much new light on the scientific aspect of the subject; according to the testimony of these observers, the human bones occur only in that part of the northern chamber which is close to the well.

We next come to the most important paper which has been published either on the cave or on its human remains. Dr. Arthur Wynne Foot visited the spot on September 10th, 1869, in company with Rev. James Graves and Mr. Peter Burtchaell, explored the cave, and collected and brought away a large quantity of bones, which, having been named, were duly deposited in the museum of the Kilkenny Archæological Society. His observations appear in the Society's *Journal* for the following year (4). After giving an excellent review of the literature of the subject, with quotations from some of the earlier writers of greater length than the exigencies of space allow me to make here, Dr. Foot fully describes both branches of the cave. No living animal of any description was observed of the several that have been recorded, from Rabbits down to Acarinae, but he recommends a thorough zoological exploration. In the following sentence he gives a useful hint:—"A very small boy who accompanied us was of the greatest use, as he acted like an inverted chimney sweep; squeezing his body through crevices impassable to others, he and his light could be seen through the chinks of the rocky floor, working away underneath us." Large quantities of human bones were collected from the soil about the pool, the

guides showing none of the usual compunction in disturbing the remains, protesting that people who could frequent such a place must have been "worse nor haythens"; 113 bones were thus obtained, and carefully catalogued in the paper. Bones of pig, sheep, lamb, goat, cow and calf were also identified, but the fact that they were all found near the entrance, and that immature bones were in a considerable proportion, renders it probable that they belonged to animals which had wandered or fallen into the cave in comparatively recent times. Dr. Foot then enters very fully into the question of the human remains, and inclines to the view that they are of great antiquity, probably representing the massacre recorded in the "Annals of the Four Masters" in A.D. 928.

Lastly, in 1875, Mr. Edward T. Hardman of the Geological Survey read a paper on the cave before the Royal Irish Academy (6), in which he records the occurrence of further deposits of bones in the cave; this paper is a very valuable contribution to our knowledge of the cavern. The well-known bone-bed is near the well at the extremity of the "Rabbit Burrow"; the new deposits discovered by Mr. Hardman and Lieut. Smith are beside the beautiful stactitic pillar called the "Market Cross." In all cases Mr. Hardman finds that the remains occur in layers of silt, sand, and stalagmite; in the newly-found deposit, the human bones belonged largely to children and infants, and were mixed with those of pig, and of sheep or goat. Mr. Hardman believes that the bones and the stratified material in which they occur were brought down by water from higher chambers of the cave, the entrances to which they now cover, and that the bones are at least as old as the Danish invasion recorded by the Four Masters, perhaps much older. Mr. Hardman's valuable paper is illustrated by a plate on which appear a sketch of the "Market Cross," and rough plan and sections of the cave—the first and last attempt at mapping it.

In the Geological Survey's "Explanatory Memoir on the Geology of the Leinster Coal-field" (7) published in 1881, Mr. Hardman briefly recapitulates the facts given in his paper above-mentioned, and adds, on a larger scale,

the sketch of the "Market Cross" published therewith. This is the last reference to the cave in scientific literature.

The latest scientific explorers of the Cave of Dunmore were Prof. A. C. Haddon, Prof. H. J. Seymour, Mr. J. N. Halbert, and myself. We went to Kilkenny on the afternoon of December 1st, 1901, and devoted the next day to examining the cavern. The preceding week had been one of almost incessant rain, and we anticipated a very wet and muddy task. To our great surprise, the cave was exceedingly dry; and in the few places where water was dripping, the dense deposit of fresh stalagmite showed that the drip was perennial.

The cave is situated on elevated ground overlooking the Dinin River, between Kilkenny and Castlecomer, on a tongue-shaped inlier of Carboniferous limestone, with Coal-measures all around. As described by previous writers, the entrance is not conspicuous, and though we knew we were within a couple of hundred yards, we found it a saving of time to ask our way. The entrance is highly picturesque. The steep semi-circular slope is tenanted by ancient Elders, beneath which is a wonderfully luxuriant growth of Golden Saxifrage. This half-cone faces a vertical wall of rock which rises above the mouth, adorned with Ivy, Hawthorn and Hazel. The Ivy, trailing down over the mouth in long streamers, forms a green veil of much beauty which, as viewed from above, almost closes the entrance. Around the mouth, the rocks are draped with an exquisite growth of Hart's-tongues, many being multifid and crested, and all having unusually wavy margins, recalling the var. *crispum*. Inside the entrance, a litter of twigs and wool showed that the Jackdaws referred to by previous writers still hold their ground; but not a bird was seen, and we could not decide whether the Rock Pigeons also are still there. The main cave plunges straight down in a uniform slope to its extremity, the floor being formed of a talus of unknown depth. On the left near the entrance is the wide recess in which are situated the steep and narrow entrances to both the Rabbit Burrow and Market Cross branches. We first explored the Rabbit Burrow branch. A steep ascent through a chimney-like opening led into a long chamber

of rectangular section, from which an ascent brought us into a very fine chamber with a high dome-shaped roof which we named "Haddon Hall." The floor was formed of great fallen blocks, concealing the true floor of the cavern, which was probably ten or thirteen feet below. A steep descent over stalagmite succeeded. On the right hand (east) wall is a handsome veil of stalagmite, and over this is the entrance of an unexplored branch; without a ladder this could not be reached. The descent leads to "the Well" mentioned by all the writers, and around this the remarkably abundant human remains for which the cave has long been famous have been mostly found. Beyond, the ground rises again over stalagmite and finally the cave dwindles into a low passage of wedge-shaped section, which narrows vertically until roof and floor meet. At this end we commenced operations, Mr. Seymour and I mapping the cave, and making halts while he took photographs; Prof. Haddon examining the human remains, and helping Mr. Halbert, who diligently searched for cave-animals. In a hollow near the extremity, where the height of the cave was only about three feet, we found a quantity of human bones; this site has not been previously noted. By the time we had mapped and photographed the Rabbit Burrow—in which no trace of Rabbits, or of their holes, is now to be seen—and collected samples of the stalactites, stalagmites, clay and sands, and of the minute cave-animals, we were hot, dirty and hungry, and lunch in the main cave was a welcome respite. We then hastened to make a rough examination of the Market Cross or southern branch. This is reached by a steep rough ascent. Beyond, it widens and the roof rises, till at the extremity it is a noble chamber. The Market Cross, so often described, is a stalagmitic pillar of great beauty. The floor around is extremely irregular, covered with huge blocks of rock, between which one can let oneself down to the true floor, and crawl along it underneath the superincumbent chaos of fallen rocks. On this floor human remains were to be found abundantly. Crevices in the end wall of this chamber open into the lofty roof of the extremity of the main cave, and we could look down sixty or seventy feet through the

dim green twilight to the sloping floor far below. All too soon our time was exhausted, and without being able to properly map this portion of the cave we had to leave. Photographs of the Market Cross were attempted, and Mr. Halbert much enriched his collections from the damp floor around. Then we climbed the steep slope of the main chamber into the waning daylight, rapidly descended the hill to where our car was waiting for us, and at 10 p.m. were once more in Dublin.

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To the above the three early MS. notices quoted on p. 148-9 must be added to make the list of references complete, and a few guide-book notices totally devoid of interest. Three vague references I have not succeeded in hunting down :—Tighe (16) says that a notice of the cave appeared in the *London Magazine* ; Hardman (6) mentions that Rev. James Graves informed him that Bishop Berkeley was the earliest writer on the cave ; and Richard Griffith's reference, I have not succeeded in finding.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Vervet Monkey from Lt. H. P. Murphy, three Cavies and some fancy Mice from Mr. W. D. Freeman, a Belgian "Hare" from Sir F. Shaw, three Rabbits from Mr. H. Hammond, a Blue-fronted Amazon Parrot from Mr. G. M'Illdowie, a Barn-Owl from Mrs. Moran, a Golden Eagle from Mr. R. Berkeley, four Kestrels from Lord Decies, and a Glaucous Gull from Mrs. Wallace. A Zebu Calf and two Lion Cubs (parents "Oseni" and "Sheila") have been born in the Gardens,

BELFAST NATURALISTS' FIELD CLUB.

MAY 18.—EXCURSION TO SAINTFIELD.—Under the leadership of S. A. Bennett, the party visited the church and then walked through the demesne of Saintfield House, by permission of Mrs. Blackwood-Price. Returning through Saintfield a quarry in the Silurian grits was visited—good examples of shearing and slickensides being exposed there. The party then proceeded to Rowallane, kindly thrown open by Mr. H. Armytage Moore. The rock garden, just in its prime, was a blaze of colour. In addition to the plants in the rock garden there were many other species of interest to botanists, the Rhododendrons being particularly fine. The party was unusually large, 122 members and friends gathering at Rowallane where tea was served. A vote of thanks to Mr. and Mrs. Armytage-Moore terminated the usual business meeting at which six new members were elected. The only wild plant seen of note was the Adder's Tongue, *Ophioglossum vulgatum*.

JUNE 1.—EXCURSION TO THE GIANT'S RING.—Fifty-four members and friends met the conductor (W. B. Burrowes) at Malone tram terminus and walked to the Giant's Ring. Mr. Burrowes explained to the party the recent research work carried out under the auspices of the Belfast Natural History and Philosophical Society at this important monument. A further walk of two miles brought the party to Drumbo, in the graveyard of which the ruins of a round tower remain. Mr. R. May described the origin and uses of these early Christian bell-houses. After tea the usual business meeting of the Club was held, the President (A. M'I. Cleland) in the chair. Two new members were elected.

The botanists found Drumbo Glen interesting—*Melica uniflora* and *Polystichum aculeatum* being noted; also a fine plant of *Vicia sepium* with pure white flowers. *Ulex Gallii* was observed growing in a hedge on the road coming from Farrell's Fort.

JUNE 15.—EXCURSION TO MUCKAMORE.—About twenty members and friends travelled by the 2 p.m. train to Muckamore. A walk of about two miles brought the party to Muckamore Abbey, where, by the kind permission of Captain Thompson, the party visited the historic grounds. Muckamore House occupies the site of the ancient priory. A small portion of the ruins of the Abbey are still standing outside the garden wall. Muckamore, one of the most celebrated monasteries in the diocese of Connor, was founded by St. Colman Ela, late in the sixth century. His mother was a sister of St. Columbkille. Mr. R. May then gave a short historical account of the Abbey. The party, by the kind permission of Major Maxwell, also visited the grounds of the Model Farm.

JUNE 29.—EXCURSION TO COMBER AND ROUGH ISLAND.—The party of about twenty-four members arrived at Comber at 2.20 p.m., and, under the conductorship of the Rev. K. Dunbar, proceeded to the Comber River and to the shore half a mile from Island Hill. The estuarine marsh afforded a good field for the botanists. Among the plants noted were *Spergularia rupestris*, *Apium graveolens*, *Samolus Valerandi*, *Suaeda*

maritima, *Polygonum maculatum*, and *Salicornia herbacea*. The weather during the afternoon was perfect. On the shore near Castle Espie a flock of over thirty swans was seen. N. H. Foster reported a bird list of thirty-one species. The most interesting ornithological feature was the observation of the Stonechat (one female seen), as the severe winter of 1916-17 had exterminated this species in some districts in Ireland [*vide Irish Naturalist*, vol. xxvi.]. The four common species of woodlice were found. Tea was served in a field at Island Hill at 4.30. Owing to the tide being full it was found impossible to visit Rough Island. Those of the party who remained till the late train had an enjoyable walk back to Comber by way of the fields through Cherryvalley.

JULY 27.—EXCURSION TO RAUGHLAN.—Under the conductorship of S. M. Macoun the members travelled by the 10.0 o'clock train to Lurgan and drove to Raughlan, where the day was spent on the shore of Lough Neagh. Before leaving Raughlan the President, A. McI. Cleland, thanked Miss Forde for permission to visit the demesne, after which the party drove back to Lurgan. After tea two members were elected. Several of the rarer or local species of plants were noted, but the most interesting botanical find fell to the conductor, who first detected *Spiranthes Romanzoffiana* growing in a dry meadow close to the shore. Collections of invertebrates were made in several groups which, when worked out, will be published in the Club's Proceedings.

AUGUST 10.—EXCURSION TO BANKS OF THE LAGAN from Shaw's Bridge to Drumbeg. A party of thirty members met, and as the district is one peculiarly rich in plant life the botanists were soon hard at work, the following among other plants being noted:—*Ceterach officinarum*, *Hypericum quadrangulum*, *Butomus umbellatus*, *Lycopus europaeus*, *Nasturtium amphibium*, *Lycium barbarum* and *Equisetum hyemale*. On reaching Drumbeg tea was served in the Parochial Hall. From the church the members proceeded to view the grounds of Drum House, which had been very courteously thrown open by the owner, Sir Samuel R. Keightley. Here the party separated, some returning to town by the road, some by the river.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 1.—EXCURSION TO KILLINEY BAY.—Eighteen members and visitors took part, the interest being mainly geological. From Dalkey at 2.30 p.m. the party walked *via* Coliemore and Sorrento to the junction of the Ordovician slates with the Leinster granite on the sea-shore, when the President (J. de W. Hinch), who acted as conductor, gave an account of the metamorphism produced in sedimentary rocks of the local Ordovician slates by the injection of the molten igneous granite. The mica-schist of the district, with its characteristic minerals, andalusite and chialstolite, was then examined, and from the adjoining granite specimens

of plumose mica were obtained. A short account of the Glacial deposits as developed at the northern end of Killiney was also given. At a short business meeting, the President in the chair, Mrs. Colles Moore and Miss Emma Barton were elected members of the Club. After tea many members wandered along the shore as the weather was brilliantly fine, and did not return to town until late in the evening.

JUNE 29.—EXCURSION TO PORTRANE.—The members left Amiens Street by the 1.50 p.m. train, twenty-two taking part in the visit, many no doubt attracted by the brilliant sunshine of the day. Owing to the much-regretted indisposition of Mr. N. Colgan, who was to have been the conductor, the leadership of the excursion devolved upon the President (J. de W. Hinch) and the Hon. Secretary (Mrs. Long). At Donabate the lane and field track to Balcarrick and the Island were taken, and here the party was joined by Mr. Launcelot Smith, of Beaverstown House, Donabate, whose very extensive knowledge of the geology of the peninsula made him virtual conductor during the remainder of the afternoon. When the shore had been reached near Balcarrick, a section of the excursion turned northwards to obtain specimens of the famous Lambay porphyry, while the remainder of the party scattered over the Island studying the sand-dune flora so well developed there. Near Corballis at 5 o'clock, tea was made by members carrying from town most of their own supplies. The party then walked along the northern shore of Malahide Creek, and had the opportunity of examining the excellent sections of Boulder-clay exposed here. From these sections the President obtained a number of shell-fragments and northern erratics (chalk, flints, granites). At Corballis House a field track brought the party back to Donabate, where the 6.19 p.m. train was taken to Dublin after a most enjoyable and profitable afternoon.

JULY 13.—EXCURSION TO HOLLYBROOK DEMESNE, BRAY.—Under very favourable weather conditions twenty members and visitors took part in this outing. Leaving Harcourt Street by the 12.35 train for Bray, the party proceeded along the Glen of the Downs road to the near gate of Hollywood, a well-wooded demesne on the northern slope of the Little Sugar-loaf, belonging to Sir Robert Hodson, Bart., who had kindly given permission to see all parts of the grounds. Here Prof. Henry, M.A., F.L.S., acting as conductor, pointed out many remarkable trees, including some splendid and very old beech, silver fir, spruce, and Scots pine, the latter of unusual beauty and dimensions. Many comparatively rare conifers were represented by fine specimens as *Deodar*, *Cupressus sempervirens*, *C. torulosa* and *C. funebris*, *Cryptomeria japonica*, *Tsuga Albertiana* and *Pinus Pinea*. Some curious old yews and evergreen oaks were noted and a grafted specimen of the Madeira Holly was worthy of inspection. A natural birch wood, which sprang up in a clearing made by the storm of 1903, presented many features of interest. Leaving Hollybrook, the party proceeded to Kilmacanogue, where tea was taken, after which a small party under the guidance of the President (J. de W. Hinch), walked up the Rocky Valley to Killough.

OBITUARY.

ALICE SCHARFF.

With deep regret we announce to our readers the death of Mrs. R. F. Scharff, which took place on August 15th, after a very short illness. The younger daughter of the late L. O. Hutton, she was married to Dr. Scharff in 1889, and devoted herself zealously to helping his zoological studies both as collector and writer. She shared particularly his keen interest in the *Irish Naturalist*, and rendered no small service to the Magazine by compiling the twenty-five years' author-index that formed the concluding number of the volume for 1916.

ARTHUR B. E. HILLAS.

The scientific institutions of Ireland have suffered yet a further loss in the death of A. B. E. Hillis, Junior Inspector of Fisheries, who received a commission in the Gordon Highlanders early in the war, and had risen to the rank of Captain. He proved himself an exceptionally capable officer: "a splendid soldier keenly interested in the welfare of his men," was the testimony of his colonel. He was reported "wounded and missing" on the western front in April, 1917, but not till the spring of this year was it certified that he had given his life. Born in Co. Sligo in 1876, Hillas was educated at St. Columba's, the High School, and Trinity College, where he took a Senior Moderatorship in 1898. Two years later he joined the scientific staff of the Irish Fisheries Office, where, until the outbreak of the war in 1914, he took an active part in the observational and experimental work on the life-history and migration of food-fishes, devising a new method of marking Salmon smolts. The results of this work and also a series of Eel-fry records made by him were published in the *Scientific Investigations* of the Irish Fisheries Office.

NOTES,

W. H. Harvey and Charles Darwin.

Shortly after the publication of the "Origin of Species" Prof. Harvey read before the Dublin University Zoological and Botanical Association (on 17th February, 1860) a paper entitled "A Guess at the Probable Origin of the Human Animal considered by the light of Mr. Darwin's Theory of Natural Selection, and in opposition to Lamarck's notion for a Monkey Parentage," which was subsequently printed for private circulation under a slightly emended title. In this he expresses disbelief in the efficacy of natural selection in the production of species, and indeed gently ridicules the whole theory. Darwin seemed disappointed that a man of Har-

vey's eminence should not at least have thought his arguments worthy of serious treatment, and wrote to J. D. Hooker, "I was not sorry for a natural opportunity of writing to Harvey, just to show that I was not piqued at his turning me and my book into ridicule, not that I think it was a proceeding which I deserved, or worthy of him."—"Life and Letters of C. Darwin," ii., 314).

Among some pamphlets from the library of Omeath House recently acquired by the National Library of Ireland there is a copy of this pamphlet, no doubt sent by the author to Mr. J. O. Woodhouse; in it is the inscription—"This is *rubbish*—merely got up to amuse an evening meeting of a *private* Society.—W. H. H." It is worth nothing, then, that our eminent Irish botanist did not in any way intend his brochure to be taken seriously, as Darwin seemed inclined to do. Possibly Harvey regretted having written his essay at all, for we gather from an editorial note in Darwin's "Life and Letters" that the copy sent to the author of the "Origin of Species" was inscribed "With the writer's *repentance*, Oct., 1860."

R. LLOYD PRAEGER.

Dublin.

BOTANY.

Spiranthes Romanzoffiana in Co. Armagh.

At a recent B. N. F. C. excursion *Spiranthes Romanzoffiana* was found at Raughlan, on the Co. Armagh shore of Lough Neagh. On this promontory the plant did not appear to be plentiful, as careful search in the shore meadows only yielded two plants, the first of which was found by Mr. S. M. Macoun. Some time ago Mr. N. Carrothers traced this plant growing practically all the way between Ellis's Cut and Kinnagoe, a distance of about two miles, and in some of the meadows in large numbers. This was recorded by Mr. Praeger (*vide* vol. xxii., p. 179). The Raughlan station is some $1\frac{1}{2}$ miles west of Kinnagoe, and from thence to the Co. Tyrone boundary there are some twelve miles of shore line which should repay investigation.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Sir Frederick Moore sent me last August a specimen of this plant collected in the cut-away bog at Brackagh by Mr. John S. W. Richardson. This is my original station for the plant (*J. N.*, ii., 159), which at the time it seemed better not to publish. Mr. Richardson saw six plants.

R. LLOYD PRAEGER.

Dublin.

Galium sylvestre in Co. Antrim.

In the *Irish Naturalist*, vol. xvi., p. 322, the late Mr. J. H. Davies notified that there was in the National Herbarium a specimen labelled thus, in Dr. Moore's handwriting—" *G. pusillum* (= *G. sylvestre*). Rare, observed near Fairhead and on Lurigedan Mountain, near Cushendall, July, 1836." The above *Galium* was excluded from Stewart and Corry's "Flora of the N.E. Ireland" (*vide* page 295). On the 24th June, of this year, I gathered on Lurigedan specimens of a *Galium* which I took to be *sylvestre*. The plants were submitted to Mr. N. Colgan, who wrote in reply as follows:—"I have examined the Lurigedan *Galium* . . . and have little hesitation in accepting it as good *Galium sylvestre*, Poll. . . . On the faith of the specimens, which I now return you, I am satisfied to restore *G. sylvestre* to the Flora of N.E. Ireland." Later I found *Galium sylvestre* at Ardclinis, *vide* Miss Knowles.

W. R. MEGAW.

Ahoghill.

ZOOLOGY.

Whales and Dolphins Stranded in Ireland.

Reference was made to Dr. Harmer's reports on the Cetacea stranded on the coasts of the British Islands in the years 1915 and 1916 in the *Irish Naturalist* of July, 1917. Another report has just been issued by Dr. Harmer published as before by the British Museum, on the Whales and allied creatures which have been cast ashore during last year. Most of the localities given are in England or Scotland. A few of them are in Ireland:—

PORPOISE (*Phocaena phocena*), Sheephaven, Co. Donegal, March 20.

WHITE-BEAKED DOLPHIN (*Lagenorhynchus albirostris*), Sheephaven, Co. Donegal, March 23.

RORQUAL (*Balaenoptera sp.?*), Rinvyle, Co. Galway, March 26.

CUVIER'S WHALE (*Ziphius cavirostris*), Liscannor, Co. Clare, June 9.

LESSER RORQUAL (*Balaenoptera acutorostrata*), Schull, Co. Cork, September 22.

BOTTLE-NOSED WHALE (*Hyperoodon rostratus*), Schull, Co. Cork, September 20.

In a note headed "errata" Dr. Harmer again alludes to a supposed specimen of Rudolphi's Rorqual (*Balaenoptera borealis*) which was reported to have been stranded at Derrynane, Co. Kerry, on the 28th February, 1914. He has since come to the conclusion that this whale was more probably a Common Rorqual.

ON THE REPRODUCTION OF THE COMMON
GARDEN SNAIL, *HELIX ASPERSA*.

BY NATHANIEL COLGAN, M.R.I.A.

THERE is in existence a considerable body of literature dealing with the life-history and the manners and customs of the Common Garden Snail (*Helix aspersa*), that air-breathing or pulmonate mollusc so well known to and so little respected by the horticulturist. The animal thrives in my garden in spite of persistent discouragement, and this summer I found it to be uncommonly active in providing for the future supply of the species. In the course of a single day's gardening I came across no less than ten individuals half buried in the soil and laying those clusters of pearly eggs so familiar to us all as common objects of the flower bed. As one of these ten had only begun egg-laying, the cluster having but five eggs, I was tempted to make some observations on the life history of the species in the hope of adding something new to the lore of a somewhat thread-bare subject.

Selecting for the purpose the snail which had already laid five eggs, I lifted it from its burrow at 5 p.m. on the 27th June last, and taking it indoors placed it on a bed of potting mould in a glass petrie-dish, two inches in diameter and one and a half inch in depth, covering the animal with an inch of mould. On examining the dish at 1 p.m. on the following day the number of eggs was found to be 74, so that 69 had been laid in the course of 20 hours. Placing the snail on the surface of the mould, I was able to watch the process of egg-laying, which continued up to 3 p.m., within which period 9 additional eggs were laid, bringing the total up to 83. The time taken for extrusion, from the first appearance of the egg at the orifice beneath the right upper tentacle until it had been passed downward to the sole of the foot, there to be cemented by mucus to the eggs previously laid, varied from 30 seconds to a minute. A few of the eggs just laid were removed for examination, and the remainder, about 75 in number, were buried in the

mould in the petrie-dish, which was covered by its glass cap and laid aside in a desk to await developments.

The eggs varied slightly in form and size. The majority were globular, with a diameter of 4.5 mm.; a few were ellipsoidal, with a longer axis of 5.5 mm., or, say, one-fourth of an inch. An outer filmy skin enclosed a dense layer of what appeared to be minute, white granules, the two forming a tenacious coat which enclosed a second filmy skin containing the colourless, glairy, albuminous matter destined for the nutriment of the embryo. Under a one-sixth inch objective the white granular coating was resolved into a dense layer of transparent crystals of the form known as rhombohedrons, these crystals being free or aggregated into small groups. In dilute nitric acid this crystal coating dissolved with brisk effervescence, leaving behind the structureless, filmy outer skin. The crystals were apparently carbonate of lime, and their presence suggested that they might be destined to furnish material for the shell of the young snail before it broke loose from the egg. This suggestion was strengthened by examination of a number of eggs just after the young snails, provided with a well-formed spiral shell, had been hatched out. In all cases the thick opaque coating of crystals was found to have disappeared from the outer envelope of the egg, leaving behind a filmy skin, dotted here and there with scattered crystals. Many of the still sharp-edged crystals were found embedded in the remnants of the albumen carried off by the young snail attached to its foot, many more were seen lying inside of the snail-shell against the animal's body, and a still larger number, much reduced in size and with blunt or rounded edges, appeared in both positions. Intermediate steps in this process of translation of the crystals from the outer coating of the egg could be traced on examination of juveniles towards the end of the incubation period, so that the process progressed *pari passu* with the later stages of growth of the young snail-shell. Treated with dilute nitric acid, these young shells gave a brisk effervescence, while the enclosed animal similarly treated gave no reaction.

At this stage of the inquiry a more diligent search through the scattered literature of the subject showed me that a

French investigator, M. P. J. F. Turpin, had forestalled me by eighty-seven years in the discovery of the carbonate of lime crystals in the egg-shell of the garden snail. His paper, illustrated by excellent figures, was read before the French Royal Academy of Sciences in 1831 and published the following year in the *Annales des Sciences Naturelles*.¹ In all points but one, and that not the least interesting, M. Turpin's observations and conclusions agree with those just detailed. This disagreement occurs on page 448, where he poses the question whether the crystals in the outer envelope of the egg are designed to serve in the formation of the young snail-shell, a question, which, he tells us, he would have been almost ashamed to ask had it not been addressed to him by several zoologists. He answers with a decided negative, asserting that these crystals are no more destined to form the shell of the young snail than the shell of the bird's egg is destined to form the bird's bones. This opinion he bases partly on analogy and partly on insufficient or erroneous observation; for he states that the crystals are always found investing the shell of the snail's egg after the animal has been hatched. As has just been shown here, this statement is at variance with fact, in so far, at all events, as Irish eggs are concerned. The gradual disappearance from the outer egg-envelope of the carbonate of lime crystals *pari passu* with the growth of the shell formed of the same substance in a non-crystalline state, seems to point to the formation of the shell from the crystals by the action of those vital processes of which we have still so much to learn. In spite, then, of M. Turpin's opinion, it is open to us to maintain that a portion of the crystals detached from the outer coating of the egg is dissolved and utilized as shell material by the still unhatched animal.

¹ *Ann. Sci. Nat.*, vol. xxv., pp. 426-453—"Analyse microscopique de l'œuf du Limaçon des Jardins (*Helix aspersa* Linn.) et de nombreux Cristaux rhomboédres de carbonate de chaux qui se forment à la paroi intérieure de l'enveloppe extérieure de cet œuf, enveloppe qui sert aux cristaux d'une sorte de géode." A committee of eminent chemists, to whom the question was referred by the Academy, reported in favour of M. Turpin's conclusion that the crystals were carbonate of lime.

On the 11th July, fourteen days after the eggs laid in captivity had been placed in the petrie-dish, the dish was examined. Many of the eggs were found to be shrivelled up. They were evidently "addled." Others were still quite plump, and one of these being carefully opened was found to contain a young snail enclosed in a transparent, colourless shell. This unhatched juvenile was already provided with a distinct radula or lingual ribbon, having a total of 240 teeth ranged in 25 rows, varying from 4 to 16 teeth in the row, with the median tooth well developed in the wider rows. In a well-grown adult *H. aspera* as many as 15,000 teeth have been counted in the radula.

Three days later, on the 14th July, another plump egg was taken from the mould in the petrie dish and for facility of examination was fully immersed in fresh water in a large watch-glass. Soon after immersion the tip of the foot was extruded from the egg, and in little more than three hours the animal had completely worked its way out. The upper tentacles were a beautiful pale violet colour, and the beating of the heart could be plainly seen through the transparent shell. The beats varied from 40 to 50 per minute, and the young snail lived fully immersed for 29 hours. One might be tempted to find in this sub-aqueous vitality of a juvenile pulmonate or air-breathing mollusc an illustration of the recapitulation theory, in which the early stages of an organism are reminiscent of its remote ancestry; for it has been suggested that the forefathers of the land snails are to be found in the marine nudibranchs. But this would be too daring an exercise of the scientific imagination, all the more so as this capacity for a somewhat lengthened sub-aqueous existence is shared by the adult.

On the 16th July, just eighteen days after the laying of the eggs, 25 young snails were found hatched out and buried in the mould, which adhered to the copious mucus of the foot so as to make it by no means easy to distinguish the animal. The following day 20 others issued from the egg, making a total of 45 successfully hatched out of 75 placed in the mould in the petrie-dish on the 28th June. The young snails were so lively that it was found necessary to keep

their travelling instinct within bounds by confining them in a crystal chamber formed of two large watch glasses placed edge to edge one over the other. A second brood hatched out with me under similar treatment on the 8th August, after 18 days' incubation, as in the case of the first brood.¹

The shell of the freshly hatched snail had a diameter of 4 mm. ; it was almost colourless, faintly tinged with yellow, but showing no signs of the characteristic blotchings which have earned for the species the name *aspersa*. In air, the heart in four specimens examined was found to give 60 regular beats to the minute. One of these four immersed in water had its heart-beats soon reduced from 60 to 45 per minute, showing a reduction of vitality by change of element. The eyes, so obscure in the dark coloured adult, were most conspicuous in the juvenile as black dots on the translucent violet tentacles. The otocysts, or chambers enclosing the otoliths or auditory granules, about 20 in number in each cyst, were clearly visible under a one-sixth inch objective when the head of the animal was subjected to gentle pressure. As one followed with fascinated gaze the rapid tremulous oscillations of these ovate granules, the very heart of the mystery of molluscan sensation seemed to be laid bare.

As soon as hatched the snails began to feed. The young leaves of the Everlasting Pea were found to suit their taste admirably. These they devoured greedily, though at long intervals, stripping off the tender parenchyma from the leaves until a band of green appearing through the transparent shell showed that the juvenile was gorged. Growth was on the whole rapid and especially so in that important organ, the radula, on which a series of observations was made with the results set out in the following table :—

¹ In the "Cambridge Natural History," vol. iii., p. 43, the Rev. A. H. Cooke says that he succeeded in hatching out eggs of *Helix aspersa*, during the very warm summer of 1893, in 17 days. It seems not improbable that under conditions of steady heat and moisture the incubation period may become shortened to 15 days.

GROWTH OF THE RADULA BEFORE AND AFTER HATCHING.

Age of Snail.	Number of rows in radula.	Estimated total of teeth. ¹
11 days incubating ..	16	100
14 " " ..	25	240
Just hatched ..	45	975
6 days out ..	75	2,600
14 " " ..	90	4,750
6 weeks " " ..	102	5,750
Adult of average size ..	130	11,500

The growth of the shell was less rapid. Taking its longer diameter as the standard, the juvenile just hatched gave a breadth of 4 mm., at the age of 9 days, 5 mm. ; of 21 days, 6 mm. ; at 6 weeks, 8 mm. ; and at 2 months, 9 mm., or about one-third of the diameter of the adult shell. As for the otoliths, about 20 when hatched, they increased to 100 after 6 days, to 125 after 21 days, to 175 after 6 weeks, and to 250 after 10 weeks.

The characteristic dark brown markings of the shell are of slow development. In specimens 6 days hatched dark brown spots and blotches were quite conspicuous, but on opening the transparent shell these markings were found to be confined to the mantle of the animal. A specimen 9 days hatched showed the first sign of shell marking in the form of a single pale tawny band encircling the body whorl. Another individual, six weeks old, showed five tawny bands on the shell, the innermost and the third from the centre being twice as broad as the remaining three, which were thread-like. With these bands appeared a few dark spots and blotches. Finally, in a snail ten weeks hatched the dark spots and blotches appeared in large numbers, while the tawny bands on the body whorl were now reduced to two, the first and third from the centre, both of these having much increased in breadth and in depth of colour.

Sandycove, Co. Dublin.

¹ Of the series of numbers given in this column, the first and second are the result of actual counting ; the remaining five are estimated by a uniform method which understates rather than overstates the number.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 9.—The Club met at Leinster House, the President in the chair. H. A. LAFFERTY exhibited preparations of mycelium of a parasitic fungus *Colletotrichum linicolium* in the epidermal cells of the testa of living flax seed. The fungus, which has been described as a new species in the *Sci. Proc. Roy. Dublin Society*, vol. xv. (N. S.), No. 30, Aug., 1918, causes a leaf-spot and stem lesion disease of flax seedlings and hibernates in the form of dormant mycelium in the testa of infected seeds.

Dr. G. H. PETHYBRIDGE exhibited the ascomycetous fungus *Keithia thujina* Dur. It was discovered in quantity in July, 1918, on the leaves of young trees of *Thuja plicata* Don in a nursery at the forestry station of the Irish Department of Agriculture at Baunreagh, in the Slieve Bloom mountains, Queen's County, where it was responsible for the death of many hundreds of three-year old trees. It was also found on an older tree in one of the plantations, but in this case the injury done was not so serious. The fungus was kindly identified by Miss E. M. Wakefield of the Kew Herbarium. This species of *Keithia* was first observed by J. J. Davis in 1908, in Wisconsin, U.S.A., on *Thuja occidentalis*, and was described by E. J. Durand in 1913 (*Mycologia*, v., p. 6). In 1916 J. R. Weir called attention to a serious disease in young plants of *T. plicata* Don occurring in the lake region of northern Idaho (*Phytopathology*, vi., p. 360) caused by the same fungus. The present notice is the first record of the appearance of *Keithia thujina* outside of North America.

W. F. GUNN showed a mounted preparation of the capillitium and spores of the myxomycete *Hemitrichia vesparium*. The species has not previously been recorded from Ireland, but was found by him in September of this year growing on a decaying sawdust heap near the Glen of the Downs.

NOVEMBER 13.—The Club met at Leinster House, the President in the Chair.

H. A. LAFFERTY exhibited microscopic preparations of *Pestalozzia funerea* (Desm.). The fungus was found growing on the bark of *Cupressus Lawsoniana* twigs, but whether as a parasite or saprophyte was not definitely determined. This fungus has hitherto been unrecorded for Ireland.

Dr. G. H. PETHYBRIDGE exhibited specimens and sections illustrating the phenomenon of heterocarpism, which, as he had recently found, occurs in *Helminthia (Picris) echioides*, the Bristly Ox-Tongue, and which does not appear to be widely known. Two quite distinct forms of fruits are borne by each head of this plant. About sixty or so are golden-brown in colour with wrinkled skins, while from three to five more or less resemble peeled bananas. Heterocarpy in this plant was dealt with by Delpino in *Mem. R. Accad. d. Sci. d. Inst. d. Bologna* (5) iv., 1894, p. 31.

NOTES.

ZOOLOGY.

Argynnis aglaia in north-west Wexford.

On July 31st I took here a faded specimen of the Dark-green Fritillary (*Argynnis aglaia*), which had evidently flown for a long distance. As we are eighteen miles from the sea, the occurrence is probably a sufficiently far inland one to be worth recording. I have paid attention to the butterflies of this neighbourhood, without once meeting *aglaia*, for forty-two years. As long ago as 1878 my local list stood at twenty-three species, and it is only in 1918 that a twenty-fourth has turned up in this weather-beaten straggler.

C. B. MOFFAT.

Ballyhyland, Co. Wexford.

New Locality for *Thecla betulae*.

On August 13, I saw (but unluckily did not capture) a fresh-looking female specimen of the Brown Hairstreak Butterfly (*Thecla betulae*) in a bit of wooded ground in the Urrin valley, near Kiltrea. The spot is only about a mile from the present bounds of old Killoughram Wood, which has long been known to me as a haunt of this rare butterfly; but as the character of the vegetation is precisely similar, and the once extensive forest of Killoughram must originally have embraced the whole of the Urrin valley, the presence of the Brown Hairstreak Butterfly—a very sedentary insect—at Kiltrea may probably be a case of survival. I had never before seen the insect anywhere outside Killoughram Wood, where of late years, from unexplained causes, it has been quite scarce.

C. B. MOFFAT.

Ballyhyland, Co. Wexford.

Abnormal Caterpillar of *Choerocampa*.

It may, perhaps, be worth recording that early in August I got a caterpillar of the Elephant Hawk-Moth (*Choerocampa elpenor*), remarkable in having three pairs of well-defined eye-markings, showing as six eyes when the sphynx attitude is assumed, and remarkable also in having the caudal horn reduced to little more than a rudiment. A few days later the caterpillar began to spin its cocoon, preparatory to pupation.

W. E. HART.

Kilderry, Co. Donegal.

Gonepteryx rhamni in Co. Fermanagh.

I saw the "Brimstone" Butterfly on my way into Pettigo on May 27th; it was a worn-out, ragged specimen.

H. B. RATHBORNE.

Dreenan, Co. Fermanagh.

Return of the Gold-crest.

I am glad to be able to report the re-appearance in this district of the Golden-crested Wren (one of the five species locally exterminated by the frost and snow of January, 1917), having seen a single individual near this house on the 25th of October last, and a party of several on the 22nd of November. Two of the exterminated species—the Grey Wagtail and Meadow Pipit—had already re-established themselves in some numbers by the close of 1917. In the November of that year I also saw a party of Long-tailed Titmice in the valley of the Urrin, but these were apparently performing a local migration, as none have been seen since. The Stonechat is, however, the only bird of the five that during the whole of the past twenty-two months has not been seen at all.

C. B. MOFFAT

Ballyhyland, Co. Wexford.

A few Bird Notes from Balbriggan.

Like my valued friend Mr. Moffat, I have noticed the absence of a good many birds this year. Unlike his, our birds have not all returned yet. I have not seen or heard a Stonechat or a Gold-crest, and other birds are notably fewer this year—such as Goldfinches and Mistle Thrushes; it may be that the aeroplanes constantly circling over this district have driven them away—and indeed no wonder when what seems to be an enormous eagle with outstretched wings and an awful droning seems to threaten their destruction. The Crows and Jackdaws in wild confusion dash in all directions to escape. On the other hand the Chaffinch "pricks" nonchalantly, and poor Robin sings sweetly as before; but the usual autumn immigration of Skylarks is wanting here, nor have the Siskins yet appeared off the shore. However, I have noted fifteen summer migrants in 1918, but none of our four "raræ aves," the Blackcap, the Quail, the Grasshopper Warbler, and the Turtle Dove. I am now looking out for the Snow Bunting, which is rare here.

CHARLES W. BENSON.

Bedford House, Balbriggan.

A Jay in Co. Longford.

During over thirty years of careful observation of bird life here, never until to-day have I seen a Jay. I had him under view with my opera glasses for at least a quarter of an hour, and could not possibly mistake his brilliant plumage. Most of time under a big oak tree, apparently at the acorns. I hope he is not merely a passer by. Your readers will be interested in this incident.

J. MACKAY WILSON.

Currygrane, Co. Longford.

BOTANY.

Irish Myxomycetes.

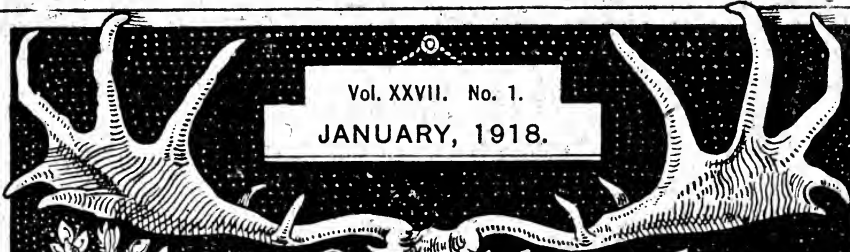
When starting on a "Myxie Hunt" one cannot always count with certainty on securing specimens, even during favourable weather conditions, but there is still in many parts of Ireland, the chance of finding something which is new to the district. This was my luck on a visit paid to the Glen of the Downs in September last, when the solitary find of the day proved to be *Hemitrichia Vasparium* McBride. It was found growing on an old heap of sawdust in a sawmill close by the Delgany entrance to the Glen, and is the first record from Ireland outside Ulster. Miss G. Lister has been good enough to examine the specimen and confirm my identification.

On the 24th October I was fortunate enough to get about a dozen sporangia of the minute but very beautiful *Comatricha elegans* Lister, on dead wood at Emo Park, Portarlinton. The only other Irish records for this are Belvoir Park, Belfast (M. W. Rea) and Carngaver woods (Stelfox).

On the 25th October my boy Stanley observed a mass of wood-plasmodium on a tree trunk near the Dodder River at Rathfarnham. He cut off a portion with the bark on which it was creeping, and brought it home to me. It was placed in a saucer with a little water, and in about a week it ripened and formed a round oethalium about one inch in diameter, which on microscopical examination proved to be *Brefeldia maxima* Rost. The only other Irish record of this scarce species which I can trace is that of Professor Yapp, who found it at Malone, near Belfast. It has also been recorded from England, France, Sweden, Germany, Switzerland, and the United States.

W. F. GUNN.

Dublin.




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JANUARY, 1918.



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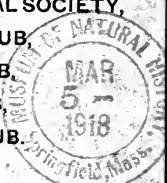
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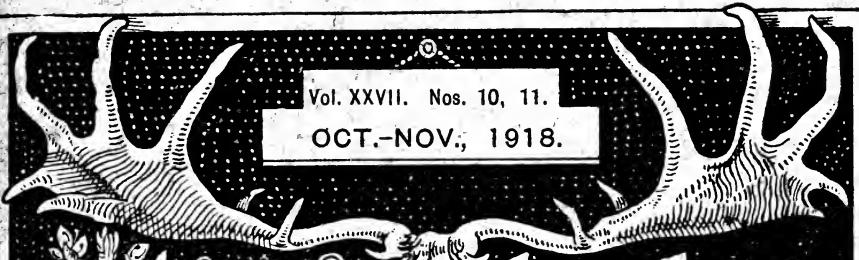
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