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OF

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Tyrone Naturalists' Field Club.

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PLATES AND ILLUSTRATIONS

ERRATUM.

Page 233, last line of R. Welch's paper, *for* "prussic" *read* "humic."

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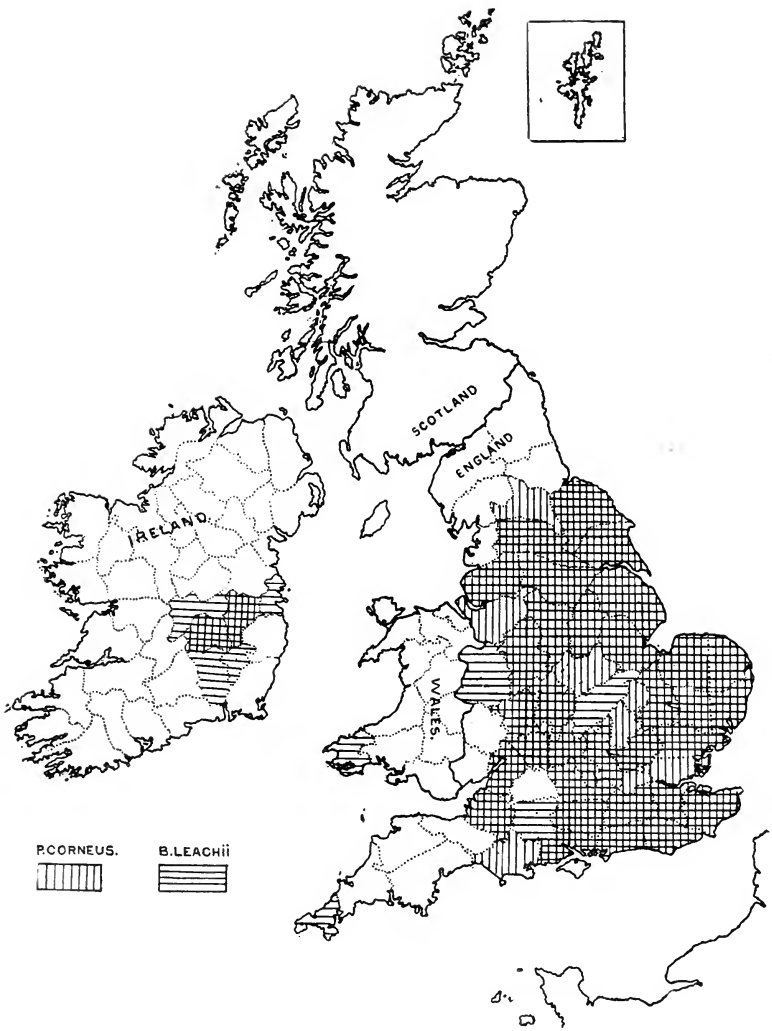

DISTRIBUTION OF BYTHINIA LEACHII AND PLANORBIS CORNEUS IN THE BRITISH ISLANDS.

To face p. 1.

The Irish Naturalist.
VOLUME XVII.

BYTHINIA LEACHII,

AN ADDITION TO THE IRISH FAUNA, WITH SOME NOTES ON ITS DISTRIBUTION AND ALSO ON THAT OF PLANORBIS CORNEUS.

BY R. WELCH, M.R.I.A.

(PLATE I.)

In searching a canal or river for freshwater shells one may sometimes come across a young specimen of that widely distributed species *Bythinia tentaculata* with a deeper suture and more slender form than usual. This is especially the case in dead eroded specimens, and when R. Ll. Praeger and I found what I thought at first was *Bythinia Leachii* in the Mountmellick branch of the Grand Canal near Monasterevan, in 1899, I came to the conclusion finally that they were only a slender local form of the commoner species with a deeper suture than usual (like D., fig. 1). With A. W. Stelfox as an addition to our party, we visited the same locality again in September, 1906, and for the same reason, to collect *Planorbis corneus* in the shallow drains of the district, the centre of its distribution—and that a very restricted one—in Ireland. Before starting on our walk across country, however, we visited both the River Barrow and the canal, and in the latter, in the old locality north of the railway, we obtained a lot more Bythinia. These A. W. Stelfox took home with him, and on comparing them carefully with specimens of *B. Leachii* that he had collected in England, came to the conclusion that they were clearly that species. They were, however, almost all immature specimens, so we sent them to our friends R. Standen and J. W. Jackson to be compared with various local sets in the Conchological

Society's cabinet in Manchester museum. This they did, confirming the identification. In returning the shells, they also sent a set of this species that J. R. Hardy had in his cabinet, collected by Theophilus Tucker and himself in 1870 in the Grand Canal, about four miles from Shannon Harbour. This was in King's Co., another county record, as the find had never been published, both the collectors being unaware that the species was an addition to the fauna of the country.

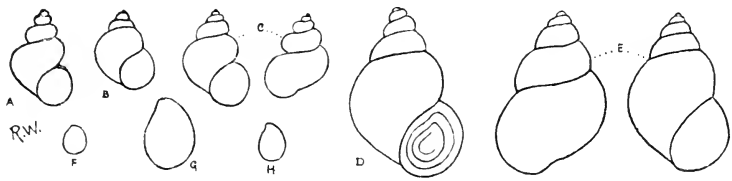

Fig. 1.

A. *Bythinia Leachii*, Monasterevan.
B. *B. tentaculata, juv.*
C. *B. Leachii*, typical English specimens from Stafford canal.
D, E. *B. tentaculata*, full-grown. D has deeper suture than typical examples like E.
F. Operculum of *B. Leachii.*
G. Operculum of *B. tentaculata.*
H. Operculum of *B. tentaculata* about half-grown.

On his way home from the Cork Conference in July last, A. W. Stelfox again visited the canal, this time at Sallins, in the north-east of Co. Kildare, and found the shell quite common there, much more so than at Monasterevan. This proved to us that it was evidently widely spread, and that it would likely be found all along the canal and its branches. I asked R. A. Phillips, of Cork, to keep a look out for it, and on 19th September he wrote me that he had that day collected it in the canal at Mountmellick, in Queen's County. In October I went down to the Grand Canal at Lucan, Co. Dublin (the Royal Canal also runs close to the village and might repay a visit), and the very first scoopful of material had a number of specimens, mostly young, with a few of the common *B. tentaculata* also. I spent about twenty minutes there, and found that it was even more plentiful than the latter, and was living among the subaquatic moss *Fontinalis antipyretica*, in about two to four feet of water along the muddy margins of the canal. I

did not find a single specimen on the other water-plants, though they swarmed with other species, especially *Physa fontinalis;* I never saw this latter so common anywhere before, but only half-grown of course at that time of year.

A few weeks after this Mr. Phillips wrote again that he had visited Graiguenamanagh, in Co. Kilkenny, and Tinnahinch, in Co. Carlow, and had obtained specimens in the River Barrow on both sides. This gives records for six counties, and not only from localities fairly close together, but from stations widely separated. I think this should dispose of the question often raised, when a local species is found in a new locality—one, too, that is supposed to have been well worked in the past—that it may have been introduced. It is true that the Grand Canal discharges into the River Barrow at Athy, but Tinnahinch is thirty-six miles lower down, and that is a long way; apart from the fact that the localities on the canal itself and its Mountmellick branch are spread along a distance of over a hundred miles in addition.

The centre of distribution in Ireland for *B. Leachii* is also that for *Planorbis corneus*, but the latter is more local. In England, however, they have almost the same range as in Ireland—a south-eastern one; a glance at the map (Plate 1) will show that they likely have an even greater similarity of range than is there given from the records we now have. In Ireland *P. corneus* so far has only been found in about eight localities along an irregular line, from near Maynooth in north-east Kildare, to Mountrath in central Queen's County, *via* Naas, Monasterevan, Lea Castle, Portarlington, La Bergerie, and Graigavern.

In an interleaved copy I possess of Thompson's "Catalogue of the Land and Fresh Water Mollusca of Ireland,"[1] which belonged to his friend Robert Callwell, of Dublin (Callwell's book-plate is in it), a former Secretary of the Royal Irish Academy, I see a MS. note opposite *P. corneus* on page 122—"*P. Corneus*, Lough Miscaul, west side of Cahirconree Mountain, specimen obtained from William Andrews, June, 1841." This is in North Kerry, a very out-of-the-way place in the Slieve Mish range, and needs verification. I think it better to mention it on the chance that some conchologist may be

[1] *Ann. and Mag. Nat. Hist.*, Sept., 1840.

keen enough to visit the locality, which is about eight miles south-west of Tralee. The habitat stated must be quite unlike those in which it lives on the central plain; there it occurs only in shallow drains in low, marshy ground, and I have not seen a trace of it in either canal or river. We examined both repeatedly between Monasterevan and Portarlington on our second visit. *Bythinia Leachii*, on the contrary, did not occur in any of the many drains we examined in a long day's walk across country, nor did we find it in the river, though it was carefully worked at many places.

Mr. Praeger tells me that the canal is fed at its summit level (279 feet) near Robertstown, Co. Kildare, by a canal from the south, which conveys water from large springs rising in an extensive marsh two miles west of Newbridge. Even if *B. Leachii* were not found in this marsh or near it, the fact would not be a good agument against its being an old member of the native fauna. E. Waller long ago pointed out,[1] in his list of the Land and Fresh Water Mollusca of Finnoe, how much the operations of the Drainage Commissioners of those days was affecting the habitats of the fresh water species, drying up or shallowing many of the old deep drains.

Further search in the counties named and those near them is very desirable. There should be no real difficulty in distinguishing the shell, especially if full-grown; as Adams[2] points out, it bears the same relation in its distinctive characteristics to *B. tentaculata* that *Vivipara contecta* does to *V. vivipara*. The whorls of *B. Leachii* are much more convex and suture much deeper; it has an umbilicus, the mouth and operculum are almost circular; while in *B. tentaculata* they are obliquely oval and angulated above. Figure 1, D, shows the only likely form of the latter that might be mistaken for it, and then only in young specimens, as full-grown shells are much larger.

In its foreign distribution *B. Leachii* is recorded from places as wide apart as Algiers and Sweden. In England and Ireland it is much more local than *B. tentaculata*, and in the former country does not seem to have been found further

[1] *Nat. Hist. Review*, 1854. p. 84.

[2] Manual of the Brit. L. and F. W. Moll., p. 142. 1896.

north than Yorkshire. I have never found any trace of it in shell-marl deposits in Ireland, though I have examined material from almost thirty localities, some well within its present range. It is, however, rare also in a fossil state in England, Kennard and Woodward recording it[1] from only three Pleistocene and three or four Holocene deposits in the southern counties.

The Pembrokeshire record rests on the authority of the late F. Walker, of Tenby, who sent a specimen to J. W. Taylor. Mr. Taylor tells me that E. G. Lowe recorded it from Glamorgan on the authority of Jeffreys about 1855; he also gives me a record from West Cornwall. A. G. Stubbs, who collected very keenly for years in Pembrokeshire, remarks on the almost total absence of the Operculata in the Tenby district. He writes that he never found either species there, but has found it in eleven localities in English counties, south and east.

I have to thank Messrs. J. W. Jackson, A. S. Kennard, R. A. Phillips, A. W. Stelfox, A. G. Stubbs, G. W. Taylor, and C. E. Wright, for many county records, and I think their kindly assistance will render the map fairly correct to date.

Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a pair of Grass Parrakeets from Madame de la Vallie, a Swan from Mr. R. Coey, a Gannet from Dr. J. H. Brownrigg, a Seal from Mr. St. George, two Turkeys from the Messrs. Carton, and two Fallow Deer from Miss Ada Bellew. Four Monkeys have been bought, and two Lion cubs have been born in the Gardens.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 23.—The Botanical Section met at the Museum. Rev. C. H. WADDELL, B.D., gave an address on Plants collected during 1907; the address was illustrated by specimens. W. H. ROBINSON read a paper on "Foliage Leaves; their Life-history, Composition, and Functions."

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[1] *Proc. Geol. Assoc.*, Nov., 1901.

[2] *Journal of Conchology*, vol. ix., pp. 321 and 363.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 13.—The Club met at Leinster House, the President (Prof. Carpenter) in the chair.

Dr. J. ALFRED SCOTT gave a demonstration on the Lumière "autochrome" process of colour photography. He exhibited under the microscope a portion of a plate prepared for the process, showing the "filter" of coloured starch grains, and displayed a series of finished lantern slides.

J. N. HALBERT exhibited a hydrachnid mite, *Aturus scaber*, P. Kram, found plentifully in moss on stones in the Devil's Glen stream, County Wicklow. This species has not been previously recorded from the British Islands. It occurs in rapidly flowing streams in the mountain districts of Europe, ranging from Norway to Italy.

F. W. MOORE showed young seedlings in various stages of *Drosera spathulata*. This species lives in Australia, Tasmania, and New Zealand and, as the specific name implies, the leaves are spathulate in shape; they are from two to three inches long, and, owing to the bright colour of the glands with which the upper surface of the leaves are covered, the dense tufts which the plant forms are very attractive. The chief interest in the seedlings lies in the fact that the young leaves are palmately divided up, regular wedges of tissue running into the few scattered glands borne by them. In the older stages the leaves become quite entire, with uninterrupted margins.

Dr. G. H. PETHYBRIDGE exhibited the potato blight—*Phylophthora infestans*—grown on tubers of the new potato, *Solanum Commersonii* (violet). The tubers concerned were derived from a crop grown in the ordinary way from tubers of the variety imported direct from the raiser. The claim of immunity put forward for this variety is therefore untenable. Two previous exhibits (see *I. Nat.*, vol. xvi., pp. 345 and 371), together with this last one, show that (1) the new tubers can easily be inoculated artificially, (2) the foliage of the plants grown from directly imported tubers suffers in Ireland from the blight, (3) the resulting tubers also become affected.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 12.—A lecture was given by JOSEPH R. FISHER, B.L. Subject—"Canada in the Twentieth Century." The paper was illustrated by a special series of lantern views.

DECEMBER 11.—R. A. DAWSON, A.R.C.A., Headmaster, School of Art, Municipal Technical Institute, Belfast, lectured on the subject "Celtic Art, its Development, Characteristics, and Possibilities," illustrated by a special series of lantern views.

DUBLIN NATURALISTS' FIELD CLUB.

OCT. 29.—CONVERSAZIONE.—The winter session 1907-8 was inaugurated with a conversazione in the Royal Irish Academy House. The members and their friends were received by the President (C. B. Moffat, M.A.), and although the attendance was smaller than in previous years, a most enjoyable evening was spent. During the evening J. Swain, B.A., gave a short lecture on "Photography in Natural History," and showed how natural history can be made interesting to young students by the use of photographs. The lecture was illustrated by a large series of lime-light views. Visitors from the other Irish Field Clubs were present, Belfast being represented by W. J. C. Tomlinson, and Cork by Thomas Farrington, M.A. The usual meeting of the officials of the Irish Field Club Union took place after the lecture, when the Hon. Sec. (R. Ll. Praeger, B.E.) gave a very satisfactory account of the issue of the special Cork Conference Number of the "Irish Naturalist." During the evening the following exhibits were on view in the Library and Council Room and attracted much attention :—

J. ADAMS, M.A.—(*a*) *Cicinnobolus Ulicis*, a new Irish fungus. (*b*) Rose Rust (*Phragmidium subcorticium*). W. B. BRUCE.—One hundred Co. Dublin weeds (with seeds of the majority). J. B. BUTLER, M.A.—Microscopical preparation illustrating the action of Protozoa under the influence of electricity. Prof. G. H. CARPENTER, B.Sc.—Microscopical preparations of the feet of insects and spiders. Prof. G. A. J. COLE, F.G.S., M.R.I.A. —Rocks showing the constitution of the Porcupine Bank, with map illustrating the work of the Fisheries Survey and Geological Survey in determining the nature of the sea-floor. J. DUFFY.—(*a*) Fossils from Lower Carboniferous Limestone of Clane, Co. Kildare (*b*) *Vestinautilus crassimarginatus*, Curkeen Hill, Co. Dublin. W. F. GUNN.—(*a*) Microscopical preparations of Hydroid polypes. (*b*) Examples of recent results in the cross fertilization and hybridisation of garden roses. J. N. HALBERT.—(*a*) Large specimen of Norway Lobster (*Nephrops norvegicus*), found off the Kerry coast. (*b*) Case of Insects (from the Natural History Museum). J. DE W. HINCH.—Fossils from the Coralline and Red Crag, Suffolk. Prof. T. JOHNSON, D.Sc., F.L.S.—Phellomyces, scab in potato, and other microscopic botanical preparations. T. HALLISSY.—Irish rocks and rock-forming minerals. Miss M. C. KNOWLES.—(*a*) *Allium Scorodoprasum*, L., from Co. Dublin. (*b*) Plants new to Co. Clare. Miss HELEN LAIRD, B.A.—Alpine plants from Switzerland. Miss N. M'ARDLE. —*Mercurialis perennis*, *Narcissus biflorus*, *&c.*, from Santry demesne. A. R. NICHOLS, M.A., M.R.I.A.—Canadian Crane, shot at Galley Head, Co. Cork. GEO. H. PETHYBRIDGE, Ph. D., B.Sc.—Photographs of Irish grasses. R. LL. PRAEGER, B.E.—Rare Irish plants. R. F. SCHARFF, Ph. D.—Living specimen of the Diamond-backed Rattlesnake from Florida. R. SOUTHERN.—(*a*) African Earthworm, *Benhamia Johnstoni*, Mount Ruwenzori, altitude 10,000 feet. (*b*) Tree Porcupine born in the Dublin Zoological Gardens (from the Natural History Museum). Miss J. STEPHENS, B.Sc.—Coloured diagrams illustrating the life-history of the

parasite of "sleeping sickness." I. SWAIN, B.A.—Fenestellidæ from the Irish Carboniferous rocks. Rev. C. TORREND.—Additions to the fungus flora of Dublin and Wicklow, including one species new to the British Isles. ROBERT WELCH, M.R.I.A.—Photographs illustrating geology, zoology, and antiquities of Cork.

NOVEMBER 16.—Fungus Excursion to Killakee Demesne,—A small party of members and visitors drove from Terenure at 1 o'clock to Rockbrook. Here a contingent of walkers joined the party, which proceeded under the guidance of Dr. G. H. Pethybridge (Vice-President) to study the Fungi of Killakee demesne. A large collection was made for exhibition at the following Tuesday's meeting, and at dusk the party returned to Terenure.

NOVEMBER 19.—The President, C. B. MOFFAT, M.A., in the chair. R. Ll. Praeger, B.E., communicated a paper on "Additions to Irish Topographical Botany during the Years 1906-7." This communication, which was illustrated by a number of specimens of the rarer plants, will appear in our next issue. H. W. D. Dunlop, M.A., asked some questions as to Connaught plants, to which Mr. Praeger replied. Mr. Praeger then described the Irish Field Club Union Conference held in Cork in July, 1907, giving a short account of the work of the Union (of which he is Hon. Secretary), and of the different excursions held in connection with the Conference. This description was illustrated by a large series of lantern slides of the Cork district. J. DE W. HINCH (Hon. Sec.), exhibited beach-pebbles, blown sand, and types of Boulder-clay from the Preglacial raised beach of the South of Ireland, and gave a short account of the formation of the beach.

DECEMBER 7.—Visit to the Geological Laboratory, Royal College of Science, under the guidance of Prof. G. A. J. Cole, F.G.S. A number of members and visitors had an opportunity of seeing the methods of instruction in use in the laboratory. There were on exhibition models, photographs, maps, specimens, microscopical preparations, &c., and Prof. Cole explained the part played by each in the education of the student of geology. Afterwards a short discussion took place on palæontology.

DECEMBER 10.—C. B. MOFFAT, M.A. (President), in the chair. Nominations were received for Officers and Committee for 1908. J. A. CLARKE then gave a lecture on "Animal Locomotion," and described a number of the adaptations by which animals produced movement in water, air, and on land. The lecture was illustrated by a series of lantern slides. The following members took part in a discussion:—The President, Prof. G. H. Carpenter, R. Ll. Praeger, B.E.; Francis Neale, J. de W. Hinch. Exhibits were then inspected. These were—W. B. BRUCE: collections of 50 Co. Dublin Plants, with specimens of seed of each. W. F. GUNN: Microscopical exhibit of a Slime Fungus.

THE SHIP-WORM AND WOOD-BORING CRUSTACEANS IN KINGSTOWN HARBOUR.

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

In October last I observed lying on the Carlisle Pier at Kingstown some old wooden piles so much decayed as to be reduced in places from the original dimensions of 13 inches square to a mere shell of an inch in thickness. The whole surface of the piles was closely pitted by small circular perforations, ranging from the size of a pinhole to $\frac{1}{8}$-inch in diameter, which, at first piercing the wood diagonally, ultimately followed the course of the grain as smooth-walled cylindrical tunnels for about half an inch, and ended in hemispherical headings. The intricate system of tunnels thus formed penetrated to about a quarter of an inch from the surface of the piles, the wood beneath the tunnelled layer being quite sound. On submitting specimens of the wood to Mr. Nichols, of the Dublin Science and Art Museum, he pronounced the perforations to be the work of the well-known wood-boring marine crustaceans, *Chelura terebrans* and *Limnoria lignorum* (the Gribble), several individuals of both species being found in the fragments submitted. Examination of a series of old piles stored in the harbour yard of Kingstown, and removed, as had been the first piles I observed, from the wooden structures flanking the granite jetty of Carlisle Pier, showed me that the two species were about equally abundant, though the Gribble, from its smaller size and sober grey colouring, appeared at a first glance to be much less abundant than the larger red-brown Chelura, which is easily detected by the naked eye. The larger specimens measured gave me the following lengths :— Chelura $\frac{5}{16}$ inch, and Limnoria $\frac{3}{16}$ inch.

These diminutive scourges of the marine engineer may be reckoned amongst the oldest inhabitants of Kingstown Harbour. One of them, Limnoria, was observed at work on the jetty there so early as 1834, or 73 years ago; both of them were found at the same place in 1842, pursuing their career

of destruction in amicable association just as we find them to-day.[1]

The rate at which these species carry on their ravages is a matter of great interest, no less to unpractical students of marine zoology than to harbour engineers, and the following information, for which I am indebted to the courtesy of the Kingstown Harbour Commissioners, may be of use in determining that rate. The old piles now being removed from the Carlisle Pier are of oak, Memel fir, and pitch pine, and those reduced to a shell were driven, some about the year 1868, others from 1877 to 1882. One of those driven between the latter years has been reduced from 18 inches square to 10 inches square; and of the other piles driven in 1886–87, three have been reduced as follows:—

(*a*) 19 in. × 18 in. reduced to 14 in. × 13 in.
(*b*) 18 in. × 16 in. „ 12 in. × 9 in.
(*c*) 16½ in. × 16½ in. „ 11 in. × 11 in.

Greenheart shows most resistance to the attacks of the *Chelura*, but is not entirely immune.

Further information and facilities for examining both the old piles removed from the pier to the harbour yard and those still *in situ* at the pier, but badly injured, were kindly given me by Mr. R. de Witt Gray, Superintendent of Harbour Works. One of the old piles shown me in the yard, a pile of Memel fir, 16½ inches square, which was driven in 1886–87, is of peculiar interest. Of the portion of this pile between high-water mark and the surface of the harbour bottom, within which limits the operations of both Limnoria and Chelura are confined, one half had been thickly studded with iron nails, a well-known preservative, which acts by coating the surface and impregnating the superficial layer of wood with iron oxide, while the other half had been left unprotected. The latter half was very badly eaten, the ravages of the crustaceans extending right up to, and apparently ceasing at, the first row of nails in the protected part. But on stooping down, it could be seen that large deep hollows,

[1] W. Thompson, *Edinb. Philosoph. Journal*, Jan. 1835, and *Ann. and Mag. Nat. Hist.*, 1847, p 161.

passing beneath the nails, had been worked from the unprotected to the protected parts of the pile, while the surface layer of this latter part remained quite intact, thanks to its coating of oxide.

At low tide, on the 4th November last, Mr. Gray took me in a boat to examine the superannuated piles still rising from the water beneath the Carlisle Pier, alongside of the sound working piles of comparatively recent date. We procured a series of specimens of the old wood, thickly populated with living Chelura and Limnoria, and I was pointed out some large piles of greenheart, driven about nine years ago, which had unexpectedly begun to show signs of decay, for this wood was reputed immune from attack. Some shavings chipped from the surface with an adze were found to swarm with living Limnoria, adult and juvenile. A few Chelura were also present, and the wood for fully a quarter of an inch from the surface was quite honeycombed with borings.

Thompson[1] notes the vitality of Chelura, which he found to remain alive out of the water in its borings for 90 hours. With me this species showed a vitality even more remarkable. In sections of old piles taken from Carlisle Pier at 4 p.m. on the 4th November last, and kept fully exposed to the air in a dry room, individuals were found living at 5 p.m. on the 14th November, so that they lived in their borings without any fresh immersion in salt water for ten days, or, to be perfectly accurate, for 241 hours. According to Bate and Westwood,[2] Limnoria lives at least for a fortnight in wood taken out of the water and placed in a dry room. It seems clear, in fact, that both species live in their wooden cells so long as these retain any moisture.

As showing the vast numbers of these crustaceans which must be simultaneously at work on a large pile, I may mention that I extracted from a small piece of Memel fir from the pier, not more than half-an-inch in cubic contents, 63 living specimens of Chelura and 48 of Limnoria. Observation of the living animals showed that Limnoria was markedly sedentary in habit, while Chelura was most active. The former rarely, if ever, issued entirely from its burrow, its

[1] *Ann. and Mag. Nat. Hist.*

[2] "British Sessile-eyed Crustacea."

motions were very slow, and, though it made a few fairly rapid swimming movements when placed in water, it lay as a rule inert on the bottom of the vessel. On the other hand, Chelura prowled freely around the neighbourhood of its wooden domicile, elevating itself on its powerful tail processes, and travelling somewhat in looped caterpillar fashion. Placed in water, it swam gracefully and rapidly, by preference on its back.

Both of these destructive crustaceans live in wood. Is it quite clear that they live on it? Does timber furnish them with both board and lodging, or with lodging only? Bate and Westwood say of Limnoria[1] that wood "evidently forms its support, as the stomach is found filled with minute ligneous particles." No authority is given for this statement, and so far as I can discover no similar statement has been made with regard to Chelura. Thompson appears to have found only Limnoria in Belfast Bay. Has Chelura since been found there, separately or in association with Limnoria?

Though the claims of Chelura and Limnoria to be regarded as long-established residents of Kingstown Harbour are beyond all question, it is otherwise with the more formidable wood-borer, the Ship-worm, *Teredo norvegica*. There seems to be only one record of the occurrence of this mollusc in Co. Dublin, the record of Thompson,[1] where we have the following entry:—"*Teredo norvagica*, Spengler—1847, Kingstown Harbour, Dr. Ball." Whether Dr. Ball procured his specimens in old ships' timbers, in drift wood, or in harbour piles it is not possible to decide, and so the following account of the occurrence of Teredo as an undoubted inhabitant of Kingstown Harbour will, no doubt, be of considerable interest to students of the Dublin mollusca.

In the autumn of 1906 I observed a portion of what was obviously a Teredo tube in an old pile lying on Carlisle Pier. The tube was about six inches long by a half-inch in breadth, but as both extremities were wanting it was impossible to determine the species. When examining the old crustacea-riddled piles in the harbour yard in October last, I asked the

[1] *Op. cit.*, vol. ii., p. 353.

[1] "Natural History of Ireland," vol. iv.

workmen there if they ever happened to come across the Ship-worm. The reply was that they occasionally met with it in sawing up the old piles, but that it was very hard to get anything like a complete specimen. The importance of preserving any examples that might occur was impressed on the men by Mr. Gray, with the result that an imperfect tube, eight inches long, destitute of the tail or siphon end, but containing the valves and fresh remains of the animal, was placed in my hands in a few days. A fortnight later, on the 23rd November last, another specimen was sent to me. This was embedded in a 3-foot length of Memel fir, cut into three sections, forming part of an old pile driven at Carlisle Pier about the year 1868, and removed as decayed during the second week of November last. The central section, $16\frac{3}{4}$ inches long, was bored right through, and the bore at either end evidently corresponded with the bores appearing in the other two sections, one of which was 9 inches and the other $11\frac{1}{8}$ inches long.

On carefully paring down all three sections with a chisel, until the bore was fully exposed, a truly magnificent specimen of *Teredo norvegica* was revealed, with all the essential parts—valves, pallets, and concamerated termination of the tube—intact, and with portions of the animal still present in a tolerably fresh state. The bore was continuous in all three sections, occupying the full length of the two larger, and $5\frac{1}{8}$ inches of the shorter or 9 inch section, so that the total length of the bore, measured in a straight line, was 2 feet 9 inches. Following its sinuosities, for the bore was not straight, the length of this remarkable tunnel through perfectly sound timber was fully 2 feet 10 inches. This exceeds by 4 inches the largest specimens I can find recorded for the British Isles, Thompson's Portpatrick specimens, which in some cases attained a length of nearly two feet and a half, with a diameter at the larger end of $\frac{7}{8}$ of an inch.[1]

The following are the principal measurements of the Kingstown specimen :—Valves, $\frac{3}{4}$-inch broad by $\frac{3}{4}$-inch long ; pallets, with the beaks, slightly over $\frac{13}{16}$-inch long by $\frac{5}{16}$-inch broad, the beaks being $\frac{5}{16}$-inch long. The greatest diameter of the

[1] *Edinb. New Philos. Journ.*, Jan., 1835.

tube, which occurred near the upper or valve end, was $\frac{7}{8}$-inch. The chambered posterior end was $3\frac{1}{2}$ inches long, and its extremity bearing the twin openings for the siphons was $\frac{3}{8}$-inch in diameter. The upper end of the bore containing the valves was destitute of any calcareous tube or lining for a length of $4\frac{1}{4}$ inches. The number of partial partitions in the posterior end of the tube was from 35 to 40, most of them being clearly visible through the semi-diaphanous yet solid substance of this part of the tube. In Forbes and Hanley[1] the number of the partitions is given as from 10 to 12. This number was no doubt taken from a specimen of average size, and the number of partitions probably increases with the age of the animal. In texture the pallets, the partitions, and the general body of the tube were laminate. This was particularly noticeable in the outer face of the pallets, whose flaky texture resembled that of the cuttle-bone. The general body of the calcareous tube lining the bore had a thickness of half a millimetre, which increased to one millimetre at the chambered end; and in the thinnest portion of the tube from 2 to 4 laminæ or distinct superpositions of calcareous matter could be detected.

Both Chelura and Limnoria were present in the wood bored by this Teredo, so that we have in Kingstown to-day, as Thompson found in Port Patrick in 1847, no less than three marine species co-operating in the destruction of harbour piles. The fourth collaborator found by Thompson in the Port Patrick piles, *Xylophaga dorsalis*, a mollusc closely allied to Teredo, has not so far been detected at Kingstown. It is, however, by no means unlikely to turn up on further examination of the decayed piles. It is likely, too, that all three of the wood-borers now resident in Kingstown Harbour will become rare in the near future, when the older timbers of the Carlisle Pier have been fully replaced by nail-studded piles.

Sandycove, Co. Dublin.

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[1] Brit. Mollusca, i. p. 70.

REVIEWS.

BRITISH AND IRISH PLUME MOTHS.

A Natural History of the British Alucitides: A Text-book for Students and Collectors. By J. W. TUTT, F.E.S. Vol. i. Pp. xiv. + 558. 5 Plates. London: Elliot Stock, 1906. Price, 21s. net.

This volume is the first of two which Mr. Tutt purposes to devote to the "Plume moths" of the British Islands, and we gather from the preface that it forms vol. v. of his great work on the British Lepidoptera. The thoroughness with which the group has been treated by Mr. Tutt may be gathered from the statement that in the 470 closely-printed pages that form the systematic part of this volume only nineteen species are described; the remainder will be dealt with in the succeding volume.

In Mr. Tutt's classification, the Plumes—best known to collectors as the family Pterophoridæ—form a "super-family" which he calls the Alucitides. In the discussion of the group beginning on page 70 of the volume and headed "Super-family IV. *a*: Alucitides," it is implied that all the "Plumes," as usually understood, fall into this super-family. But on page 127 we find another "Super-family IV. *a*: Agdistides," with arguments in favour of making the small group represented in Britain only by that local species *Agdistis Bennettii*, into a "Super-family" distinct from all the rest of the "plumes." Possibly Mr. Tutt may be justified in this course, but the uninstructed student who may try to benefit by the author's vast mass of learning ought not to be puzzled by such changes of view in the course of a single chapter.

The systematic worker will be grateful for the very full historical account which is given of the literature on the classification of the plumes. Not only are all the important authors, from Linné onwards, mentioned, but their schemes of generic distinction are quoted at length. The synoptic table from Hofmann ("Die deutschen Pterophorinen," 1895) will be of especial value to the British student, Hofmann's distinctions being justifiably preferred by Mr. Tutt to the more superficial if more concise characters employed by Meyrick. The historical section concludes with a list of the fifty-five generic names that have been proposed for various species of the "plumes" from Linné onwards. Mr. Tutt is himself responsible for twelve of these. It is lamentable that several names—such as Pterophorus and Aciptilia—well known and in general use by all systematic writers through the last century—are discarded as synonyms under the supposed requirements of the "laws" that govern the fixing of generic types.

Of great interest and importance is Mr. Tutt's section on the "General Biological Characters of the Alucitides." Alike as all the "plumes" are in their general appearance, and few comparatively as are the species, "the divergence exhibited is exceedingly great, and there are few of the largest super-families that exhibit so varied structures in the larval, pupal, and to a less extent, wing characters." Nothing like so full an account of the larvæ and pupae of Pterophorids has ever before been brought into so readily accessible a form as in this chapter; there are few entomologists who will not find here much that is new to them. An elaborate table of the characters of the last larval instar in some two dozen species of the group will be especially valuable for comparative purposes; this table is the work of Mr. Bacot and Dr. Chapman. The pterophorid pupa is of great interest—"incompletely obtect," with the intermediate and hind legs "quite free from the abdominal segments," of which four are movable in the male and three in the female; it does not move from its resting position before the eclosion of the imago, as "incomplete" lepidopteran pupæ usually do, but is "fixed by a cremaster that is developed on the eighth and tenth abdominal segments." Further, the "larval tubercles are carried over into the pupal stage." In many genera of the family the pupa is hairy; it is but rarely enclosed in a cocoon, being usually simply attached by the cremaster to a silken pad. The presence of larval tubercles on the pupa is to be regarded as a specialised feature, probably correlated with the absence of a protective cocoon; for the insectan pupa is typically much more akin to the imago than to the larva. This is one of the many features dwelt on by Mr. Tutt as showing the isolated position of the "Plumes" among the Lepidoptera. Mr. Tutt rejects their usual association with the Pyralides, the obtect pupa of the latter being in his view—shared by that high authority Dr. Chapman—a fatal objection to any near relationship. In this contention he is probably right, though, in our opinion, he allows too little weight to those characters of wing-neuration to which other lepidopterologists such as Hampson and Meyrick perhaps allow too much. But in estimating the importance of characters as showing affinity, it must be remembered that neurational features are usually non-adaptive, and, therefore, more reliable than larval characters, which are likely to be highly adaptive. On the other hand, the main features of the pupa are perhaps more weighty than any other single set of characters. We cannot follow Mr. Tutt in laying great stress on the form of the egg.

As already mentioned, Mr. Tutt divides the "plumes"—excluding the "multiplumes" (Orneodidæ), which are generally acknowledged to have no close kinship with the Pterophorids—into two super-families, the Agdistides and the Alucitides. The former contains only a single British species—*Agdistis* (or, as Mr. Tutt prefers to call it, *Adactylus*) *Bennettii*, which has not yet been found in Ireland. It differs from the other British plumes by its undivided wings, and its distribution is curiously restricted to eastern England and Holland.

The Alucitides are divided by Mr. Tutt into two families—the Platyptilidæ and the Alucitidæ. The former have cylindrical larvæ that

usually feed internally, and comparatively smooth pupæ, while the latter have flattened larvæ that feed openly on their food-plants, and hairy pupæ. The female Platyptilids have a single spine to the frenulum, while in female Alucitidæ this structure is double. These divisions are probably natural, but it is doubtful if the distinctions are sufficient to warrant their separation as families. Throughout the classification adopted, however, Mr, Tutt is inclined to draw sharp distinctions. In this volume he deals only with the Platyptilidæ, and these are split into four sub-families, most of which are again subdivided into tribes, and the eighteen species are distributed among twelve genera. Meyrick in his Handbook (1895) admits only nine genera in the entire group!

Space will not permit us to refer to all the species, but every Irish naturalist will look eagerly for Mr. Tutt's remarks on the "Galway plume," which appears in the volume as *Fredericina tesseradactyla*, having been removed with *calodactyla* (*Zetterstedti*), from the comprehensive genus Platyptilia, and placed in one of Mr. Tutt's new genera. The discovery of this insect by Messrs. Dillon and Kane in Cos. Clare and Galway is well known to most zoologists in this country. Its restricted distribution in Ireland and its apparent absence from Great Britain are very puzzling, in view of the very wide foreign range which Mr. Tutt records. For the moth occurs in the United States of America, both east and west, in Finland, Russia, Lapland, Sweden, Norway, Germany, France, Belgium, Austria, Switzerland, and North Italy. Probably it belongs to the circumpolar fauna, although ranging far south in Continental Europe. Fairly full accounts of the larva are given from German sources. *Platyptilia isodactyla*, for which a few Irish localities are given, has a strangely restricted range, being known only from Germany, Holland, Great Britain, Ireland, the Channel Isles, and Spain.

The range of the species in the British Isles is not easy to trace, as Mr. Tutt holds to the objectionable arrangement, on which we have before remarked, of giving long, closely-printed lists, with all the counties in various parts of the United Kingdom placed alphabetically. The detailed and careful descriptions of the insects and their larvæ would be much improved, and might, indeed, be considerably curtailed, if accompanied more liberally by structural figures. But the crowded pages are a storehouse of facts and a monument of painstaking industry.

As usual in the former volumes of his great works, Mr. Tutt gives introductory chapters on some problems of general interest. In this volume Hybridization and Mongrelization among the Lepidoptera are discussed. The facts given are worth the careful study of zoologists interested in problems of heredity. There is no constant appearance of Mendelian phenomena among the hybrids or the mongrels, but the results of crossing typical *Amphidasys betularia* and *Abraxas grossulariata* with their natural varieties—*doubledayaria* and *flavofasciata* respectively—refute a recent statement that Mendelian results can only be seen in domesticated mongrels.

G. H. C.

THE DISTRIBUTION OF BRITISH MOSSES.

A Census Catalogue of British Mosses, with List of the Botanical Vice-Counties and their boundaries, and Lists of Sources of Records, compiled under the direction of the Moss Exchange Club by:—England—Professor BARKER and W. INGHAM, B.A.; Wales—D. A. JONES, F.L.S.; Scotland—R. H. MELDRUM; Ireland—Rev. C. H. WADDELL, M.A., B.D., and Canon LETT, M.A., M.R.I.A.; Channel Islands—E. D. MARQUAND, A.L.S. 8vo. 64 pp. York: Coultas and Volans, 1907. Price 1*s.* 6*d.*, or 2*s.* interleaved.

The study of our native mosses will be much furthered by this publication, which, by showing the distribution in the British Islands, as known up to last year, of every species and variety, renders available at a glance a mass of information previously to be obtained only after laborious search, and a further mass of distributional facts hitherto unpublished. Considering that the project of producing such a census was first mooted only in July, 1906, the Committee who carried it out are to be congratulated on the promptness of the appearance of the catalogue, which involved a vast amount of labour. For not only have all reliable existing records been utilized, whether published or unpublished, but a considerable amount of special collecting has been carried out in the less known districts, for the filling up of obvious gaps. Considering the number of workers who have been busy since the last (2nd) edition of the "London Catalogue of British Mosses" was published in 1881, and the forward movement made during the intervening quarter-century in the critical knowledge of the group, it may be imagined what an advance in every direction the present catalogue shows over its predecessor. For the purpose of the census, Watson's 112 vice-counties have been adopted as regards Great Britain, and Praeger's 40 division as regards Ireland. We are sorry that the editors have retained the illogical and scientifically indefensible trick of bracketing the French islands of Guernsey and Jersey with the natural biological province formed by Great Britain and Ireland. The catalogue is prefaced with lists of the botanical divisions before mentioned, and of the published and unpublished sources from which records were derived. In the census itself, the arrangement of the mosses follows Dickson's "Handbook," each name being followed by a list of the numbers which correspond to the botanical divisions—the Channel Islands appearing between the Scottish and the Irish numbers! Round and square brackets distinguish the more or less doubtful records. The "Census Catalogue" is a model of neatness and conciseness, and makes one wish that equally accessible and complete lists were available for other sections of our Britannic flora.

R. Ll. P.

NEW KERRY INSECTS.

Stray Notes from South Kerry in 1903. By FRANK BOUSKELL, F.E.S., F.R.H.S. (*Transactions of the Leicester Literary and Philosophical Society*. Vol. IX., Part I., January, 1905).

After his previous successful experience amongst the plants and insects of Kerry (Bouskell and Donisthorpe, *Irish Nat.*, 1903), Mr. Bouskell decided to spend another holiday exploring the fauna and flora of the south-west, selecting the Caragh Lake district. The results of his researches, during three weeks in June and July, are contained in this paper.

The records are mostly of insects and plants, and there are a few references to birds, notably to a Hoopoe, which was seen flying "through the wood close to the house," on the north shore of the lake. This occurrence is of interest, as, according to Mr. Ussher, the bird is seldom seen except as an irregular spring and autumn visitor in the south of Ireland. A brood of Siskins was also seen "which had evidently been bred in the district." Mr. Bouskell was also informed that a Martin had been noticed during the winter months.

The most interesting entomological discovery is that of three species of myrmecophilous beetles in a nest of the large Wood Ant *Formica rufa*. These are *Quedius brevis*, *Monotoma formicetorum*, and *Clythera iv-punctata*, all being additions to the Irish list. The Wood Ant *Formica rufa* is a decidedly local insect in this country. It has been found at Churchill in the county Armagh by the Rev. W. F. Johnson (*Irish Nat.*, 1896); in Killoughrim Forest, county Wexford, by Mr. C. B. Moffat (*Irish Nat.*, 1896); and it occurs commonly near the Upper Lake, Killarney. The writer has also found it in numbers running on tree trunks in a fir plantation close to Woodford, county Galway. When recording it from Wexford Mr. Moffat gave some convincing arguments in favour of this being a native insect and not an importation, as had been suggested. The occurrence of these parasitic beetles in nests of the Wood Ant at Caragh Lake is undoubtedly favourable to the same view, as they are all more or less characteristic denizens of nests of *Formica rufa*.

Another interesting capture is the handsomely coloured beetle *Callidium violaceum*, both the larvæ and perfect insects of which were found under bark of fir trees at Lickeen, making a fourth new Irish record. Mr. Bouskell suggests that it is in all probability native in such an isolated and little explored locality as Lickeen, and we are inclined to agree with him, although the species is one somewhat liable to importation.

In this connection the reputed extirpation of the original Scotch Fir of Ireland, and the question as to whether our pine-feeding insects are truly indigenous, is an interesting one. It would seem to be a difficult matter to decide whether the original stock of Scotch Fir was really exterminated before recent plantings had begun. One would be inclined to believe that some remnants of the original pine woods must have

lingered on in wild and remote parts of the country, especially in the south-west. The editors of *Cybele Hibernica* (2nd edition) place the Scotch Fir in the "Appendix" to their work, amongst the excluded species, and write with reference to this subject: "There can be no doubt that the Scotch Fir was formerly native and abundant in Ireland. Its roots and trunks were frequently dug up from the bogs. . . . The absence both from the spoken language and from the place-names of Ireland of any native name for the tree would tend to prove that it had become quite rare if not extinct in very early times. Whether the records given above refer to relics of a former abundance, or merely to introductions, must remain doubtful; but there is no reason to believe that any indigenous Scotch Fir now exists in Ireland." It must be remembered also that pine feeders are extremely conservative, and as a rule refuse to feed on the widely different substitute plants with which collectors often succeed in rearing lepidopterous caterpillars.

Other rare species are the Cardinal Beetle *Pyrochroa serraticornis*, only previously known in Ireland from county Limerick; *Donacia dentata*, *D. clavipes*, and *Leistus montanus*. Among the lepidoptera the best capture was a fine male Lobster Moth (*Stauropus fagi*).

J. N. H.

NOTES.

BOTANY.

The Extinction of Cryptogamic Plants and the Need for a Lichen Exchange Club.

I.—For some years past in England as well as to some extent in Ireland Scotland, and Wales, in the neighbourhoods of large towns, it has been noticed that cryptogamic plants, such as Lichens, Hepatics, and Mosses, have become gradually scarcer and scarcer year by year. This is due to a variety of causes, amongst which perhaps the most potent is *smoke*.* Other reasons are increased dryness and the great variation from normal climatic conditions noticed during the last twenty years. To this may be added drainage and the deforesting of large wooded areas for purposes of cultivation. Where these or any other causes have brought about the extermination of cryptogams (and flowering plants also) information on this point would be exceedingly valuable to the writer, who is drawing up an account of the extent of this increasing extermination amongst these plants, and desires to have reports from each county in the British Isles.

In Ireland the causes mentioned are not so operative as in some parts of England and Wales. Still as the causes are universal so are the effects, and notes on this question from Irish counties will be gratefully received and acknowledged.

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* See *Journ. of Bot.*, September, 1907.

II.—Whilst it is still possible to study these plants the writer further would wish it known that a Lichen Exchange Club is being formed for the encouragement of the study of lichenology. For many years past these plants have received little attention, and it is thought that a medium for the exchange and naming of critical or little known species would give some impetus to those who already study these plants as well as beginners also.

Ireland affords many opportunities for the field-botanist interested in cryptogams to study Mosses, Hepatics, and Lichens, and there are a number of Irish species unknown in England or Scotland, whilst as a whole it presents a far better hunting-ground for these plants than most parts of the British Isles. It is desirable, therefore, that the study of lichens be encouraged in Ireland. The writer will be pleased to receive the names and addresses of those desirous of becoming members of the new Club. Communications on this point and as to the extinction of cryptogams in Ireland may be addressed to Ivanhoe, Gwendolen-road, Leicester.

A. R. HORWOOD.

Corporation Museum, Leicester.

Central Committee for the Survey and Study of British Vegetation.

The usual autumn meeting was held in Manchester on November 30 and December 1. Out of twelve members, eleven were present. F. J. Lewis, F.L.S. (Liverpool University), and afterwards R. Lloyd Praeger, in the chair. Also present—W. B. Crump, O. V. Derbishire, Ph.D. (Manchester University), C. E. Moss, M.Sc., Prof. F. W. Oliver, D Sc., F.R.S. (London University), W. M. Rankin, W. G. Smith, B.Sc., Ph.D. (Leeds University), A. G. Tansley, M.A. (Cambridge University), J. W. Woodhead (Halifax Technical College), Prof. R. H. Yapp (Aberystwith College). Prof. F. E. Weiss, D.Sc. (Manchester University), also sat with the Committee. The general business included minutes, proposal to form a society for the study of ecology, report on excursion to Sherwood Forest, report on negotiations *re* publication of maps, appointment of sub-committee to consider the use of various symbols on vegetation maps, letter from Prof. Conwentz (Dantzig) relative to Naturdenkmäler, proposed excursions in Ireland on the occasion of the Dublin meeting of the British Association. The following papers were subsequently read :—F. W. Oliver—"Salt marsh development and reclamation in the Bouche d'Erquy"; R.Ll. Praeger—"The vegetation of the Glendalough district"; W. M. Rankin—(1) "Heaths on chalk and similar strata," (2) "Peat moors of the New Forest"; W. G. Smith—"Vegetation in the Upper Ward of Lanarkshire"; A. G. Tansley—"Classification of oak woods"; F. E. Weiss—"Dispersal of seeds by ants." Exhibits were also shown, including mounted botanical photographs illustrating the travelling collection now

being formed by the Committee (by A. G. Tansley), and some recent literature, including papers by Ostenfeld (Faeroes), Cockayne (New Zealand), Conwentz (Germany), Russell (Kent), &c. (exhibited by W. G. Smith).

Hypnum hamulosum.

Mr. M'Ardle records this moss in his interesting paper on Co. Mayo mosses (*I. N.*, Nov., 1907), from a wood near Cong. It usually grows at a high elevation, and is classed among alpine mosses. It is possible that some of these alpine species may grow at a lower elevation in the western districts of Ireland. It would be useful if observations were made of the lowest elevations at which they have been observed.

C. H. WADDELL.

Saintfield, Co. Down.

ZOOLOGY.

Scarcity of Wasps.

I also observed the scarcity of wasps last year, referred to by Messrs. Barrington and Welch (*I. Nat.*, vol. xvi., pp. 323, 370). They were more numerous towards the end of the season, especially among the twigs of the Juniper. I noticed that the flowers of the Figwort were, in the absence of wasps, much frequented by a small Carder Bee.

W. E. HART.

Kilderry, Co. Donegal.

Testacella haliotidea and other Mollusca in Co. Kerry.

While staying at Parknasilla in June, 1907, I heard from Mr. Dalzell, of the neighbourhood of Sneem, of a curious slug with a small shell on its tail that ate worms. I visited the locality, and after digging a considerable time, come across a nice specimen of *Testacella haliotidea*, Drap. Two more were obtained during my stay. Mr. C. Oldham has confirmed my identification. Mr. R. Welch told me that the species is new to Kerry. Staying at Valentia early in June, I came across big colonies of *Planorbis glaber*, *P. pusillum*, *Limnæa truncatula*, and *Helix rufescens*, var. *alba*.

B. R. LUCAS.

Northwich, Cheshire.

New Localities for Vitrea hibernica.

I have just submitted a number of Vitreæ from Irish localities to Mr. A. S. Kennard, and he finds his new *Vitrea hibernica* from such places as Glengarriff, Roughty Bridge, Kenmare, Sligo Abbey, Knocknarea Glen, Co. Sligo, and Dromahaire Abbey, Co. Leitrim.

B. R. LUCAS.

Northwich, Cheshire.

Exotic Land Mollusca at Belfast.

Ten years ago J. Ray Hardy, Manchester Museum, sent me specimens of *Opeas Goodalli*, Miller, with the remark that I should be sure to find specimens in some of the old greenhouses in the north-east. Though I have searched greenhouses in many parts of Ireland since, I never found the species till this year. In April I was hunting for the rare tiny Rosy Woodlouse in the palm bed at Crawford's Nursery when I found five or six specimens of the Opeas alive and dead on the surface of the soil. A few months later A. W. Stelfox came with me to the nursery again and we found a large number, well on to a hundred, alive and dead, of *O. Goodalli* and *Subulina octona*, Chemnitz, another and larger species of the Stenogyridæ. Dead specimens of the latter are easily mistaken for *Cochlicopa lubrica*, if not full grown. Alive there is no chance of this, as the animal is a bright greenish yellow, and shows very markedly through the transparent shell. Eggs in many also showed clearly through shells and R. Standen tells he has had specimens from Manchester green-house packed full of eggs. Both are West Indian species, and are supposed to have been introduced to the British Isles with plants. The species are very difficult to determine, as they are numerous and very much alike, and there may be a third species among those we collected. Mr. Standen kindly helped me in the identification of the Subulina.

In the same palm bed were other foreign animals, including several woodlice, cockroaches, a spider or two, and a very tiny ant, which I have forwarded to Dublin Museum to be worked out when time permits.

R. WELCH.

Belfast.

Mollusca of Bushy Park, Dublin.

In this Journal, June, 1904, we gave a list of the mollusca living in the marsh at Bushy Park. *Valvata cristata*, which was common in the pond below the house and also lived in the marsh, was omitted by mistake. This year we find that *Limax marginatus*, whose seeming absence we commented on, does occur, living on old trees near the garden. The upper part of the marsh, in which the bulk of the small species was obtained, has now been entirely altered by a drain opened out to the Dodder, and the removal of the stone-heaps to build rockeries ; and we find some of the xerophiles have now come down from the dry bank between the marsh and the river, and are feeding where three years ago we collected the Pisidia and *Aplexa hypnorum*. We mention this fact, as any one now visiting the marsh might easily fail to find the species we listed, unless they have partly migrated to the lower end, which still remains undrained. It was, however, not as good collecting ground as the upper half. The pond near the house, too, as a habitat for mollusca has altered through the introduction of swans.

A. W. STELFOX.

Belfast. R. WELCH.

New Irish Cephalopods.

In a "Preliminary Notice of New and Remarkable Cephalopods from the South-west Coast of Ireland" (*Ann. Mag. Nat. Hist.* (7), xx., 1907, pp. 377–384), Miss A. L. Massey records six species of Cephalopoda (three of which are new to science) met with during the years 1901–1907 at 50 to 70 miles off the south-west coast of Ireland.

Of the five different families to which these six species belong, specimens of one family only, viz., Polypodidæ [=Octopodidæ] have previously been obtained in the Irish marine area.

The three new species described are *Polypus* [=*Octopus*] *profundicola*, *P. Normani*, and *Helicocranchia* (n.g.) *Pfefferi*; the other three species are *Gonatus Fabricii*, Lichtenstein, *Octopodoteuthis sicula*, Rüppell, and *Histioteuthis bonelliana*, Férussac, none of which have been previouly recorded from British or Irish waters.

A detailed report of the whole collection of Cephalopoda obtained by the Fisheries cruiser "Helga" during the years 1901–7 is promised in a coming part of the *Scientific Investigations* of the Fisheries Branch of the Department of Agriculture and Technical Instruction.

Breeding of the Red-throated Diver.

In the November number of the *Irish Naturalist* (vol. xvi., p. 337), I was surprised to read Mr. W. C. Wright's account of the continued persecution of the Red-throated Divers at their Donegal breeding haunt. It is some years now since attention was directed to the fact of the eggs being taken every season, and it certainly does not tell in praise of the wealthy North of Ireland naturalists that no adequate protection has been afforded to the poor birds up to the present.

The Dublin naturalists, in their protection at Malahide of the Tern's breeding haunt, are an example that might be worthily followed by the successors of the late William Thompson in Belfast and its neighbourhood.

ROBERT WARREN.

Moy View, Ballina.

GEOLOGY.

Boulder at Narin.

The interesting boulder described by Mr. Welch in the *Irish Naturalist* for December, 1907, p. 371, is quite likely to be a large inclusion in the Donegal granite. These often assume a spheroidal form, and Irish examples on a large scale have been described by me from near Pettigo (*Trans. R. Irish Acad.*, vol. xxxi., 1900, p. 455), and on a smaller scale from other localities (*Proc. R. Irish Acad.*, vol. xxiv., sect. B, 1903, pp. 363–368 &c.). Examples near Narin are described in the same Proceedings, vol xxv., sect. B, 1905, p. 123.

GRENVILLE A. J. COLE.

Royal College of Science, Dublin.

ADDITIONS TO THE FUNGI OF THE COUNTIES OF DUBLIN AND WICKLOW.

BY REV. C. TORREND, S.J.,

Professor in the College of Campolide, Lisbon.

DURING a visit to Ireland of three years duration, from which I have just returned, I paid special attention to collecting Myxomycetes. In the course of my work, however, I collected a large number of the Fungi proper as well, and thinking that a list of both the Fungi and the Myxomycetes, which I have noticed as not hitherto recorded for the above district, would be useful, I append the names and localities herewith.

AGARICACEÆ.

Marasmius caulicinalis, Fr.—On rotten twigs, Dunran.
Pleurotus dryinus, Pers.—Railway sleepers near Kilcool.
Cantharellus muscigenus, Fr.—On moss, Kelly's Glen.
Polyporus amorphus, Fr.—Rotten pine wood, Kilcool.
P. picipes, Fr.—On willow trunks, Kilcool.
Ganoderma applanatum (Pers.), Fr.—On elm, Blackburn estate.
Fomes fulvus, Scop. non Fr.—On willow, Kilcool.
Poria ferruginosa, Schrad.—Fallen oak branches, Powerscourt.
P. vulgaris, Fr.—Fallen branches, Blackburn estate.
P. sanguinolenta.—On old tree stumps, Devil's Glen.

HYDNACEÆ.

Hydnum pudorinum, Fr.—On fallen branches, Blackburn estate.
H. stenodon, Pers.—On a dead trunk, Devil's Glen.
Odontia uda, Fr.—On wood and bark, Devil's Glen.
O. fimbriata, Pers.—On bark, Devil's Glen.
O. crinalis, Fr.—Inside a rotten pine stump, Kilcool.
Irpex fusco-violaceus, Fr.—On dead pine stump, Powerscourt.
I. pachyodon (Pers.), Bres.—On oak trunk, Bray.
I. obliquus, Fr.—On dead wood, Devil's Glen.
Radulum lætum, Fr.—Under bark of fallen twigs, Devil's Glen.
R. orbiculare, Fr., f. **tenuior.**—Fallen branches, Devil's Glen.
Phlebia contorta, Fr.—Bark of rotten fir, Kelly's Glen.
P. livida (Pers.), Bres., var. **cæsia.**—On fallen branches, Devil's Glen.

TELEPHORACEÆ.

Telephora terrestris, Ehr.—On the ground, Dunran estate.
Lloydiella Chailletii (Pers *sub Stereum*), Bres.—Fallen branches and dead trunks, Devil's Glen.
Hymenochæte ferruginea (Bull.), Bres.—Inside of oak trunk, Blackburn estate.

Corticium cœruleum, Pers.—Twigs and fallen branches, Devil's Glen.

C. roseum, Pers.—On dead wood, Devil's Glen.

C. Sambuci, Fr.—Fallen alder branches, Devil's Glen.

Hypochnus ferrugineus, Pers.—On dead leaves, Devil's Glen.

DACROMYCETACEÆ.

Guepinia merulina (Pers.), Quel.—Fallen larch and fir branches, Devil's Glen.

HYMENOGASTRACEÆ.

Hymenogaster vulgaris, Tul.—Palm House, Glasnevin Botanical Gardens.

LYCOPERDACEÆ.

Lycoperdon pratense, Pers.—Fields, Milltown Park.

Bovista plumbea, Pers.—Dublin mountains.

NIDULARIACEÆ.

Crucibulum vulgare, Tod.—Dead wood, Devil's Glen.

UREDINEÆ.

Coleosporium Petasites, D.C.—Leaves of Petasites, Blackburn estate.

MUCORACEÆ.

Pilobolus roridus, Schum.—On horse dung, Kilcool.

EXOASCACEÆ.

Exoascus Pruni, Fuck.—Leaves of Plum, Kilcool.

GEOGLOSSACEÆ.

Mitrula paludosa, Fr.—Dead leaves in marsh, Powerscourt.

HELOTIACEÆ.

Arachnopeziza aurelia (Pers.), Fuck.—On dead wood, Devil's Glen.

HYPOCREACEÆ.

Hypocrea rufa (Pers.), Fr.—On dead wood, Devil's Glen.

SPHÆRIACEÆ.

Rosellinia aquila (Fr.), de Not.—On dead wood, Blackburn estate.

XYLARIACEÆ.

Hypoxylon multiforme, Fr.—On dead wood and bark, Devil's Glen.

Daldinia concentrica (Bolt.), de Not.—On elm trunk, Blackburn estate.

Xylaria polymorpha (Pers.) Grev.—On dead stumps.

HYPHOMYCETES.

Periconia calicoides, Berk.—On dead wood, and on *Poria sanguinolenta,* Devil's Glen.

Lasioderma flavo-virens, D. et M.—On dead leaves, Devil's Glen.
Myrothecium inundatum, Tod.—On decaying agarics, Glen of the Downs.

MYXOMYCETES.

Ceratiomyxa mucida, Schroet.—On dead wood, Devil's Glen. (Several forms have been found approaching the varieties *genuina* and *flexuosa*).
Badhamia utricularis, Berk.—On dead wood and mossy trunks, Devil's Glen.
Physarum psittacinum, Dibm.—On rotten elm stump, Blackburn estate.
P. viride, Pers.—On fallen branches, Dunran estate and Devil's Glen.
P. penetrale, Rex.—On an hepatic, Dunran estate and Devil's Glen. (An interesting and rare species, five previous records only having been made—viz., from Scotland, N. America, Sweden, Java, and Germany. Verified by Dr. Lister).
P. nutans, Pers.—Very common on dead wood.
Craterium pedunculatum, Trent.—On fallen branches, Devil's Glen.
Chondrioderma spumarioides, Rost.—On mossy stumps, Dunran estate.
Didymium difforme, Duly.—On dead leaves, &c., Milltown Park.
Stemonitis splendens Rost, var. **Webberi.**—On rotten trunks, Devil's Glen.
Comatricha obtusata, Preuss.—On dead wood, Blackburn Estate, Kilcool, &c.
C. laxa, Rost.—On dead wood, Rockbrook and Devil's Glen.
C. typhoides, Rost.—On dead wood, Rockbrook and Devil's Glen.
C. Persoonii, Rost.—On fallen branches and bark of coniferous trees, Devil's Glen.
Enerthenema elegans, Borom.—On dead wood, Devil's Glen.
Licea flexuosa, Pers.—On dead pine wood, Rockbrook and Devil's Glen.
Trichia persimilis, Karst.—On fallen branches, Devil's Glen.
T. fallax, Pers.—Common on dead wood, Devil's Glen, &c.
Hemitrichia Karstonii, List.—On fallen branches, Stillorgan.
Arcyria albida, Pers.—On dead wood, common, Rockbrook and Devil's Glen.
A. flava, Pers.—On rotten trunks, Devil's Glen.
Perichæna populina, Fr.—On bark, Kilcool.

Lisbon.

ADDITIONS TO "IRISH TOPOGRAPHICAL BOTANY" IN 1906–1907.

BY R. LLOYD PRAEGER.

[Read before the Dublin Naturalists' Field Club, 19th November, 1907.]

Two years have now elapsed since, in a paper entitled "Irish Topographical Botany: Supplement, 1901–1905," and published by the Royal Irish Academy,[1] I summed up the additions to our knowledge of plant distribution in Ireland, which had been made during the five-year period mentioned. The two years which have now succeeded have been fairly fruitful, and a considerable list of new county records, including some very interesting plants, has now to be dealt with.

The most complete piece of work carried out has been Miss Knowles' survey of the Barony of Shanid,[2] resulting in a plant-list larger than that previously existing for the whole of Co. Limerick (of which Shanid forms about one-seventh), and the addition of about 60 plants to the county flora. Some of these are very valuable additions. *Rosa stylosa*, discarded from the Cork flora as a mere escape, must now be readmitted to the Irish list on the Limerick evidence. *Glyceria Foucaudi* is also new to Ireland; *G. festucæformis* has its only previous Britannic habitat in Co. Down; *Rosa hibernica*, as previously known, was confined to the north-east; while *Rosa glauca* and *Epilobium angustifolium* have each only one previous station in the southern half of Ireland. It should be remarked that some of these plants were published in time to be included in my 1901-1905 Supplement, and therefore are not given in the lists which follow.

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[1] *Proc. R.I.A.*, xxvi., Sect. B. No. 2.

[2] *Irish Nat.* xvi., 185–201. 1907.

Mr. Phillips has continued his study of the southern Brambles.[1] *R. longithyrsiger*, previously known only as var. *botryeros*, is now recorded from Ireland in the typical form; and *R. curvidens*, a sub-species of *R. anglosaxonicus*, is also new to the country. *R. Borœanus* is also practically new to Ireland, some doubt having arisen regarding the only other record (Aghaderg, Co. Down).

Mr. G. C. Druce paid us a welcome visit in the autumn of 1906, and in the course of a rapid tour amassed an interesting series of notes.[2] He added *Rubus thyrsoideus*, and the segregate *Rhinanthus monticola*, to the Irish flora, gathered a new variety of *Agrostis canina* (var. *lævis*, Hackel) on Brandon, extended the range of *Thymus Chamædrys* northward into Sligo, and that of *Scilla verna* southward into Wexford, and happily stumbled across a solution of the question of the occurrence of the American *Polygonum sagittatum* in Kerry.

As regards work dealing with individual species, northern botanists carry off the palm. Mr. Tomlinson's discovery[3] that *Spiranthes Romanzoffiana* grows in abundance in several stations on the northern side of Lough Neagh is of the very highest interest to botanists throughout Europe. The local Vetch, *Vicia Orobus*, of which only one plant has been known to grow in Ulster for the last thirty-four years, has been shown by Mr. Lilly[4] to occur on the adjoining Antrim moors in a number of stations, which number has been added to by Mr. Tomlinson.[5]

Mrs. Leebody's find[6] of *Glyceria aquatica* near Ballyshannon, gives a first station in the north-west of Ireland for this Central Plain grass. Mr. Davies[7] has found *Galium sylvestre* in Down, and shown that Dr. Moore's discarded Antrim record for the same plant is correct, thus extending the range of this local species from the west to the east side of Ireland. Mr. Waddell[8] reports the identification (we hope final) of a puzzling Saintfield Hawkweed, which has masqueraded under several names, as *H. serratifrons*, var. *Cinderella*; this species has not hitherto been recorded in Ireland, save from Kerry and Limerick.

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[1] *Irish Nat.* xv., 118–120. 1906. [2] *Ibid.*, xvi., 146–153. 1907. [3] *Ibid.*, xvi., 311–314. 1907. [4] *Ibid.*, xv., 267–268. 1906. [5] *Ibid.*, xvi., 349–350. 1907. [6] *Ibid.*, xv., 233. 1906. [7] *Ibid.*, xvi., 321 322. 1907. [8] *Ibid.* xvi., 350. 1907.

I myself have been spending some time in the West. Inishturk has been surveyed,[1] and the range of *Helianthemum guttatum* extended into West Mayo. Lough Carra has been examined,[2] its best plant being *Ncotinea intacta* (in three stations), which here reaches its northern limit in Ireland and in Europe. The extreme south-western corner of Connemara has been shown[3] to possess a very interesting group of calcicole plants. Of these, *Neotinea intacta*, *Ajuga pyramidalis*, and *Euphrasia Salisburgensis* have not previously been known except on the limestone pavements (the last also on limestone hills). *Ranunculus scoticus*[4] has been found to come down from its sub-alpine stations in Achill and Fermanagh, and to grow abundantly on the limestone shores of Lough Corrib.

In the matter of our alien flora, Miss Knowles[5] has supplied an interesting study of a large group of casuals growing near Straffan, beside a house where grain siftings had been used for feeding fowl. Such colonies of alien immigrants are the recruiting ground for eventual additions to the permanent established flora, and deserve more attention than they have hitherto received in this country.

Before proceeding to list the new county records, two records have to be withdrawn from "Irish Topographical Botany." Both arise from clerical errors, the notes in each case having been inadvertently placed under the wrong division. These are :—

Galeopsis versicolor, Curt.—"Near Foxford;" attributed to Galway W.; belongs to Mayo E.

Polypodium Phegopteris, L.—"S.W. of Slieve Aughta;" attributed to Galway S.E.; belongs to Clare.

I shall now, as in previous years, list the new county-records first under their respective botanical divisions. All published new records have appeared in the *Irish Naturalist*, which has made it an easy matter to give, by means of a volume and page number, a reference in each case to the original record. Then the new county records will be re-listed in systematic order; and, finally, those records which have not been published (on this occasion few in number) will be dealt with, and particulars of each given.

[1] *Irish Nat.*, xvi., 113-125. 1907. [2] *Ibid.*, xv., 207-214. 1906. [3] *Ibid.*, xv., 257-266, 1906, and xvi., 241-243, 1907. [4] *Ibid.*, xvi., 159. 1907. [5] *Ibid.*, xv., 143-150. 1906.

NEW RECORDS ARRANGED UNDER COUNTY DIVISIONS.

1. KERRY SOUTH.—
Rubus thyrsoideus, xvi., 148.
Polygonum maculatum, xvi., 150.

2. KERRY NORTH.—
Fumaria capreolata, xvi., 147.
Origanum vulgare, xvi., 150.

3. CORK WEST.—
Rubus silvaticus, xv., 119.
pyramidalis, xv., 119.
Rubus longithyrsiger, xv., 120
foliosus, xv., 120.
Carex vesicaria, xvi., 304.

4. CORK MID.—
Rubus erythrinus, xv., 118.
argentatus, xv., 119.
silvaticus, xv., 119.
leucostachys, xv., 119.
Boræanus, xv., 119.
Rubus oigocladus, xv., 120.
Kœleri (cognatus), xv., 120.
Marshalli, xv., 120.
dumetorum (raduliformis), xv., 120.

5. CORK EAST.—
Rubus dumnoniensis, xv., 118.
argentatus (type and robustus), xv., 119.
silvaticus, xv., 119.
myricæ (hesperius), xv., 119.
Questierii, xv., 119.
micans, xv., 119.
pyramidalis, xv., 119.
Boræanus, xv., 119.
Rubus anglosaxonicus (curvidens), xv., 119.
echinatus, xv., 120.
Babingtonii, xv., 120.
scaber, xv., 120.
foliosus, xv., 120.
dumetorum (type and raduliformis), xv., 120.

8. LIMERICK.—
Ranunculus Drouetii, xvi., 195.
peltatus, xvi., 195.
Lingua.
Cochlearia danica, xvi., 196.
Sagina maritima, xvi., 196.
Ulex Gallii, xvi., 197.
Rubus silvaticus, xv., 119,
infestus, xv., 120.
mutabilis, xvi., 197.
Marshalli (semiglaber), xvi., 197.
Rosa glauca (subcristata), xvi., 198.
Rosa stylosa (systyla), xvi., 198.
Epilobium angustifolium, xvi., 198.
Hieracium vulgatum, xvi., 198.
*Lycium barbarum, xvi., 199.
*Marrubium vulgare, xvi., 199.
Galeopsis versicolor, xvi., 199.
Lamium hybridum, xvi., 199.
Glyceria festucæformis, xv., 279.
Chara aspera (capillata), xvi., 201.

9. CLARE.—
*Papaver somniferum.
Lepidium hirtum.
Linum angustifolium.
Agrimonia odorata.
*Polygonum Bistorta.
Hordeum secalinum.

10. TIPPERARY NORTH.—

*Fœniculum officinale.

11. KILKENNY.—

Potentilla procumbens, xv., 189.
Rosa spinosissima, xv., 43.
involuta, xv., 43.
rubiginosa, xv., 43.
Rosa sepium, xv., 43.
Populus tremula, xv., 189.
Poa nemoralis, xv., 189.
Equisetum hyemale.

12. WEXFORD.—

Agrimonia odorata, xvi., 148.
Arctium Newbouldii, xvi., 149.
Scilla verna, xvi., 152.

13. CARLOW.—

*Trifolium agrarium.

14. QUEEN'S COUNTY.—

Nasturtium palustre.
*Cheiranthus Cheiri.
Callitriche stagnalis.
Bidens tripartita.

15. GALWAY SOUTH-EAST.—

Vicia Orobus, xvi., 148.
Agrimonia odorata, xvi., 148.
Lycopodium clavatum.

16. GALWAY WEST.—

Ranunculus scoticus, xvi., 159.
*Chelidonium majus, xv., 263.
Sagina maritima, xv., 263.
Geranium columbinum, xvi., 241.
*Trifolium hybridum, xv , 264.
Prunus Avium, xv., 264.
Apium graveolens, xv., 264.
*Petroselinum sativum, xv., 264.
Sium angustifolium, xv., 264.
Œnanthe Phellandrium, xv , 264.
Caucalis nodosa, xv., 264.
Galium sylvestre, xv., 264.
*Petasites fragrans, xv., 265.
Euphrasia Salisburgensis, xv., 265.
Utricularia vulgaris, xv., 265.
Mentha sativa, xv., 265.
Lamium intermedium, xv., 265.
Ajuga pyramidalis, xvi., 243.
*Chenopodium Bonus-Henricus, xv., 265.
Atriplex hastata, xv., 265.
Rumex Hydrolapathum, xv.,265.
Lemna trisulca, xv , 266.
Carex teretiuscula, xv., 266.
vulpina, xv., 266.
Poa nemoralis, xv., 266.
Glyceria maritima, xv., 266.
Festuca elatior, xv., 266.

17. GALWAY NORTH-EAST.—

Ranunculus scoticus, xvi., 159.
*Chelidonium majus, xv., 263.
Sisymbrium Alliaria, xv., 263.
‡Lychnis Githago, xv., 263.
Lotus uliginosus, xv., 264.
Vicia hirsuta, xv., 264.
angustifolia, xv., 264.
‡Prunus Cerasus, xv., 265.
Rosa rubiginosa.
Callitriche stagnalis, xv., 265.
Peplis Portula, xv., 265.
‡Smyrnium Olusatrum, xv., 264.
Pimpinella magna, xv., 264.
Scandix Pecten-veneris, xv., 264.
Œnanthe crocata, xv., 264.
Valerianella olitoria, xv., 264.
*Inula Helenium, xv., 264.
*Tanacetum vulgare, xv., 265.

*Crepis biennis, xv., 265.
Mentha sativa, xv., 265.
Stachys arvensis, xv., 265.
*Chenopodium Bonus-Henricus, xv., 265.
Polygonum Hydropiper.
Empetrum nigrum, xv., 265.
Juniperus nana, xv., 265.
Potamogeton perfoliatus, xv., 266.
Carex vulpina, xv., 266.
Glyceria plicata, xv., 266.

18. KING'S COUNTY.—
Vicia angustifolia.
Potentilla procumbens.
Callitriche stagnalis.
Rumex Hydrolapathum.
Juncus obtusiflorus.
Sparganium simplex.
Glyceria plicata.

19. KILDARE.—
Potentilla procumbens.
Bidens tripartita.

21. DUBLIN.—
†Allium Scorodoprasum, xvi.,348.
Aspidium aculeatum, xvi., 178.
Lycopodium alpinum, xvi., 368.

26. MAYO EAST.—
Viola Reichenbachiana, xv., 211.
Prunus Avium, xv., 212.
Padus, xv., 212.
Myriophyllum spicatum, xv., 211.
‡Anthemis Cotula, xv., 213.
Hieracium iricum, xv., 213.
Euphorbia exigua, xv., 213.
Ulmus montana, xv., 211.
Juniperus nana, xv., 214.
Taxus baccata, xv., 212.
Neottia Nidus-avis, xv., 212.
Listera cordata, xv., 213.
†Lolium temulentum, xv., 213.

27. MAYO WEST.—
Helianthemum guttatum, xvi., 121.
Sagina subulata, xvi., 121.
Rubus erythrinus, xvi., 122.
Rubus macrophyllus, xvi., 148.
Borreri, xvi., 122.

28. SLIGO.—
Rubus macrophyllus, xvi., 148.
‡Mentha piperita, xvi., 150.
Thymus Chamædrys, xvi., 150.

30. CAVAN.—
Lysimachia Nummularia.
Lathræa squamaria, xvi., 132.
‡Mentha rotundifolia.

33. FERMANAGH.—
Callitriche autumnalis.

34. DONEGAL EAST.—
Ranunculus Lingua.
Glyceria aquatica, xv., 233.

36. TYRONE.—
Ranunculus heterophyllus, xv., 186.
*Carum Carui.
Pyrola minor.
Carex Hudsonii.
præcox.

38 DOWN.—
*Lepidium Draba, xvi., 222.
Galium sylvestre, xvi., 321.
Hieracium serratifrons (Cinderella), xvi., 350.

39. ANTRIM.
Galium sylvestre, xvi . 322.
Dipsacus sylvestris.
†Leucojum æstivum, xv., 170.

40. LONDONDERRY.— Lepidium campestre, xv . 187.

NEW RECORDS ARRANGED SYSTEMATICALLY,

with division numbers appended.

Ranunculus Drouetii, 8.
heterophyllus, 36.
peltatus, 8.
scoticus, 16, 17.
Lingua, 8, 34.
*Papaver somniferum, 9.
*Chelidonium majus, 16, 17.
Fumaria capreolata, 2.
*Cheiranthus Cheiri, 14.
Nasturtium palustre, 14.
Cochlearia danica, 8.
Sisymbrium Alliaria, 17.
Lepidium campestre, 40.
hirtum, 9.
* Draba, 38.
Helianthemum guttatum, 27.
Viola Reichenbachiana, 26.
‡Lychnis Githago, 17.
Sagina maritima, 8, 16.
subulata, 27.
Linum angustifolium, 9.
Geranium columbinum, 16.
Ulex Gallii, 8.
*Trifolium hybridum, 16.
* agrarium, 13.
Lotus uliginosus, 17.
Vicia hirsuta, 17.
Orobus, 15.
angustifolia, 17, 18.
Prunus Avium, 16, 26.
‡ Cerasus, 17.
Padus, 26.
Rubus erythrinus, 4, 27.
dumnoniensis, 5.
thyrsoideus, 1.
argentatus, 4, 5 (type and robustus).
silvaticus, 3, 4, 5, 8.
myricæ, 5 (hesperius).
macrophyllus, 27, 28.
Questierii, 5.
micans, 5.
pyramidalis, 3, 5.
leucostachys, 4.
Boræanus, 4, 5.
anglosaxonicus, 5 (curvidens).
Borreri, 27.
infestus, 8.
echinatus, 5.
oigocladus, 4.
Babingtonii, 5.
mutabilis, 8.
scaber, 5.
longithyrsiger, 3.
foliosus, 3, 5.
Kœleri, 4 (cognatus)
Marshalli, 4, 8 (semiglaber)

Rubus dumetorum 4 (raduliformis).
5 (type and raduliformis).
Potentilla procumbens, 11, 18, 19.
Agrimonia odorata, 9, 12, 15.
Rosa spinosissima, 11.
involuta, 11.
rubiginosa, 11, 17.
sepium, 11.
glauca, 8 (subcristata).
stylosa, 8 (systyla).
Myriophyllum spicatum, 26.
Callitriche stagnalis, 14, 17, 18.
autumnalis, 33.
Peplis Portula, 17.
Epilobium angustifolium, 8.
‡Smyrnium Olusatrum, 17.
Apium graveolens, 16.
*Petroselinum sativum, 16.
*Carum Carui, 36.
Sium angustifolium, 16.
Pimpinella magna, 17.
Scandix Pecten-veneris, 17.
†Foeniculum officinale, 10.
Œnanthe Phellandrium, 16.
crocata, 17.
Caucalis nodosa, 16.
Galium sylvestre, 16, 38, 39.
Valerianella olitoria, 17.
Dipsacus sylvestris, 39.
*Inula Helenium, 17.
Bidens tripartita, 14, 19.
‡Anthemis Cotula, 26.
*Tanacetum officinale, 17.
*Petastes fragrans, 16.
Arctium Newbouldii, 12.
Hieracium iricum, 26.
serratifrons, 38 (Cinderella).
vulgatum, 8.
*Crepis biennis, 17.
Pyrola minor, 36.
*Lysimachia Nummularia, 30.
*Lycium barbarum, 8.
Euphrasia Salisburgensis, 16.
Lathræa squamaria, 30.
Utricularia vulgaris, 16.
‡Mentha rotundifolia, 30.
‡ piperita, 28.
sativa, 16, 17.
Origanum vulgare, 2.
Thymus Chamædrys, 28.
*Marrubium vulgare, 8.
Stachys arvensis, 17.
Galeopsis versicolor, 8.
Lamium intermedium, 16.
hybridum, 8.
Ajuga pyramidalis, 16.
*Chenopodium Bonus-Henricus, 16, 17.
Atriplex hastata, 16.
Polygonum Hydropiper, 18.
maculatum, 1.
* Bistorta, 9
Rumex Hydrolapathum, 16, 18.
Euphorbia exigua, 26.
Ulmus montana, 26.
Populus tremula, 11.
Empetrum nigrum, 17.
Juniperus nana, 17, 26.
Taxus baccata, 26.
Neottia Nidus-avis, 26.
Listera cordata, 26.
†Leucojum æstivum, 39.
†Allium Scorodoprasum, 21.
Scilla verna, 12.
Juncus obtusiflorus, 18.
Sparganium simplex, 18.
Lemna trisulca, 16.
Potamogeton perfoliatus, 17.
Carex teretiuscula, 16.
vulpina, 16, 17
Hudsonii, 36.
præcox, 36.
vesicaria, 3.
Poa nemoralis, 11, 16.
Glyceria plicata, 17, 18.
aquatica, 34.
maritima, 16.
festucæformis, 8.
Festuca elatior, 16,
†Lolium temulentum, 26.
Hordeum secalinum, 9.
Aspidium aculeatum, 21.
Equisetum hyemale, 11.
Lycopodium clavatum, 15.
alpinum, 21.
Chara aspera, 8 (capillata).

Particulars of Unpublished New Records.

Ranunculus Lingua, L.

8. Limerick. Lough Gur, 1906 (Mr. Kennedy)—Miss Knowles.

34. Donegal E. Port Lough, 1907 (D. C. Campbell)—Mrs. Leebody.

***Papaver somniferum,** L.

9. Clare. Canon Island, 1907—Miss Knowles.

***Cheranthus Cheiri,** L.

14. Queen's Co. Abundant on Lea Castle, Portarlington, 1906—P.

Nasturtium palustre, DC.

14. Queen's Co. Roadside near Lea Castle, 1906—P.

Lepidium hirtum, Smith.

9 Clare. Near Kilfiddane church, 1907—Miss Knowles.

Linum angustifolium, Huds.

9. Clare. Common by the Shannon, between Labasheeda and Killadysart, 1907—Miss Knowles.

15. Galway S.E. Meadow between Woodford and Lough Derg (M. Dowd)—More, *Recent Add.*, 1872. In Irish Top. Bot. this record was withheld, as the station lay far outside the apparently well-marked south-eastern range of the plant, and had not been verified in this well-worked locality. The recent finding of the plant in Limerick and S. Clare goes far to bridge over the gap in its distribution, and the probability would seem to be that the record is correct.

***Trifolium agrarium,** L.

13. Carlow. Old Grange, 1868 (D. B. Pack-Beresford spec.)—Miss Knowles.

Vicia angustifolia, L.

18. King's Co. Crinkle near Birr, 1906—Miss Annette Hemphill!

Potentilla procumbens, Sibth.

18. King's Co. North-west of Monasterevan, 1906—P.

19. Kildare. Near Monasterevan, 1906—P.

Agrimonia odorata, Mill.

9. Clare. West of Killadysart, 1907—Miss Knowles.

Rosa rubiginosa, L.

17. Galway N.E. Three miles south of Tuam, 1906—Miss Joyce.

Callitriche stagnalis, Scop.

14. Queen's Co. Near Lea Castle, Portarlington, 1906—P.

18 King's Co. North-west of Monasterevan, 1906—P.

C. autumnalis, L.

33. Fermanagh. Blaney Bay, 1906—W. N. Tetley!

***Carum Carui,** L.

36. Tyrone. Dungannon, and established at Arboe, 1906—R. W. Bingham!

***Fœniculum officinale,** Mill.

10. Tipperary N. A good colony on roadside 2–3 miles west of Nenagh, 1906—W. F. Gunn.

Dipsacus sylvestris, Huds.

39. ANTRIM. About 50 plants among brambles on spoil-bank of a chalk quarry, one mile N.E. of Moira, 1906—N. H. Foster!

Bidens tripartita, L.

14. QUEEN'S CO. Near Lea Castle, Portarlington, 1906—P.

19. KILDARE. Monasterevan, 1906—P.

Pyrola minor, L.

36. TYRONE. Fadross, Clogher, 1907—Miss Peck!

***Lysimachia Nummularia,** L.

30. CAVAN. Two miles from Belturbet, 1904—W. A. Barnes.

‡Mentha rotundifolia, Huds.

30. CAVAN. Dungummin, two miles from Oldcastle, 1904—W. A. Barnes.

Polygonum Hydropiper, L.

18. KING'S CO. North-west of Monasterevan, 1906—P.

Rumex Hydrolapathum, Huds.

18. KING'S CO. Ballycumber, 1906—P.

***P. Bistorta,** L.

9. CLARE. Killaloe, 1906—Miss Annette Hemphill

Juncus obtusiflorus, Ehrh.

18. KING'S CO. North side of R. Barrow near Lea Castle, 1906—P.

Sparganium simplex, Huds.

18. KING'S CO. By R. Barrow, east of Lea Castle, 1906—P.

Carex Hudsonii, Ar. Benn.

36. TYRONE. Near Dungannon, 1906—R. W. Bingham!

C. præcox, Jacq.

36. TYRONE. Dungannon, 1906—R. W. Bingham!

Glyceria plicata, Fr.

18. KING'S CO. Ballycumber, 1906—P.

Hordeum secalinum, Schreb.

9. CLARE. Near Killadysert pier; abundant in a swampy meadow on Deer Island, 1907—Miss Knowles.

Equisetum hyemale, L.

11. KILKENNY. Castletown, 1907 (W. S. Irving)—Miss Knowles.

Lycopodium clavatum, L.

15. GALWAY S.E. Attymon bog—Mrs. Joyce.

NEWS GLEANINGS.

Rowland Southern, B.Sc.

Our hearty congratulations to our valued contributor, Rowland Southern, of the National Museum, Dublin, who has lately obtained his degree in science at the University of London with 2nd-class honours in zoology.

Lichen Exchange Club.

We are glad to learn, from the receipt of a small pamphlet, the first official publication of the Lichen Exchange Club of the British Isles, that the proposal recently made by Mr. A. R. Horwood that such a club should be founded, has borne fruit. There can be no doubt that in our islands the study of Lichens has been lagging behind, and if the success of the Moss Exchange Club may be taken as a guide, the foundation of this Society ought to help to direct more attention to the group. The first list of members contains sixteen names, most of them of well-known cryptogamic botanists. The distributor for the year is Rev. H. P. Reader, Holy Cross Priory, Leicester, and the Secretary A. R. Horwood, Leicester Corporation Museum.

REVIEW.

BRITISH BIRDS.

Birds of Britain. By J. Lewis Bonhote, M.A., F.L.S., F.Z.S., M.B.O.U., with 100 illustrations in colour selected by H. E. Dresser from his "Birds of Europe." London: A. & C. Black, 1907. Pp. x. + 399. Price 20*s.* net.

The appearance of Mr. Bonhote's book almost synchronizes with his appointment as Secretary of the British Ornithologists' Union, and we congratulate him on both events. His book will never take the place of his predecessor's well-known and valued "Manual," but nevertheless it possesses distinct merit of its own, and it contains particulars of eighteen species not included in Saunders' work, these having been added to the list of our avifauna since the latter's publication. The reading of Mr. Bonhote's book has given us great pleasure. The condensed descriptions of the birds are usually well done, and are better than most compressed accounts with which we are familiar. Written in a popular style, the author shows a close personal acquaintance with all the commoner British birds, and his pen-pictures of the manners and customs of many of his feathered favourites are admirably done. The descriptions of the scenery to be associated with some of our birds are also very good and are evidently written first-hand from nature. Most of the coloured plates, which are taken from Dresser's "Birds of Europe," are life-like and excellent (such as the Magpie and Wryneck, for example), but some of them are very crude in colouration (see plates of Robin, Whitethroat, Hedge-Sparrow, Wren, Tree-Creeper, Barn Owl [right figure] and Partridge), while in plate 100, the names of the two birds figured are reversed. Indeed the book shows traces of hurry in production, as it is marred by a number of misprints (Orphaen, p. 44, cornata, p. 239, boschas, p. 241, Shoveller, p. 245, bardi, p. 326, pheopus, p, 348, Buffous, pp. 374-5, &c., &c., and at least five plates contain misprints), while in our copy eight pages are inserted twice. In the dimensions, Mr. Bonhote as a rule gives

Saunders' figures, but a few are slightly different, while the following are evidently typographical errors—length of Golden Eagle, 23 ins.; length of Macqueen's Bustard, 38 ins.; of Avocet, 10 ins; of Purple Sandpiper 8·57 ins.; of Great Black-backed Gull, 23 ins.

We doubt the statement (p. 40) that the Nightingale sometimes exceeds in size the Greater Nightingale, or "Sprosser," while the assertion that the Nightingale is "only known to the south-east of a line from the Humber to the Severn," is quite wrong, according to the latest information. (See "Birds of Yorkshire," p. 50).

We must confess to a feeling of disappointment that the book does not give more information in regard to the Anatidæ, of which group the author keeps so many species in confinement, and in which he has been so successful in hybridisation. A full detailed description of the down lining the nests of the various species would have been most valuable. On page 361, the remarkable statement is made that in winter the bill and legs of the Black-headed Gull are *white*! And in describing the *summer* plumage of the same bird, the words "Bill and legs much darker than in summer" only makes more confusion in the mind of the young student On the other hand, we have nothing but praise for the description of the nesting place of the Kentish Plover on p. 301. ". . . and it will never be met with unless a special journey is made to that lonely stretch of shore which is its only home in these Islands." Egg-dealers will not make much out of *that* description!

When we come to examine the book from the stand-point of the Irish ornithologist, we regret to find that the references to our island are often misleading, and sometimes quite erroneous. A closer perusal of Ussher's "Birds of Ireland," and the pages of this Journal since the publication of that work, would have modified many of Mr. Bonhote's statements, and with such information easily available, English ornithologists have no excuse for misleading their readers regarding Irish bird-life. For instance, one would think the Siskin did not breed here; the Brambling "has only occurred at very irregular intervals"; the Crossbill "has nested at irregular intervals"; one would infer that the Magpie was local and scarce here; the nesting colonies of Gannets "are pretty well distributed round our coasts, especially in Scotland *and Ireland*"; the occurrence of the Pink-footed Goose in Ireland "is not yet authenticated"; the Gadwall is not so rare here as one would suppose; the breeding of the Scoter in Ireland is not mentioned; of colonies of the Sandwich Tern "Ireland can only boast of one, in the North"; the Great Crested Grebe "nests in several localities"; while the only numbers of Irish occurrences given (Red-necked Grebe) are wrong! These instances are picked out at random and could be added to, but such statements should not have been allowed to pass. We hope ere a second edition is called for more attention will be given to the Irish records. The book is well printed and bound, the pages have wide margins, and, so far as English information is concerned, it leaves little to be desired. Its value lies in its original descriptions of bird-life and habits, and for these we cordially welcome it.

R. P.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Reeves Pheasant, a Silver Pheasant, and three Golden Pheasants from Mr. W. T. Potts, a White Cock Pheasant (first cross between Common and Mongolian Pheasant) from Capt. Longworth Dames, a Blue and Yellow Macaw from Miss C. P. Widdup, a pair of Swans and a Canadian Goose from Major Cusack, a Hawk from Mr. Johnston, a Cub Otter from Mr. Macdermott, and a Budgerigur from Miss MacDonnell. An East African Galago, two Badgers, an Eagle, and a Peregrine Falcon have been acquired by purchase.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 11.—The Club met at Leinster House, Dr. G. H. PETHYBRIDGE (Vice-President) in the chair.

W. F. GUNN exhibited a specimen of Japanese wood paper. This paper is made from very thin layers of wood super-imposed and cemented on sheets of thin ordinary paper, and gives a surface with the appearance of polished timber. The combined thickness of the two layers is about $\frac{1}{310}$ of an inch, and, assuming that each layer is of equal thickness, would give a thickness of about $\frac{1}{500}$ for the upper layer of wood. The species of wood used in the preparation of the paper was not ascertained, but the distance between the annual rings indicates that it is one of rapid growth, and possessing few vessels. Small portions mounted in balsam make excellent microscopic slides,

J. N. HALBERT showed the common green Hydra (*Hydra viridis*) found among moss in a rapid stream, at a considerable elevation on Kilmashogue Mountain, Co. Dublin. Such a locality is rather unusual for this species.

R. SOUTHERN showed a specimen of the polychaet worm, *Dasychone bombyx* (Johnston), which was dredged from several localities in Dublin Bay. The most striking characteristic of this species is the presence of numerous compound eyes on the tentacles, which form a crown round the head of the worm. This species is widely distributed in the North Atlantic, but has not yet been recorded from Irish waters.

Dr. G. H. PETHYBRIDGE exhibited a mildew, *Erysiphe tortilis* (Wallr.), Fr., in its perithecial stage, found parasitic on the leaves of a species of Cornus, probably *C. sanguinea*, growing at the Albert College, Glasnevin. This is the first record for this fungus in Ireland.

F. W. MOORE exhibited *Sphaerella Taxi*, Cooke, a fungus which is found growing on yew trees. It is said to grow only on dead leaves, and not to be a destructive fungus, a view which the exhibitor could not accept. He showed dead leaves, and also healthy green leaves, with *Spaerella Taxi* on them in various stages of development. Exhibitor had found it in Counties Kildare, Louth, and Dublin, and in each instance the symptons of the attack were similar.

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 14—BOTANICAL SECTION.—A meeting was held in the Museum, when two short papers were read; by W. J. C. TOMLINSON on "Local Botanical Field Work in 1907," illustrated by mounted specimens of rare plants collected during the season, and by SYLVANUS WEAR on "Cluster-cups, &c.," illustrated by special micro-slides.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 14.—Prof. GREGG WILSON, D.Sc., M.R.I.A., lectured on "'Primitive Australia': An account of some of the more notable features of Plant life, Animal life, and the habits of the Aborigines." The paper was illustrated by a special series of lantern views.

OBITUARY.

LORD KELVIN.

In Lord Kelvin, the most distinguished Irishman of our time has passed away. In the widest sense no greater naturalist has ever lived. The laws of energy, which he did so much to establish, control the lives of all living beings. Energy as an entity of varying form was not understood till his work, along with that of Carnot, Joule, and Helmholtz, founded the great conception: the most fertile ever brought into science.

His more detailed work for natural science was the invention of the deep-sea sounding-wire. This has been instrumental in revealing a new world to us, as unlike our aerial world as if originated on another planet.

In geology he was a pioneer in exact methods. The impatience with which his mathematical restrictions were received by contemporary geologists show how much the new methods of exact induction were required. No matter how plausible the hypothesis, when experiment and mathematical reasoning enter the field, the only weapons are those of exact science, or, failing these, submission. Much has changed since the time when physicist and geologist contended over the period since the *consistentior status*. But the change is largely due to Lord Kelvin.

J. JOLY.

ADMIRAL SIR F. L. M'CLINTOCK, K.C.B., F.R.S.

We regret to record the death in London on November 17th of last year of the distinguished Irishman Admiral Sir Francis Leopold M'Clintock, who commanded the steam-yacht "Fox", that sailed to the Arctic Seas in 1857 in search of the Franklin Expedition, and returned in 1859, bringing home authentic intelligence of the death of Sir John Franklin at King William's Land on June 11th, 1847.

M'Clintock had also accompanied the three expeditions in 1848, 1850, and 1852, that had been sent out by the British Government in search of Sir John Franklin and his companions. In these three expeditions he distinguished himself by some remarkable sledge journeys, in the last and longest of which a distance of no less than 1,400 statute miles was made over the desolate wastes and frozen seas in the hitherto unexplored region northward of Melville Island. The north-east shore of Prince Patrick's Land, and the off-lying Polynia Islands were explored, the northernmost of these islands lying almost under the 78th parallel of latitude being named Ireland's Eye.

M'Clintock appears to have taken a great interest in the Natural History of the regions traversed, and his paper "Reminiscences of Arctic Ice-Travel in Search of Sir John Franklin and his Companions,"[1] contains interesting observations on the mammals, birds, fossils, &c., of Griffith's Island, Melville Island, and neighbouring islands of Arctic North America.

During his residence in the Arctic Regions M'Clintock made valuable collections of mammals, birds, shells, &c., which he presented to the Natural History Museum in Dublin, the capital of his native country. The following are some of the more important donations:—Skeletons and skins of Musk Ox from Melville Island, skin of a very large Polar Bear from Bellot Strait, skins of Eider Ducks and various Gulls. These were mounted and have long been exhibited in the Museum. The first authentic egg of the Ivory Gull (*Larus eburneus*) that had been brought to Europe was obtained by M'Clintock in June, 1853, at Prince Patrick's Land (lat. 77·25 N, long. 116 W.). The egg is preserved in the Dublin Museum; it was figured and the nidification of this gull described by Carte.[1]

An extensive and valuable collection of rocks and fossils was also brought home by M'Clintock, and deposited in the Dublin Museum. These were examined by the late Rev. S. Haughton,[2] who described and figured several new species of fossils, including a very fine Trilobite (*Cromus arcticus*), an interesting Liassic fossil (*Ammonites M'Clintocki*), *Orthoceras Griffithi*, *&c.*

From 1865 to 1868 M'Clintock was commodore of the Jamaica station. While there he sent to the Museum collections of fishes and marine invertebrates from Barbadoes and Jamaica, also two skins of the rare Petrel,

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[1] *Journal Royal Dublin Society*, vol. i. 1858.

[2] *Ib.*, vols. i.–iii., 1858–62; and Appendix No. iv. to "the Voyage of the 'Fox' in the Arctic Seas," London, 1859.

Oestrelata caribbæa, Carte.[1] This Petrel (known in Jamaica as the "Blue Mountain Duck") lives in burrows in the mountains, and, owing to the introduction of the Mongoose, is stated to be in danger of becoming exterminated.

A. R. N.

REV. S. A. BRENAN.

Samuel Arthur Brenan, B.A., who died at his rectory at Cushendun, Co. Antrim, last January, at the age of 72 years, was a botanist of considerable ability, and a close observer of nature. During a long residence in the Glens of Antrim, he acquired a very complete knowledge of the northern flora, and to a less extent of the fauna. He was not a scientific writer, and his published work consists of a few notes contributed to the *Journal of Botany* and to the *Irish Naturalist*. He was the finder of *Hieracium tridentatum* at Marble Arch, Co. Fermanagh, which still remains its only Irish station; and he enriched our knowledge of the Antrim flora with new stations for several of its rarer plants.

R. Ll. P.

EDWARD A. L. BATTERS.

The death of E. A. L. Batters, B.A., LL.B., F.L.S., at the premature age of 46 years, has put a stop to the career of one of the most distinguished of British algologists, and one the bulk of whose work still lay before him. With great energy he combined a keen eye and a highly critical perception; and when to these qualities a position of independence is added, the way seemed clear for a long and fruitful study of the large and difficult group which he had selected for research. He had only just begun to make the acquaintance of Ireland as a collecting-ground for his favourite plants. He promptly accepted an invitation to take part in the investigation of the fauna and flora of Lambay, the results of which were published in this journal last year, and as the result of a week spent on the island in April, 1906, he contributed a very remarkable list of over 200 species, no less than 20 of which had not previously been recorded from Ireland, some of these being species of great rarity. His loss will be deeply felt by Irish as well as by English botanists.

R. Ll. P.

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[1] *Proc. Zool. Soc. Lond.*, 1866.

NOTES.

ZOOLOGY.

Vitrina pyrenaica in Ireland.

By the kindness of Mr. A. S. Kennard, I have been enabled to examine two living specimens of the *Vitrina* announced in the August number of the *Irish Naturalist* (vol. xvi., p. 225) as *V. elongata.* I have myself captured and examined both *elongata* (*semilimax*) and *pyrenaica* in France; and I have no hesitation in pronouncing the Irish specimens sent to me to be *V. pyrenaica*, Fér. Their anatomy is easily distinguishable from that of *V. semilimax.*

E. W. Bowell.

Penshurst, Kent.

The Red-necked Phalarope in Ireland.

British Birds for November, 1907, contains an extremely readable article on observations on the breeding habits of this interesting and rare bird as observed by Hugh S. Gladstone, F.Z.S, at its Irish breeding-haunt last season.

Black-cap in November.

On 25th November I found a small bird on my avenue which I made sure was a Black-cap; but lest there should be any doubt of it I sent it at once to Messrs. Williams, of Dame-street, who confirmed my identification Is it not unusual to find this bird so late in the season? It had evidently just died, and it certainly could not have been in the place I found it the previous day, as I walked along there several times on the Sunday.

Thos. B. Gibson.

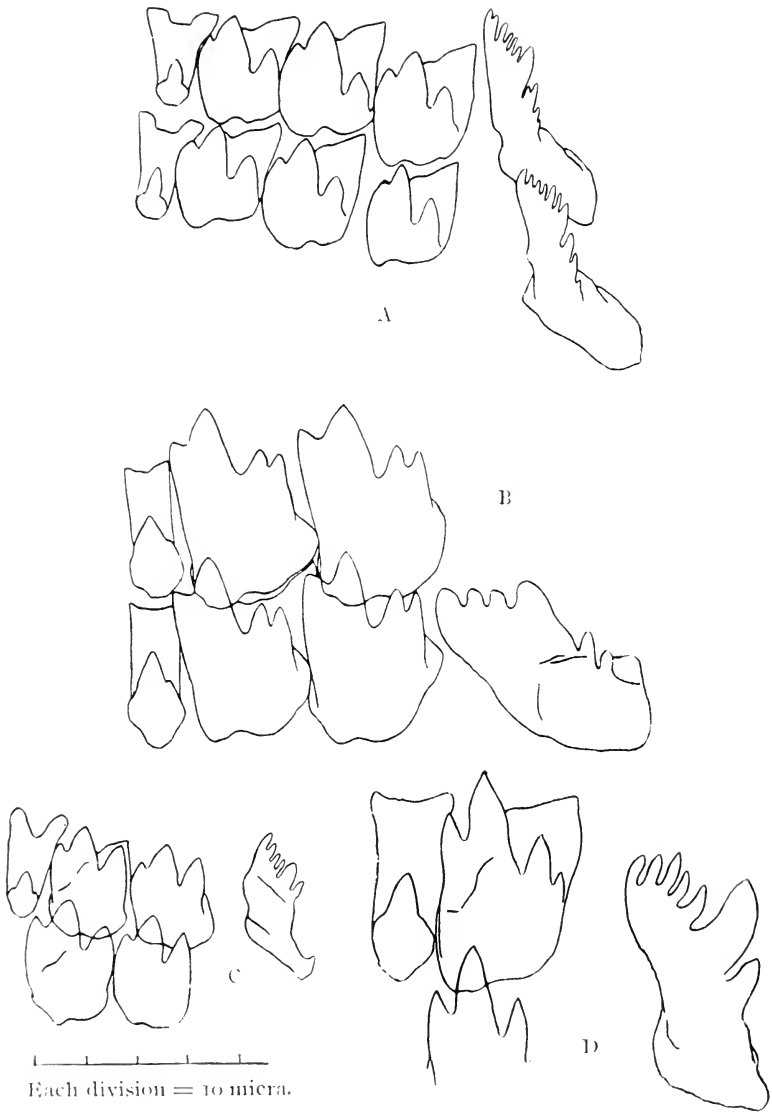
Ferns, Co. Wexford.

Scarcity of Sparrows in Co. Clare.

It is very noticeable in this neighbourhood that Sparrows have almost disappeared. In the spring a few were seen, but hardly any during the summer months, and as far as I can find out they have not been observed in other parts of the county. That birds which literally swarmed in this place should have disappeared in one season is curious. It would be interesting to ascertain if their absence has been noted elsewhere, and if it has been accounted for in any way. Within the last week a few hen Sparrows have been seen here.

D. C. Parkinson.

Ennis.



RADULAR TEETH OF LIMNÆA.
Magnified 500 diameters.

A, *Limnæa involuta*. B *L. pereger*. C, *L. glabra*. D, *L. limosa*.

To face page 45.]

ON LIMNÆA PRÆTENUIS, N.SP., AND L. GLABRA, MÜLL.

BY REV. E. W. BOWELL.

[PLATE 2.]

THROUGH the kindness of Mr. A. S. Kennard I have received original examples from Mr. A. W. Stelfox of the Limnæa found by him and Mr. J. N. Milne in Lough Nagarriva, and figured in his paper entitled "Further Notes on the Land and Freshwater Mollusca of Cork West and Kerry," which appeared in the September number of the *Irish Naturalist* for 1907.[1]

Messrs. Stelfox and Milne give in that paper the opinions of some leading conchologists who had examined the shell. All referred it to that curious alpine group which includes *L. involuta* and *L. Burnetti*. I have seen nothing of *Burnetti* but the shell, of which I possess a number of old specimens from Loch Skene; but of *involuta* Mr. Kennard placed several in my hands for dissection, obtained at Crincaum Lough by the same indefatigable collectors. With these latter came one of the egg-masses mentioned in the paper above referred to; it contained six embryos, one of which was undeveloped; the remaining five (alt. about 0.7 mm.) all had intorted spires. I was thus enabled to examine the embryonic radula of *L. involuta*.

The peristome of *Limnæa glabra* (of which Mr. Kennard has sent me living specimens) is very similar to that of these alpine species. Like them it moves rapidly, and exserts the body from the shell. Its radula also presents points of resemblance; perhaps the first that strikes one is the regularity of the marginals, which in other Limnæas overlap one another confusedly like strands of bedraggled seaweed. I have therefore added some notes on this species. One would at first think that *glabra* must be quite distantly related to the species in which the spire is flat or intorted; but they do in fact seem to have very much in common. To put it in a designedly rough and metaphorical way:—Nature seems to

[1] *Irish Nat.*, vol xvi., 1907, p. 286.

be attending to the subject of spires in this group—making experiments in spires. Hence the negative and positive variation is directed mainly to the spire; some forms have it exceptionally high, while in others it is exceptionally low. In the same way in the genus Vallonia we find costation strongly developed, and also its complete absence: in the radula of the difficult "glabra" group of Vitreæ we find both unusual shortening and unusual lengthening of the central mesocone; other examples will occur to every student of the Mollusca, in which a new and pronounced character is accompanied in the same group of forms by its inversion. The bearing of this upon the Mendelian hypothesis will be evident. It may also be noted that if there is some such affinity between *Limnæa glabra* and the alpine Limnæas, they may be in some sense alternative to one another, and this would give a meaning to the recorded non-occurrence of *L. glabra* in the district where these latter are found.

At the suggestion of Mr. B. B. Woodward, I propose for the Lough Nagarriva form the name of *Limnæa prætenuis*, in allusion to its remarkably thin shell.

LIMNÆA PRÆTENUIS, *n.sp.*

(*Irish Naturalist*, vol. xvi., pp. 286-8, pl. 36.)

L. involutæ proxima, testa ovata conglobata terete neritiformi, subdiaphana, colore corneo, tenuissima (0·02 ad 0.03 mm.), striis notata spiralibus minutissimis exacte dispositis; anfractibus quattuor rapide crescentibus; spira appressa parum eminente, interdum erosa; columella obliqua leviter contorta, subtus vix reflexa; apertura ovali subpyriformi, altitudinem gyri penultimi pæne duplicante. H. 9–10; d. 8–9 mm. Hab.: Lough Nagarriva.

The type specimens are in the collection of Mr. A. S. Kennard. The extreme tenuity of the shell is further exemplified by the fact that three specimens weighed less than 3 milligrammes. It appears evident that this is not a case of irregular or pathological variation, for all the animals examined were "well set up," and appeared to be in every way healthy examples of a fixed and uniform type. The

slight differences which distinguish it from *L. involuta* were uniformly present. The fragility of the shell may well account for its rarity and isolation; indeed, it is evidently not made to be a "wanderer."

As in all the ovate Limnæas which I have examined, the bulk of the female part of the epididymis and the albumen gland was relatively very great; so much so as to suggest that extreme development of these parts may be the predisposing cause of the ovate condition of the shell. In one *involuta* examined, the volume of these parts was three-

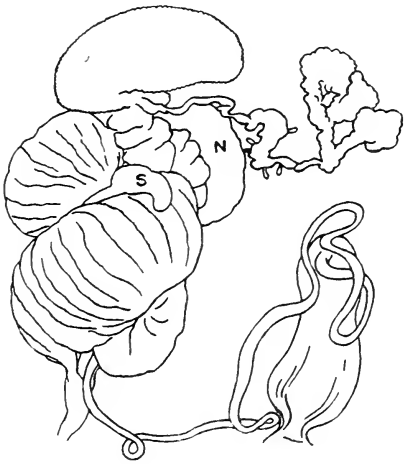


FIG. 1.

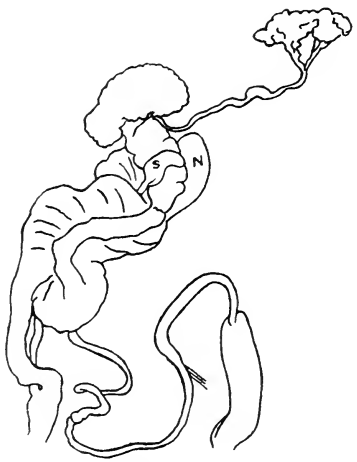


FIG. 2.

Fig. 1, Genital Organs of *Limnæa prætenuis*. Fig. 2, of *L. glabra*. Magnified 5 times.

quarters of that of the whole animal. Concurrently, the size of the digestive glands is reduced, and the upper whorls are shared about equally between these and the ovotestis. One would naturally expect an animal of such propagative construction to be short-lived; and accordingly we find that when adult it has only four whorls. With respect to relative size of parts, *L. glabra* presents a converse condition. The large specimens often to be seen in collections testify to its capacity for longevity.

Of the accompanying figures, Nos. 1 and 2 represent the genital organs of *L. prætenuis* and *L. glabra* respectively.

The spermatheca in each case has been moved out of its natural position to show its shape, which is different from that which prevails in the *L. pereger* group. In the *L. prætenuis* the female side of the epididymis has developed to such an extent as to enwrap the rest of the apparatus. In these figures N indicates the nidamental gland, and S the spermatheca.

The remaining figures (Plate 2) represent typical teeth from the radulæ of the species above mentioned. The general aspect is very distinct in each case; but considerations of time have prevented me from giving drawings of a large portion of each radula, as I had intended. These tracings of typical teeth will serve to show the more striking points of difference. Putting them in a tabular form, we have the following comparison :—

See Plate 2.	Fig. A. L. involuta.	Fig. B. L. prætenuis.	Fig. C. L. glabra.	Fig. D. L. limosa (pereger).
Central cone, . .	Narrow.	Wide.	Narrow.	Wide.
Asymmetry of c.c., .	Marked.	More marked.	Frequent.	Rare.
Basal plate of c.c., .	Triangular.	Parallel.	Triangular.	Subparallel.
General appearance of laterals.	Rounded.	Squared.	Rounded.	Diffused.
Ectocone of lat., .	Rounded.	Straight.	Rounded.	Irregular.
Endocone of lat., .	Short.	Short, s. bifid.	Long.	Short, with acces.
Basal plates of lat., .	Pyriform.	Subquadrate.	Quadrate.	Rhombiform
Marginals, . .	Slender.	Very wide.	Wide.	Claw-like.
Basal plates of m., .	Long, slanting.	Square, straight.	Squared, with tail.	Subpyriform.

I have in preparation notes on the actual numbers and measurements of the radular teeth of the different Limnæas, and in these the figures relating to the above species will be included.

Those who are interested in the preparation of radulæ will find it an advantage to try mounting in styrax, which (owing

to its high R.I.) brings out the smallest details perfectly, while introducing no undesirable aberrations from the objects themselves. Stained or unstained material may be used at pleasure.

Penshurst, Kent.

REVIEWS.

ENGLISH AND IRISH CAVES.

The Netherworld of Mendip: Explorations in the Great Caverns of Somerset, Yorkshire, Derbyshire, and elsewhere. By ERNEST A. BAKER, M.A., and HERBERT E. BATCH. 8vo. Pp. 12 + 172. Many illustrations. Clifton: J. Baker, 1907.

Mr. Baker is well known as an intrepid cave-explorer, and as a writer of breezy and picturesque descriptions of caverns, and of the often exciting and dangerous work which attends their exploration. In the present most readable volume he describes a number of the more famous English caverns, and narrates the story of various attempts—sometimes successful, sometimes unsuccessful—to penetrate their recesses In the final chapter he deals with the famous cave of Mitchelstown, and gives an account of his visit there in 1905, with results which he has already reported in this Journal (*I. Nat.*, vol. xv., pp. 29–36. Plate 1) The work is profusely illustrated with subterranean photographs—some of which are notably successful examples of a difficult branch of cave work—and can be confidently recommended both to the cave-explorer and to the general reader.

R. LL. P.

The Science Year Book, with Astronomical, Physical, and Chemical Tables, Summary of Progress in Science, Directory, Biographies and Diary for 1908. Edited by MAJOR B. F. S. BADEN-POWELL, F.R.A.S., &c. London: King, Sell and Odling, Ltd. Pp. 152 + 365. Price 5*s.* net.

The present is the fourth issue of this valuable annual, which cannot fail to be useful to naturalists and to men of science generally, the arrangement of the diary, engagement lists, and other practical details being especially convenient. The information in the Directory still needs revision; although the staff of the Irish Geological Survey is now given correctly, Col. G. T. Plunkett still appears as Director of the Dublin Museum, and the late T. H. Longfield as Art Keeper, while the name of Prof. A. Dendy has not yet been included among the scientific staff of King's College, London, nor that of Prof. Gregg Wilson in Queen's College, Belfast.

NOTES ON THE KERRY FLORA, 1907.

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

SINCE the publication of my last Kerry Notes in the *Irish Naturalist*, 1904, pp. 77 and 128, several interesting plants have been added to its flora, and the range of others much extended. In addition to these *Valeriana Mikanii* can now be definitely restored to its list. In "Irish Topographical Botany" this plant was recorded on my authority as rather frequent in both N. and S. Kerry, but was withdrawn in my Kerry Notes for 1904, p. 78; however, a plant quite agreeing with Syme's form was gathered near Listowel in the summer of 1904, so it is probable that this extreme form will be found to occur sparingly elsewhere in the county. Mr. G. Claridge Druce's visit to the south and west of Ireland in the autumn of 1906 (*Irish Naturalist*, 1907, p. 146), added several critical plants to the Kerry flora, such as *Rhinanthus monticola*, Druce, *Polygonum tomentosum*, Schrank (*P. maculatum*), *Agrostis canina*, var. *lævis* Hackel in litt., and *Kœleria gracilis* Pers.; it also produced an interesting note as to a possible source of introduction for the prickly American *Polygonum sagittatum*, Linn. When first found by me in 1889 in what still appears to be its only known station in Europe, this plant was shown to my friend, the late A. G. More, and the locality described to him; he immediately suggested American grain as its probable source of introduction. Elderly people living in the neighbourhood have told me that they can just recall the existence of a very small mill on the streamlet that flows beside the *Polygonum* locality and enters the sea at Castlecove; one, however, an old man quite seventy years of age, said it had ceased to work before he was old enough to remember things. Whether introduced here in the manner stated by Mr. Druce's informant—the purchase by the owner of this mill of a shipwrecked cargo of American grain—or as I, personally, still think, through the distribution of relief in the shape of Indian corn from the States during the terrible famine period of 1847–48, in either case the plant appears to have existed in this spot for a period of between 60 and 70 years. Difficult as the introduction of this plant is to account

for, its continued isolation in this locality is even more so. The hard nuts and prickly clinging stems would seem to lend themselves most readily as means of dispersal both here and elsewhere, but during the nineteen years this *Polygonum* has been under my observation, no appreciable difference has been noted in its local distribution, nor has it apparently been carried to any of the numerous bogs and swamps in the neighbourhood.

I notice in Mr. Druce's account of his visit to this locality that he speaks of his vasculum as being "full" of this plant. I can only hope his vasculum was a small one; to my own knowledge, however, on two occasions at least, visitors have filled vasculums of very considerable dimensions with this *Polygonum*, and I would earnestly ask botanists visiting Kerry to be sparing in their gathering of this and other easily exterminated rarities.

In the following list, additions to District I. of *Cybele Hibernica*, 2nd edition, are indicated as usual by "I.," while records followed by 1 or 2 are additions to the Kerry subdivisions of *Irish Topographical Botany*.

***Diplotaxis muralis,** DC.—Sparingly at the foot of a wall near Fenit pier, Tralee bay, 1906. This plant has probably come to stay in Kerry, as it appears to be increasing in its Ballyheigue station recorded in *Irish Nat.*, 1903, p. 114. Although so fond of railway banks and tracks, it has not so far been seen in such situations in the county.

†**Crambe maritima,** Linn.—2. About a dozen fine plants scattered along the stony margin of the beach west of the Spa, Tralee bay, 1905. They were not there a few years previously, but appear to be well established now; it is quite possible, however, that they may have originated from garden outcasts. Dr. Smith in his "History of Kerry" records "*sea coleworts*" as occurring in the county near the head of the Kenmare river as long ago as 1756, but no plants have been seen in his locality in recent years.

Trifolium arvense, Linn.—1. In some plenty on rocks and rocky ground about Foilhomurrum near Bray Head, Valencia Island, 1907; Miss Wooton. This is a most welcome addition to the Kerry flora. Miss Delap, to whom I already owe several additions to the local flora, was kind enough to send me fresh specimens of this clover gathered in Miss Wooton's locality.

Rubus sulcatus, Vest.—I. 1. Rather sparingly in a damp, rocky wood by the River Sheen, south of Kenmare. This appears to be the first Irish record for this plant.

R. incurvatus, Bab.—I. 1. River side near Blackstones, Glencar.

Rubus Colemanni, Blox.—I. 2. Near Glena bay, Lower Lake, Killarney.

R. adenanthus, Boul. & Gill.—I. 1.2. In the stony bed of the River Sheen, near Dromanassig bridge, and in an open wood near Kenmare. About Woodlawn near Killarney. These records now confirm the provisional naming of this plant by the Rev. W. Moyle Rogers in 1903; vide *Irish Nat.*, 1904, p 129.

R. rudis, Wh. & N.—I. 2. Near Glena bay, Lower Lake, Killarney. "A small singular variety"—W.M.R.

R. dasyphyllus, Rogers.—1. Wood near the N.E. corner of Caragh Lake.

R. Balfourianus, Blox.—Thicket on limestone near the Lake Hotel, Killarney. This is the first specimen from Kerry seen by Mr. Moyle Rogers, but it has been already recorded from Killarney by Prof. Babington in *Cyb. Hib.*, 1866.

R. saxatilis, Linn.—1. Very sparingly on one of the Greenane Islands, Kenmare bay, 1904. The locality is a bare limestone island very similar in appearance to portions of Muckross demesne and Ross Island, where this plant grows in abundance. In the Kenmare station the island has been nearly stripped of its shrubby vegetation, and the plant appears to be dying out and very nearly extinct.

***Sedum album,** Linn.—2. On walls about Fenit, and on banks and walls by the sea about the Spa, Tralee bay, 1905. This plant appears to be spreading in the county.

***Carum Carui,** Linn.—Sparingly on a bridge near the head of Kenmare estuary, 1907. This is a very rare casual in Kerry.

***Galium Mollugo,** Linn.—2. In some abundance on the lawn and in the shrubberies at Carriglea House near Killarney, 1904. This is the only station in Kerry known to me where the plant occurs at present; it seems to have disappeared from the Killarney Workhouse grounds.

Valeriana Mikanii, Syme.—2. Rather sparingly near Inch bridge, north of Listowel; *vide antea.*

Dipsacus sylvestris, Linn.—Sparingly in a ditch between Milltown and Castlemaine, 1905; Capt. Creagh Howard; but not seen there in 1906 or 1907.

***Artemisia Absinthium,** Linn.—2. Rather sparingly by roadside banks, &c., near the Ballyroe mills between Causeway and Ballyheigue, 1907. This plant is very rare indeed in Kerry, and has much diminished in its Stradbally locality near Castlegregory, where it was quite plentiful in 1900.

†**Carduus pynocephalus,** Jacq.—Sparingly on a roadside bank between Milltown and Gallerus, west of Dingle. This is a very rare Kerry thistle.

***Cichorium Intybus,** Linn.—1. Several plants in a field near houses at Ballinasteenig, east of Dingle, 1905. This is the only occasion on which I have seen this plant in the county, where it appears to be little better than a casual.

Hieracium orimeles, W. R. Linton.—In some plenty on Bealalaw bridge and more sparingly on rocks in the neighbourhood on both sides of the Caragh river, 1906-07. Sparingly in two or three spots about the Muckross shore, Lower Lake, Killarney, 1904-07

Pyrola minor, Linn.—I. 1. Sparingly in a rocky wood near the Caragh river, Glencar, 1907; Dr. Wood and R.W.S. The discovery of this plant in Kerry is really due to Dr. Wood, an angling visitor to the Glencar Hotel. When making his way through a dense tangle of vegetation near the river his eye happened to be caught by a solitary flowering spike. Fortunately this was gathered and brought to me at the hotel as '*Lily of the Valley.*' A careful search was then made, which resulted in the discovery of four or five plants only, two of which, including that plucked, were flowering. No doubt a visit to the locality earlier in the year, before the vegetation assumes such dense proportions, would result in the discovery of this Pyrola elsewhere in the neighbourhood. This addition to the Kerry flora is a wide extension of the known range of this rare plant in Ireland; Tyrrell's Pass in Westmeath, where Dr. Moore discovered the plant in 1872, appears to be the nearest locality on record.

Chlora perfoliata, Linn.—1. Rather abundant over an area some hundred yards in length on the Ventry sandhills, 1905. The Rev. W. Bently, now of Abbeyfeale, tells me he remembers finding a small patch of this plant in the above locality when stationed at Ventry some years ago. It is surprisingly rare in the county.

Lithospermum officinale, Linn.—In some plenty by the roadside a little west of Lixnaw bridge, 1907. This is only the second locality known in Kerry for this species, which proves to be one of the rarest lowland plants in the county.

Stachys ambigua, Smith (*S. palustris* × *sylvatica*).—2. In a ditch on the outskirts of Killarney (with the parents), 1904, and by the roadside south of Ballymullan, Tralee, 1905.

Listera cordata, R. Br.—This little orchid reaches a height of 2,450 feet on the south-east slopes of the Purple Mountain, Gap of Dunloe, the greatest elevation yet recorded for it in Ireland. As might be expected, Kerry furnishes several instances of plants attaining to unusual heights, thus *Trifolium repens*, *Hieracium Pilosella*, and *Urtica dioica* were all gathered near the Punch Bowl on Mangerton at 2,200 feet; in these latter cases the seeds were most probably derived from pony fodder brought up with tourists.

Ophrys apifera, Huds.—A few plants on the lawn of Carriglea House near Killarney, 1904; the third Kerry station known.

Sisyrinchium angustifolium, Mill.—Several fresh Kerry localities have been found for this interesting plant. It occurs in very great abundance in roadside fields in several places between Inch and Boolteens on the north side of Castlemaine harbour, and is also rather plentiful on rough mountain pastures both north and west of Castlemaine, ascending here to nearly 400 feet, 1904-05. The more I see of the distribution of this plant in Kerry the more I am inclined to consider it indigenous there.

Potamogeton crispus, Linn.—1. On the north side of Castlegregory Lake; Hart, 1884. In a pond near Knightstown, Valencia Island, 1906; Miss Delap. This is a rare pondweed in South Kerry.

‡**Poa nemoralis,** Linn.—1. Sparingly in Ardtully demesne, between Kenmare and Kilgarvan, 1904. Very sparingly in the "Green," Tralee, 1907. Three demesnes are now known for this grass in Kerry, and in all three instances it grows alongside such compromising neighbours as *Sedum Telephium*, *Ruscus*, or *Rhododendron*; so far, at least, it can hardly be regarded as native in the county.

Equisetum majus, Syme.—At about 1,500 feet, in damp cliffs on the north side of the Pap's mountain. This is a very unusual elevation for this Horsetail, and it appears to be the highest yet recorded for it in the British Isles.

My thanks are due to the Revs. W. Moyle Rogers and E. S. Marshall for their kindness in looking over doubtful plants.

Dundrum, Co. Dublin.

SOME IRISH BRAMBLES.

BY R. A. PHILLIPS.

THE following notes refer to a small collection of Rubi made in the south-west of Ireland during the summers of 1906–7, which contains some interesting species, one of them (*R. ochrodermis*) being certainly, and another (*R. Colemanni*) probably, new to Ireland, while several make new records for the counties in which they were found.

All the specimens have been submitted to, and named by, the Rev. W. Moyle Rogers, whose kind assistance I once again gladly and gratefully acknowledge; and many of his notes, being of interest and importance, are here largely quoted under the various species to which they refer.

As usual, many of the specimens differ considerably in appearance from those of the same species gathered in Great Britain, and of these, Mr. Rogers writes:—

"Apparently we must give up all expectation of matching, in every case or in nearly every case, your S.W. Irish forms by well-known English ones. In most cases, however, I believe it will be unnecessary to make new names, as it will be allowable to admit of slight modifications, attributing

them to differences of climate and soil. And in this connection I may explain that the addition to a specific name of 'f. *umbrosa*' may imply no more than that the conditions under which the plant in question grows are such as to produce much the same modification of character in a species as we commonly expect under the influence of shade."

Additions to the county or vice-county lists of "Irish Topographical Botany" are here indicated by having the county names printed in capitals:—

Rubus argenteus, Wh. & N. (*R. erythrinus*, Genev., auct. brit. prius).
5. CORK E. By the Blackwater east of Mallow.

R. Selmeri, Lindeb.
15. GALWAY S.E. In a wood at Woodford.

R. Colemanni, Blox.
5. CORK E. The Glen, Cork, 1906 (*f. umbrosa*). Mr. Rogers writes of this—"A most interesting discovery and addition to Irish brambles. Focke suggested the name for a Glendalough (Wicklow) plant of Praeger's, but I felt obliged to characterise it as 'doubtful,' and I know of no other Irish record." [1]

R. hirtifolius, Muell & Wirtg.
5. CORK E. The Glen, Cork, 1906, a form between type and var. *danicus*, Focke. A very beautiful plant, new to Co. Cork.

R. iricus, Rogers.
9. Clare. By the river Fergus near Ennis. Mr. Rogers informs me that this species, which was supposed to be endemic in Ireland, has recently been found in West Cornwall (quite typical), and also in Wales (a small form). This handsome and striking bramble is very abundant in many parts of Galway and Clare.

R. oigocladus, Muell. & Lefv., f. **umbrosa.**
5. Cork E. Plentiful at The Glen, Cork. Of these specimens Mr. Rogers writes—"I agree with you in putting this to *R. oigocladus*, M. & L.—as a modified form (I suppose) through being shade-grown. A very handsome plant."

R. Griffithianus, Rogers (forma).
5. CORK E. By the Blackwater east of Mallow, and by the same river near Fermoy, 1907. Of the Mallow specimens Mr. Rogers says—"This cannot, I think, be kept distinct from my *R. Griffithianus*. . . . . On the strength of these Mallow specimens, *Griffithianus* must now, in my opinion, be accepted

[1] Since this was written I have had a note from Mr. Rogers, in which he says—"Since I returned your specimens, I have had a packet from Mr. Scully which contained a North Kerry ('Thicket near Glena Cottage, Killarney') plant, which recalled at once to me your 'Glen, 1906,' *R. Colemanni*, f. *umbrosa*. I should give the same name to both."

as Irish (confirming former more doubtful records)." The Fermoy plant differs considerably, and is placed—"provisionally under *Griffithianus* as a new form or variety. A very interesting plant, calling for further study."

R. mutabilis, Genev.

2. Kerry N. Hedgerow near Killarney.

R. scaber, Wh. & N.

5. Cork E. Wood near Fermoy.

15. GALWAY S.E. Woods at Woodford.

R. botryeros, Focke.

5 Cork E. Lota, near Glanmire. "Hardly distinct from the Jersey plant referred to on p. 78 of my "Handbook of British Rubi"—W. M. R.

R. hystrix, Wh. & N., f. **umbrosa.**

10. TIPPERARY N. In a wood at Cloughjordan.

R. ? tereticaulis, P. J. Muell.

5. Cork E. Wood near Fermoy. Of this specimen Mr. Rogers says—"I write '*tereticaulis*, P. J. Muell,' here only by way of suggestion, and rather as suggesting affinity than identity. We have no definite knowledge of Mueller's plant, and Mr. Linton's Sprowston specimens are not in all particulars like this." This is the second time that Co. Cork specimens have been doubtfully referred to *R. tereticaulis*.

R. ochrodermis, A. Ley.

15. GALWAY S.E. In a wood near Woodford, 1906. New to Ireland.

R. diversifolius, Lindl.

4. CORK MID. By the Blackwater west of Mallow. New for Co. Cork and S.W. Ireland.

Cork.

NOTES.

ZOOLOGY.

Trichoniscus pygmæus, Sars, a Woodlouse new to Ireland.

Under an old box lying in my garden I found a colony of *Trichoniscus pusillus*, but among them were a few Isopods of smaller size and much lighter colour. Being unable to reconcile their characteristics with those of any of the published British species, I submitted them to Dr. Scharff, who pronounces them to be *Trichoniscus pygmæus*, a species which has not hitherto been observed in Ireland. Until quite recently this species was only known from a single locality in the vicinity of Christiania (Norway), but it has lately been discovered in the neighbourhoods of Glasgow and Newcastle-on-Tyne.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Morning Flight of Sea Birds over Dublin.

During the last two winters I have been much struck by the continual passage of sea birds during the period between dawn and sunrise, as viewed from my own garden at Rathgar, 3 miles S.S.W. of the centre of Dublin city. The birds consist mostly of gulls, flying south-west. The movement is noticeable as soon as there is light enough for observation, and seems to cease about sunrise. I have not observed any corresponding return movement in the evening, so that it would appear that the birds straggle back during the day. They evidently come from the mouth of the Liffey, presumably from the sands of the North and South Bull, but why so great a number head in this particular direction I do not know. If we assume that an equal number passes across the whole arc (about two-thirds of a circle) of the Dublin suburbs, the total number of birds going inland each morning would be enormous. I give an abstract of two observations, each of 15 minutes duration. The birds fly in bunches of 1 to 50, sometimes in compact bodies, more often straggling—the gulls especially. On windy mornings their flight is much more irregular than when the weather is calm.

11th JAN., 1906. 7.30 to 7.45 a.m.—Gulls, 369 going S.W., 2 W, 1 N.W., 3 S.E. Rook, 1 S.W., 1 N. Magpie, 1 N. Jackdaw, 12 S.E., 2 N. Starling, 2 N.E. Pigeon, 1 N.E. Finch, 1 N.

14th JAN., 1907. 7.40 to 7.55.—Gulls, 449 S.W. Curlew, 20 S.W. Rook, 2 N. Magpie, 2 N. Finch, 2 N.W., 2 N. The dim light of January mornings prevented my exercising my limited ornithological talents as to the closer identification of species.

R. LLOYD PRAEGER.

Dublin.

Ornithological Notes from Londonderry.

The following notes for 1906 and 1907 may be of some interest to the readers of the *Irish Naturalist*, though they do not record the occurrence of any great rarities. The Pied Wagtail is, I think, one of our most uncertain and shy songsters, and I have only heard its song a few times in my life, and then at unusual seasons. I heard it singing one day at the end of January, 1906, on the roof of the Corn Market in our city, and on 27th September, 1907, I heard it singing in Templemore Park on a dull foggy morning. During the past two springs I have found the Great Crested Grebe breeding at Port Lough, Co. Donegal, about five miles from our city. I saw two pairs on the lough, which is of small size. I believe this is the first record of the Great Crested Grebe breeding in Co. Donegal. Prof. Leebody reports that he saw a Red-throated Diver in full summer plumage at Inch, Lough Swilly, on 8th June, 1907, also that he saw a pair of Smew at Inch, early in May, 1907.

I found the Lesser Tern nesting on the sandbank in the *fresh* water at Inch; one pair in 1906, and three pairs in 1907. In June, 1907, Mr. David Woodburn, when searching this low grass-covered sandbank with

me, found a Black-headed Gull's nest with one egg. The nest was little bigger than one of the Common Terns near by, but was in the centre, not at the edge of the bank. The pair of gulls were seen frequenting the bank, so I think it was a genuine case of a pair nesting amongst the Terns. The wet spring of 1907 worked sad havoc among the nests on this Inch sandbank. The entire bank was flooded, and the nests were covered with three to six inches of water. In some places many eggs were washed into the sandy hollows, and twenty or thirty could be picked up at once. At one end of the bank a pair of Mute Swans had made their nest, and as the flood rose they built up their nest higher and higher. A kindly gentleman fishing near by gathered a great armful of coarse grass and wrack and laid it beside the nest, and this they used to keep out the rising flood. A few fine days intervened and the water fell, leaving the bank fairly dry.

At once the terns set to and built again, this time further from the water's edge, and laid their eggs. The nests were larger and more compactly built than before. But, alas! the wet weather again set in, the flood rose and the homes of the poor terns and Ringed Plovers were again swamped and ruined beyond repair. The swans did their best but at last they, too, had to give up in despair.

The Quail has visited this district during the past two summers. In September, 1906, Mr. R. H. Smyth shot an adult at Raphoe. In October, 1906, among the call notes of the migrants passing over our city at night. I heard calls on two nights, which were quite new to me, croaking guttural notes. I could not make them out, but at last discovered that they proceeded from Manx Shearwaters, for one of these birds alighted on one of the nights in question in the yard of a shop in town, and was brought to Mr. E. McCourt, who kept it alive for some time. It emitted the same guttural call notes at night. Some years ago a Manx Shearwater was brought to me, which had alighted in a yard in Derry, on a night in September, or early in October. I cannot understand why shearwaters should fly over our city in numbers in autumn.

D. C. CAMPBELL.

Londonderry.

Short-eared Owls.

I wonder if any readers noticed the abundance of owls last autumn. Short-eared Owls were especially numerous, in fact I saw more last November than I ever saw before in my life. Up to 16th November I had observed seven on different occasions, but on Monday. 18th November, while shooting over a piece of ground of about half an acre, I rose seventeen Short-eared Owls; they rose in pairs, or singly, out of the withered bracken and sometimes six or eight would be on the wing at one time. As the day was bright they were probably dazzled, as they flew past very close to me and lit again not far off. I could have shot several of them with the greatest ease had I wanted to, but I prefer to see these beautiful birds flying about to seeing them in a glass case.

They had probably just arrived, as they come south in winter and travel in flocks. Unlike others of this family they avoid forests, and are found in open country such as moors, fens, and sandhills where bracken abounds. Although these birds live nearly altogether on vermin, it is surprising how few people recognise them as useful birds; gamekeepers do their best to exterminate them, and in doing so increase the number of their enemies; others shoot them because they are rare, or because they imagine their story will not be believed unless they can produce a specimen; for this reason I do not name the locality in which I saw them.

E. H. FLETCHER.

Castlerock, Co. Londonderry.

Richard's Pipit in Co. Dublin.

In the *Zoologist* for January, W. J. Williams records the capture in a net at Lucan on November 21 of a Richard's Pipit, (*Anthus Richardii*), the first occurrence in Ireland.

Wood-Pigeon Diphtheria.

We are glad to draw attention to the schedule issued by *British Birds*, which is inserted in the present number. Much public interest has been shown lately in the disease of which Wood-Pigeons were dying so freely last winter The subject is of considerable scientific interest; moreover, it is quite possible, although it has not yet been absolutely proved that this disease, which is most infectious amongst Wood-Pigeons themselves, may also be contracted by other birds, and especially game-birds. It is of great importance, therefore, to find a means of stamping out the diphtheria. Before, however, any effective means can be taken to eradicate the disease it is necessary to discover its origin. In the January issue of *British Birds*, Dr. C. B. Ticehurst, of Guy's Hospital, wrote on Wood-Pigeon diphtheria, and explained that it was due to a micro-organism called *Bacillus diphtheriæ columbarum*. At the same time Dr. Ticehurst points out that the etiology of the disease is most incomplete, and that much has to be learnt as to its origin and distribution, before we can suggest a remedy.

Little Bittern in Co. Donegal.

A beautiful specimen of an adult male Little Bittern (*Ardetta minuta*, Linn.) has just been received from Owey Island, N.W. Donegal. It was found exhausted on the beach on February 9th by the light-keeper, and died shortly afterwards.

R. M. BARRINGTON

Fassaroe, Bray.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 28.—The Annual General Meeting was held in the lecture theatre of the Royal Dublin Society, the Rt. Hon. JONATHAN HOGG (President) in the chair.

The report of the Council was read by the Hon. Secretary (Dr. R. F. SCHARFF), who stated that the admissions to the Gardens during 1907 were 260,666, and the receipts £4,074 9*s.* 4*d.*, as against 188,422 and £2,490 9*s.* 8*d.* respectively for 1906.

It is with great satisfaction that the Council have to announce this enormous increase of the number of visitors to the Gardens during the past year, with a corresponding considerable addition in the receipts at the gate. That in spite of the bad weather visitors came in such enormous numbers to the Gardens, must be ascribed largely to the influence of the Exhibition, which brought such great flocks of excursionists from all parts of Ireland, England, and Scotland.

In the early part of the summer, on the occasion of the opening of the new Carnivora House, the Council gave a Garden Party in the Society's grounds, at which the Lord Lieutenant honoured the Council by his presence. This gave many members and their friends an opportunity of inspecting the recent improvements carried out by the Council.

Although there can be no doubt that the Dublin people are proud of their Zoological Gardens, the Council wish to draw attention to the fact that there was a decrease in the amount received from subscriptions. A smaller number of members joined the Society last year than in previous ones, the falling-off being principally in life members, of whom only nine joined during 1907.

Prof. A. F. DIXON, who has for several years past undertaken the post of Honorary Treasurer, retires The Council feel assured that the Society will share with them the regret which they feel at losing his services. They nominate Dr. E. MacDowel Cosgrave for the vacant post.

The Superintendent of the Gardens, Mr. Thomas Hunt, has retired from the post which he occupied since February, 1890. During the 17 years that Mr. Hunt held the post he had on several occasions received the Council's acknowledgment and thanks for his prompt and courageous action in times of emergency, while his kindly disposition earned for him the esteem of the Keepers who served under him. It was, therefore, with regret that the Council accepted his resignation

Nearly 200 candidates applied for the post, and it was with some difficulty that a selection was made among the applicants. As Captain L. C. Arbuthnot brought forward testimony of possessing special qualifications and experience, the Council appointed him Superintendent; and he took over the duties on the 1st December last.

As in previous years, the duties of the Honorary Secretary during his absence from Dublin were carried on by the Honorary Vice-President, Mr.

W. E. Peebles, while Professor Mettam discharged again the function of prosector, and furnished the Council with most valuable reports on the *post-mortem* examinations made by him. The Honorary Secretary represented the Society during the year at the International Zoological Congress in Boston, and subsequently visited the Zoological Gardens in New York, Philadelphia, and Washington, where he was most courteously received by the authorities in charge.

The Council are particularly indebted to Messrs. Palgrave, Murphy and Co. and the City of Dublin Steam Ship Company, for the generous arrangements they have made in connection with the transit of animals.

One of the most important structural additions made during the year was the building of series of open-air cages designed by Mr. C. J. M'Carthy for the large Carnivora, such as hyænas, wolves and pumas, for which species accommodation had always been rather deficient. The cages occupy the site between the Aquarium and the Llama and Giraffe enclosure. They are partly covered with a corrugated iron roof, and the sleeping dens are placed in a passage to the rear, from which the cleaning operations take place.

The second large structure which was undertaken during the past year, and which has only been completed last December, is the new Seal enclosure. A member of the Society, Mr. John Kincaid, initiated this useful addition by generously contributing towards the expenses of erection. The enclosure is situated close to and below the old seal pond. It consists of an extensive ornamental wall of rockwork, with three fenced-in divisions containing concreted ponds. These can be used for various kinds of aquatic animals such as the Californian Seals, our native Seals, and others.

During the coming year the Council propose to rebuild the old Lion house, and, if possible, to effect various improvements in the existing structures.

For years past the state of the lake proved to be an eyesore to the frequenters of the Gardens in the summer, owing to its slimyness and green colour. This condition was found to be due to the enormous growth of algæ. At Dr. Scriven's suggestion the experiment was tried to kill the algæ by means of sulphate of copper, which has already proved so beneficial to agriculture in the destruction of fungoid growth on plants. After calculating the amount of water contained in the lake by measuring the depth and superficial area, it was easily ascertainable what strength of the salt could be applied without injury to the birds, fish, and other creatures frequenting the lake. The correct quantity of sulphate of copper was then filled into a large sack and tied to the end of a boat, which was rowed several times round the lake. The next day the lake was bright red, due to the floating masses of dead algæ; but a day or two after the water became absolutely clear, such as it had never been before, and myriads of minute crustaceans, worms, and water snails could be seen crawling about quite uninjured, while the algæ had all fallen to the bottom. Thus the experiment proved a perfect success.

The catering department of the Society's work has been carried on during the year under the management of Miss Kinahan, and continues to be a great success. Large parties had often to be catered for, and the Council have reason to believe that the work has been carried out on every occasion to the satisfaction of the many visitors who thronged the Gardens in the summer months.

No less than eight lion cubs were born, namely, five males and three females, while Lord Cranworth presented a young male which he had caught on the banks of the Tana River, in East Africa. "Jeremiah," or "Jerry," as Lord Cranworth called him, was so tame that the Superintendent could allow him to roam about freely in the Gardens. He never interfered with the many waterfowl or other birds which are accustomed to gather on the walks. It was only his natural playfulness which caused him eventually to become a permanent inmate of the Lion house after having been one of the most interesting attractions of the out-door life in the Gardens.

These additions to the collection made it necessary to part with some of our old stock. One lion cub was exchanged, three others were shipped to England, the lion Prince went to Scotland, while Remus and Lady Lilly also enriched the collections across the Channel. There are now in the collection a total of 11 lions and 9 lionesses, 14 of which are Irish-born animals.

As more funds were available, the purchases made during the year were more numerous than those for some years past. The more recent arrivals are a pair of fine Zebras, one of them belonging to the variety called "Grant's Zebra," while the other is a "Burchell's Zebra." A female Ostrich was also bought, as well as a Sea Lion, a male Llama, a Bennett Kangaroo, and a good many smaller mammals and birds. A female Chimpanzee was obtained by exchange. The most important gifts were a pair of young Ostriches from West Africa, sent by Dr. W. H, Langley, and a pair of Rheas from South America, given by the Duke of Bedford.

The most severe loss that the Gardens have sustained was the death on the elephant Padmahati, which had been presented to the Society by the Duke of Connaught. It died apparently from some intestinal inflammation of unknown origin. A Sea Lion also succumbed from unknown causes, as well as a good many Monkeys and Birds. Whenever possible Professor Mettam makes a *post-mortem* examination and reports to the Council.

The Society's silver medal for the best set of pictures was awarded to Mrs. H. C. Sutherland, the Bronze Medal to Mr. J. F. Gainsfort, on the recommendation of the Council's photographic committee.

The Treasurer's Report shows that a balance of £1,936 10*s.* 2*d.* remains to the credit of the Society as a result of the year's work.

After the adoption of the Report moved by E. WHITE and seconded by Dr. E. MacD. COSGRAVE, an exhibition of lantern slides illustrating the year's changes in the Gardens was given by Dr. J. A. SCOTT. Prof. G. H. Carpenter, A. E. Goodbody, and E. White were elected to fill vacancies on the Council.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 8.—The Club met at Leinster House—Dr. G. H. PETHYBRIDGE (Vice-President) in the chair.

R. SOUTHERN exhibited a specimen of the tubicolous polychæte worm, *Pectinaria auricoma* (Müll), together with its tube. The distinguishing characters of this species are the curvature of the tube, and the frilled margin of the peristomium. The specimen was obtained by Mr. Colgan, in July, 1907, in five fathoms of water, off Skerries, Co. Dublin. It seems probable that this species was included under the name *Pectinaria belgica*, Lam., by Thompson ("Nat. Hist. of Ireland," vol. iv., p. 429). He describes it as of "the size of the full-grown *Dentalium entalis*, and of similar curvature." This is clearly not the straight-tubed *P. belgica*, Lam., but may be either *P. auricoma* (Müll) or *Cistenides granulata*, L. It is difficult to see from Thompson's account whether the straight-tubed *P. belgica* was obtained or not, though the specimens taken by Templeton in Strangford Lough, to which Thompson refers, are placed by Johnson ("Catalogue of Worms," p. 244) under *P. belgica*, Lam.

N. COLGAN exhibited living specimens of two of the rarer Co. Dublin Nudibranchs, *Tritonia Hombergi* and *Polycerna Lessonii*, dredged in 10 fathoms off Bullock Harbour, on the 14th December last, during one of the winter dredging trips of the Dublin Marine Biological Committee. The individuals shown had lived with the exhibitor for twenty-five days, during which they had fed freely on the common zoophyte, *Antennularia antennina*. When mature, Tritonia is the largest of the Britannic Nudibranchs, attaining to a length of six inches. The Bullock specimen exhibited was, however, quite juvenile, measuring only $\frac{5}{8}$ of an inch. Under a low power its branchiæ and tentacles were very interesting objects.

J. N. HALBERT exhibited specimens of a small Rove-beetle, *Thamiaræa hospita*, Maerk., found last February in burrows made by the Goat Moth (*Cossus ligniperda*) in an old oak tree in the Lucan demense. There are only two recorded European species in the genus Thamiaræa, both of which appear to live almost exclusively in the tunnellings of the Goat Moth in various forest trees. The species here recorded is rather widespread in Central Europe, and occurs also in the more southerly parts of the Britannic area. It has not been previously recorded from Ireland.

W. F. GUNN exhibited a minute fungus, *Stilbum tomentosum*, growing on *Trichia chrysosperma*. The host plants had been gathered from the decayed trunk of a tree in Killakee Woods about two months previously, and had been kept in a closed glass vessel. In the interval the sporangia of the Trichia had burst, exposing the capilitium and spores, and the Stilbum developed on the sub-stratum thus formed.

F. W. MOORE showed a small slice from the upper surface of the sepals of *Scaphosepalum anchoriferum*. In many of these minute orchids the lip

is covered with peculiar hairs, or rugosities, but the surface of the other floral segments is usually smooth. In this case the surface of the sepals near the apex is covered with peculiar flask-shaped, imbricated, hair-like out growths from the epidermal cells. The plant is a native of Costa Rica, and is scarce in cultivation.

BELFAST NATURALISTS' FIELD CLUB,

OCTOBER 25.—ANNUAL CONVERSAZIONE. The PRESIDENT and Mrs. Patterson entertained almost 500 members and friends to a conversazione in the "Patterson Museum" of the People's Palace, Belfast. Tea was served in the large hall, while the exhibits were displayed in the Museum and in the minor hall underneath. The buildings were specially decorated and illuminated for the occasion, and music was provided. The fotlowing is a summary of some of the principal exhibits:—

BOTANY:—BOTANICAL SECTION.—Specimens from Club's Herbarium N. CARROTHERS: Plants collected during summer session. J. H. DAVIES: *Galium sylvestre* from County Down. W. GRAY, M.R.I.A.: Microscopic Demonstration. J. HAMILTON: *Bertholletia excelsa*, from the Amazons, showing growth of nut. W. H. PHILLIPS: Four new varieties of exotic Ferns, growing. Also series of dried specimens of a large number of choice varieties of British Ferns. W. PORTER: *Athyriums* raised from spores. J. STRACHAN: Iron-bacterium (Cladothrix) from the Six-Mile Water, growing on basalt; Ferruginous deposits caused by same, &c. Rev. C. H. WADDELL, M.A., B.D.: Some rare flowering Plants and Mosses.

GEOLOGY:—Miss M. K. ANDREWS: Microscopic sections of Derbyshire "Toadstones." R. BELL: Palæolithic implements from drift gravels, England. C. BULLA: Remains of *Cervus giganteus* from County Tyrone. T. DEWHURST, A.R.C.Sc. (London): Demonstration in optical properties of minerals; and straining of rock sections. W. J. FENNELL, M.R.I.A.: Minerals from the Mourne granite. F. C. FORTH, A.R.C.Sc.I.: Geological specimens, minerals, and models. W. A. GREEN: Plant remains from the Coal-measures, Ballycastle, and other Carboniferous fossils. W. GRAY, M.R.I.A.: Microscopic demonstration. W. H. GALLWAY: Teeth of fossil Sharks. J. L. S. JACKSON: Portion of stalagmitic flooring from prehistoric cave, Doneraile; also section showing growth of stalagmite. J. STRACHAN: Specimens of jasper and chert; Mydrophaneopal from Sandy Braes; Tube-amygdaloid from Ballypallidy; Primary natrolite in basalt from near Carnmoney. W. J. C. TOMLINSON: Cretaceous fossils (Gault and Chalk) from Folkestone; Kentish Rag fossils from Hythe beds, Kent; Pyrites nodules from the Gault and Greensand, Folkestone. J. WRIGHT, F.G.S.: Foraminifera from Lough Swilly and Sheephaven, North Donegal.

ZOOLOGY:—F. BALFOUR BROWNE, M.A., F.R.S.E.: Stages in the life-histories of aquatic insects; specimens and drawings. J. COTTNEY: Uncoloured eggs from covered nests. G. DONALDSON: Marine shells.

N. H. FOSTER, M.B.O.U.: Woodlice collected during Cork Conference week, July, 1907. W. H. GALLWAY: Development of Dog-fish; jaws of Port Jackson and common Sharks. J. HAMILTON: Insects from the Amazons. J. L. S JACKSON: Living specimens of Netterjack, Changeable, and Fire Toads, also Salamanders, Common Frog and Newts. H. M'CLEERY: Insect anatomy (microscopic demonstratlon). W. S. M'KEE: Pond life (microscopic demonstration). H. L. ORR: Skulls of Mammals, R. PATTERSON, F.L.S.: Pair of adult Tree Sparrows and young from County Donegal—the first obtained in Ulster; Case of young Coots to illustrate independent young; Skull of American Coypu (Water Rat) recently captured at Holywood, compared with skull of Common Rat. S. M. STEARS: Night Heron, Glossy Ibis. A. W. STELFOX: Land and freshwater shells collected during Cork Conference week, July, 1907. PROF. SYMINGTON, M.D., F.R.S.: A series of illustrations of the brains of Apes and Man. PROF. GREGG WILSON, D.Sc., M.R.I.A.: Demonstration showing how to tell the age of Fishes, Snakes, poisonous and non-poisonous: Living marine animals. R. WELCH, M.R.I.A.: Land and freshwater shells.

MISCELLANEOUS:—F. C. FORTH, A.R.C.Sc.I.: Physical apparatus, models, &c. W. GRAY, M.R.I.A.: Models of pre-historic Irish monuments W. A. GREEN: Crusies, Irish and Continental. A. R. HOGG: Examples of colour photography. R. MAY: Old Ulster door and gate keys; Two ancient iron hammers; Ivory paper-knife found in excavation of site for Scottish Provident buildings. D. C. PATTERSON: Humorous drawing of exterior of Dr. J. S. Bowerbank's house in 1846. S. M. STEARS: Ancient steel gun crossbow.

MICROSCOPIC DEMONSTRATIONS,—By MISS M. K. ANDREWS, Messrs. DEWHURST, GRAY, M'CLEERY, M'KEE, WRIGHT, Prof. GREGG WILSON, and others.

At 9.15 an adjournment was made to the large hall, where a short business meeting enabled the President to give a hearty welcome to all who had responded to his invitation, and a summary of the Club's aims and objects Twelve new members were elected, and a unique and beautiful series of pictures of wild bird life on our coasts, taken by Oliver G. Pike, were shown by a cinematograph. The meeting concluded with the usual lantern display of photographs taken on the Club's excursions.

NOVEMBER 19.—The Vice-President (N. H. Foster, M.B.O.U.) in the chair. Robert WELCH, M.R.I.A., gave a brief description of the discovery and scientific value of *Bythinia Leachii*, a shell new to the Irish fauna. Professor C. J. PATTEN, M.A, M.D., D.Sc., of Sheffield University, read a paper entitled "Links in Man's Ancestral Chain," in which he referred to the strides which had taken place in recent years regarding our knowledge of man's origin and his place in Nature. Dr. Patten dealt with the links connecting some of the most primitive of the living races of mankind with the highest types, and also with those connecting man with his nearest ape-like kinsman. The lecturer touched briefly on the anatomy and habits of the man-like apes now existing. The paper was

illustrated with an exceptionally fine set of lantern slides. A discussion took place, the speakers including Prof. Symington, M.D., F.R.S.; Prof. Gregg Wilson, D.Sc., and C. M. Cunningham.

NOVEMBER 27. ZOOLOGICAL SECTION.—Robert Welch, M.R.I.A., in the chair. The Vice-President (Nevin H. FOSTER, M.B.O.U.) read a short paper entitled "An Elementary Outline of Zoology." Through the kindness of Prof. Gregg Wilson he was enabled to illustrate his remarks with a number of preserved specimens from Queen's College Museum. A discussion followed the close of the paper. The following members took part:—R. Welch, T. Dewhurst, A. Deane, J. N. Milne, J. Carson, Rev. J. Shiels, and W. H. Gallway.

DECEMBER 10.—A special meeting was held in the Museum, the President (Robert Patterson, F.L.S.) in the chair. The object of the meeting was to bring before the Club the work done during the week spent with the Field Club Union in Cork last July. The various speakers showed a number of lantern slides, which had been prepared for the evening. The following members read papers:—Nevin H. Foster, on the botany and terrestrial isopods of County Cork; Robert Patterson, the ornithology of the district, and (in connection with the visit to the Mammoth Cave) anaccount of the distribution of the Norway and Arctic Lemmings; Robert Welch, on the geology and land and freshwater mollusca of the county; J. L. S. Jackson, on the Mammoth Cave at Buttevant; W. H. Gallway, on the archæology of the districts visited. The attendance was large.

DECEMBER 14. BOTANICAL SECTION.—H. C. Marshall in the chair. Two short papers were read by members. The first, entitled "Local Botanical Field Work in 1907," by W. J. C. Tomlinson, in which an account was given of the finding by the speaker of *Spiranthes Romanzoffiana*, *Vicia Orobus*, &c.; the second, by Sylvanus Wear, on "Cluster-cups and Microscopic Fungi."

DECEMBER 17.—The President (Robert Patterson, F.L.S.) in the chair. Thomas PLUNKETT, M.R.I.A., read a paper on the "Tombs, Temples, and Pyramids of Egypt," illustrated by a large number of lantern slides. The attendance was remarkably large, many people being unable to gain admission to the lecture room.

JANUARY 21.—The President (Robert Patterson, F.L.S.) in the chair. At the outset, the President referred in feeling terms to the late Lord Kelvin, and drew the attention of the members to the proposed public memorial. E. J. M'KEAN, B.A., B.L., read a paper on "A Holiday Trip to West Kerry," dealing with the archæology and folk-lore of the district. The next paper was by JOHN HARBISON, B.A., on "Hydra; its Movements and Reactions," illustrated by living specimens, diagrams, and lantern slides. The lecturer, by means of the blackboard, described the construction of Hydra and its somewhat complicated movements. A point which had not hitherto been noticed in the movements of Hydra was that it did not contract *en masse*, but in fractions, one-third or one-quarter of its length at a time. As Prof. Gregg Wilson had pointed out to him, this might be due to a segmental arrangement of muscle

spindles in the body walls. Here they had indications of segmentation in the very first of the Metazoa. The animals showed "light" reactions, due, no doubt, to the green chlorophyll corpuscles in the endoderm, this being one of the few cases where plant pigment occurred in the animal world. A very interesting discussion ensued, in which the following took part:—The President, Miss Andrews, Prof. Gregg Wilson, William Gray, M.R.I.A., Robert Welch, M.R.I.A., and Robert May. The election of six new members brought the proceedings to a close.

BOTANICAL SECTION. JANUARY 29.—W. C. Marshall in the chair. ALEXANDER MILLIGAN read a paper on "Lower Forms of Plant Life." The Chairman referred to the presence at the meeting of James W. White, author of the "Flora of Bristol," and also to the loss which the Club had sustained by the death of its old member, Richard Hanna.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 11.—VISIT TO THE HERBARIUM, NATIONAL MUSEUM.—A number of members and visitors assembled at 2.30 p.m. in the Herbarium of the National Museum. Miss Knowles, who acted as conductor, gave a demonstration of the methods adopted in the Herbarium in drying, poisoning and mounting botanical specimens. Afterwards the different botanical collections deposited in the Museum were inspected and then the members were taken through the different sections of the Herbarium.

JANUARY 14.—ANNUAL GENERAL MEETING.—During the earlier part of the evening the chair was filled by C. B. Moffat, M.A. (President), and afterwards by Dr. G. H. Pethybridge, the newly-elected President. The Hon. Secretary (J. de W. HINCH) read the report for 1907, which reported a slight increase in membership and in other respects a prosperous year. Among the matters referred to the most important were—The publication of "Contributions to the Natural History of Lambay," to which fourteen members of the Club contributed material; the holding of the Triennial Field Club Union Conference in Cork in July, and the special report published on the work done during the Conference; the representation of the Club at the centenary celebration of the Geological Society of London; the establishment of a photographic survey of the Dublin district in connection with the visit of the British Association; and the starting of a marine biological committee to deal with the coast of the County Dublin. The Hon. Treasurer then read his report, which showed a satisfactory balance to the credit of the Club. After a ballot had been held the President announced the election of the following officers;—President, George H. Pethybridge, Ph.D.; Vice-President, A. R. Nichols, M.A.; Hon. Treasurer, H. K. Gore Cuthbert; Hon. Secretaries, J. de W. Hinch and J. Bayley Butler, M.A. Votes of thanks were passed to the outgoing officers and members of Committee, the Royal Irish Academy and the Dublin Press. The President then delivered his inaugural address on "Plants and their

Environment." He spoke of the habits of plants, their obedience to the law of gravitation, their sensitiveness to contact, their perception of light, etc. The address was illustrated by a large series of lantern slides. Two candidates were proposed for membership.

IRISH SOCIETY FOR THE PROTECTION OF BIRDS.

JANUARY 23. ANNUAL MEETING.—Mr. Justice Boyd in the chair. The Secretary (Miss Constance Pim) read the annual report, which stated that during the year Mr. W. P. Pycraft had lectured in Dublin on the invitation of the Committee; lectures were also given at Mountmellick by Mrs. Webb, at Malahide by Miss Jellett, and at the Father Mathew Hall, Dublin, by Rev. T. O'Ryan. Two watchers were employed in the Dublin district during the year; three prosecutions were carried out under the Wild Birds' Protection Acts, and in five other cases bird-catchers were warned and put under police supervision. The membership of the Society has increased by 51 members and 15 associates. The accounts showed a credit balance of £32 16*s.* 4*d.* The report and statement of accounts were adopted. Subsequently R. M. Barrington gave a short address on the subject of birds, illustrated by lantern slides.

IRISH FIELD CLUB UNION.

ACCOUNTS, 1907.

RECEIPTS.	£	s.	d.	EXPENSES.	£	s	d.
To Balance, 1905,	8	7	1	R. Ll. Praeger, Lecture in Cork,	1	1	0
Affiliation Fees—				H. J. Seymour, Lecture in Limerick,	1	14	6
D.N.F.C., 1906,	1	1	4				
B.N.F.C., 1906 7,	2	2	0				
O.N.F.C., 1907,	0	5	0				
C.N.F.C., 1906,	0	5	10				
L.F.C., 1907,	0	19	0				
Profit on Cork Conference,	0	19	8	By Balance,	11	4	5
	£13	19	11		£13	19	11

Audited and found correct.

J. DE W. HINCH,
Hon. Sec. D.N.F.C.

R. LLOYD PRAEGER,
Hon. Sec. I.F.C.U.

SOME COUNTY DUBLIN HOLOTHURIANS.

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

THERE can be little doubt that all of the species of the Holothurian division of the Echinoderms are rare on the coasts of Co. Dublin. Of the fifteen species known to occur in the shallow water area of Ireland,[1] only four have been recorded for Co. Dublin, and, with one exception, these records are at least 45 years old. Evidently much remains to be done in working out the Irish distribution of the Holothurians, and it is hoped that the following notes, giving the meagre results of the writer's shore-collecting and dredging in 1906, may act as a stimulus to further investigation.

CUCUMARIA PENTACTES, Linné.

A single specimen of this species occurred to me at Shennick's Island, Skerries, under a stone at low water, on the 25th July, 1906. It was cream-white in colour, the mouth ringed with brown, and the tentacles spotted with the same colour on a yellowish ground. At rest, the animal was one inch in length, and in motion extended to rather more than $1\frac{1}{2}$ inch. Two out of the ten tentacles were much smaller than—indeed, little more than one-third the size of—the remaining eight, and these two were contiguous.

With occasional changes of water this specimen lived with me for eight days in a small glass tube, 2 inches long by $\frac{5}{8}$-inch wide, and passed one night, or, at all events, some hours of it, entirely out of water. This last severe test of its vitality was undesigned. On going to bed the second night after the capture of the animal, I left it in its open tube of sea-water on the dressing-table in my bedroom. When I got up next morning, eager to resume my observations on the manners and customs of the interesting captive, I found the tube unoccupied, and after a vain search on the floor for the absconding tenant, finally discovered it far under the stand of the looking-glass, where it lay high and dry, and reduced

[1] See A. R. NICHOLS, "A List of Irish Echinoderms." *Proc. R. I. Acad*, vol. xxiv., p. 231.

to a tough, shapeless knob. Replacing the apparently dead animal in its tube, and giving it some fresh sea-water, I left it there to the operation of the *vis medicatrix naturæ*. When I returned in about an hour's time, I was astonished to find the animal extended to full length, and creeping up the side of the tube by means of its sucker-feet. All its tentacles were displayed, and in graceful rhythmical motion, and the creature had evidently entered once more upon the inscrutable joys and sorrows of Holothurian existence.

On the sixth day of its captivity the animal was observed to be greatly swollen in its upper part, which had grown quite pellucid. This change, which I interpreted as a sign of approaching dissolution, was in reality but a prelude to self-evisceration, that curious faculty or infirmity which many of the Holothurians are well known to possess or be liable to; for within an hour's time the intestines of the animal were observed to protrude from its upper extremity near the base of the tentacles, their owner remaining all the time in a lively state. All next day the animal remained alive, with the tentacles in feeble action. On the 1st August it was still alive with the tentacles fully extended but inert; and, finally, on the morning of the 2nd August, it died and was placed in spirit. Throughout these last two days the extruded viscera remained attached to the animal, but at one point only.

A second specimen of this species almost precisely the same in colour and size with that just described was taken by me under rocks at low water, on Shennick's Island in July 1907.

CUCUMARIA LACTEA (Forbes and Goodsir).

Ocnus lacteus and *Ocnus brunneus*, Forbes.

On the 11th August, 1906, when dredging in Dalkey Sound, close by the shore of the island, in about 5 fathoms, the dredge, as often happens in the Sound, came up quite filled with *Ophiocoma granulata* (Forbes), the individuals ranging in colour from cinnamon brown to velvety black. The haul of fully half a hundred weight of "creepers" was spread out on a tarpaulin in the stern sheets of the boat, and while glancing over the writhing mass a spray of zoophyte with shapeless brown blobs attached to it caught my eye. The spray was transferred to a jar of sea water where half an hour later some of the brown blobs were found expanded into unmistakable

Holothurians with suckers and tentacles fully displayed. On more leisurely examination at home the species proved to be *Ocnus brunneus* of Forbes' British Starfishes, apparently new for County Dublin and for East Ireland, or Marine District II. of Mr. Nichols' List. On the spray of zoophyte examined there were six individuals of *Ocnus brunneus*, ranging in size from quarter inch to three-quarter inch, and agreeing closely in form and colour with Forbes' figure and description. Three of them lived with me for four days, creeping rather rapidly up and down the sides of the tube in which they were lodged, and freely displaying their tentacles. As in *C. pentactes*, so in all three individuals of *Ocnus brunneus* which I examined, two of the ten tentacles were much smaller than the remaining eight, and the smaller tentacles were in all cases contiguous. The colour of the whole animal, body, suckers, and tentacles, was a rich chocolate brown.

THYONE FUSUS (J. F. Müller).

Thyone papillosa, Forbes Brit. Starfishes.

A single specimen of this species three-quarter inch in length was taken in the same haul with *Ocnus brunneus* on the 11th August, 1906. It lived with me for two days and a half, never displaying its tentacles, but perpetually changing its form. The changes were so smooth and gradual as to be followed by the eye with great difficulty. At one time the animal appeared to suffer from swelled head, the anterior end becoming swollen to twice the diameter of the remaining portion. Then an almost imperceptible wave would be propagated downwards along the body, the head would dwindle to normal size, and the whole animal assume a roughly cylindrical or oval form. But before long a severe fit of tight lacing would supervene. A deep constriction in the centre of the body would threaten to sever the animal in two, then the central pressure would be somewhat relieved and a second constriction would appear dividing the body into three swollen segments. While the animal lived this change of form appeared to be going on with greater or less rapidity, only the extreme tail end retaining throughout its comparatively slender proportions.

Sandycove, County Dublin.

THE DETERMINATION OF SEX IN THE WOODCOCK.

BY R. F. SCHARFF, PH.D., F.L.S.

How to distinguish a male Woodcock from a female one by means of external characters has often puzzled ornithologists, and has led to a good deal of discussion. For in spite of the most careful inspection by the trained eye of the naturalist, no difference can be detected between them. Young birds of both sexes appear to be lighter in colour than adults, while the outer web of the primary feathers has a distinct series of fulvous notches. This has given rise to the belief there are two distinct species of Woodcock. Some sportsmen have maintained that the male birds are always heavier in weight than the females. Others contend that the contrary is the case. We have, therefore, no unanimity of opinion in this respect, nor in the matter of size. In any case, the weight of a bird would not be a reliable test in distinguishing the sex of a Woodcock, for it is evident that there must be strong and heavy, as well as feeble and light, birds among both males and females.

Lord Ardilaun requested me recently to re-investigate the problem of finding a reliable distinguishing character between the male and female Woodcock, and sent me for that purpose ten specimens which he had shot in his demesne at Ashford, Co. Galway. I was quite anxious to do so, as so many naturalists had tried the same investigation and failed to arrive at any definite conclusion. In order not to keep ornithologists in too great a suspense, I may as well mention that I did not succeed in my endeavour, but I think it may be useful to place on record in the *Irish Naturalist* the facts revealed by my studies.

After labelling the specimens, they were carefully weighed by Mr. Nichols, who assisted me. As the right wing had in every case been removed from the wrist, the weight of the remaining left wing was added to that of the bird, so as to ascertain the correct weight of the whole bird. We then took very careful measurements of the length of the bill and the length of the wing from the wrist, which I indicate below,

and made notes of the colour, which was practically the same in all except No. 6. The latter was darker than the others.

A dissection of the ten birds revealed the fact that eight of them were females and two males, and that all were immature except No. 6. An examination of the gizzard showed that the birds had been feeding on beetles, as well as vegetable matter and earthworms. No mollusc remains were found, but Mr. Halbert, to whom I handed the contents of the gizzards for further examination, intends to publish a note on the subject of their food shortly.

The following table indicates the weight (in ounces) and size (in milimetres) of the 10 specimens of Woodcock :—

No. 1.	9¾ oz.	(Female).	Bill, 73 mill.	Wing, 195 mill.
No. 2.	10½ ,,	(do.)	,, broken.	,, 195 ,,
No. 3.	10¼ ,,	(do.)	,, 76 mill.	,, 198 ,,
No. 4.	12½ ,,	(Male).	,, 72 ,,	,, 200 ,,
No. 5.	11 ,,	(Female).	,, 77 ,,	,, 205 ,,
No. 6.	10 ,,	(Male).	,, 69 ,,	,, 190 ,,
No. 7.	11 ,,	(Female).	,, 72 ,,	,, damaged.
No. 8.	11¼ ,,	(do.)	,, 73 ,,	,, 201 mill.
No. 9.	10½ ,,	(do.)	,, 74 ,,	,, 202 ,,
No. 10.	10½ ,,	(do.)	,, 73 ,,	,, 200 ,,

Dublin Museum.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Chacma Baboon from Mr. C. Leslie, a Sparrow Hawk from Mr. D. Denagher, a Blue-fronted Amazon from Mr. R. P. Grevlish, a pair of Pheasants from Mr. W. T. Potts, Badgers from Mrs, Phipps and Mr. W. W. Despard, five Guinea Pigs from Mrs. F. S. Smith, an Alexandrian Parrakeet from Lady Clarke, a pair of Barred Owls from Mr. J. R. Lentaigne, a pair of Muscovy Ducks from Mr. W. W. Despard, a pair of Chinese Geese from Mrs. V. C. Singleton, six Telescopic Fish from Col. J. J. Cronin, and a Bonnet Monkey from Mr. J. Watts. Six Marmosets, three Spotted African Owls, and a number of Rheas have been obtained by exchange or purchase. The Rheas are from the collection of the late Sir Douglas Brooke. Like the Rheas already in the Gardens, they will be accorded liberty in the grounds. The Emeus have lately been moved from their old house into an open paddock, to the great improvement of their health.

The Council have considered plans for rebuilding the old Lion House. The proposed new structure, in conjunction with the "Roberts" house, will make a magnificent lodging for the Society's famous collection of large Carnivora.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 12.—The Club met at Leinster House, Dr. G. H. PETHYBRIDGE (Vice-President) in the chair. He exhibited the parasitic fungus *Tilletia striiformis* attacking the grass *Holcus mollis*. The fungus is one of the "smuts" or "bunts," and causes the appearance of longitudinal black lines in the grass leaves, parallel to their edges, easily seen by the naked eye. Microscopic examination shows that the vascular bundles of the leaves have become replaced by masses of the dark-brown chlamydospores of the fungus. The specimen was gathered near Brittas in co. Wicklow, and is new for the district and for Ireland.

W. F. GUNN exhibited an alga, *Chroolepus aureus*. It is a common and widely-distributed species, of a deep yellow or orange colour. The specimen shown was found growing in profusion on the inside walls of a greenhouse in Co. Cork.

Dr. R. F. SCHARFF exhibited a minute Woodlouse (*Trichoniscus pygmæus*, Sars.) which had been forwarded to him by Mr. N. H. Foster from Co. Down. Mr. Foster intends to publish a full account of the distinguishing features of this species, which is new to the Irish fauna.

D. M'ARDLE showed plants of the Extinguisher Moss, *Encalypta streptocarpa*, Hedw. (=*Leersia contorta*, Lindb.) which he collected on Heron Island, Lough Erne, last year. He also showed microscopical preparations of the leaves, their strong red nerve and the basal areolation, which is very hyaline and streaked with bright purple, but the most striking characters in the leaves are the projecting marginal papillæ. He also exhibited a preparation of the remarkable tomentum, which more resembles persistent protonema, and lies among the young leaves in neat strata of a brilliant red colour with dark septa, and bearing club-shaped and spherical heads, which are very fugaceous and may be vegetative. The plant has not been found in fruit in this country, though evenly distributed in limestone districts. A drawing of a fruiting specimen and of the leaves showing the projecting papillæ and the curious protonemoid tomentum enlarged 400 times demonstrated the exhibit.

J. N. HUNTER of Park Road, Trinity, Edinburgh, sent for exhibition *Dicranum strictum* (Schleich) and a drawing of the leaves and areolation, together with some notes on this rare moss, which had been collected in Roslin Wood, Midlothian, last January.

In Dr. Braithwaite's "British Moss Flora," volume i., the species is recorded as *Dicranum viride* (Lindb.), but H. N. Dixon in his "Handbook of British Mosses" has shown conclusively that the plant is really *Dicranum strictum* (Schleich), and that all the British specimens he has examined belong to the latter species. It belongs to the section Aporodictyon of the genus Dicranum—this section being characterised by the

plants being dioicous, the leaves subdulate, lower cell-walls (alone) rarely porose, capsule rather small, usually erect and symmetric, longly exserted. *Dicranum strictum* occurs in tufts usually on old rails and trunks of trees and a very characteristic feature is the fragile nature of the leaves, nearly all of them having the apex broken off. The nerve is narrow at base, about ⅓th of width of leaf, and the basal cells are elongate-rectangular, thin walled, 4–8 times as long as broad, gradually becoming shorter above, very shortly rectangular or almost graduate near the summit. The leaf is finely channelled-subulate, entire or faintly denticulate at the margin above. The capsule is oblong-cylindric, but unfortunately all the British plants have been found in a sterile condition. *Dicranum strictum* occurs in a very few localities in the English Midland counties, and also on trees in Roslin Wood, 6 miles from Edinburgh, where it was discovered by Mr. W. Evans.

C. F. BALL showed species of Tillandsia, a genus of tropical and subtropical plants which are mainly epiphytic. The usual type of Tillandsia has broad channelled leaves, sheathing at the base; the rain pouring upon these leaves runs down into the axils, where it collects, and is then absorbed by means of special glands at the base of the leaf. *Tillandsia usneoides*, called the Spanish Moss or Old Man's Beard, is a native of tropical America. The plant is wiry and threadlike, covered with silvery scales one layer of cells in thickness; no roots are produced, but the plant takes up its food by means of glands which are distributed over both stem and leaves. A section under the microscope showed these glands, which have a centre of cells in form of a sphere divided into quadrants, around which two other rows of cells are arranged. In its native country this plant has been long used as material for packing breakable articles and also orchids. The stems are fairly strong though thin, and are said to be used by the Watchipicket birds for making their curiously-contrived nests hanging on the twigs of trees.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 15—GEOLOGICAL EXCURSION TO CARRICKMINES.—Twenty members and visitors took part in this outing. They left Harcourt-street at 2.15, and on reaching Carrickmines walked across country in a violent hail shower to the Dingle. The origin of this strange steep-sided ravine was explained by the conductor, H. Hallissy, who pointed out the numerous facts which went to prove that it was the overflow channel of a lake formed during the later stages of the Glacial Epoch. From the Dingle the party proceeded to Ballycorus, where near the disused shaft of the lead mine some fine specimens of galena were obtained. Thence to the Scalp, which, as the conductor pointed out, was another example of a glacial overflow channel. After tea at the Scalp the party walked back to Carrickmines station.

FEBRUARY 18.—The third business meeting of the session was held in the Royal Irish Academy House. G. H. Pethybridge, Ph.D. (President), in the chair. J. DE W. HINCH read his report as delegate of the Club at the celebration of the Centenary of the Geological Society of London in September, 1907. The Report dealt with an excursion into the Crag districts of Suffolk and Essex which had been organised by the Society, with the official reception in London on September 26 (when an address of congratulation from the D.N.F.C. was presented by the delegate), and with excursions in the Thames valley and Kent, which took place after the official receptions had concluded. The President then read a letter from Sir Archibald Geikie, thanking the Club on behalf of the Geological Society for the address it had presented. J. BAYLEY BUTLER, M.A., brought forward the Report of the Corresponding Societies Committee of the British Association for 1907. The Report dealt with the British Association proposals for the establishment of a photographic survey of the British Isles, and with proposals for a Fungus Survey. The President gave a short account of what the sub-committee of the Club had already done with reference to the Photographic Survey. J. DE W. HINCH then read a paper on "The Occurrence of Shelly Drift at 12.50 feet in the Killakee Valley." An abstract of this paper will be published in the *Irish Naturalist.* Miss Helen Laird, B.A., and Miss Walker, B.A., were elected members.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 22—BOTANICAL SECTION.—Rev. C. H. WADDELL, B.D., lectured on "Our Native Orchids, how they grow and where to find them." The lecture was illustrated by mounted specimens of the various species.

NOTES.

BOTANY.

Irish Algæ.

In the *Journal of the Linnean Society* (vol. xxxviii., pp. 279–289, plates 29–21, January, 1908), Prof. G. S. West publishes a paper on "Some Critical Green Algæ," in which *Polychætophora simplex* from Lough Gartan, Donegal, is described as a new species, and W. Archer's *Cosmarium platyisthum* is re-described under the name *Tetraedron platyisthum.*

Mosses of Co. Dublin.

In the list of Mosses of Lambay, given at pp. 100-103 of the *Irish Naturalist* for 1907, ten species are marked with an asterisk as being "New to Co. Dublin." This statement, however, requires correction, as four of these—viz., *Grimmia apocarpa*, *Barbula cylindrica*, *Trichostomum mutabile*, and *Bryum murale*—had been collected in this county fifty years previously, and the specimens are in the Herbarium of the Science and Art Museum; while two were recorded from the same county, thirty years ago, by the late Dr. David Moore, of Glasnevin Royal Botanical Gardens, one (*Trichostomum tenuirostre*) in his "Synopsis of Irish Mosses," published in the *Proceedings* of the R.I. Academy for 1872, and the other (*Weissia rupestris*) in the *Proceedings* of the Royal Dublin Society for 1878.

H. W. LETT.

Loughbrickland.

There is no locality given in the late Dr Moore's work on the Mosses of Ireland for *Grimmia apocarpa*; he describes it as common; it is not mentioned in his list of Dublin and Wicklow mosses, and I feel justified, therefore, in recording the locality for it. *Bryum murale* is published in the same work (p. 82) as *β. erythrocarpa*, *β. murorum*, collected near Killarney by Hunt. *Trichostomum mutabile*—there is no locality given for Dublin; he writes, "Frequent in southern counties" *Weissia rupestris* is given under the name of *Gymnostomum rupestre*, and *Trichostomum tenuirostre* under the name of *Didymodon cylindricus*. The asterisk to this and others, if I mistake not, was duly deleted by me when correcting proofs. I am sorry I have not time at my disposal to search herbaria for such records, having only a few hours to spare some days in the week. I used the asterisk to denote "not previously recorded from Co. Dublin," and the presence of unrecorded specimens in a herbarium does not invalidate my statement.

D. M'ARDLE.

Glasnevin.

Erophila præcox and Vicia Orobus.—Corrections.

In making up my recent paper on Additions to Irish Topographical Botany in 1906-7, two slight errors were observed which might possibly mislead if not corrected. In recording *Erophila præcox* from Galway and Clare as new to Ireland (*I. N.*, xv., 155), Mr. Phillips overlooked C. P. Hurst's Clifden record for the same plant (*I. N.*, xi., 45). Again, Mr. Druce cites *Vicia Orobus* from Church Island, S. E. Galway, as new to District VI. (*I. N.*, xvi., 148). But it is recorded from this district (Castle-Lambert, N. E. Galway) in *Cybele Hibernica*, Ed. II.

R. LL. PRAEGER.

Dublin.

Oxyria digyna in Co. Clare—A Correction.

In a paper on the Levinge Herbarium, by Prof. Johnson and myself, published in the *Scientific Proceedings* of the Royal Dublin Society, 1903, *Oxyria digyna*, Hill, is recorded from "Hill near Lisdoonvarna, Co. Clare." Further examination of this specimen proves it to be an unusual form of *Rumex scutatus*. The leaves are rounded at the apex, much less sagittate than usual, and so like those of the Mountain Sorrel, as to have deceived Mr. Levinge, who had labelled it *Oxyria digyna*, Hill. *Rumex scutatus* is recorded from an old wall at Lisdoonvarna in the appendix to "Cybele Hibernica," 2nd Ed. Specimens from this locality have recently been presented to the herbarium by Mr. Praeger, and a comparison of the Levinge specimen with these shows that it is identically the same plant.

M. C. KNOWLES.

Dublin Museum.

ZOOLOGY.

Notes on Irish Birds.

British Birds for March contains notices of a Black Redstart captured on 3rd November at Kilternan, Co. Dublin. The January *Zoologist* contains notes from W. J Williams of the occurrence of two immature Ospreys in Co Sligo in November, 1907, and of a Night-Heron in Co. Meath during the same month.

Seagulls in the City of Dublin.

Any person interested in birds, especially sea birds, cannot but be struck with admiration at the beautiful sight of the gulls that frequent the River Liffey in the vicinity of Wellington-quay, where the Poddle River discharges itself into the Liffey. The gulls in former years were dispersed along the river, but as the main drainage is now an accomplished fact they are somewhat restricted in their feeding ground, and congregate in large numbers to feed on the offal brought down by the Poddle in its underground course through part of the slums of Dublin. Several species of gull may be seen at different periods of the year; the Herring Gull, *Larus argentatus*, frequents the river all through the autumn, winter, and early spring, but is seldom seen during the breeding season, June and July. In March the Lesser Black-backed Gull—*Larus fuscus*—arrives from its winter home, and haunts the river almost the summer through till the advent of winter warns to go south again. In May, 1906, I had the pleasure of seeing that rare species, the Iceland Gull, *L. leucopterus*, in company with Herring Gulls,

near Grattan Bridge. It has always appeared strange to me that the Common Gull, *Larus canus*, seldom visits the river at any time. I have noticed it in Stephen's Green Park, but have no record of ever seeing it at Wellington-quay. The most abundant gull, and one which may be seen at all times, is that interesting and changeable species, the Black-headed Gull, *Larus ridibundus*. Many persons ask, if you show them this bird in the winter plumage, why call it the Black-headed Gull? Usually in the month of July, but sometimes in the last week of June, young birds bred on the inland bogs follow the course of the Liffey until they reach the rich banqueting ground at Wellington-quay. There they may be seen following their parents, which have dark-brown heads, pearl-grey backs, and pure white tails. Towards the end of September the young birds have turned to pearl-grey on the back, but with a well-defined dark brown bar on the tail, and brown stripe along the secondary wing feathers. This plumage they retain till the following spring. In the parents of July, the dark-brown hood becomes dappled with white, and a few weeks later not a sign of the brown head is visible, with the exception of a dark patch behind the eye. The feet and beak of the adult birds become a bright vermilion, whilst the feet and beak of the immature birds are pale ochre. This can readily be seen as the birds descend to pick up food. No change takes place till the following February, when the adult birds again begin to show signs of the dark head. Although called the Black-headed Gull, in reality the colour of the head is dark brown. During March and April, the young birds hatched the previous year also assume the dark head, which is even a deeper shade than that of their parents, but they can always be identified by the bar on the tail and brown stripe along the wing previously mentioned. By the end of April most of the adult birds have gone inland to breed, leaving the immature birds, which are not at this period interested in nesting, to frequent the river, where they are occasionally joined by an adult bird, who is too old to undertake the serious duty of incubation, or whose breeding ground is within easy flight of the city. In the following autumn of the second year the immature birds, with the bar on tail and brown stripe along the wing, moult into the full adult plumage—viz., pure white tail, pearl-grey back, vermilion feet and beak, losing all traces of the distinguishing brown marks of the immature stages. In the following spring they join the vast throng that leave the river to breed on the inland bogs. It is remarkable how tame the gulls have become within recent years in the city. The bird that sits on the Liffey wall, within a few paces of the passer-by, is entirely changed when you meet him on the North Bull (four miles away). Here he has learned by bitter experience the effect of firearms, and he will give you a wide berth and little opportunity to study his plumage. The Black-headed Gull has learned to vary his diet by a visit to the lake in Stephen's Green Park, much to the discomfiture of the ornamental water fowl, who sit still while he snaps the bread in mid-air thrown by visitors. I have seen one almost take bread from the hands of children. So tame have they become, that many visitors

think these gulls are part of the collection kept by the Board of Works for their instruction and amusement. Perched on the branches of a weeping ash, growing on the south side of the lake, may be observed, taking little notice of the visitors who pass within a few feet, the Lesser Black-backed, which gull, I regret to say, has found out this sanctuary; one immature specimen last summer frequented the lake, resting on the cornice of a house overlooking the Park, till an opportunity presented itself of swooping down and snatching one of a group of ducklings. It became so expert at this form of poaching that special orders were issued by the Board of Works, and the marauder promptly executed. On another occasion an adult Lesser Black-backed attacked a duckling, and was in turn attacked by the parents (a pair of Chilian Wigeons) with such success that the exhausted gull was killed by one of the Park constables with a stick. No such charge can be levied at the head of the Black-headed; they live in peace with the water fowl, making no attempt to molest the young birds, no matter how small and weak they are. The gulls conspicuous by their absence from the city proper are—the Greater Black-backed (*Larus marinus*) and Kittiwake (*Rissa tridactyla*), the latter in the early spring frequent the river as far up as the London and North Western boats, but the former I have not seen beyond the Pigeon House Fort.

W. J. Williams.

Dame-street, Dublin.

Morning Flight of Gulls across Central Scotland.

Within view of a south window alone here the flight of Herring Gulls continues all winter. They pass over almost invariably in a S.W. direction, between the Forth and Clyde estuaries. Their flight has been traced at various points all along the course. So far as those seen here are concerned the same line is chosen, but the full width of the area so occupied has not so far as I know been accurately laid down or mapped. The flight continues from daylight—at this point—onwards, and often continues most of the day, but on some days ceases about 10.0 a.m. It is almost entirely when the wind is westerly, that they travel, and they are little observed if the wind is easterly. I have not observed any corresponding return in the evening, and rarely see even a straggler *going east*. They come from the mud-flats and shores of the Firth of Forth, and are known to congregate on the mud and shores of the Clyde; and at a few intermediate stations where food supplies are obtainable.

Early in November or earlier, these flights are accompanied by a few parties of Great Black-backed Gulls—1, 2, 3, 4, or up to 7, or 8 (I can't recall ever seeing more), but all of this species apparently soon pass over and *none* are seen as the winter advances. I have of late years carefully scanned the birds passing over, but have always failed to make out *any* Lesser Black-backed Gulls amongst them, or flying over at any time. But when early spring arrives, and lambing-time on the inland moors

and valleys, Lesser Black-backs *in pairs*, are common, and many are to be seen hanging in the keeper's "larders" of vermin. These birds—as with the Herring Gulls—are almost invariably pursuing a westerly course, *up* the valleys.

Similarly here, in late autumn and winter, Rooks pass at dawn, continuing till about 9 or 10 a.m., and sometimes till noon, flying S.W., and have been traced along the course all the way to Glasgow, some dropping here and there along the railway lines and other feeding stations, but all returning in the "gloaming" on an easterly course. It is believed that a large proportion of these Rooks belong to the huge winter roost at Dunmore, and from it and to it, they appear certainly to take almost bee-lines, *wind*-strengths permitting.

These notes may prove of some little interest to compare with my good friend, Mr. R. Lloyd Praeger's—to whom greetings.

J. A. HARVIE-BROWN.

Dunipace, Stirlingshire.

Morning Flight of Black-Headed Gulls.

I live six miles from Dungarvan Bay, and the morning procession of Black-headed Gulls coming inland from the sea, as well as their return towards evening, has been so long familiar to me that I have come to look on it, at least in winter, much as I do on the daily round of light and darkness. In the *Birds of Ireland*, p. 331, it is said, "As winter approaches these flocks spread over the country during the day, largely following the plough for the worms that are turned up, but they retire towards evening to roost on some isolated sea-bank or other marine retreat, if such be within reach."

There is a daily flight of Rooks coming from the great rookery at Dromand, in the reverse direction to the gulls, which return in a long column to their home at night. The daily movements are similar, but while the gulls retire at night to the seaside, the Rooks betake themselves to the greatest mass of old trees in the county.

R. J. USSHER.

Cappagh, Co. Waterford.

Great Shearwaters and Fulmars.

I am again favoured by Mr. George P. Farran with a series of interesting notes of oceanic birds made during the cruises of the "*Helga*," chiefly off the Teraght, Skelliggs, and the Bull Rock, and extending to 40, 60, and in one case, 90 miles from land. They were made at various times of the year in February, May, August, and November.

There are thirty-three observations of Fulmars, birds which occurred at all seasons, and this agrees with the reports of Mr. W. S. Green and Mr. Holt, who often met with Fulmars off the west coast of Ireland.

Mr. Farran has sent me eighteen observations of Great Shearwaters made on the same occasions and places as those of the Fulmars; but these Great Shearwaters were only met with from August to November inclusive, while their absence at other seasons is specially mentioned.

The notes I now refer to include those given in the *Irish Naturalist* for 1907, p. 163. The Sooty Shearwater is said not to have been met with in 1906–7, though Mr. H. Becher found both Great and Sooty Shearwaters in some numbers off the same coast in 1900 and 1901 (*Irish Nat*, 1901, p. 42, and 1905, p. 43).

R. J. USSHER.

Cappagh, Co. Waterford.

Pink-Footed Goose in Co. Roscommon.

It might be of interest to some of your readers to know that on the 17thof February I shot at Rockingham, Boyle, Co. Roscommon, a Pink-footed Goose, this being only the second occasion on which it has ever been secured in Ireland.

I was waiting on an island on Lough Key for Bean Geese which frequent this lake, and I shot this bird, which was one of two that came over me. I think it probable that these two were the only ones of that species, though there may have been more among the Bean Geese.

Unfortunately I left the next day, and had, therefore, no further opportunity of finding out for certain. The bird is being set up by Williams and Son, of Dame-street.

HENRY G. O. BRIDGEMAN.

Royal Hospital, Dublin.

Mayo Birds.

To the February *Zoologist* Mr. Robert Warren supplies "Some Ornithological Notes from Mayo and Sligo," dealing chiefly with the migratory movements of the White Wagtail.

GEOLOGY.

Coastal Features in Co. Waterford.

In an article in the *Geological Magazine*, (5) vol. iv., Jan., 1907, F. R. Cowper Reed discusses the stretch of coast on the west side of Waterford Harbour, lying between Credan Head on the south and Knockavelish Head on the north, and known as Fornaght Strand. About the middle of this area, and 200 yards from the present sea-margin, is an Old Red Sandstone ridge which terminates abruptly in what the writer considers to be an old sea-cliff produced by marine erosion. This conclusion gains support from the existence of (1) an old rock platform preserved beneath the drift deposits at the north end of the strand and

(2) a shelf cut in the face of the Old Red Sandstone cliffs of Knockavelish Head. The level of this ledge is from 10–15 feet above the present short platform, and corresponds with that of the base of the inland cliff. At Credan Head there is no trace of a similar ledge, but this may be accounted for by the fact that the rocks are soft and have yielded readily to the weather. Inland, however, up the Credan valley, relics of an old sea-cliff still persist. A close correspondence obtains both as regards buried rock-cliffs and also wave-cut rock-platforms between this and the various sections along our south coast which have been examined and described by Messrs. Wright and Muff. A submerged forest is observable at low spring-tides, which records a former downward and a more recent upward movement of our coastline. About 30 stools were counted, the diameter of the trunks being in most cases 1–1½ feet. In a second article (*l. c.*, *Dec.*, 1907), it is stated that between Tramore and Dunmore East, the materials of the drift are largely derived from the old Red Sandstone, and there is an absence of granite, gneiss, and metamorphic rocks, which form such an important part of the drift at Passage.

The Soil Geology of Ireland.

Accompanying the volume recently reviewed in our pages (vol. xvi., p. 340) is a map showing the surface geology of the country, prepared under the direction of Sir Archibald Geikie, F.R.S.: scale 10 miles to an inch.

REVIEWS.

BRITISH AND IRISH MARINE WORMS.

A Monograph of the British Annelids. By W. C. McIntosh, M.D., F.R.S., &c. Vol. II., Part i. 1908. 4to. Pp. 1–232. Plates XLIII.—L. coloured, and LVII.—LXX. uncoloured. Issued by the Ray Society to subscribers for the year 1907. London, 1908.

The third part of Professor McIntosh's sumptuous Monograph of the British Annelids has just been issued by the Ray Society. The first part, issued in 1873-4, dealt with the Nemertine worms, which are no longer included among the Annelids. Part 2, published in 1900, included the Families Amphinomidæ, Aphroditidæ, Polynoidæ, Acoetidæ, and Sigalionidæ. It was briefly reviewed in the *Irish Naturalist*, Vol. ix., p. 181. The volume just issued deals with the Families Nephthydidæ, Phyllodocidæ, Hesionidæ, and Syllidæ. It is illustrated by 8 beautiful coloured, and 14 uncoloured plates. The completion of this elaborate

Monograph will be a great boon to all students of the Polychæta, and one can only hope that the intervals between the publication of the forthcoming volumes will be shorter than they have hitherto been. In the "Temporary Preface," Prof. McIntosh states that the Carnegie Trust made a grant of £100 towards the cost of publication. He also gives us the welcome news that the next volume is ready for the press.

The absence of an Index, or even a Table of Contents, is to be greatly deplored. It adds considerably to the labours of those using this Monograph. Such aids to progress as Keys to the Genera and Species are quite absent. Prof. McIntosh does not adhere to the system of classification put forward by Prof. Benham. The Family Aphroditidæ of Benham is equivalent to the Aphroditidæ, Polynoidæ, Acoetidæ, and Sigalionidæ of this Monograph. The account of each species is very full and besides the anatomy, includes notes on its history, development, habits, parasites, and economic uses. The use of the name *Lagisca Jeffreysii* for the new species described in Part II., p. 305, is quite indefensible, as Prof. McIntosh had already applied this name in 1876 to a species which he now regards as identical with *Lagisca extenuata* (Grube).

The Polychæta collected by the various dredging expeditions of the Royal Irish Academy and the Royal Dublin Society, as well as those collected by Prof. Haddon, the late A. G. More, and many others, were sent for examination to Prof. McIntosh, and so this Monograph is of special interest to Irish zoologists. Examined from this point of view, the Monograph shows some unsatisfactory features. For instance, in the Dublin Museum there are Irish specimens of *Castalia punctata* (O. F. M.), *Eteone picta*, Quat., *Mystides Lizziæ*, McI., *Eulalia nebulosa*, Mont., and *Phyllodoce maculata*, L., named by Prof. McIntosh himself, and yet these species are not recorded as Irish in the volume just issued. The records of Irish Polychæta are very few, but they have usually been ignored by Prof. McIntosh.

The total number of species described is 133, with 6 varieties, and of these 51 species and 3 varieties are recorded from Irish waters. Families such as the Nephthydidæ (7 out of 10), and Polynoidae (20 out of 37), which contain large conspicuous forms, are well represented in the Irish records, whilst the Family Syllidæ (5 out of 33), which is composed of small forms living chiefly between tide-marks, is but poorly represented. Careful shore-collecting is needed to remedy this deficiency.

The following list includes all the Irish species recorded so far in this Monograph. Those marked with an asterisk have only been found as yet in Irish waters. Some of the localities of the deep-water species are indicated so vaguely that it is impossible to decide whether they come within the Irish area. These are omitted from the list:—

AMPHINOMIDÆ.

Spinther oniscoides, Johnston. Euphrosyne armadillo, Sars.
Euphrosyne foliosa, Aud. and Ed.

APHRODITIDÆ.

Aphrodite aculeata, L.
Lætmatonice filicornis, Kinb.
L. producta, var. britannica, McI.*
Hermione hystrix, Sav.

POLYNOIDÆ.

Lepidonotus squamatus, L.
L. clava, Montagu.
Gattyana cirrosa, Gall.
Lagisca floccosa, Sav.
L. extenuata, Grube.
Harmothoë imbricata, L.
H. Fraser-Thomsoni, McI.
H. lunulata, Chiaje.
Evarne impar, Johnston.
E. Johnstoni, McI.
Antinoë finmarchica, Malmgren.
A. mollis, Sars.
Scalisetosus assimilis, McI.
Malmgrenia castanea, McI.
Halosydna gelatinosa, Sars.
Polynoë scolopendrina, Sav.
Achloë astericola, Chiaje.

SIGALIONIDÆ.

Sthenelais boa, Johnston.
S. limicola, Ehlers.
S. Jeffreysii, McI.*
S. sp., McI.*
Eusthenelais hibernica, McI.
Leanira hystricis, Ehlers.
Phloë minuta, Fabricius.

NEPHTHYDIDÆ.

Nephthys cæca, O. F. Müll.
N. Hombergii, Lamarck.
N. hystricis, McI.
N. Johnstoni, Ehlers.
Nephthys cirrosa, Ehlers.
N. incisa, Malm.
N. pansa, Ehlers.

PHYLLODOCIDÆ.

Notophyllum foliosum, Sars.
Eulalia viridis, O. F. Müll.
E. imbricata, Ehlers.
Eumida sanguinea, Oersted.
Anaitis kosteriensis, Malm.
A. Jeffreysii, McI.*
Phyllodoce lamelligera, Gmelin.
P. groenlandica, Oersted.
Genetyllis hibernica, McI.*

HESIONIDÆ.

Ophiodromus flexuosus, Della Chiaje. Castalia arctica, Malm.

SYLLIDÆ.

Exaone gemmifera, var. Scharffi. McI.*
Xenosyllis Kinbergi, McI.*
Sphærosyllis histrix, Claparède.
Odontosyllis gibba, var. Robertianæ, McI.
Syllis cornuta, Rathke.

R. SOUTHERN.

TROPICAL TRAVEL.

Three Voyages of a Naturalist, being an account of many little-known Islands in three Oceans, visited by the "Valhalla," R.Y.S. By M. J. NICOLL, M.B.O.U., with an introduction by the Rt. Hon. the EARL OF CRAWFORD, K.T., F.R.S. Pp. xxvi.+246. With 56 plates, 4 sketch maps and text illustrations, London, Witherby & Co. 1908. Price 7*s.* 6*d.* net.

This book of scientific travel will appeal to all naturalists, and especially to lovers of birds. The author, Mr. M. J. Nicoll, who now holds a post in the Zoological Gardens at Giza, near Cairo, accompanied Lord Crawford on three voyages of his yacht, the "Valhalla," in order to obtain specimens for the British Museum collections from remote and little-visited regions of the earth. The voyages described are round Africa, to the West Indies, and round the World. On the first-named voyage, after visiting St. Paul's Rocks in Mid-Atlantic and Fernando Noronha, the naturalists had the good fortune to observe, about 14 miles off the coast of Brazil, a "Sea-serpent, with a quadrate dorsal fin and a long eel-like neck surmounted by a head shaped somewhat like that of a turtle." The neck was 6 feet long and as thick as a man's thigh! From the aspect of the fin, Mr. Nicoll concludes that the creature was a mammal and not a reptile. The island of South Trinidad, visited by naturalists only on three previous occasions, afforded many interesting birds for study, while near the more familiar Tristan da Cunha were seen specimens of our mysterious Great Shearwater. Dassen Island near Capetown afforded Jackass Penguins and Sacred Ibis. On Aldabra of the Mascarene group, Abbot's Ibis was photographed; the difficulty was not to avoid frightening the birds but to keep the birds in their inquisitive tameness from upsetting the camera. An observation of much general interest to the student of animal behaviour is that on the same uninhabited island one species of bird may be tame and fearless while an allied species is suspicious and shy.

In the other two voyages better known islands were visited Martinique, Easter, Pitcairn, Tahiti, and Samoa. But in all cases, facts of the natural history of the places are plainly and simply told. The photographs that adorn the volume are always good and frequently beautiful.

G. H. C.

A BOOK OF BIRDS.

A Book of Birds. By W. P. PYCRAFT, A.L.S., F.Z.S. Pp. 156; with 30 full-page, coloured plates, and many illustrations in the text. London: Sidney Appleton, 1908. Price, 6*s*. net.

This attractive volume is uniform in appearance with Mr. W. F. Kirby's "Mammals of the World," lately noticed in this magazine. It can be recommended as, on the whole, a trustworthy and fascinating introduction to ornithology. The opening chapter contains an account of the structure of birds in which the characteristic features of the skeleton, feathers, and, more briefly, of the internal anatomy are described with care and accuracy, attention being especially called to the points of affinity between birds and reptiles. The short description of Archæopteryx is particularly good, and the evolutionary standpoint of this chapter cannot fail to be stimulating to the beginner who may read it.

In the succeeding sixteen chapters the various orders of birds are dealt with in ascending order according to the revised modern classification, the species figured in the coloured plates being chosen for special description. In sketching the distribution of our native birds, Mr. Pycraft has not neglected Ireland; for example, the recent spread of the Tree-sparrow in Co. Dublin has not been overlooked. Various errors—such as the statement that "the Yellow Wagtail is an extremely common bird in parts of Ireland," and the implication that the Tree-Pipit ("fairly distributed throughout the British Islands") is an Irish bird—may be corrected in a second edition.

G. H. C.

OBITUARY.

REV. WILLIAM RICHARDSON LINTON.

The death on January 4, at the age of 57 years, of Rev. W. R. Linton, M A., F.L.S., Vicar of Shirley, removes one of the most energetic and acute of British field botanists. His earlier work in Britain was done mostly in Scotland; later he devoted much time to the working out of the botany of the county in which he was long resident, and the result appeared in his "Flora of Derbyshire" in 1903. He studied especially critical plants, issuing in conjunction with his brother and others the well-known sets of British Rubi, Willows, and Hieracia. His latest work was the "Account of the British Hieracia," published in 1905. Linton twice made a botanical tour in Ireland—in 1885, when he gathered many of the endemic species, and again in 1895, when he studied Rubi, Characeæ, &c., with H. C. Levinge in Westmeath.

ROBERT PRIDE.

We regret to record the death in Dublin on Sunday, February 2, after a very brief illness, of Robert Pride, who had been connected with the Dublin Natural History Museum for a space of nearly fifty years.

His death was very unexpected, for he seemed in remarkably good health in the summer of 1904, when he retired under the age limit, and it was thought he would then have several years in which to enjoy his well-earned pension.

During his long connection with the Dublin Museum as taxidermist, he had acquired an extensive knowledge of the history of the various specimens; a great number of the stuffed birds and skeletons were mounted by him, also many of the marine invertebrates, which required great patience and skill in their manipulation.

He was a man of deep religious convictions, and always most anxious to assist in the promotion of any work of a charitable nature.

NEWS GLEANINGS.

Prof. Henry H. Dixon, D.Sc., F.R.S.

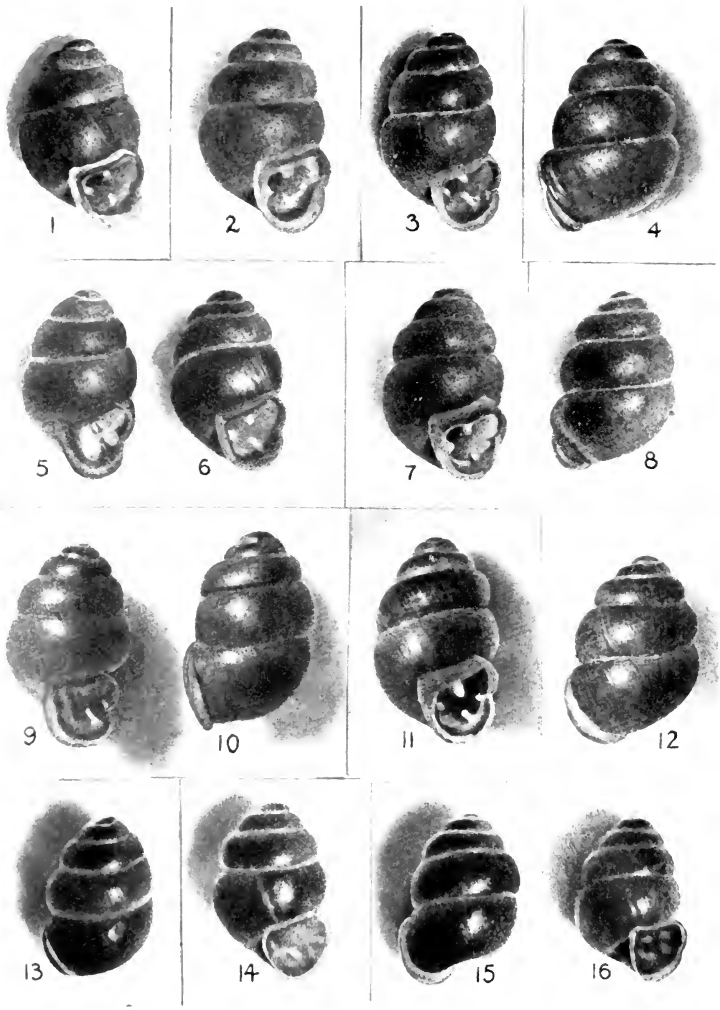
Among the fifteen names chosen for election into the Royal Society we are delighted to see that of the Professor of Botany in Dublin University. Prof. Dixon has attained this honour unusually early in the career of a naturalist. We congratulate him most heartily, for his brilliant researches in vegetable cytology and physiology have thoroughly deserved the recognition.

The Royal Irish Academy.

Among the twelve chosen for election into the Royal Irish Academy natural science is represented by J. N. Halbert, of the Dublin Museum, whose excellent work in entomology is well-known to all our readers; Dr. A. Henry, the forestry expert; and Sir John Ross of Bladensburg, who adds to his military knowledge, eminence as an arboriculturist.

British Birds' Nests.

We have received Part I. of a new edition of R Kearton's "British Birds' Nests," to be completed in sixteen fortnightly parts at one shilling each. The work, illustrated with photographs by C. Kearton, and coloured plates of eggs, will be welcomed by all lovers of natural history and artistic photography. It is published by Messrs. Cassell & Co.



J. W. Jackson, Photomicro.

VERTIGO MOULINSIANA, V. LILLJEBORGI, AND V. ANTIVERTIGO, showing variation in size, form, and mouth

V. moulinsiana, 1–4, Tunnahinch, X9; 5—6, Morden, Dorset, X8; 7—8, Braunton Burrows, Devon, X8; 9—10, Wicken Fen, X9; 11—12, Bessungen, Darmstadt, X9.
V. Lilljeborgi, 13—14, Connemara, X10; V. antivertigo, 15—16, Connemara, X10.

VERTIGO MOULINSIANA, DUPUY.

An Addition to the Irish Fauna.

BY R. A. PHILLIPS.

(Plate 3.)

This rare and interesting little mollusk, apparently through confusion arising from a similarity in its shape and dentition to those of *V. Lilljeborgi*, has on previous occasions been recorded as occurring in Ireland. Thus, a shell found by Dr. J. G. Jeffreys in 1845, at Ballynahinch, Co. Galway, was named by him *V. moulinsiana* (*British Conchology*, vol. i., p. 255), this name being afterwards corrected to *V. Lilljeborgi*, West. (*Annals and Magazine of Nat. Hist.*, 1878, p. 380) It was also included by Dr. Scharff in his list of "Irish Land and Fresh-water Mollusca" (*I.N.*, 1892, p. 136), he, at that time, looking on *V. Lilljeborgi* as a variety of *V. moulinsiana*, a view taken also by some recent British authors, and by the compilers of the Conchological Society's census. The rediscovery of *V. Lilljeborgi* at Ballynahinch by Messrs. Chaster and Tomlin in 1902 settled all doubt as to what the shell found by Jeffreys really was, and careful comparison of the specimens then obtained with *V. moulinsiana* showed that the two are quite distinct. As a result of this discovery, Dr. Scharff withdrew the latter species from the Irish list, saying in a note on the article announcing it (*I.N.*, 1903, p. 14):—"When I wrote my paper in the *Irish Naturalist*, vol. I., on the 'Irish Land and Fresh-water Mollusca,' I had not seen a specimen of *V. Lilljeborgi*, and a shell I took on the Aran Islands seemed to me to agree more closely with the description of *V. moulinsiana*, but as my only specimen has unfortunately been lost, I cannot now compare it in the light of more recent researches. Possibly both species may occur on the west coast of Ireland, but until a specimen of *V. moulinsiana* is forthcoming it would be better to omit it from the Irish list."

Under these circumstances, I have now much pleasure in definitely recording *V. moulinsiana*, Dupuy, as a member of the Irish fauna, having, early in October last, discovered

quite a colony of it in a small marsh by the side of the River Barrow, near Tinnahinch, Co. Carlow

I first perceived it resting on the stems and leaves of the tall grass *Glyceria aquatica* and other plants, and a further search revealed some dozens of specimens on the leaves and twigs of a hawthorn bush at the edge of the marsh.

During the second week in January I was again at Tinnahinch and revisited the marsh. Expecting to find the animals wintering, like some other Vertigoes, in the shelter of hollow stems and other plant-remains, I spent some time examining the marsh débris without finding a trace of them ; at last, quite unexpectedly, I caught sight of a specimen on the trunk of a small Alder ; this gave me a clue to their true winter habitat, and I was not long in discovering numbers of the hardy little creatures hibernating, during the coldest spell of weather we had last winter, on the most exposed parts of the lower branches, at from two to three feet above the ground. They are gregarious and apparently viviparous, as there were several small communities of from four to about twenty individuals huddled together, many of them bearing young ones of two or three whorls on the backs of their shells. Later on I took some handfuls of loose, dry leaves that had got caught by the forking of the branches, and found that each curled-up leaf contained several specimens, both adult and juvenile. In no case did I find one among leaves that were wet, or in a position to retain moisture. Its constant companion in both these situations was *Succinea putris*, a species said to hibernate in mud, of which there were hundreds among the leaves and on the Alder branches.

Parts of the marsh produce a dense growth of Bur-reed (Sparganium), the leaves of which wither and dry, but do not fall or decay until the following summer, and on these large numbers of young Vertigoes were congregated waiting for the spring, when the new crop of leaves would supply them with food and fresh habitat.

An hour or so after being collected, the little snails were to be seen actively crawling about the box in which they were placed, their black bodies and tentacles fully extended. I tested their power of motion in water, and found that when beyond their depth they floated, but were quite helpless ; on

being blown to the edge of the water they quickly crawled out of it, carrying their shells in an upright position. Most of the shells have only four denticles, but some of the older specimens possess an additional small one at the corner of the lip near the columella.

The first specimens I collected differed from English (Bishopstoke, Hants) ones in my collection in being of a much darker colour and possessing a more contracted mouth and rather narrower lip-margin, so I sent some to Dr. Scharff, who compared them with English and Italian ones in the National Museum, and at once pronounced them true *V. moulinsiana*. This determination was afterwards fully confirmed by Messrs. R. Standen and J. Wilfrid Jackson, of Manchester Museum.

The distinctions noted above between the Irish and English specimens induced Mr. Standen to go deeply into the question, and comparison with the numerous sets from nearly all its known localities, British and continental, in his own collection and in the collections of the Conchological Society and Manchester Museum, resulted in showing that these differences were fully accounted for by the "locality variation" to which most species of mollusca are subject. This was clearly demonstrated by a number of beautiful photo-micrographs prepared by Mr. Jackson, who has kindly allowed me to reproduce some of them here (Plate 3.). A fairly large gathering made at Tinnahinch in January proves that even among individuals of one locality a considerable amount of variation may occur, many specimens showing differences in size, outline of lip and tumidity. This is well illustrated in Plate 3 and in the accompanying figures (see next page).

V. moulinsiana has, like many other species, been described by various authors under different names, and the synonymy here published, I believe for the first time, will, it is hoped, prove useful to conchologists.

Dr. Scharff, who kindly worked out its distribution for me, says that *V. moulinsiana* seems to be a member of the Lusitanian fauna. It occurs in Spain, France, North Italy, Carinthia, Sicily, and as far east as the Caucasus. Northeastward it spreads into Switzerland, Germany, Belgium Denmark, and northward into the south of England and Ireland.

Mr. A. S. Kennard, F.G.S., informs me that, according to Dr. Boettger, it is found in North America (United States) as *V. ventricosa*, Morse.

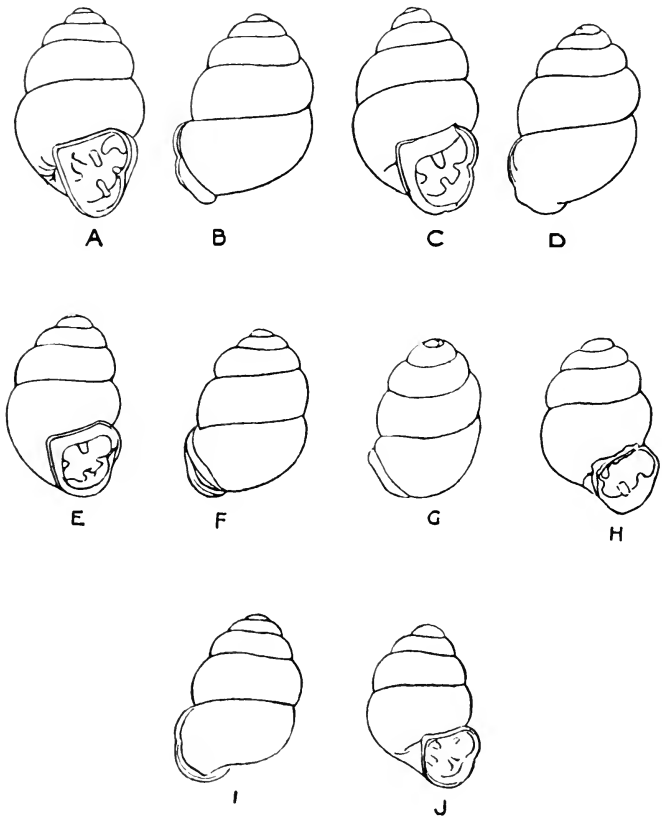


FIG. 1.

A, B.	Vertigo Moulinsiana.	Tinnahinch, Co. Carlow,	× 9.
C, D.	Do.	Bessungen, Darmstadt,	× 9.
E, F.	Do.	Morden, Dorset,	× 8.
G, H.	V. Lilljeborgi,	Ballinahinch, Co. Galway,	× 10.
I, J.	V. antivertigo,	Roundstone, Co. Galway,	× 10.

In England it has been found in Devon, Dorset, Hants, Berks, Cambridge, Herts, Notts and Derby.

The fact that *V. Lilljeborgi* is distinct from *V. moulinsiana* is quite apparent when the two are seen side by side under a lens. The former is much smaller, more glossy, its whorls are more tumid, and its thinner lip lacks the broad, almost colourless margin of the latter. The habits of the two animals also appear to be quite different, for, as has been shown, *V. moulinsiana*, although inhabiting marshes, avoids during both summer and winter anything in the nature of damp or decaying matter; while the favourite, if not only habitat, in this country at least, of *V. Lilljeborgi* is among the decaying roots and stems of aquatic plants cast up on lake shores. *V. Lilljeborgi* is also a much more local shell, having been found only in Sweden, Norway, and West of Ireland. Judged from its size, form, and habits, *V. Lilljeborgi* would seem to be more closely related to *V. antivertigo* than to *V. moulinsiana*, but of course the dentition of the two species is entirely different (Pl. 3., figs. 13–16).

For information and assistance kindly given me in the preparation of these notes, I desire to express my thanks to Dr. R. F. Scharff, Messrs. R. Standen, J. Wilfrid Jackson, and R. Welch, M.R.I.A.

SYNONYMY.

Vertigo moulinsiana, *Dupuy.*
V. Charpentieri, *Shuttleworth.*
V. Charpentieri, *Adams.*
V. lævigata, *Kokiel.*
V. moulinsiana, *Drouët.*
Pupa anglica, *Moquin-Tandon.*
P. lævigata, *Pfr.*
Vertigo Lilljeborgi, *Westerlund.*
Pupa desmoulinsiana, *Jeffreys* (1855).
Vertigo moulinsiana, *Jeffreys.*
V. modesta, *Westerlund.*

EXPLANATION OF PLATE 3.

Figs. 1-12, Vertigo moulinsiana, from various localities.
,, 13-14, V. Lilljeborgi.
,, 15-16, V. antivertigo.

Ashburton, Cork.

ON THE ANATOMY OF VITRINA PYRENAICA,

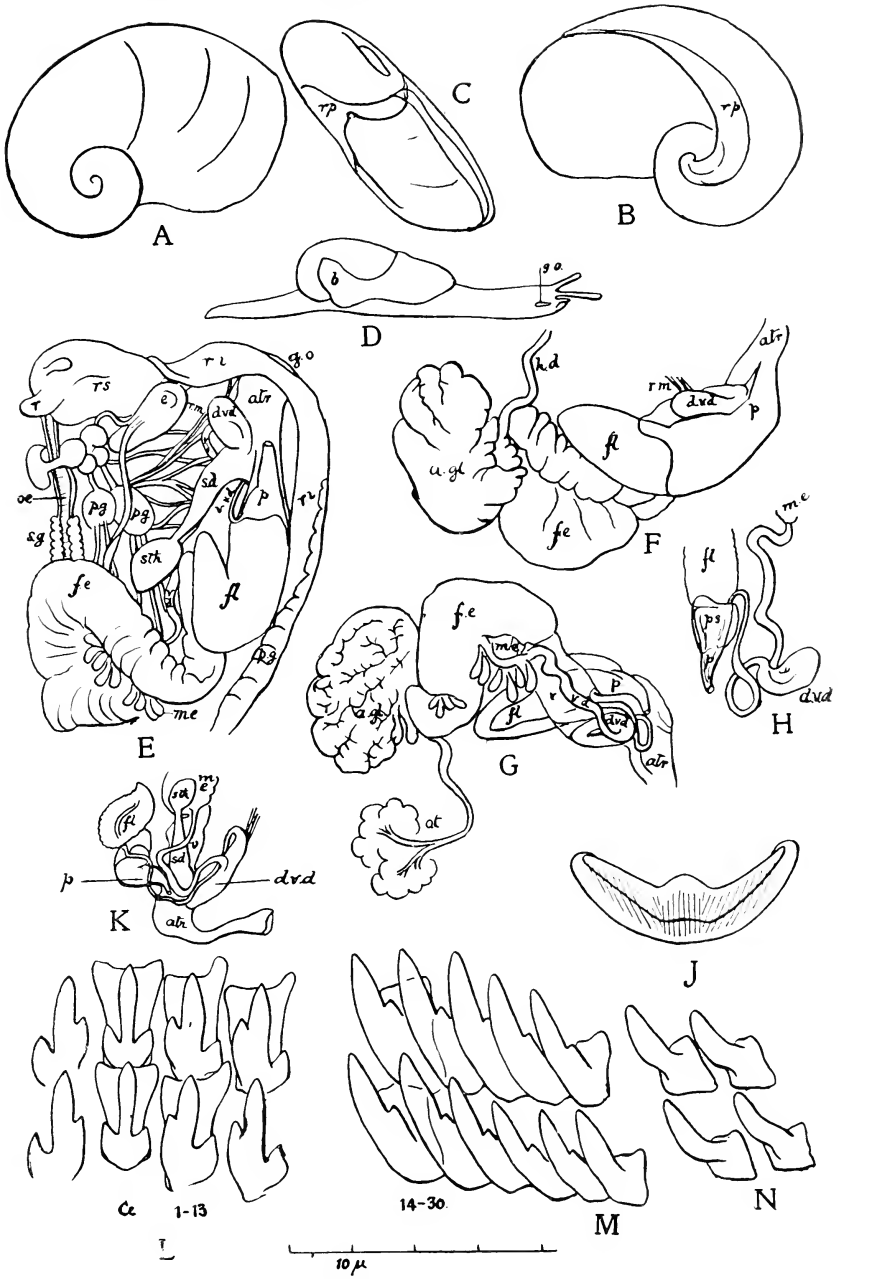
BY REV. E. W. BOWELL, M.A.

[PLATE 4.]

LAST year Mr. Kennard kindly sent me for examination two living specimens of the new Irish Vitrina which Mr. Grierson had sent him. I at once pronounced them to be *V. pyrenaica*, Fér., though I was aware that they had been ascribed by a high authority to *V. elongata* (*semilimax*); and that Simroth's figure of the genitalia of that species had been copied in illustration of them.[1] I have taken both these species myself in France. Recently Mr. Kennard sent me eight more specimens of the Vitrina, which had been collected by Mr. R. A. Phillips in Co. Louth, March, 1908. I was especially glad to have this extra material, as it has enabled me to verify and correct my former dissections. All doubtful points have been elucidated by paraffin sections of properly-fixed specimens.

In Plate 4, figures A, B, and C represent the shell. The actual length of the example drawn is 4 mm. Figures E, F, G, and H are on the same scale. They were traced with the Abbe camera from the actual objects. The most remarkable feature of the shell is its extreme obliquity; in order to see the spire and the lower margin of the peristome at the same time it must be held at an angle (as at C), when its flatness is also apparent. In the living animal the shell rests on one side of the visceral hump, inclined at an unusual angle to the vertical axis, as will be seen by comparing figures A and D. This last figure shows the animal in about an average state of extension; it is capable of still further elongation, and is also able, when at rest, to assume very much the same shape as *Agriolimax lævis*. When the animal is extended, the walls of the atrium (which are very thin and flimsy) are drawn out, as shown in figure K (*V. pellucida*). But the flagellum, vagina, and proximal parts of the epididymis are also capable of considerable extension; thus the end of the flagellum is often found retorted, as in fig. E. The external genital orifice

[1] J. W. TAYLOR, "Vitrina elongata in Ireland," *Irish Nat.*, vol. xvi., 1907, pp. 225–231, pl. 26.



VITRINA PYRENAICA.

A, B, C. Shell. D. Shell with animal extended. E, F, G, H. Dissections of Internal Organs (for references see text of paper). K. Reproductive organs of V. pellucida. J. Maxilla. L, M, N. Radula Teeth

The micrometer scale refers to L, M, N only.

To face page 94.]

(*g.o.*, figs. D and E) is large; the "balancier" (*b.*) covers the spire of the shell.

Figure E represents a dissection, in which the integument has been divided longitudinally, and reflected (*r.i.*); *p.g.* shows the position of the scale-like grooves along the edge of the foot. The radular sac, *r.s.*, has been gently drawn aside and turned half over, so as to display the collar of ganglia in profile; *œ* is the œsophagus, and *s.g.* the salivary glands (about half of their length). The flagellum, which normally covers the spermatheca and its duct, has been drawn over to the outside; figure F shows the same organ (*fl.*) in its normal position. The vagina appears at *v.*; the lower part of the line dividing it from the spermathecal duct (*sth. d.*) is really only part of a fold in the fine membranous bag which surrounds all these organs. This bag, of which it is impossible to form a just idea without actually dissecting a fixed specimen in a medium of high refractive index, encloses the whole of the flagellum and spermatheca, each of them having a separate pocket. It is doubly folded round the male organ (*p.*), which can be completely everted, and it afterwards joins the walls of the atrium. A part of it is the retractor muscle (*r.m.*), which has led some authors to describe the (*d.v.d.*) inferior dilatation of the vas deferens as the intromittent organ and sac. This dilatation *looks* also very much like a dart-sac; but the first objection to that is that the apparent dart is turned the wrong way. It is quite probable that it may be the place where the capreolus is secreted, but I have not found an example. The true course of the vas deferens is shown in figure H, which should be compared with figure K, in which the proximal parts of these organs in *V. pellucida* are shown. The penis sheath (*p.s.*) is similar in shape to the organ discovered by Messrs. Moss and Paulden in *Helicella barbara*, but in this Vitrina it is merely a soft bag of connective tissue, without any signs of chitinisation or calcareous deposit. The dilatation (*d.v.d.*) is merely in the form of a sigmoid flexure, with the sides appressed, and the whole covered over with a fold of the enclosing bag; its similarity to a penis or dart-sac is purely superficial. The retractor muscle is not uncommon in this position.[1] The same dilata-

[1] *Proc. Malac. Soc.*, vol. viii., p. 53.

tion, slightly further modified, and of a different shape, is found in *V. pellucida* (figure K; specimen from Penshurst); and it seems probable that the male organ and its flagellum is what has been described as a globular spermatheca; there can be no doubt at all about the real spermatheca, which opens into the vagina, and not into the atrium. I have referred throughout to this highly glandular organ (*fl.* in the figures) as the flagellum, because I think that histologically it is without doubt the same as the organ usually so called; there is perhaps nothing to show whether the filiform or the obovate type is the older, but certainly the latter seems more perfect in function. The central canal varies considerably in width, according to the condition of the individual; sometimes it is straight, sometimes spirally convoluted.

In figure F these organs are seen as they appear when dissected out entire from a fixed specimen; figure G shows the same from the inner side. The letters *m.e.* and *f.e.* mark the male and female parts of the epididymis. Figure G also shows the form of the ovotestis, which lies in the living animal just below the point of the "balancier." The spermatozoa have acrosome, nuclear portion, mesosome, and axial filament each of about the same length, and there is a long flagellum. Exclusive of the flagellum, their length is 15 to 18 μ.

In *V. pellucida* the flagellum and intromittent apparatus do not always appear so largely developed as shown in figure K. At such times they are very easily detached from the wall of the atrium; and I was unaware of their existence until I found a specimen in which they had reached the acme of development; after which, on searching in other specimens more carefully, I have always found them occupying precisely the same position as the corresponding organs of *V. pyrenaica*, which vary in size much more than the rest of the apparatus does, but are never difficult to find, judging from the ten specimens that I have seen; although even in *V. pyrenaica* they are very easily detached from the atrium. They should be compared with the corresponding parts of that very interesting species, *Agriolimax agrestis*, in the anatomy of which there are several points of unique interest. In Vitrina the flagellum may be always demonstrated in sections, even when

it is shrunk to very exiguous proportions; and either in sections or in dissections its presence is at once indicated by staining with dilute carbolthionin, which will of course colour everything else in time, but goes first for the cells of which the peculiar glandular structure of the flagellum is made up, just as borax carmine serves as a histological test for the cells of the nephridium, and may indeed on that account be turned to practical use, since there are structures in the Neomeniidæ concerning which opinions differ as to whether they are or are not nephridia. I have observed the occasional atrophy of the phallic organs in other species; for example, in *Pyramidula rupestris*. In this snail, according to my observations, the eggs seem to be always retained in the body of the parent; and the young snails do not come out until the parental structures are "defecated to a pure transparency." This is the reason why so many specimens of *P. rupestris* are found adhering to the rocks on which they live, in a dried-up condition, and with their periostracum rapidly vanishing. On examining these specimens I find them to contain eggs, or more commonly egg shells and young snails; the chief organs of the parent being reduced to thin transparent membranes, the original functions of which can, however, easily be discerned; the radula of course is in perfect condition. Being curious to know which of the organs first suffered degeneration, I have looked carefully at others in which this process of encystment, if one may be permitted to use the term, was apparently only beginning. The glands of the digestive system appear shrunk, and the male part of the genital apparatus is in an evanescent condition; but the female epididymis and the albuminiparous glands are well developed. The morphological interpretation of this might be that in hermaphrodite Gastropods the male part of the apparatus is secondary to the female part, an idea which I find supported by such embryological and developmental facts as have come under my notice. I have some reason to believe that the curious nidamental gland (a development of the female epididymis) in Limnæa is correlated with an occasional atavistic habit in gestation. I have found this gland very large in large ovate specimens of *L. peregeri* or *vulgaris*, which occur sparingly, in some seasons, in ponds where the prevailing form is small and high-spired. I mention these

matters in order to invite further research; but certainly this curious phenomenon of phallic decrescence in a well-known form like Vitrina seems worthy of special notice. It may assist us to estimate what at first sight seems to be discrepant evidence given by several distinguished anatomists concerning the construction of Geomalacus. I ought also to mention that in one specimen of *V. pyrenaica* (the largest of the ten) the intromittent organ was found turned upwards in the direction of the vagina; on careful observation I was unable to satisfy myself that the appearance was artefact.

The maxilla is figured at J; the size and direction of the striæ is as shown. There is no indication of bilateral origin. The actual length (width) of this object is 0·6 mm. The radula is shown in the remaining figures (L, M, N). The basal plates are foot-shaped in the larger marginals, gradually becoming rhomboid towards the outer edge, even those under the centrals and laterals are distinguished for the concavity of their sides. This is indeed a generic characteristic. But the greater number of laterals, greater length of mesocones, presence of distinct endocones on laterals,[1] great shortening of the ectocones of the marginals (so that the marginals no longer have the shape of a little hand with fingers together and thumb erect by itself, as in *V. pellucida*), and the absence of external serration to the marginals; all these points combine to make the radula easily recognisable. The scale of figures L, M, and N, can be ascertained by reference o the micrometer divisions (each representing 10 μ, ten micra) traced below them.

In conclusion, I must tender my heartiest thanks to Messrs. A. S. Kennard, P. H. Grierson, and R. A. Phillips, whose kind assistance has provided me with the material described above.

Penshurst, Kent.

[1] I have a Herefordshire Vitrina radula which shows these distinctly, and has marginals not much unlike those of *V. pyrenaica*. Specimens of *V. pellucida* that I have taken in the South of England show no variation in these matters. The Herefordshire form just mentioned is, however, distinctly not *V. pyrenaica*.

THE OCCURRENCE OF HIGH-LEVEL SHELLY DRIFT IN THE KILLAKEE VALLEY, COUNTY DUBLIN.

BY J. DE W. HINCH.

[Read before the Dublin Naturalists' Field Club, February 18, 1908.]

THE position of the section of shelly drift which I wish to deal with is situated on the Military Road, running from the Killakee valley to Glencree. On this road a point is reached where the road is joined by that coming from Glendhu, and it is in the right angle that the road makes here that the section occurs. The height above sea-level can be stated with more than usual definiteness, for the 1,273 foot bench-mark of the Ordnance Survey is placed on the road a few feet to the south, and the 1,250 contour line enters the angle mentioned, and runs a few feet from the eastern and northern edge. The drift is of a very mixed type, but four kinds may be seen—(1) Boulder-clay, containing many erratics of lime-stone and grit, and some granite; (2) clayey sand; (3) clean fine sand; (4) a series of wisps and pockets of rather coarse, gravelly sand. It is in the last of these that the shell frag-ments occur. The pit is an extremely shallow one, not more than six or seven feet at its deepest part, and as a col-lecting ground for shell fragments most unsatisfactory; indeed, after four visits, I was only able to reckon 27 frag-ments altogether. These are of the usual type of shells collected from gravelly sand, and so fragmentary that, with three exceptions, it was quite impossible to identify either species or genera—the exceptions being a rather large (15 mm. long) fragment of Mytilus, an incomplete *Tellina balthica*, and a complete valve of *Astarte compressa*—the most ubiquitous of the Glacial mollusca. On the road outside are heaps of the pit material awaiting removal, and on the heaps I collected over fifty shell-fragments. These, strictly speaking, should not be used as records, but as the material is from the pit, and as they include *Cardium edule* and *Cyprina islandica*, I mention them. The erratics in the drift are numerous (the pit is being worked for road metal), and include the following:—Carboniferous limestone in large quantities, granite, chalk

and chalk-flints, grits, red sandstone, chert, slate, and a basaltic andesite. The chief interest of the section is that it is one of the highest sections—if not the highest—of shelly boulder-clay which has up to the present been recorded on the Dublin hills.

Dublin.

NOTES.

BOTANY.

Ranunculus Lingua—An Erroneous Record.

I have just heard that Mr. Praeger has recorded *Ranunculus Lingua* from County Donegal. He was not asked to do so, and the record is an error. I presume he never saw the specimens, which were merely an elongated lacustrine form of *R. Flammula*. Mackay made the same mistake long ago in this county (Lough Eske), and it is very tiresome to have it repeated. Perhaps Mr. Praeger found the record useful for his maps of distribution of Irish plants, published some years ago (which are very unfortunate as regards Donegal), and was in a hurry to seize it.

H. C. HART.

Carrablagh, Co. Donegal.

I thank Mr. Hart for his note. The recording of *Ranunculus Lingua* from Donegal was, as he says, an error, and it would in the ordinary course have been withdrawn in my next annual summary of new records, &c. The find was reported to me in writing on excellent authority, but was verbally withdrawn some months later; by my own inadvertence the written record remained uncancelled among the topographical additions of the year. I have not succeeded in grasping the argument in the latter part of the note; but it is surely evident to any student of geographical distribution that the range of this plant is such as to render its occurrence in Donegal unlikely; and that far from being useful for my maps of distribution (whatever that may mean), the record would be distinctly inconvenient! I am sorry that Mr. Hart should think that my maps do not do justice to Co. Donegal; but he made the same complaint of "Cybele Hibernica," so I sin in good company.

R. Ll. PRAEGER.

ZOOLOGY.

Supposed Occurrence of the Spoonbill.

The following may be of interest:—Whilst talking to a small local farmer living on the estuary of the Shannon near Foynes, Co. Limerick, the other day, about birds, he said to me (I give his words as well as I can recollect them)—"Please, sir, what would this bird be? I shot it here on the mud in the hard frost of 1905. It was all white, and had legs long like the Crane (of course he meant Heron), and had a bill what got bigger as it got out, and flat like." Surely this can only be an unrecorded occurrence of the Spoonbill.

It may also be of interest to some that during the last two winters I have found Gadwalls to be not at all uncommon on Lough Key, Co. Roscommon. The winter 1906-'07 we killed two males, and this last winter four males and three females. These I identified, but very probably more were shot when I was not present. They seemed to be as a rule by themselves, and usually in the most secluded and reedy bays of the lake, in pairs.

This seems to me to indicate that they are now visiting Ireland more frequently than in previous years

HENRY G. O. BRIDGEMAN.

Royal Hospital, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Badger from Mr. C. A. M. Alexander, a Mute Swan from the Countess of Kilmorey, a Black Swan from Mr. J. W. Turner, two Gulls from Mrs. Gordon, a Macacque Monkey from Dr. R. Martin, sixteen Variegated Mice and a Sparrow Hawk from Mr. John Cliper, an Egyptian Flat-tailed Field-Mouse from Capt. J. W. Gippings, a number of native birds from Mr. W. W. Despard, a Ferret from Mr. M. M'Murdo, and a White Ferret from Mr. W. Ennis. Among the recent births in the Gardens are a Black-striped Wallaby, a Great Wallaroo, and a Brown Lemur. Noteworthy acquisitions by purchase are two Vervet Monkeys, a Brown Mouse Lemur, a Black Lemur, six Rheas, two hybrid Golden-Amberit Pheasants, two Welka Rails, and an American White-headed Eagle

A portion of the open-air rockery is now used for the display of several large vultures, which show admirably in such comparative freedom. The pair of young Chimpanzees—"Barney" and "Jenny"—continue to attract much attention from visitors. "Barney" was attacked in March by a serious bronchial complaint, but, thanks to the care of the superintendent and keeper, he has made a perfect recovery, and the two apes are now as lively and playful as possible.

DUBLIN MICROSCOPICAL CLUB.

MARCH 11.—The Club met at Leinster House, Dr. G. H. PETHYBRIDGE (Vice-President) in the chair. He exhibited potato tubers affected with the disease known as Black Scab, Warty Disease, Potato Rosette, &c., due to a fungus in all probability identical with that described by Schilberszky in the *Ber. d. deut. bot. Ges.* xiv., 1896, as occurring in Hungary, to which the name *Chrysoplyctis endobiotica* was given. The tubers exhibited had been obtained from England, inasmuch as the disease has so far not been reported in Ireland, and it is to be hoped that it will not appear here. The disease has been known in England for some twenty years, but it is only some eight years or so since scientific investigation was brought to bear on it. In 1899 Dr. W. G. Smith, of Leeds, investigated it, but did not identify the cause; in 1902 it was reported on from Kew, but a mistake was made in identifying the fungus, and the first correct account of the fungus seems to have been given by Professor Potter in that year. The disease, which has become widely spread in Great Britain during recent years, is much more destructive than ordinary potato scab, and exceedingly difficult to eradicate when once established. Sections of the diseased tissues were exhibited under the microscope, which showed the thick-walled, resistant, resting spores of the fungus, each occupying a single cell of the potato tissue. The germination of these spores (or sporangia—for possibly they may be such) has not yet been observed. An illustrated leaflet on this disease has recently been issued by the Department of Agriculture and Technical Instruction for Ireland, and a sharp look-out should be kept by everyone growing potatoes, whether in a large or small way, so that, if it should appear in Ireland, means may be immediately taken to stamp it out.

R. SOUTHERN, B.Sc., exhibited specimens of the rhabdocœle Turbellarian *Macrorhynchus croceus*, Fabr. Several individuals were obtained from seaweeds in rock-pools at Malahide, in February of this year, when they were quite mature. The specimen exhibited was mounted in a mixture of glycerine and acetic acid, which, though of no value for permanent preparations, is useful for temporary mounts. The worms contained large egg-capsules, lying in front of the characteristic chitinous penis-sheath. This species has been recorded from Valencia Harbour, by Gamble; from several localities in Great Britain; and from various parts of the North European shores.

F. W. MOORE, M.R.I.A., exhibited a plant of the curious and rare little orchid *Restrepia xanthothalma*, from Guatemala. The small flowers are borne at the back of the leaves and face downwards. He also exhibited the labellum under the microscope, to show the peculiar manner in which the blotches of colour, due to coloured cell sap, were distributed through the tissues.

J. N. HALBERT, M.R.I.A., exhibited a rare neuropterous insect, *Psectra diptera*, Burmeister, which he found amongst bushes on the banks of the River Slaney near Wexford, in July, 1900. The insect is chiefly remarkable for the rudimentary condition of the second pair of wings in the

male, and also for its small size and extreme rarity. The first British specimen was found on hazel in Somersetshire by Mr. J. C. Dale more than sixty years ago, and at the time of its discovery near Wexford it had not since then been noticed in any other locality in Britain. The species has recently (1903) been taken on the banks of the Nith, in Dumfrieshire, this being the third recorded locality in the Britannic area. Though widely distributed, it is said to be an excessively rare insect in Europe, and but few examples are known in collections.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 14.—EXCURSION TO GREEN HILLS ESKER, BALROTHERY.—Twenty members and visitors left Terenure by the 2.45 tram, and on arrival at Balrothery proceeded to study the eskers which are so well developed in that locality. The conductor, J. Swain, B.A., gave a general account of the method of formation, and then the party moved along the crest of the esker-ridge in the direction of Clondalkin. On the way a large number of sections in the eskers were examined. The party returned to Dublin through Dolphin's Barn.

MARCH 17.—The fourth business meeting of the session was held in the Royal Irish Academy House, the President in the chair. J. BAYLEY BUTLER, M.A., gave an account of the methods used in modern marine research, dealing with thermometers for recording temperatures of great depths, with methods for collecting and preserving specimens. The paper was illustrated by a large collection of lantern slides. J. de W. Hinch spoke on the paper.

APRIL 11.—EXCURSION TO THE DODDER AND FRIARSTOWN GLEN.—The closing winter excursion was attended by thirty members and visitors, who left Terenure by the 1.30 steam tram for Tallaght. From here the party, under the conductorship of W. B. Bruce, walked up the western bank of the Dodder in the direction of Bohernabreena, observing such plants as the present late season afforded. A heavy shower stopped work for some time, but afterwards a section visited Friarstown Glen, afterwards returning to Tallaght across the fields in time for the 7 tram to town.

APRIL 14.—The concluding meeting of the winter session was held in the Royal Irish Academy House. The President in the chair. Prof. G. H. CARPENTER, B.Sc., gave a paper illustrated by lantern slides on Irish Springtails, with an account of two new species, new to the Britannic fauna. The paper, which will shortly be published in the *Irish Naturalist*, was discussed by F. Neale, R. Ll. Praeger, and the President. The President then proposed that the summer excursions of the year 1908 should be devoted to a geological and biological examination of the North Bull or some other defined district. The matter was discussed and referred to the committee. J. H. Lloyd was proposed as a member, and Messrs. J. Johnson and T. Harford were proposed as Associate Members.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 29.—BOTANICAL SECTION.—ALEXANDER MILLIGEN read a paper on "The Lower Forms of Plant Life, and the Phenomena of Reproduction." The lecturer drew attention to the remarkable progress that had been made in our knowledge of the so-called "lower" forms of plant life. He directed attention to the various phases of the reproductory process, (*a*) by simple cell division, (*b*) by sexual spores, and (*c*) by various modes of the sexual method. A distinguished member of the Bristol Naturalists' Society, Mr. James W. White, F.L.S., was present as a visitor, and took part in the discussion.

FEBRUARY 12.—ARCHÆOLOGICAL SECTION.—Miss E. ANDREWS read a paper on "Folk Lore connected with the Ulster Raths and Souterrains." There was a large attendance of members of the section, with the President in the chair.

FEBRUARY 18.—The President (Robert Patterson, F.L.S.) in the chair, Mr. THOMAS DEWHURST, A.R.C.Sc. (Lond.) read a paper on "Volcanoes and Volcanic Action." Before calling on the lecturer, the President referred to the loss the Club had sustained by the death of Mr. Richard Hanna, an old member, who had been very active in the Botanical Section. He also referred to the success which had attended Mr. Nevin H. Foster's investigations into land isopods, he having recently discovered a species new to Ireland. Mr. Dewhurst gave a most interesting account of celebrated volcanic outbursts of recent years, illustrated with numerous lantern slides. The portion of the lecture dealing with intrusive masses of lava was illustrated by slides showing these features at Cave Hill, Scrabo Hill, and other localities near Belfast. The following members took part in the discussion:—The President, R. Welch, M.R.I.A., Thomas Anderson, and William Gray, M.R.I.A.

FEBRUARY 26.—ZOOLOGICAL SECTION.—The Vice-President (N. H. Foster, M.B.O.U.) in the chair. ROBERT PATTERSON, F.L.S., read a short paper on "The Markings of Nestling Birds." After dealing fully with the various types of nestling birds and describing the curious tongue-marks that are found in many species, the lecturer asked the members to assist in the investigations that were going to be carried on in the coming season. Very careful notes should be taken of the kind of bird, the nature of the nesting site, and the relative amount of light which reached the interior of the nest. The paper was illustrated by specimens of young Coots just out of the egg, and by a drawing of the tongue-marks of nestling birds. The following members spoke to the paper at the close:—N. H. Foster, R. Welch, W. J. Fennell, William Carson, and William Gray.

MARCH 4.—ARCHÆOLOGICAL SECTION.—Three papers were read—"Notes on Palæolithic Deposits," by ROBERT BELL; "Conjectures regarding recent Sand-dune Finds at Dundrum," by ROBERT MAY; and "Colours and Superficial Appearances of Flint Implements," by JAMES STRACHAN. The papers gave rise to a spirited discussion, in which Mrs. Hobson, William Gray, W. A. Green, Miss Andrews, A. Milligan, J. Carson, and H. L. Orr took part.

DUBLIN MARINE BIOLOGICAL COMMITTEE.

GENERAL ACCOUNT OF DREDGING OPERATIONS, 1907.

WITH SPECIAL NOTES ON THE MOLLUSCA.

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

THE Dublin Marine Biological Committee was formed in the Spring of 1907 at the instance of Mr. J. Bayley Butler, with the object of promoting further exploration of the County Dublin sea-fauna. In addition to Mr. Butler and the writer of the present report, who were appointed respectively Secretary and Treasurer, the Committee was made up of the following members:—Miss M. C. Knowles, Miss J. Stephens, Dr. Scharff, Professor Carpenter, Messrs. J. Adams, J. A. Clarke, J. N. Halbert, J. de W. Hinch, A. R. Nichols, and R. Southern. A small grant was obtained from the Royal Irish Academy Fauna and Flora Committee, and with this the Marine Committee began its operations in May, 1907. Eight dredging trips were made in the course of the year, the field of exploration stretching from Lambay in the north to Killiney Bay in the south. With the exception of a couple of scrapes made off Lambay Head, the dredgings were strictly confined within a limit of three miles from the shores of the county mainland, and within a maximum depth-limit of 20 fathoms. A considerable mass of material selected from the various dredgings has been preserved, and, it is hoped, will yield on examination some interesting results in departments of marine zoology which have hitherto been insufficiently explored. The marine Mollusca were allotted to the Treasurer as his special department, and as it has been possible for him to examine his material as, or at all events, soon after, it was collected, it seems best to place the more interesting results on record here without further delay, and, at the same time, to give a general account of the dredgings made by the Committee.

MAY 25.—The Secretary and Mr. Adams opened the year's work by a short dredging trip by row-boat in the neighbourhood of the Muglins, east of Dalkey Island. An unfortunate accident to the dredging gear brought the day's operations to

a premature close after one scrape had been accomplished in 17 fathoms. The scanty material handed over to me for examination was found to include, amongst many commoner species, the following, which, except where otherwise stated, were dead, and represented by single examples only:—

Trochus granulatus, 2.
Odostomia spiralis.
O. insculpta.
Rissoa costata.
Astarte sulcata.
Astarte triangularis (2 living).
Pecten striatus, 1 valve.
Pectunculus glycimeris, 3 valves.
Tellina crassa, 2 valves.
Solen pellucidus.

One of these, *Pecten striatus* is new for Dublin, the only record for the Irish east coast, so far as I can discover, being the very vague and unsatisfactory one, "East of Ireland," given in vol. ii. of Jeffreys' "British Conchology."

JULY 13.—Messrs. Butler, Colgan, and Southern started from Kingstown, at 8 a.m., in the fishing smack, "Emma Mary." Though a very good sailer, and equipped with a serviceable otter trawl, the "Emma Mary" proved sadly deficient in the free deck-space without which the sorting of weighty dredgings is a weariness of the flesh. A fresh breeze carried us out to the North Burford buoy in threequarters of an hour from the harbour mouth. Here the trawl was shot, and we stood in for the Bailey Light, a little north of which our catch was brought on board about 11 o'clock. This haul gave us, from about 14 fathoms, one fine specimen of *Solaster endeca*; some twenty specimens of *Æolis tricolor*, Ald. & Hanc., a handsome nudibranch new to Co. Dublin and to East Ireland; and single examples of three other nudibranchs, *Dendronotus arborescens*, *Doris bilamellata*, and *Doto coronata*. Most of the specimens of *Æolis tricolor* were damaged by pressure of the miscellaneous contents of the trawl net, yet a few specimens were in fine condition, and transferred to a jar of fresh salt water displayed their delicate colouring to perfection. Whitish towards the base, the large flattened papillæ were tinted above with faint violet, and tipped with opaque yellow. In addition to these interesting nudibranchs, this haul gave us many unexpected and unwelcome objects of art, including a navvy's shovel encrusted with Balanus, some scrap-iron, several old boots, and a rusty bucket.

A few scrapes of the dredge were made along the northern shores of Howth Head, from the Bailey to the Nose, in water ranging in depth from 12 to 15 fathoms. Here, too, the ground proved to be extremely foul, in the usual, not the nautical sense of the adjective, and was almost destitute of the marine life which the known depth and the assumed cleanness of the bottom had led us to expect. The foul ground here is evidently formed of drifted matter from the Corporation hopper barge, which for years past has discharged daily at a considerable distance off the Howth promontory all the rubbish of Dublin City.

Greatly disappointed with our trawling here, we put about after mid-day and tacked southward across the Bay till we reached 15 fathom ground off the Muglins. About here several scrapes of the dredge were made. In one of these the dredge bag came up filled, and indeed overflowing with a writhing mass of "creepers," *Ophiocoma rosula*, a species which so pullulates in parts of Dublin Bay as sometimes to fill and break the trawl nets of the fishermen. Other scrapes about here gave us a fair variety of Mollusca, including living examples of the following:—*Leda minuta*, 3, *Cardium fasciatum*, 4, and *C. nodosum*, 2. Along with these were the common *Phasianella pullus*, *Nucula nucleus*, and *Scrobicularia alba*, all three of which were brought up living in large numbers.

JULY 20.—The same three members of the Committee as in the preceding trip made an early start from Kingstown in the "Emma Mary." It was a perfect morning from a landsman's point of view, but most execrable sailing weather. Only the lightest airs stole over the surface of the harbour, so that, with all sail set, it took us fully twenty minutes to clear the mouth. Outside, the weather improved slightly, and we crept slowly across the bay towards the Howth promontory, the way on the boat being for short spells sufficient to drag the tow-net, which, together with a small beam-trawl, now formed part of our equipment. When first brought on board the tow-net yielded us an abundance of the beautiful *Cydippe pomiformis*. The contents of the pocket were thrown into a white glazed milk-pan half filled with sea water, and while the smack lounged across the Bay in a lazy roll, the Committee amused itself in attempts to seize and transfer to glass tubes a few

specimens of the translucent and almost invisible Cydippe. We soon found that the only way to work on board the "Emma Mary" with any approach to comfort was to stand in the hold, and, with half the hatches off, explore the jars and pans placed on the deck. In weather such as we had this day it was easier to take in a sleeve full of water from the rolling milk-pan than to catch one of its elusive population of Cydippes.

Jelly-fish large and small frequently wobbled past our boat. We caught a few and found them to be *Pilema octopus*, a species very common in Dublin waters. All the larger examples captured carried in their pouches that well-known commensal amphipod, the green-eyed *Hyperia galba*. A scrape of the dredge in about six fathoms a mile north by east of Kingstown Harbour gave us many large living specimens of *Scaphander lignarius*, with abundance of living *Nucula nitida*, and three live specimens each of *Lacuna crassior* and *Odostomia rufa*. Along with these were dead examples of *Montacuta ferruginosa* and *M. bidentata*.

Failing to work across the bay to Howth Head, we put about and crept down towards Dalkey Island. A slight freshening of the breeze enabled us to make a couple of runs of the beam trawl, and these yielded one specimen of *Sepiola atlantica* and two of *Æolis tricolor*, the nudibranch we had added to the Dublin marine fauna on our previous trip. From a depth of eight fathoms off Bullock the dredge brought up a large spray of *Antennularia ramosa* bearing numerous spawn coils of a nudibranch, and close examination of the hydroid was rewarded by the capture amongst its roots of eight live specimens of *Doto coronata* harmonizing perfectly in colour with their host.

JULY 31.—Starting from Bullock Harbour in a row boat, Messrs. Butler and Colgan did some shore-collecting at low water between Dalkey Island and the adjacent islet known as the Lamb, and then dredged along Dalkey Sound and out into Killiney Bay. The shore-collecting yielded little of interest beyond one large specimen each of *Æolis papillosa* and *Doris tuberculata*. Two scrapes of the dredge in nine fathoms between Bullock and the northern end of the Sound gave us 53 species of Mollusca, amongst them the following:—

Emarginula fissura, 5.
Fissurella græca, 5.
Trochus Montacuti, 32, many living.
Rissoa proxima, 1.
Adeorbis subcarinatus, 2.
Defrancia linearis, 9.
Pleurotoma rufa, 1.
Utriculus truncatulus, 3.
Cylichna cylindracea, 3.
Dentalium entalis, 2.
Leda minuta, 2 living.
Astarte triangularis, 13 living.
Venus ovata, 27 ,,
Cardium fasciatum, 2 ,,
C. nodosum, 6 ,,
Psammobia tellinella, 3 ,,
Pecten tigrinus, 4 valves.
Tellina crassa, 4 ,,
T. donacina, 8 ,,
Thracia papyracea, 10 valves.

Another scrape in 15 fathoms about a quarter of a mile S.E. of Dalkey Island gave 43 species, the most interesting of these being—

Trochus Montacuti, 37.
Rissoa costata, 1.
R. semistriata, 6.
R. punctura, 6.
R. reticulata, 2.
Velutina lævigata, 2 living.
Trophon muricatus, 8.
Odostomia spiralis, 2.
Cerithium perversum, 2.
Eulima distorta, 1.
Leda minuta, 2 living, 7 valves.
Cardium fasciatum, 15 living, 11 valves
C. nodosum, 5 ,, 18 ,,
Psammobia tellinella, 4 ,, 11 ,,
Lima Loscombi, 1 valve.
Thracia distorta, 1 ,,

The dredgings made in Killiney Bay from the Sound to near Shanganagh river yielded no species of interest.

AUGUST 24.—Messrs. Butler, Colgan, and Hinch spent a half day in dredging at Malahide, chiefly in the shallow water of the River, as the channel is called by which the great creek or lagoon of Malahide is filled and emptied by each flow and ebb of the tide. A few scrapes were made in the open sea outside of the bar, but the sandy ground gave us no results of interest. In the river itself, however, we were more successful. This is the *locus classicus* of two nudibranch species, *Proctonotus mucroniferus* and *Æolis Farrani*, discovered here more than 50 years ago by Messrs. Alder and Hancock in company with Dr. Farran. The whole of the river from the bar to the railway bridge was dredged by us rather thoroughly, partly by rowing and partly by towing the boat and dredge from the sandy banks of the channel. The best reach of the river was found to lie above the wooden landing stage of the Island ferry in low water soundings of not more than two fathoms.

In this part of the river we found the common sponge, *Halichondria panicea*, in great abundance and luxuriance, just as it was in September, 1843, when Alder and Hancock worked over this ground. Our dredge came up filled with it, clinging in large yellow masses to seaweeds, especially *Halidrys siliquosa*. A fine specimen of *Doris pilosa* was captured here, measuring fully 1⅛-inch by 1-inch, along with three specimens of *Goniodoris nodosa* from ¼-inch downward, and three of *Lamellaria perspicua*, the largest ⅜-inch, and all dirty yellow in colour with small black points. Along with these were two live specimens of *Lacuna crassior*.

A jarful of sponges and zoophytes was carried home, and examination of these yielded me two opisthobranch mollusca new to Dublin and to East Ireland, *Elysia viridis* and *Æolis cærulea*. Both of these came from quite shallow water, not more than two fathoms. The Elysia was $\frac{9}{16}$-inch long and the Æolis $\frac{11}{16}$-inch when in motion. The coloration of the Æolis was strikingly beautiful. The cylindrical papillæ, disposed in about seven rows transverse to the body, were indigo black below, brilliant blue in the centre, and bright orange red at the tips. The black eyes were conspicuous, the body was translucent, displaying the dark viscera within, and the rhythmic beating of the heart was distinctly visible behind the dorsal tentacles. The only previous record I can discover for this species is one for Valentia Island.[1]

SEPTEMBER 7.—Five members of the committee, Messrs. Butler, Colgan, Halbert, Hinch, and Southern, set sail from Kingstown in the "Emma Mary" at 9 a.m. for a two-days' cruise to the northward. Our plans were ambitious. We hoped to run straight for Lambay Deep, a long trough-like depression in the sea-floor lying some eight miles eastward of Lambay, and giving soundings of from 40 to 70 fathoms. Here we were to make a few scrapes before sunset, and then standing in to Lambay Sound, anchor there for the night and dredge the deep water to the east of the island on the following day. But once again we were baffled by the failure of the wind. It was 11.45 before we found ourselves off the Bailey Light; it was half-past two when we got fully round it, and

[1] *Irish Naturalist*, vol. v., 1896, p. 135.

long before that all hope of reaching Lambay Deep was abandoned. A couple of scrapes made in about eight fathoms while crossing the bay gave us one living specimen each of *Sepiola atlantica*, *Polycera Lessonii*, *Pleurotoma nebula*, and *Odostomia rufa*.

Having rounded the Bailey we tried the beam trawl and the dredges several times in the deep water off the northern shores of the Howth promontory, and as on our previous trip of the 13th July, we brought up a large quantity of rubbish, tin cans, clinkers, cabbage stalks, and old boots. Many of the old boot-soles were thickly studded with *Doris bilamellata*, the commonest of all the County Dublin nudibranchs, grouped in threes or fours, and some of large size up to three-quarters of an inch. One scrape in about thirteen fathoms between the Bailey and the Nose gave us two very fine specimens of *Aplysia hybrida* fully five inches long when in motion, one a uniform dull dark brown (var. *depilans*), the other light brown mottled with sage green, but the results of our dredgings in this deep-water area were extremely meagre in all departments of marine life.

It was fully half-past seven that evening, about ten hours out from Kingstown, when we made Lambay Sound and sat down to dinner on deck by the dim light of a swinging lamp. That dinner was the committee's most successful operation of the day. The lamp we all agreed cast quite as much shade as light; the free deck space was nowhere large enough to accommodate an Irish jig dancer, and the "Emma Mary's" bulwarks were hardly six inches high, yet none of us fell overboard or into the hold, and only one of the five was heard to complain that his after-dinner tea had been "sweetened with salt."

We slept on deck that night. A very broken sleep it was, short snatches of dozing alternating with long spells of gazing at the Pleiades overhead or listening to the rush of the tide against our bows, and we rose stiff and unrefreshed before dawn next morning. By half-past five, just as the sun's rim had cleared the sea margin, the anchor was up and we were running eastward under the northern cliffs of Lambay. Another hour took us to Lambay Head. Here the dredge was shot in about fifteen fathoms, and the "Emma

Mary" was brought to and suffered to drift in a very nasty cross sea. For the next hour, supported only by a strong sense of duty, we allowed our craft to drift with a hideous motion compounded of pitch and roll. Meanwhile two scrapes were made, the dredge being brought on board each time with great difficulty and some risk; but the results of both were almost nil. A stone or so of sand with dead and broken shells of the commonest species was all we got for our labour. A third time the dredge was shot in about 16 fathoms, but no sooner had it begun to scrape than a sudden tension of the line showed that we had fouled on a rock. There was little rope to spare, so the end was "belayed" and a frantic effort made to get way on the boat. But it was too late. The "Emma Mary" lifted herself on the crest of a wave, and as it passed, threw her whole weight viciously on the stout rope and snapped it like pack thread. And so our deep water explorations off Lambay Head were brought to an untimely end with the loss of one of our dredges and some 30 fathoms of rope.

We retreated to the smooth waters of the Sound, where we lay almost becalmed until midday, the way on the boat being just enough to permit of our making a few feeble scrapes of the dredge in shallow water with no better yield than a solitary specimen of *Dendronotus arborescens*. Two o'clock found us off Ireland's Eye, where the dredge was shot for the last time that day in about 12 fathoms and brought up a single example of the rather rare Sucker-fish, *Lepadogaster bimaculatus*. Soon after 5 o'clock we made Kingstown Harbour and our fruitless two days' cruise came to an end.

OCTOBER 26 AND NOVEMBER 2.—Some shore-collecting was done on these days at low water near Bullock Harbour by the writer of this report, who was fortunate enough on both occasions to find there *Actæonia corrugata*, an opisthobranch new to Dublin and to east Ireland. It occurred on corallines and dwarf sea-weeds, four specimens on the first date and six on the second, the largest being one-eleventh inch in length. Along with the Actæonia on the 2nd November were found nine specimens of *Runcina Hancocki*, the largest $\frac{1}{4}$ inch long.

NOVEMBER 16.—Messrs. Butler and Colgan made a second half-day excursion to the Malahide River. Operations by row-

boat were confined to the upper reaches of the River from the ferry-stage to the railway bridge, and, as before, *Halichondria panicea* was brought up in large masses. On stones from about two fathoms low water two species of Chiton were found, both rare for County Dublin, *C. ruber* and *C. fascicularis*, but only one specimen of each was obtained. Of *Lamellaria perspicua*, four living specimens were taken here, all of the same dirty yellow hue as those previously dredged by us from the same ground. A few samples of the sponges and zoophytes were brought home in a jar of sea water, and these on careful examination yielded me the following interesting Opisthobranchs:—

Runcina Hancocki, 2.	Goniodoris castanea, 1.
Ægires punctilucens, 1.	G. nodosa, 2.

Of these, *Goniodoris castanea* is new for Co. Dublin and for east Ireland, and appears to have been only twice previously recorded for the Irish coasts, the first time from Dursey Sound, the second from Ballinakill Harbour. The Malahide specimen agreed perfectly in coloration with the plate in Alder and Hancock's "Monograph." For Ægires there is only one previous Co. Dublin record. The occurrence of Runcina here and at Bullock, some 12 miles south of Lambay, where it was added to the Dublin marine fauna by Mr. Wolleston in 1906, shows that the species is widely distributed in the county.

DECEMBER 14.—The Committee's last dredging trip for the year was made on this day, the ground selected being Dalkey Sound and its approaches. The Treasurer was the only representative of the Committee present, and operations were carried on from a row-boat, manned by two Bullock fishermen well acquainted with the soundings and the nature of the bottom. Only four scrapes were made altogether, two in 10 fathoms a little south of Bullock Harbour, one in mid-Sound in about 8 fathoms, and a fourth in 15 fathoms, about a quarter of a mile south-east of the Battery on Dalkey Island. Amongst the results of the first two scrapes, the following are of interest:—

LIVING.	DEAD.
Polycera Lessonii, 3.	Odostomia rufa, 1.
Ægires punctilucens, 1.	Dentalium tarentinum, 2 frags.
Tritonia Hombergii, 1.	Venus casina, 1 valve.
Leda minuta, 2.	Tellina crassa, valves frequent.

The Polyceras were all of the typical form *citrina*, warm orange brown in colour, and the Tritonia was quite immature, only $\frac{5}{8}$-inch long, and in colour translucent white.

The third scrape in the Sound yielded one living specimen each of *Doris aspera* and *Aplysia hybrida*, and the fourth, in 15 fathoms, brought up a quantity of very fine clean gravel, which produced, along with abundance of dead and living examples of *Astarte triangularis*, dead examples of the following interesting species:—

Rissoa violacea, 1.	Pecten similis, 2 valves.
Dentalium tarentinum, 2 frags.	Scrobicularia prismatica, 20 valves.
Lima Loscombi, 1 frag.	Tellina pusilla, 5 valves.

Of these, *Pecten similis* is new for Dublin and for East Ireland, and *Tellina pusilla* quite rare.

To sum up—the results of the Committee's operations for 1907 cannot be regarded as disappointing, at least in the department of Mollusca, which, for fully a century, has engaged the attention of a series of competent workers. During the year seven species have been added to the list of Dublin marine mollusca—*i.e.*, *Elysia viridis*, *Actæonia corrugata*, *Æolis cærulea*, *Æ. tricolor*, *Goniodoris castanea*, *Pecten striatus*, and *P. similis*. At the same time, some valuable experience has been gained, along with a general knowledge of the nature and capacity of the various dredging grounds of the county, which may be of service in directing future operations.

Sandycove, Co. Dublin.

THE SHELL-BEARING DRIFTS OF CO. DUBLIN.

BY J. R. KILROE.

MOST readers of the *Irish Naturalist* are familiar with questions relating to the origin of the drift deposits of the region around Dublin. Interest in the subject was much enhanced by the discovery of shells in these deposits, of northern species; and the account which Scouler gave of his discovery, in the early part of last century, introduced, as we may say, amid calms, a theme destined to gather round it an unwonted amount of interesting scientific debate. The apparently obvious hypothesis of submergence of the land became (to follow the metaphor) overcast with perplexing elements in the seventies, when the shell-bearing gravels were found at high levels on the Dublin mountains; and, a little later, perplexity was followed by somewhat stormy controversies when such large demands were made upon the generally accepted hypothesis. The controversies have at length subsided, and we have happily reached the post-cyclonic stage of debate, enjoying a cleared atmosphere and a more detailed and extended perspective.

As long ago as 1838 John Scouler[1] gave lists of shells which he had collected in the gravels of Howth and Bray Head. Those from the former place are included in the more comprehensive list of A. Bell.[2] This list is given in the subjoined table under Howth, the species reported by Scouler not mentioned by Bell being *Turbo littoreus* and *Nerita littoralis*. Those which Scouler reported from Bray Head were *Cyprina islandica*, *Turritella terebra* and Dentalium.

Shells from the drifts of other low level localities were subsequently reported by J. R. Kinahan[3] and others, in connection with which, while the glacial origin of the containing deposits was not questioned, the marine agency of transport was naturally inferred. The publication of Rev. Maxwell Close's[4] paper, "The Elevated Shell-bearing Gravels near Dublin"

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[1] *Journ. Geol. Soc. Dublin*, vol. i., pp. 266–276.
[2] *Report Brit. Assoc.* 1890, p. 411.
[3] *Journ. Geol. Soc. Dublin*, vol. viii., pp. 87–60.
[4] *Journ. Roy. Geol. Ireland*, vol. iv., p. 36–40.

(1874), gave inquiry into the origin of the drifts an important impetus, for he showed that these deposits occur at a level somewhat higher than 1,200 feet at Caldbeck Castle, and at 1,000 feet at Ballyedmonduff on the Dublin mountains; and expressed his conviction that the "upper limits of these gravels are clearly not raised beaches."

Since 1874 the shell-bearing deposits have been met with at considerably higher levels than 1,200; and drift-gravels occur on Kilmashogue Mountain at 1,300 feet, rivalling in height those at Moel Tryfaen on the opposite coast of Wales.

An exhaustive account of the drifts is given in the Memoir accompanying the Geological Survey Drift Map of the Dublin area. The subjoined table is a summary of the lists given in the Memoir and other papers. No attempt has been made to revise the naming of the species or to bring it up to any particular standard.

TABLE OF SHELLS FOUND IN THE DRIFTS AROUND DUBLIN.

SPECIES	Howth.	Ballyedmonduff.	Caldbeck Castle.	Killiney	Kill-o'-the Grange	Palmerston.	Owendoher.	Edmondstown.	Larch Hill.	Corrigeen (Glenasmole).	Glendoo Road (Glenasmole).	Bohernabrena.	Lambay.
LAMELLIBRANCHIATA.													
Artemis exoleta, *Linn.*,									×		×		
A. lincta, . .		×											
A. ? . . .							×						
Astarte borealis, *Chem.*, .	×				×	×	×	×	×		×		
A. compressa, *Mont.* .		×				×		×	×				×
var. striata, . .				×	×								
A. sulcata, *Da Costa*, .	×	×		×	×	×	×	×	×		×		
var. elliptica, *Brown*,		×		×	×								
Cardium echinatum, *Linn.*	×	×	×	×			×	×	?				
C. edule, *Linn.*, . .	×	×		×					×				×
C. norvegicum, *Speng.*, .									×		×		
C. tuberculatum, *Linn.*, .									?		×		
C. *sp.* . . .						×							
Corbula gibba, *Olivi*, .				×					×				
Cyprina islandica, *Linn.*,	×	×	×	×	×		×	×	×			×	×
Donax vittatus, *Da Costa*,									×				
Glycimeris (Panopœa) norvegica, *Speng.*									×				

Species.	Howth.	Ballyedmonduff.	Caldbeck Castle.	Killiney.	Kill-o'-the-Grange.	Palmerston.	Owendolier.	Edmondstown.	Larch Hill.	Corrigeen (Glenasmole).	Glendoo Road (Glenasmole).	Bohernabrena.	Laughay.
Leda pernula, *O. F. Muller*,	×			×									
Lima subauriculata, *Linn.*					×								
Lucina borealis, . .				×									
Lutraria elliptica, .		×											
Mactra elliptica, *Brown*,	×												
M. solida, *Linn.*, . .				×								×	
M. stultorum, . .		×	×										
M. subtruncata, *Da Costa*,				×									
M. *sp.*, . . .									×	?			
Mya arenaria, *Linn.*, .									×				
M. truncata, *Linn.*, .	×	?		×	×			×					
Mytilus edulis, *Linn.*, .				×									
M. modiolus, *Linn.*, .				×	×								
M. *sp.*, . . .									×				×
Nucula nucleus, *Linn.*, .									?				
Nucularia (Leda) pernula, *O. F. Müller*.							×	×	×			×	
Ostrea edulis, *Linn.*, .	×			×					?			×	
Pecten maximus, *Linn.*,					×				×				
P. opercularis, *Linn.*, .	×				×	×	×		×		×		
P. varius, *Linn.*, . .	×								×				
P. *sp.*, . . .		?											
Pectunculus glycimeris, *Linn.*					×								
Panopœa norvegica, *Speng.*					×								
Pholas crispata, *Linn.*, .	×	×											
P. *sp.*, . . .												×	
Psammobia, *sp.*, . .					×								
Saxicava rugosa, *Linn.*,								×					
Solen siliqua, *Linn.*, .				×	×			×					
Tapes aureus, *Gmel.*, .					×								
T. virgineus, *Linn.*, .				×									
Tellina balthica, *Linn.*, .				×									
T. solida [balthica], .	×			×	×				×				×
T. *sp.*, . . .												×	
Venus casina, *Linn.*, .		×						×					
V. striata, . .		×	?		×				?			×	
V. striatula, . .												×	
V. verrucosa, *Linn.*, .		×	×										
V. *sp.*, . . .									×				
GASTEROPODA.													
Aporrhais pes-pelicani, *Linn.*									×				
Buccinum undatum, *Linn.*	×			×									

Species.	Howth.	Ballyedmonduff.	Caldbeck Castle.	Killiney.	Kill-o'-the Grange	Palmerston.	Owendoher.	Edmondstown.	Larch Hill.	Corrigeen (Glenasmole).	Glendoo Road (Glenasmole).	Bohernabreena.	Lambay.
Cerithium recticulatum, *Da Costa.*									×				
Chrysodomus (Fusus) contrarius, *Linn.*					×								
Dentalium entalis, *Linn.*,					×	×		×	×				
Fusus antiquus, *Linn.*, .	×												
F. gracilis, *Da Costa*, .	?												
F. ? islandicus, . .	×												
Littorina littorea, *Linn.*,	×								×				
L. obtusata, *Linn*, .	×												
L. rudis, *Maton*, . .						×							
L. *sp*. . . .								×					×
Murex erinaceus, *Linn.*,				×					×				
Nassa incrassata, *Muller*,						×			×				
N. reticulata, *Linn.*, .									×				
N. *sp*, . . .				×									
Natica Alderi, *Forbes*, .					×								
N. catena, *Da Costa*, .									×				
Patella vulgata, *Linn.*, .	×												
Pleurotoma costata, *Donovan.*									×				
P. rufa, , . .					×								
P. turricula, *Brocchi*, .	×						×		×				×
Purpura lapillus, *Linn.*, .					×				×				
Trochus cinerarius, *Linn.*									×				
T. magus, *Linn.*, . .									×				
Trophon clathratus, *Linn.*									×				
T. Bamffius, *Donovan*, .						×			×				
T. muricatus, . .		×											
Turritella communis, .		×											
T. terebra, *Linn.*, .	×			×	×	×	×	×	×	×		×		×
ANNELIDA.													
Serpula, *sp.*, . .		×	×					×					
CIRRIPEDIA.													
Balanus balanoides, .		×											
B. Hameri, *Ascanius*, .					×			×					
B. tulipa-alba, . .				×									
B. porcatus, *Da Costa*, .									×				
B. *sp*, . . .						×			×			×	×

Lias Fossils obtained from Kill-o'-the-Grange Boulder-clay (Sollas and Praeger).

UPPER LIAS,	Harpoceras bifrons, *Brug.*	LOWER LIAS,	Cardinia Listeri, *Stritch.*
MIDDLE „	Lytoceras fimbriatum, *Sow.*	„ „	Gryphœa incurva, *Sow.*
„ „	Belemnites breviformis, *Volts.*	„ „	Lima gigantea, *Sow.*
LOWER LIAS,	Œgoceras Portlockii, *Wrighti.*	„ „	Schlotheimia angulata, *Schloth.*

Geological Survey, Dublin.

WILD BIRD PROTECTION IN CO. DUBLIN.

BY ALEXANDER WILLIAMS, R.H.A.

MUCH might be written concerning the good effects that have resulted from recent legislation passed for the preservation of our Irish birds. It is not so very many years since the poulterers' shops in the City of Dublin often contained in the last week of April numbers of Golden Plover in the handsome black, white and yellow full summer plumage, together with specimens of the fine White-fronted Goose, a sight that often grieved humane bird lovers. The law which fixed the end of the killing season nearly two months earlier has saved the lives of a great many more of our beautiful shore birds and put a stop at the same time to what was a crying evil, the constant Sunday shooting that was carried on at Clontarf, Dollymount, Sutton, Baldoyle and different parts of the bay of Dublin.

Owing to this protection one species, the Herring Gull, has increased enormously in numbers, and has become remarkably tame, especially along the course of the Liffey. Their great depot is in the vicinity of the South Wall beyond the Pigeon House Fort, where the Rathmines sewage is discharged at ebbing tide into the Liffey; here they gather in great flocks. In the Custom House Docks they may be seen in hundreds lined along the ridge tiles of the roofs of the warehouses, on the gunwales of the boats, and the mooring buoys, and following the course of the river up to the Phœnix Park. Frequently they congregate on the roofs of the houses about Ormond-quay, and a very favourite spot is the top of the Presbyterian church, where they select the points of the stone pinnacles of the building. They may often be noticed now frequenting roofs of public buildings and private houses some distance from the river, and also ploughed fields and meadows in the suburbs, where they must be most useful to the farmer in clearing the land of insect pests.

The Green Plover, "Peewit" or "Lapwing" are rigidly preserved on the Golf Links of Portmarnock, nesting there in great numbers, and they are, I might say, absurdly tame for birds which at other times are so very difficult of approach.

But perhaps the most striking instance of the direct effect of protection is afforded by a visit to the nesting place of the Common and Arctic Terns at Malahide Island. A long strip of sandbank runs parallel to the Golf Links shore, from which it is separated at high tides. This bank is said to have been first formed by drifting sand collecting round a seaman's straw mattrass which floated on to the shore. It is now some hundreds of yards long, partly covered with grass, and at the sea end numbers of sandy hillocks have been formed, and bear a covering of bent grass and weeds. A few years ago my brother the late Edward Williams found a couple of pairs of the Common Tern nesting here, and latterly both species have bred here and on one of the islands at Skerries, County Dublin. But the thanks of everyone interested in bird life are due to the Irish Society for the Protection of Birds, who some time ago appointed a watcher whose duty it is to see that visitors do not molest the birds or take their eggs. It gave myself and my brother, W. J. Williams, the keenest pleasure to pay a visit to this ideal spot on the 7th of July last year, a beautifully fine day. Some egg-collecting boys provided with pill boxes had just come over for a raid on the nests and the watcher had been doing his duty, greatly to the disappointment of the young naturalists. As we approached the colony the birds collected in a great white flock and we found it impossible to calculate their numbers. They kept hovering over the bank for a little and then took themselves higher up in the air, crossing and recrossing and keeping up their incessant screaming of *ski-r-r-r*.

We soon found nests in plenty scattered about where the vegetation was thin and small patches of sand showing, and we found them often placed close to a Sea Holly or other fairly large plant. Some were on the sandy slopes among the bent grass, and as we walked toward the widest part of the breeding ground, which is here about 40 yards across, the number increased until we counted nine nests in sight of where we stood. There was great variety in the colouring of the eggs; some had a pale green ground, whilst in others the tone was brownish-olive, and one beautiful clutch of three eggs had a strong greenish colour with only a few markings at the small end and a closely dotted ring of very dark spots and blotches

at the other. Some were remarkably dark and rich in both ground colour and markings.

We picked up three dead birds, one young Arctic and two young Common Terns. One appeared to have been killed by a peck on the side of its head.

It was very pleasant to notice the confidence with which the birds as we passed hovered in dozens with outstretched white wings and settled down again on their nests about twenty-five yards from us. One curious habit we remarked, all would suddenly rise off the ground, flying in a long white wave, and would cease to make any noise for a few moments, then the screaming recommenced. This movement was repeated several times. After passing through the nests we turned out on the bare sandy shore and close to high water mark a colony of the Lesser Terns had placed their nests on the bare sand without concealment of any kind whatever, depending altogether on the protective colouring of their eggs with their surroundings, to avoid discovery. Here we examined about twenty nests, but those beautiful little birds nested in other different parts of the sandbank, for on walking across a low-lying part of the shore to where an unusually high tide had left a fringe of *débris*, we found about a dozen eggs of the Lesser and Common Terns, where they had been washed up by the tide and driven into a bend of the shore. In another place, half covered in sand, we got some more as well as eggs of the Ringed Plover. Probably the recent very heavy rain had the effect in conjunction with an unusually high tide of raising the water over some low-lying sandbanks where the birds had incautiously placed their nests. We were unable to distinguish between the Common and Arctic Terns owing to the birds keeping so much between us and the sun. I roughly jotted down the contents of each nest that came under observation, but I am sure we missed many.

Nests of the Common and Arctic Terns,	211
Number of eggs examined,	338
Young birds observed,	28
Dead birds found,	3

Some of the nests contained one egg and one young bird, and in some cases we found young birds that had just left the egg, their down matted together with red yolk, and we were puzzled as to how the tiny creatures got rid of this sticky matter.

Several pairs of young we found near empty nests, concealed and motionless under the leaves of weeds; these were sturdy little fellows, well covered in thick down, and just started on the first survey of their surroundings. Thirty-one of the nests contained three eggs each, and four nests had four eggs in each. It is to be hoped that the success attending the efforts of the Irish Society for the Protection of Birds may be imitated in other parts of the country, and that it may be the means of inducing the Roseate Tern, which formerly bred abundantly at Rockabill and which still yearly breeds on the Welsh coast, to become once more a summer resident.

Dublin.

REVIEWS.

POPULAR ENTOMOLOGY.

The Insect Book. By W. Percival Westell, F.L.S. Illustrated with Photographs by R. P. Misson. London: John Lane, 1908. Price 3s. net.

This little volume is the latest addition to the "County Handbook" series, and the first in the series treating of insect life. In the preface the author points out that "The Insect Book" is intended for the use of beginners in the study of entomology, and to encourage "those willing to learn something of the ways of the insect creation." The author adopts the faunistic method in the arrangement of his subject, a method which has some advantages in a popular work of this kind, as its readers may be supposed to have no knowledge of the classification of insects. After an introductory chapter on the wonderful variety of structure and habits of insects, the author describes some of the common and more interesting forms of insect life of the garden, the water-side, the woodland, &c., and a chapter on household insects concludes the book.

In the chapter on garden insects some well-known, useful, and injurious insects are described. A reference on page 37 to the Great Water-beetle, *Dytiscus marginalis*, and its allies, is likely to convey a wrong impression, as the reader is warned against the chance of confusing the "two kinds of these beetles to be found by the water side." We presume the second kind, referred to as the Great Brown Water Beetle, is the common *Colymbetes fuscus*. The chapter on household insects is mostly given up to an account of the Common House-fly. "The Insect Book" may be recommended to beginners in the nature-study of insect life, as it contains a large amount of trustworthy information conveyed in a pleasant manner. The book is well printed, and the great majority of the insects dealt with are excellently illustrated.

J. N. H.

AQUATIC BIRDS IN CAPTIVITY.

Ornamental Water-fowl: A Practical Manual of the Acclimatization of Swimming Birds. By Hon. ROSE HUBBARD. Second edition. Walsall and London: Simpkin, Marshall, Hamilton, Kent & Co. 1907. Pp. 248 + xvi.

This manual is written for amateurs, and appeals particularly to those who possess a lake and grounds suitable for the introduction of foreign waterfowl. We are already amply supplied with works on poultry, pigeons and cage birds, and there are also many dealing with ornithology from a purely zoological point of view. Books of the latter kind are mostly expensive, and contain more information than is required by those who simply wish to obtain some knowledge as to the breeding and management of the various kinds of ducks, geese and swans generally kept on ornamental lakes. That a work of this nature really fulfils a want is evidenced by the fact that it now appears in its second edition. And we may say that the task of writing it has been thoroughly well done by its authoress. Not only are the descriptions of the couple of hundred species couched in plain language which can be easily understood by the non-scientific reader, there are chapters on the diseases and accidents liable to occur among birds, and on pinioning waterfowl while a glossary of terms and a good index concludes this useful little book.

R. F. S.

NOTES.

BOTANY.

Irish Plants.

To the *Journal of Botany* for May, Rev. C. H. Waddell contributes notes on Rubi, among which are a few collected in Limerick and Down; he also contributes a note on *Orthotrichum diaphanum*, Schrad., var. *aquaticum* Davies, which he has found at Magheralin, Co. Down.

Peziza Adæ in Co. Antrim.

On March 12 several specimens of this pretty fungus were observed growing at Ballyclare, within a few feet of the place where it was found more than two years ago (vide *Irish Naturalist*, vol. xiv., pp. 185–7). The conditions of growth seem to indicate, as on the previous occasion, that the presence of lime, organic matter, and excess of moisture are exceedingly favourable to the development of this fungus. A rather interesting point is the abnormally large size of most of the Irish specimens of *P. Adæ*. The normal maximum of British specimens is 2·5 cm., but several of the Co. Antrim specimens found in 1905 were over 6 cm. in diameter, while the largest of those found lately measured 7·5 cm.

JAMES STRACHAN,

Ballyclare, Co. Antrim.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include Rabbits from Miss Dorothy Townsend and Mrs. Newman, some River Lampreys from Mr. W. W. Despard, a Sparrow Hawk from Mr. E. Galway, a pair of Grey-breasted Parakeets from Mr. A. E. Goodbody, a pair of Swans from Mrs. Bolton, and a pair of Peruvian Guinea-pigs from Mrs. Brock. Three Black-footed Penguins, two Naked-eyed Pigeons, and ten Saffron Finches have been purchased. Two Golden Agoutis have been born, and a clutch of Chinese Goose-eggs have been hatched in the Gardens. The new Seal pond, in which Penguins and Seals may now be seen disporting themselves, is a great addition to the Gardens. A couple of young Sea Lions have been obtained and placed in one of the divisions of the pond.

DUBLIN MICROSCOPICAL CLUB.

APRIL 8.—The Club met at Leinster House, Prof. G. H. CARPENTER, President, in the Chair. He showed specimens of a new genus and species of Collembola, brought from South Victoria Land by the National Antarctic ("Discovery") Expedition. The insect will be shortly described and figured in the volumes of "Results" in course of publication by the British Museum.

J. N. HALBERT exhibited a Stone-fly *Capnia atra*, Morton (previously unrecorded from Ireland), both sexes of which were found under stones on the shore of the Devil's Punch-bowl, on Mangerton Mountain, in June, 1905. The male of this species first came under Mr. Morton's notice from Finnish Lapland, when he pointed out its specific distinctness from the commoner *Capnia nigra*, Pictét (*Trans. Entom. Soc. London*, 1896). The species has since been found in various localities in Northern Britain.

Dr. R. F. SCHARFF exhibited a specimen of the Woodlouse *Armadillidium pictum*, taken by Mr. H. N. Foster in a greenhouse at Holywood, Co. Down. He demonstrated the salient features of distinction in the antennæ and tail-appendages between it and *Armadillidium pulchellum*, which was already known as an Irish species. He also showed specimens of the latter collected by Mr. J. N. Halbert at Carrickmines in Co. Dublin, being the first record for the east of Ireland.

R. SOUTHERN, B.Sc., showed specimens of the Nematode worm, *Tylencholaimus minimus*, De Man, belonging to the family Anguillulidæ These worms, in company with two other species, were found under the epidermis of roots of Sweet Pea from Donnybrook. Some of the plants were diseased, whilst others, which also harboured these worms, were apparently uninjured; so that the question as to the disease being caused by these nematodes is still unanswered. They were hardly present in sufficient numbers to have a directly injurious effect. Possibly the

apertures which they make in the epidermis of the root facilitate the entrance of injurious bacteria. This species has only hitherto been recorded from Holland, and, as in the present instance, only females were found. It is figured and described by De Man in his monograph on "Die freilebenden Nematoden der Nied. Fauna," 1884, p. 134.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 18.—JOSEPH WRIGHT, F.G.S., read a paper on "Foraminifera from the Gravel Pit, Longhurst, Dunmurry, and other localities in the vicinity of Belfast, with a reference to Malone Sands." He said, in April, 1906, he received from Mr. John Brown, F.R.S., a ball of rolled clay from Longhurst. The ball weighed seven and a half pounds, and yielded a large quantity of foraminifera—about 1,500 specimens. Three other balls were examined later, and they also contained specimens in abundance. They were also found *in situ* but in lesser numbers in the finer sands, and in a bed of clay at the bottom of the pit they occurred in great profusion. Subsequently he visited the gravel pits at Armagh, Lisburn, and Dundonald, and the fine sands at all those places yielded foraminifera. At the last locality they were very abundant in a bed of clay, 1,000 specimens being obtained from a sample of one and a half pounds weight. In the Malone sands also specimens were found. As some of the fine sands in the other pits closely resembled Malone sands, and as they all contained foraminifera, Mr. Wright thought it probable that these, as well as the eskers, represented a great series of gravels, sands, and clays deposited off the coast when the land was at a lower level, the eskers being tilted up by currents running in opposite directions; and to the same cause, he said, they might attribute the formation of sandbanks now lying off the coast, such as the Nymph Bank off Dublin, the Bray Bank, the Arklow Bank, and others.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 17.—The President (Robert Patterson, F.L.S.) in the chair. Mrs. HOBSON submitted her report as delegate to the Corresponding Societies of the British Association, Leicester Meeting, 1907. She described in detail the various meetings and arrangements made, in a racy and interesting manner, and by means of lantern slides the scenery and antiquities of Leicester were brought vividly before the meeting. The President, R. Welch, William Gray, and C. M. Cunningham, spoke favourably of the report at the close. At the Science Gossip half-hour which preceded the paper, R. Welch exhibited a new Irish land shell, *Vertigo moulinsiana*, discovered in Co. Carlow by Mr. R. A. Phillips.

MARCH 18.—ARCHÆOLOGICAL SECTION.—The President in the chair. A paper on "Notes on Early Christian Ornament in Italian Churches" was read by Miss LAMB, illustrated by lantern slides. The paper was spoken to by Mrs. Hobson, E. J. M'Kean, R. May, and T. Dewhurst.

MARCH 25.—GEOLOGICAL SECTION.—W. J. C. Tomlinson in the chair. The first paper was by ROBERT BELL, on the newly-recognised mineral Beekite. It generally occurs on fossil sponges, corals, and shells mainly from Cretaceous rocks. In chemical constitution it is a form of chalcedony. Our local Cretaceous deposits have now been proved to yield it. Colin Glen, the slopes of the Black Mountain, and Hillsport have all yielded excellent specimens of the mineral from both the Greensand and Chalk rocks. The second paper was by JAMES STRACHAN on the "Origin and Formation of Zeolites in Basalt." It is to be published in full in the Club's *Proceedings*. An animated discussion ensued regarding the theories advanced, in which the chairman and T. Dewhurst, H. L. Orr and W. Gray took part.

APRIL 8.—The President (Robert Patterson, F.L.S.) in the chair. The Curator of the City Museum, ARTHUR DEANE, read a paper on "The Dispersal of Seeds." The mechanism for the dispersal of seeds was spoken to under four heads—1, ejection by the plant; 2, transport by air; 3, transport by water; 4, transport by animals. Mr. Deane referred in detail to these four divisions, and gave a most interesting and instructive account of the ways by which plants ensure the dispersal of their seeds. The paper was illustrated by diagrams and a large number of specimens, and it was discussed by the President, F. Balfour Browne, M.A.; W. J. C. Tomlinson, William Gray, M.R.I.A., and Dr. Clarke Robinson.

APRIL 14.—ANNUAL MEETING.—The forty-fifth annual meeting was held, the President (Robert Patterson, F.L.S.) in the chair. W. H. GALLWAY, Hon. Secretary, read the annual report, which stated that during the year fifty-one new members were elected, of whom forty-six qualified by paying their fees. There were seven deaths and eighteen resignations. On 1st April, 1907, the membership was 418; on the corresponding date this year it is 439, leaving a net increase of 21 new members. Two new sections—the archæological and zoological—were formed at the beginning of the present session, and, with those of the botanical and geological, have proved successful, the papers read at the meetings being valuable contributions to science, and many of them the result of original research. Eight successful excursions were carried out to different places of interest, the average number present being 50, and the largest attendance at any one excursion being 110.

The Committee desire to thank the Erratic Blocks Committee of the British Association, through Professor Percy F. Kendall, for the grant of £4 for the purchase of maps and memoirs on glaciation. The Treasurer submitted his statement of accounts. Last year the deficit was £3 9*s.* 1*d.* This year shows a balance to the credit of the Club of £16 17*s.* 1*d.*, all accounts having been paid. The Librarian's report and the reports of

the botanical, geological, zoological, and archæological sections were submitted.

The adoption of the several reports was moved by the President, seconded by F. Balfour Browne, supported by William Gray, and passed.

The following were elected officers for the ensuing year:—President, Robert Patterson, F.L.S.; Vice-President, W. H. Gallway; Treasurer, W. H. Phillips; Librarian, J. L. S. Jackson; Hon. Secretaries, R. Welch, Miss Jean Agnew; Committee, N. H. Foster, Robert Bell, N. Carrothers, W. J. Fennell, W. A. Green, H. C. Marshall, H. L. Orr, W. J. C. Tomlinson, F. Balfour-Browne, and Arthur Deane.

N. H. Foster, M.B.O.U., moved to add to Rule 5—"That, in the event of a vacancy occurring among the officers, the Committee may co-opt a member of the Club to fill the vacancy." The motion was carried.

There were three competitors for the prizes of £1 each offered by the Club—Mrs. Green, collection of Liassic fossils; W. A. Green, collection of Carboniferous fossils; and George Donaldson, collection of marine shells. These collections were of great merit, and were neatly mounted and named. James Strachan carried off the prize of one guinea offered by William Swanston, F.G.S., for six photographs from nature illustrative of geology, contributed to the Club's album, to which they will become a valuable addition. The judges—Robert Patterson, N. H. Foster, and W. J. C. Tomlinson—had no hesitation in awarding the prizes to the above members.

CORK NATURALISTS' FIELD CLUB.

APRIL 23.—SIXTEENTH ANNUAL MEETING.—The President (T. Farrington, M.A.) in the chair. The reports of the Hon. Secretary and Hon. Treasurer were read and adopted. The Treasurer's report showed a good balance to the credit of the Club, and the subscriptions well maintained. The Secretary's report was as follows:—The membership of the Club has been well maintained during the past season. Four of our members on leaving Cork resigned, viz., Miss Martin, Mr. and Mrs. Copeman, and Mr. Humphreys, against which we have five new members, making a total of 47 now on the roll. We regret the departure of all the above from our midst, as they always had the best interests of the Club at heart, and were enthusiastic members, Mr. Copeman, in particular, being the founder of the Club over seventeen years ago, and officer for many years. During the summer only two excursions were held, one to Brown Island and the other to Carrigtwohill and district. This is accounted for by the fact that the Irish Field Club Union made Cork its headquarters for the Fifth Triennial Conference last summer, which took place on July 11th and lasted till the 17th. We are indebted to Professor Hartog, M.A., for his interesting and instructive lecture delivered last month, on "The Work of the

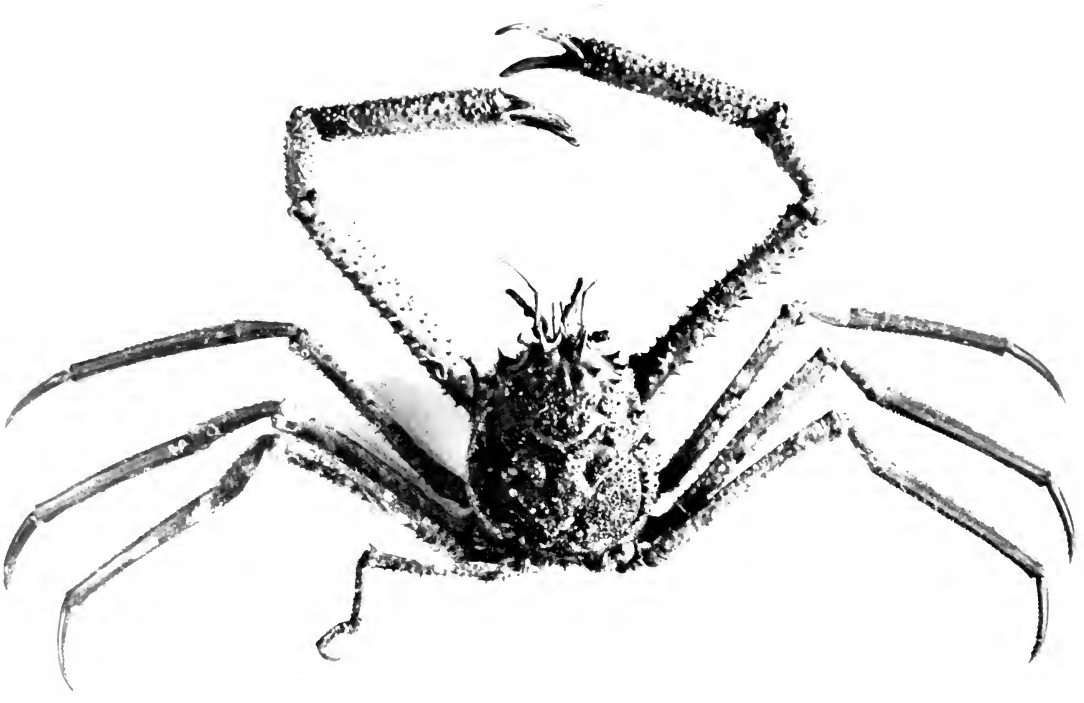
Naturalists' Field Club." Professor Hartog gave a detailed account of the work of the Club, its aims, excursions, &c., illustrated by limelight views. The outgoing officers were re-elected for the next session.

At the conclusion of the general meeting a lecture was delivered by F. R. ROHU, entitled, "Thirteen Weeks of Natural Study." The lecturer dealt with the botany, entomology, and ornithology of the various weeks from April to June, all the subjects being chosen with a view to their special seasons. All the illustrations were taken from life.

NEWS GLEANINGS.

Proposed Survey of Clare Island.

A meeting, convened by circular, was held in Dr. Scharff's room in the Dublin Museum, on the afternoon of April 23, to consider the question of instituting a complete natural history survey of one of the islands off the west coast of Ireland. Dr. Scharff was moved into the chair. Also present:—R. M. Barrington, Major Barrett-Hamilton, Prof. Carpenter, Prof. Cole, Nathaniel Colgan, G. P. Farran, J. de W. Hinch, S. W. Kemp, Rev. Canon Lett, C. B. Moffat, A. R. Nichols, R. Lloyd Praeger. Letters regretting inability to attend, or making suggestions, were read from J. Adams, F. Balfour Browne, D. C. Campbell, H. K. G. Cuthbert, N. H. Foster, Charles Green, P. H. Grierson, J. N. Halbert, Prof. H. Lyster Jameson, Rev. W. F. Johnson, J. R. Kilroe, D. M'Ardle, Robert Patterson, G. H. Pethybridge, R. A. Phillips, R. J. Ussher, Rev. C. H. Waddell, R. Warren. Dr. Scharff, in an opening statement, emphasized the importance of the careful study of island floras and faunas, and cited the case of the recent survey of Lambay, concerning which he had received favourable comments from both European and American naturalists. He called on R. Lloyd Praeger, who reviewed the various islands, from Tory to the Blaskets, which invited exploration, both from the point of scientific desirability and the practical one of expenditure of time and money in travelling and sustenance. An interesting discussion ensued, in the course of which Mr. Barrington strongly urged the claims of the Blaskets. Eventually Clare Island was selected, on the motion of Canon Lett, seconded by C. B. Moffat. The following were appointed an executive committee to approach the British Association with a view of obtaining a grant of money, and to carry out the necessary arrangements for the work:—R. M. Barrington, Nathaniel Colgan, Prof. Cole, Rev. Canon Lett, Dr. Scharff, and R. Lloyd Praeger (Secretary). It was intimated that on account of the forthcoming meeting of the British Association in Dublin it would not be possible to get much work done on the island this year, but that investigations would be vigorously begun next season.



T. Price, photo.

Paromola Cuvieri,
from Courtmacsherry, Co. Cork.

To face page 129.]

THE OCCURRENCE OF PAROMOLA CUVIERI IN IRISH WATERS.

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

[PLATE 5.]

ON the 17th of February last a fine specimen of the crab *Paromola Cuvieri* (Risso), was captured alive by Mr. J. O'Driscoll in a small shore pool, about two feet in depth, near the mouth of Courtmacsherry Harbour, on the Cork coast. As it was quite unknown to the captor, he promptly forwarded the specimen to the National Museum, Dublin, where it was received in a perfectly fresh condition.

The capture of this rare species on our coast proves to be a most interesting occurrence, for although it has recently been found in deep water off the Irish coast, and a Scotch specimen, of which particulars will be given, is preserved in the British Museum, yet the species seems to be unrecorded from the British and Irish marine area.

The Cork specimen is a fine male of most striking appearance, due largely to the enormous size of the first pair of legs (chelipeds), the spiny and brightly coloured body, and in part also to the presence of numerous marine organisms which have taken up permanent quarters on the general surface of the crab. In the fresh condition the colour of the carapace was a yellowish brown, with irregular reddish markings. The four last pairs of legs, especially the flattened terminal segments, were much suffused with a fine dark red. Even in the dried condition, in which the crab is preserved, sufficient of the original colouring remains to give a good idea of the appearance of the animal during life. In the natural walking position, with flexed legs, as shown in the plate, the creature spans some 29 inches. The following measurements may be useful for comparison with future captures of this species :—

Length of carapace (including rostral spine),	$6\frac{1}{2}$	inches.
Breadth of carapace, - - -	$5\frac{1}{2}$	,,
Length of abdomen, - - -	6	,,
Length of right cheliped, about, -	22	,,
Average length of 2nd, 3rd, and 4th legs,	17	,,
Length of fifth pair, - - -	9	,,

That the species reaches a greater size than is here indicated is evident, as, according to Professor Carus, the Mediterranean specimens range to 22 centimètres, or about 8½ inches in length.[1] In spite of their size, the limbs of this crab are comparatively fragile, breaking off quite readily between the second and third segments.

As already mentioned, the Cork specimen is decorated with the various external "messmates" so commonly found on the larger kinds of crabs. It is abundantly studded with young individuals of the bivalve shell Anomia, especially amongst the spines on the sides of the carapace, while on the legs are numbers of worm tubes (Serpula) in various stages of growth; both of these can be seen distinctly in the plate. Less obvious tenants are various kinds of Polyzoa, some of which are very minute. Mr. A. R. Nichols has examined these, and finds the following species represented:—*Membranipora catenularia*, *M. Flemingii*, *Bicellaria ciliata*, *Microporella ciliata*, and *Mucronella Peachii*, all more or less common forms. As well as these there are several colonies of a pretty Hydroid, which Miss Stephens has identified as *Sertularella Gayi* (Lamouroux), a species found in fairly deep water off the Irish coast.

So far as I can ascertain there are no published records of the occurrence of *Paromola Cuvieri* in British waters. That it is an indigenous species in the south-western part of the Irish marine area has been recently proved by Mr. S. W. Kemp and his colleagues of the Fisheries Branch of the Department of Agriculture,[2] when they had the good fortune to capture specimens during dredging operations last September at a depth of from 627 to 728 fathoms. The actual locality is about 68 miles off the south-west coast (Lat. N., 50° 42′: Long. W., 11° 18′), and the crabs were found associated with the Tuft-coral (*Lophohelia prolifera*), a species indigenous to the deep waters of north-western Europe. This interesting discovery furnishes a record in the bathymetric distribution of *Paromola Cuvieri*, as the lowest previously

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[1] Carus, *Prodr. Fauna Medit.*, 1, p. 499.

[2] Mr. E. W. L. Holt has kindly given me permission to make use of the "Fisheries" observations of this species.

recorded[1] depth appears to be that observed during the voyage of the "Talisman" (1883), when it was captured in 640 métres (about 350 fathoms).

The "Fisheries" specimens are much smaller than the Cork individual; the spines and hairs on the carapace are comparatively more developed and closer together, causing the crabs to have a more spiny appearance.

Dr. W. T. Calman has kindly supplied some particulars of a Scotch specimen which has been preserved for many years in the British Museum collection. The only definite information to be obtained concerning this specimen is a scrap of paper torn from a letter, unsigned and undated, stating that, "The crab shell was found on the shore of Ensay, a farm on the west coast of Mull, belonging to Lord Compton." It consists of a detached carapace, six inches in length, and the two chelipeds. From the size of the latter Dr. Calman says it is no doubt a male. Possibly this occurrence has been regarded as somewhat insufficient for definitely including the species in the Scotch fauna. In view of the recent captures, however, it is highly probable that the crab will eventually be found in deep water off the western coast of Scotland.

The family Homolidæ contains comparatively few species, two forms only occurring in European seas; these are, *Homola barbata* (Fabr.), and *Paromola Cuvieri* (Risso).[2] The first is the commoner form, occurring at both sides of the North Atlantic, the Azores, and in the Mediterranean, often at considerable depths. *Paromola Cuvieri* has been most frequently met with in the western parts of the Mediterranean, where it has been recorded from various places off the coasts of France, Italy and Sicily, also, according to Lucas, on the North African coast. "Cette belle et rare espèce a été prise une seule fois par les pêcheurs dans la rade d'Alger, et m'a été donnée

[1] A. M. Edwards and Bouvier, Travailleur et Talisman, Crust. Decap., pt. 1, p. 10.

[2] Previous to 1891 this species was included in the genus Homola. In that year Wood Mason proposed and defined the genus *Paromola* for its reception (*Ann. Mag. Nat. Hist.*, Ser. 6, vii., p. 267). In a recent monograph, Milne-Edwards and Bouvier discuss the generic characters and suggest others. (Travailleur et Talisman, Crust. Decap.).

The synonymy is briefly as follows:—*Hippocarcinus hispidus*, Aldrov. *Dorippe Cuvieri*, Risso. *Homola Cuvieri*, Risso (et auct.). *Paromola Cuvieri*, Wood Mason.

par M. Deshayes. Environs du Cap Matifou, pendant l'été."[1] In the Eastern Mediterranean it is recorded from Morea; and, according to Heller, it is unknown in the Adriatic, a shallower and more recent sea.

It was dredged during the "Talisman" voyage (1883) to the South of Cape Bojador (Lat. N., 25° 39′, Long. W., 18° 18′), off the North-West African coast, and it has also been found off the Portuguese littoral.

As may be seen from this, all the previous captures of *Paromola Cuvieri* have been either in the Mediterranean or the adjacent ports of the North Atlantic. So that its known range at present is confined to the Mediterranean, Lusitanian and Celtic marine provinces, as these are defined by Dr. Heller.[2]

The occurrence of an isolated specimen of this species in a shore pool is perhaps sufficiently explained by the assumption that it was a chance wanderer from deep water. It is just possible, however, that the specimen may have been captured by a 'trawler' while dredging in fairly deep water off the south-west coast, and was afterwards returned to the sea at some point nearer to land. The comparatively perfect condition of the Cork specimen is, however, rather against the latter explanation.

With regard to the habits of the *P. Cuvieri*, little information is available. The highest definite range mentioned[3] for the species is 10 mètres, but its occurrence at this slight depth is possibly as exceptional as in shore pools. In the Gulf of Lyons M. Paul Gourret found[4] it on gravel and mud at a depth ranging from 100 to 200 mètres, while, as already mentioned, the "Talisman" dredged it at 640 mètres on a bottom of sand, mud, corals, and shells. Finally, the discovery during the Irish Fisheries investigations of its association with the deep-water coral Lophohelia, at from 627 to 728 fathoms, indicates the nature of its habitat in British and Irish waters.

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[1] Lucas, Exploration scientifique de l'Algérie, Crustacés, 1849.

[2] Heller, Crust. Südl. Europe, p. 311.

[3] Doflein, Deutsche Tiefsee-Expedition, Valdivia, 1898, 1899, p. 16.

[4] Gourret, Rev. Crust. Podoph. Golfe de Marseille. Musée d'Histoire Naturelle de Marseille. Zool., III., 1888.

National Museum, Dublin.

THE NEW FLORA OF BURNT GROUND ON THE HILL OF HOWTH:

A Study of Plant Dispersal.

BY JOHN ADAMS, M.A.

Last July, in company with the students attending the Summer Course in Botany at the Royal College of Science, I went over the burnt ground on Howth summit in order to observe the colonization of a piece of new ground, quite devoid of vegetable life. This was two years after the fire of 1905, which smouldered for nearly a week, and seems to have done its work very thoroughly. The results are, I think, of sufficient interest for publication in the columns of the *Irish Naturalist*.

In all 31 species of plants were observed, and of these only two specimens had survived the fire, all the rest having sprung from seeds and spores. The first was a Bracken, which was growing out of the mouth of a Rabbit's burrow. The other was a Whin, which was sprouting from the base of the burnt stem. All the other Whins observed were seedlings.

The following is the complete list of species found :—

Mosses.—*Funaria hygrometrica* in fruit, and another species, apparently a Polytrichum.

Ferns.—*Pteris aquilina* (from the old stem).

Monocotyledons.—*Agrostis alba*, *Aira præcox*, *Anthoxanthum odoratum*, *Dactylis glomerata*, *Deschampsia flexuosa*, *Festuca ovina*, *Holcus lanatus*, *Poa annua*, *Carex pilulifera*.

Dicotyledons.—*Rumex Acetosella*, *Cerastium vulgatum*, *Cotyledon Umbilicus*, *Sedum anglicum*, *Rubus fruticosus*, *Ulex europæus*, *Epilobium montanum*, *E. palustre?*, *Calluna vulgaris*, *Erica cinerea*, *Teucrium Scorodonia*, *Galium saxatile*, *Carduus lanceolatus*, *Hypochæris radicata*, *Senecio Jacobæa*, *S. sylvaticus*, *S. vulgaris*, *Sonchus oleraceus*, *Taraxacum officinale*.

All the species mentioned above grow in the neighbourhood on Howth Head. It is worthy of note that eight species were Grasses, and seven species were Composites, these two families being the most successful in colonizing the earth's surface generally.

The two species of Mosses had their spores carried by wind. Nineteen species of Seed Plants were also, doubtless, distributed in the same way, namely, 8 species of Grasses, 1 species of Carex, 1 species of Rumex, 2 species of Epilobium, and 7 species of Composites.

One species, namely, *Rubus fruticosus*, doubtless had its seeds carried by the agency of birds.

It is somewhat of an enigma how the seeds of the other seven species got there. With the exception of *Ulex europæus* and *Teucrium Scorodonia* they have very small seeds, which might conceivably be carried by wind. But this method of transport could scarcely be applicable in the case of Whin, which has comparatively heavy seeds. Could these by any possibility have survived the fire?

It remains to add that the most abundant species on the area under consideration were *Ulex europæus*, *Erica cinerea*, and *Senecio sylvaticus*.

An interesting reference to a similar subject will be found in Treub's paper.[1]

Three years after the eruption he found six species of Blue-green Algæ, two species of Mosses, eleven species of Ferns, and fifteen species of Seed Plants, four of the last group being Composites. The nearest land in this case was ten miles distant.

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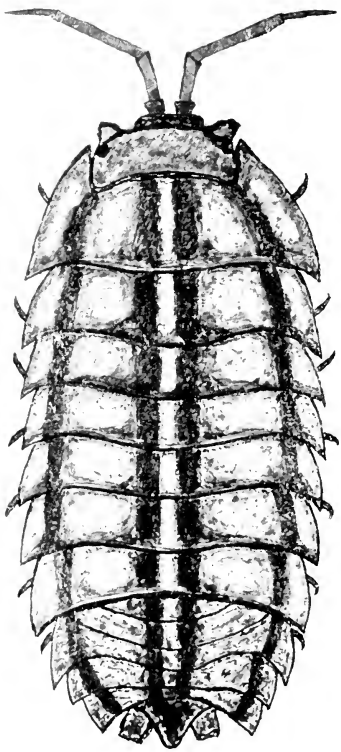
[1] "On the New Flora of Krakatoa." *Ann. and Mag. Nat. Hist.* vol. iii., (6th ser.), 1889.

Royal College of Science, Dublin.



N. H. Foster, del.

Armadillidium pictum.

ARMADILLIDIUM PICTUM, BRANDT.

An Addition to the Britannic Fauna.

BY NEVIN H. FOSTER, M.R.O.U.

[Plate 6.]

On 28th March I collected some woodlice in a greenhouse here,[1] and among them found one specimen of Armadillidium, which, on submitting to Dr. Scharff, he pronounced to be *A. pictum*, Brandt, a species which had not hitherto been recorded from the British Islands. Since the above date I have taken several more of this species, all the specimens having been found among the "drainage crocks" of pots in which plants of various kinds were growing. As this species is new to the Britannic fauna, I have made a drawing from one of the specimens, which shows the main specific characters. (Plate 6.)

The genus Armadillidium comprises some thirty species, of which six can now be included as Britannic, viz., *A. vulgare*—found in England, Scotland, and Ireland; *A. nasatum* and *A. depressum*—recorded from several stations in the south of England; *A. album*—recently found in Devonshire; *A. pulchellum*—discovered in Sligo by Dr. Scharff and by Mr. D. R. Pack-Beresford in Carlow,[2] and since found in England; and *A. pictum*, now recorded, but which was found a few days later in the Botanic Gardens at Glasnevin, Dublin, by Mr. J. N. Halbert.

This species appears to have rather a northern distribution, having been recorded from Sweden, Denmark, Germany, Belgium, and France. Like all the species in this genus, it possesses the power of rolling itself up into a perfect ball, though, so far as my experience goes, it accomplishes this in a much more leisurely fashion than does *A. vulgare*. The dorsal surface is very convex, smooth, and shiny, and is

[1] Not Holywood, *vide* p. 124, *ante*.

[2] *Irish Naturalist*, vol. x., p. 109, vol. xvi, p. 250.

beautifully variegated with yellowish markings on a brownish-black ground. There is considerable variation in the colour-arrangement of the specimens I have taken; some have a broad dark median band running down the dorsal surface, as illustrated in Sars' figure, but the majority have this band divided by a narrow central yellowish line, as shown in the accompanying plate. Most of my specimens measure about 8 mm. in length, but one specimen only attains to 6 mm., and one reaches a length of almost 10 mm. This species may easily be distinguished from *A. vulgare* and *A. pulchellum* by the shape of the last segment of the metasome, which, in the two species above named, is truncated at the tip, while in *A. pictum* it is obtusely pointed. The relative lengths of the joints of the flagellum in the specimens taken here differ from those given for this species by G. O. Sars.[1] In my specimens the proximal joint measures about three-quarters the length of the distal joint, whereas Sars states that the distal joint is more than twice as long as the proximal joint, but Dr. Scharff considers this to be obviously an error.

In the same greenhouses I find that three of our rarer Woodlice—*Trichoniscus roseus*, Koch; *Porcellio dilatatus*, Brandt; and *Metoponorthus pruinosus*, Brandt—are numerous.

I have to tender thanks to Dr. Scharff, who kindly examined my specimens and gave me valuable information in respect to the characteristics and distribution of this species.

Since the above was in type I find that *A. pictum* is exceedingly plentiful in the greenhouses at Belvoir Park, Co. Down; in fact 49 out of every 50 Woodlice I saw there belonged to this species.

[1] *Crustacea of Norway*, vol. ii., p. 191.

Hillsborough, Co. Down.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a female Chimpanzee and a female Wart-hog from Dr. H. C. Tweedy, a Duiker Antelope from Miss F. C. Tate, two Rhesus Monkeys from Mrs. F. D. Nelson, some Lizards from Miss Mooney, a Herring Gull from Dr. G. B. Crawford, two Belgian Hares from Mr. G. P. Beater, and two Canaries from Mrs. L'Estrange.

The new Chimpanzee is a lively young female named "Jane." She may be seen daily with "Barney" and "Jenny" in the Ape House, where the antics of the three prove a great attraction to visitors. The young female Wart-hog is zoologically a most interesting addition to the collection, and so is the Duiker Antelope—also a West African animal—which is remarkably tame and friendly; it is on view in the small paddock next the Superintendent's house. A young female Indian Elephant has arrived in the Gardens from Liverpool; she is now undergoing a course of training to fit her for carrying children. The new Sea Lions are lively, tame, and in excellent health.

DUBLIN NATURALISTS' FIELD CLUB.

MAY 23.—EXCURSION TO THE NORTH BULL.—Over thirty members and visitors met the conductor, Dr. Geo. H. Pethybridge, at the Coastguard Station, at three o'clock. In pursuance of the suggestion recently made by the President (Dr. Pethybridge) that a definite piece of natural history work should be undertaken by the Club, it had been decided to institute a survey of the North Bull, on lines somewhat similar to those on which the recent work on Lambay was carried out, and the excursion was organised in order to give members a preliminary idea of the nature of the locality and of the work it is hoped will be accomplished. From the Coastguard Station the party walked along the seaward face of the Bull until the golf links had been cleared, and then entered the sand-hills, where the rest of the afternoon was spent. The conductor pointed out the various zones of vegetation, which run from S.W. to N.E., *i.e.* parallel to the sea-shore, and members collected a number of the characteristic plants. A general outline of the work to be done was given, after which members returned to town.

The survey will include all the branches of Natural History, and it is particularly desired to enlist the services of members as observers and collectors of material for a detailed survey. Members willing to co-operate in the undertaking, who were unable to be present on this occasion, are earnestly requested to communicate with the Secretaries, and to indicate the directions in which they are willing to assist. A special committee will probably be formed later to direct research and collate results.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 6.—GEOLOGICAL SECTION.—EXCURSION TO IRISH HILL.—A party of ten members travelled by the 1.30 p.m. train to Ballyclare, where they were met by a local member, Mr. James Strachan, under whose direction they visited the bauxite mines. On arrival at Straid Hill House the geologists were welcomed by the Mining Company's manager, Mr. Furniss, who very courteously conducted them over the principal workings. They observed the typical Inter-Basaltic Beds, with minerals, including Lithomarge, Pisolitic Iron Ore, Aluminous Iron Ore, Bauxite, and Lignite. The Lithomarge is over 40 feet thick; and the other beds, varying in thickness from 15 inches to 6 feet, overlie the former. The Pisolitic Iron Ore passes gradually into Aluminous Iron Ore, and the latter gradually into Bauxite, with which is associated the Lignite, both as underlying strata, and included lenticular beds.

After tea at Ballyclare the party returned to town by the 8 o'clock train.

NOTES.

BOTANY.

Galium Cruciata, Scop. in County Down.

Hitherto only two stations, one in Fermanagh and one in Down, have been known in Ireland for *Galium Cruciata*. Five years ago a Scotch botanical visitor to Belfast collected some specimens somewhere between the River Lagan and Belvoir Park, inside the Belfast City boundary, but on the County Down side of the river. He subsequently called on Mr. S. A. Stewart, at the Museum, and showed his find, explaining at the same time as definitely as a stranger could the exact locality where the plant grew. Several local botanists, connected with the Naturalists' Field Club, examined the district at Mr. Stewart's suggestion, but failed to locate the plant. This year, however, it was refound independently by the Rev. W. P. Carmody, on the 9th May. On hearing, through Mr. Praeger, of the discovery, I visited the place on the 26th May indicated by Mr. Carmody, and had no difficulty in finding the station. Apparently only one isolated patch, about a yard in diameter, exists in the locality. It is a fine, healthy clump, and grows on a piece of grassy waste ground by the side of a broad laneway leading from Annadale-avenue to the boggy pastures that abut on the River Lagan between Annadale Brick Works and Belvoir Park. Clearly it has been in existence here undisturbed for a very long time. That it was introduced designedly at any time seems out of the question. The forsaken-looking roadway where it grows was a private one in the

grounds of Annadale Hall, and it was only in recent years, since the opening up of Annadale-avenue, that parties in the vicinity were allowed to use it as a pathway to the Lagan. When the search was made five years ago this lane was not examined, as the station was supposed to be by a path in the fields below. That it remained so long unnoticed in this Annadale station is not surprising, as the place was not one where our local botanists were likely to intrude. Mr. Stewart for example, tells me that he was never along the lane in question. The plant is still plentiful on the Rath at Downpatrick. I saw it in abundance there on the 23rd May. The first record from Downpatrick was in 1744.

W. J. C. TOMLINSON.

Belfast.

ZOOLOGY.

Migrants at Rockabill.

Rockabill Lighthouse sends three Sedge Warblers, three Whitethroats, and one Wheatear (a fine old male), all killed striking May 26. These species are rarely killed so late in the season at light stations indeed, the Wheatear is altogether out of date), and their occurrence on migration at this period would seem to indicate that the remarkable spell of cold weather over Western Europe at the end of April arrested the northward movement of many birds considerably.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

A Disaster on Migration.

On the evening of Sunday, May 10, a remarkable incident occurred. I was walking along a road with some friends, and on reaching a certain avenue half of the party went in while the other half retraced their steps along the same road. About forty yards from where we turned back we found lying on its back in the middle of the road, quite warm but quite dead, a Redwing. Not more than two minutes had elapsed since we had passed that particular spot, and then the Redwing was not there. A telephone wire crossed the road at this place, and it was evident that the bird must have struck the wire in its rapid flight, and been instantaneously killed, because the wire was still vibrating when I looked up. The curious feature of the incident is that the Redwing was flying sufficiently low to strike a telephone wire, while the date is remarkably late, even for the North of Ireland. It may have been injured in some way, and was making its way north in easy stages.

ROBERT PATTERSON.

Glenbank, Holywood, Co. Down.

Fecundity of the Chaffinch.

In the June number of the *Irish Naturalist* last year (vol. xvi., p. 207) Mr. Moffat, quoting on the authority of the Rev. Allan Ellison, who has an extensive acquaintance with the habits of the Chaffinch in Ireland, states that this species is 20 per cent. less prolific in Ireland than in Herefordshire, where clutches of six are by no means uncommon, and clutches under five are unusual. If this is so, and we have no reason to doubt Mr. Ellison's authority, it opens up a very interesting question. The cause of the increased fecundity of the Chaffinch in England, as compared with Ireland, is assigned by Mr. Ellison to its being more persecuted, in which view I scarcely share. I can hardly believe that the Chaffinch is more persecuted in Herefordshire than Yorkshire, and yet the average clutch of eggs in this district cannot be more than 4.75. Six eggs in a nest is an exceptional number in the Bradford district, and this variation in the fertility of this species in the range of its distribution owes its origin probably to other and more deep-seated causes than is accounted for by Mr. Ellison.

E. P. BUTTERFIELD.

Bank, House, Wilsden.

Supposed Occurrence of a Wild Cat in the West of Cork.

A species of Wild Cat is proved by its fossil remains to have inhabited Ireland at no very remote period, as Dr. Scharff has shown in his very careful paper (Proc. R. I. Academy, January, 1906), and he also urged that enquiries should be made as to whether such an animal has been seen or heard of lately (*Irish Naturalist*, 1905, p. 79). Though the specimen referred to below has unfortunately perished, and conclusive proof of its species is therefore unattainable, it may be well to record the remarkable descriptions given me by several members of the Becher family.

In 1881 I made a note of the statement of Mr. E. W. Becher and his sister to the effect that some years previously their elder brother shot a Wild Cat at Liss Ard, The O'Donovan's place.

"It had a broad head, short legs, and a short, bristly tail; the colour "was brindled, with bars of black on a dark grey, with a dash of tan "colour."

I have recently met their elder brother, the Rev. H. Becher, who at my request has written the following account:—

"Castlehaven Rectory, Skibbereen, *May 8th*, 1898.

"I shot what I took to be a Wild Cat at Liss Ard, Skibbereen, during "the winter of 1873-74, probably in January, 1874. The place was high, "rocky ground, on the skirt of a young plantation. I just got a glimpse "of it passing through the gorse and brambles, and thought it might be "a Marten Cat. We were beating for Woodcocks. The retriever fetched "it, and when she came out of the covert the Cat had her by the nose.

"The colour of the Cat was grey, the fore legs bent and strong, the tail "shorter and the head more tiger-like than in the common cat. My "sister had the skin for years.—H. BECHER."

The peculiarity of the tail would seem to agree rather with the existing Wild Cat of Great Britain than with the African Wild Cat, but it is impossible to settle the question unless another specimen should be obtained. Rabbit-trappers frequently kill cats, and this notice might be of use if it led to enquiries being made through such men in the West of Ireland.

R. J. USSHER.

Cappagh, Co. Waterford.

REVIEWS.

INSECT LORE FOR FORESTERS.

Forest Entomology. By A. T. GILLANDERS, F.E.S. Pp. xxii. + 422, with 351 illustrations. Edinburgh and London: William Blackwood & Sons. Price 15*s.* net.

As implied by its title this book appeals both to the student of insects and to the practical forester. The author is woods-manager to the Duke of Northumberland, and he is at the same time an enthusiastic entomologist. He is thus doubly qualified to write on entomology for the benefit of foresters, and his book cannot fail to be of service both to naturalists and to "practical" men.

The volume begins with an introduction on the outward and internal structure, and the transformations of insects and the classification of the Arthropoda. This section is necessarily brief, but it contains many essential points, clearly stated. The use of "segment," both in its correct sense, and also in the sense of a region of the body, *e.g.*, the thorax or abdomen, is however unfortunate, and may mislead the beginner. Following this introductory chapter comes a systematic treatment of the families, genera and species of insects that injure forest trees. The chapters on the orders of true insects are preceded by a good account of the injuries by gall-mites (Eriophyidæ). Then two chapters are devoted to Coleoptera, two to Hymenoptera, one each to Lepidoptera and Diptera, one to Coccidæ, one to Aphidæ, and one to Psyllidæ and "Cicadidæ." It is hard to understand why these three last-named chapters—all dealing with families of the homopterous suborder of the Hemiptera—should have been separately intercolated between the sections on other orders instead of being brought together.

The two chapters on the Coleoptera are particularly good. Diagnoses—taken from Fowler's well-known monograph—of the leading sections, genera and species are given, and the life histories of the more important destructive beetles are described at length. *Rhopalomesites Tardyi* is mentioned as "almost exclusively an Irish species," but incidentally a record of the weevil from the Hastings District is given. Beech only is mentioned as a food plant; in most of its Irish localities it also attacks holly. The second of the two chapters is entirely devoted to the Scolytidæ, which are, naturally, fully dealt with. Not only will the reader find accounts of such well-known bark-beetles as *Hylesinus fraxini* and *Hylurgus piniperda*, but also references and figures of the principal species of Hylastes, Cryphalus, Dryocætes and other genera less familiar to those who are not specialists in the Coleoptera.

One of the chapters on Hymenoptera deals with the Oak-galls—the other with Sawflies; the former is illustrated with a selection of excellent photographs of galls, and in the latter Mr. Gillanders has taken full advantage of the recent work of Konow and Morice. The chapter on Diptera deals for the most part with the gall-midges (Cecidomyidæ). Quotation is made from much recent English and foreign economic work, but there is no reference to Kieffer's important papers. The chapter on the Coccidæ—a family to which the author has paid special attention—has been made exceptionally interesting and valuable with acknowledged help from the writings of Newstead. The account of the Aphidæ on the other hand is less satisfactory; it is surprising to find no reference to the migrations of Chermes between larch and spruce.

Following the systematic portion of the book, come concluding chapters on collecting and preserving insects, on insecticides, and on beneficial insects, together with a useful list of species arranged under their food-plants. The illustrations are mostly good; some of the photographs and many of the drawings are excellent, but there are a considerable number of rather feeble photographs taken from ill-mounted dead specimens. On the whole, however, the book may be warmly welcomed as filling worthily a distinct place in English entomological literature.

G. H. C.

BRITISH BUTTERFLIES.

A Natural History of the British Butterflies: Their worldwide Variation and Geographical Distribution. A Text-book for Students and Collectors. By J. W. TUTT, F.E.S., vol. ii. Pp. x. + 494. Pls. i.-xxviii. London: Elliot Stock, 1907-8. Price 21*s.* net.

This volume follows—after an interval of little more than twelve months—the first instalment of Mr. Tutt's work on the Butterflies, which was reviewed at length in this magazine last year (vol. xvi., pp. 170-4). The general plan of the book is the same as that of the preceding

volume; 80 pages are devoted to essays on points in the general bionomics of the Lepidoptera, while in the remaining 400 odd pages we have a detailed systematic account of seven species—the five British "Hairstreaks," and two of the "Blues."

In the first chapter Mr. Tutt deals with the aestivation and hibernation of the larvæ of butterflies. More than half of the British species pass the winter as caterpillars, and besides these "some, possibly all, of the butterflies known to us to hybernate in the egg stages, really do so as fully-formed larvæ, but within not without, the egg-shell." This statement is justified by a reference to our large "fritillaries." *Argynnis adippe* hibernates in the egg. In *A. aglaia* and *Dryas paphia*, though "the larvæ hatch in July or August, when there is an abundance of food and a high temperature, they positively refuse to feed, and in exactly the same stage as they leave the egg, pass through the winter, awaiting the first warm day of spring before partaking of their first food."

The second chapter is devoted to a discussion of the gregarious habit in butterfly larvæ, interesting series being traced from such caterpillars as live solitary throughout their term—like *Pieris napi* and *Pyrameis cardui*, though those that have an imperfectly developed social life like *Pieris rapæ*, and to the truly gregarious species like *P. brassicæ* and *Aglais urticæ*. The web formed by the common labour of the larvæ in the last-named and in other species is an additional development of the social habit Further in *A. urticæ*, as also in *Vanessa io*, the larvæ scatter to some extent at least as they approach maturity, while in *V. antiopa* and *Eugonia polychloros* they remain gregarious until pupation.

After this valuable discussion, Mr. Tutt gives us nine short chapters on "Family Habits in Butterfly Larvæ," taking a family or section of butterflies, and giving a general account of the larval habits to be noticed in its species. The particular habit usual in a certain family or genus are by no means universally followed by all its species; as might be expected, the field is one in which adaptation is constantly modifying instinct, and "the general impression bristles with exceptions." Among the Satyridæ, however, all the protectively-coloured, grass-feeding larvæ live through the winter; only occasionally does the caterpillar of *Pararge egeria* pupate in autumn.

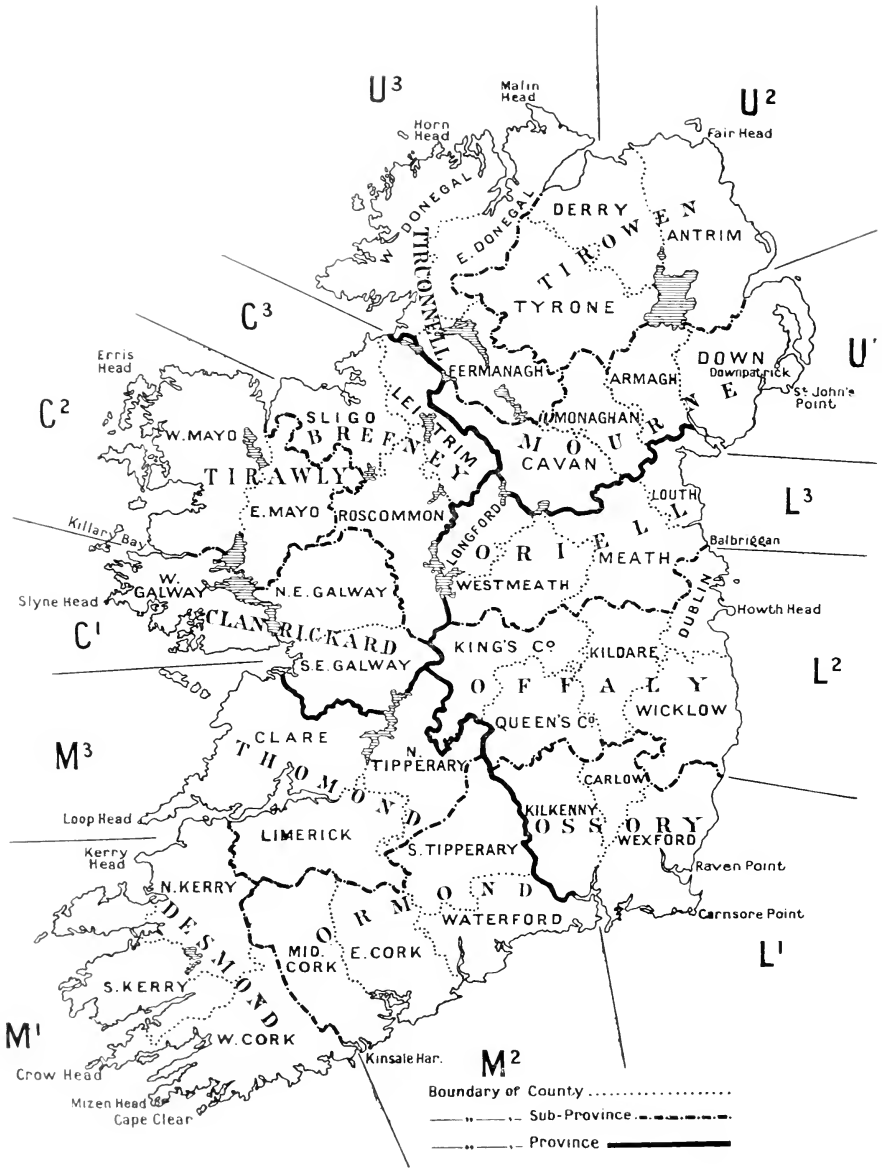
The great part of the volume contains a continuation of Mr. Tutt's survey of the family Lycænidæ, or—as he prefers to call it—Ruralidæ. How full his descriptions are may be gathered from the fact that in 400 pages he deals with only seven species. The general plan is the same as in previous volumes, and the long lists of British, Irish, and Continental localities are given in the confusing and unsystematic manner to which we have before alluded. Thus of our familiar "Green Hairstreak"—*Callophrys rubi*—it is stated "Very strangely localised in England, Ireland, and Scotland, abundant in some counties, apparently quite absent in others." But in order to make out how the distribution is localised, the reader must wade through two pages of closely printed type, with the counties arranged alphabetically, *e.g.*, Carnarvon, Clackmannan, Cork,

Cornwall, Cumberland! This, if a minor blemish, detracts needlessly from the value of Mr. Tutt's marvellously thorough work.

Each of the five British "hairstreaks" is placed by Mr. Tutt in a distinct genus. According to his nomenclature they are to be called *Callophrys rubi*, *Chattendenia w-album*, *Strymon pruni*, *Bithys quercus* and *Ruralis betulæ*. The separation of *rubi*—the only species of the group common in Ireland—from the other Palæarctic species of the old genus Thecla, has been generally accepted for several years past, and is doubtless warranted by the distinctive characters afforded by imago, larva, and egg-shell. The genus of *w-album*—called Edwardsia by Mr. Tutt in the text of the volume, and Chittendenia (Edwardsia being pre-occupied) in a corrigendum at the end—is separated from that of *pruni* on somewhat slight characters, these two species falling into a natural tribe (Strymonidi), while the genera of *quercus* and *betulæ* belong to a third distinct tribe (Ruralidi). It is to be hoped that this last division will be allowed to retain the familiar name, Theclidi, Thecla being apparently the type of *betulæ*, though Mr. Tutt's discussion on the subject must convince any reader how utterly vain and unprofitable is the striving after what is called "priority" in nomenclature, because though the systematists profess to agree about the rules to be observed, they differ altogether as to the practical application of these rules. It is a point of interest to Irish naturalists that while *Callophrys rubi* is widespread in Ireland, *Bithys quercus* and *Thecla betulæ* are confined to the south and west, and the two British Strymonidi are altogether absent. We can support therefore, from a geographical standpoint, Mr. Tutt's grouping of the hair-streak species. The two "blues" included in the volume are *Lampides bœticus*, that widespread migrant species of which stray individuals have occurred from time to time in southern England, and *Celeastrina* (usually called *Cyaniris*) *argiolus*, the "Holly Blue," which has a wide distribution in Ireland.

In the case of every species Mr. Tutt gives, as in the former volume, a full account of the life-history, habits and variation. The larval structure is very fully described, and a large amount of original observation supplements the author's extensive reading, so that nothing like so full an account of the early stages of the species included in the volume has ever been published before. The plates are for the most part well reproduced photographs by Messrs. Clarke, Main and Tonge, showing the butterflies, larvæ, pupæ and eggs; many of these photographs are evidently from live specimens, and reflect great credit on the artists. There are also photomicrographs of the characteristic spines and tubercles of the larval and pupal cuticle. Only in *Cyaniris argiolus* is the genital armature figured; some illustrations of structural details of the imago in all the species would have added greatly to the value of the work—high as that value undoubtedly is. All scientific students of the Lepidoptera will hasten to study Mr. Tutt's volume, and will look forward eagerly to the publication of its successor.

G. H. C.



BIOLOGICAL SUB-PROVINCES OF IRELAND.

To face p. 145.

ON THE DIVISION OF IRELAND INTO BIOLOGICAL SUB-PROVINCES.

BY J. ADAMS, M.A.

(PLATE 7.)

THE first attempt to divide Ireland into botanical districts was made by Babington (1)[1] in 1859. He divided the whole country into twelve districts, which were still further subdivided into thirty-seven counties and vice-counties. The larger counties, Kerry, Cork, Tipperary, Galway, and Mayo, were each divided into two, the remaining counties constituting the other twenty-seven subdivisions. His divisions of Counties Cork and Kerry are quite different from those subsequently adopted by Praeger (18). The twelve districts, moreover, are such that they cannot be grouped into the four provinces of Ireland.

Babington's twelve subdivisions were adopted later by the authors of Cybele Hibernica (4), both in the first and second editions. The Aran Isles are considered as belonging to Co. Clare, and that part of Co. Derry, west of the Foyle, is grouped along with Co. Donegal. In the second edition the boundary line separating North and South Cork is not quite the same as in the first edition.

In 1873 Moore, in his "Synopsis of the Mosses of Ireland" (13), indicated the distribution in the different counties. He also employed the county divisions in his "Report on Irish Hepaticæ" (14) in 1877.

In 1884 M'Nab (12) divided the country into twelve "provinces," which were the same in extent and boundaries as those of Babington, but were called by different names. Babington's term "district" is undoubtedly preferable to that of M'Nab, as "province," to most people's minds, carries the idea of one of the four political divisions of Ireland. M'Nab's system, however, recognised only thirty-six counties and vice-counties, as he did not divide Kerry into two sections.

Groves (5) in 1895 adopted the twelve divisions of Babington in dealing with the distribution of Irish Characeæ.

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[1] The numbers refer to the Bibliography at the end.

In 1896 appeared (18) Praeger's forty divisions into counties and vice-counties, which were subsequently adopted (with one change as regards Co. Donegal), in his "Irish Topographical Botany" (19) in 1901. While the county boundary is rigidly adhered to elsewhere, as regards the liberties of Derry, Drogheda, Waterford, and Limerick, this rule is departed from; and the Aran Isles are considered to belong to Clare.

The twelve divisions of Babington were employed by M'Ardle (11) in 1904 to show the distribution of Irish liverworts. On the other hand, Praeger's divisions are employed to show the distribution in Macvicar's "Census Catalogue of British Hepatics" (10) published in 1905, and also the distribution of Irish Mosses in the Moss Exchange Club's "Census Catalogue of British Mosses" (15), published in 1907.

In a forthcoming paper on Irish Algæ I have employed the four provinces as the units of area.

So far we have been considering the subdivisions of Ireland from a botanical standpoint only.

Scharff in his paper on the Irish Land and Freshwater Mollusca (20) in 1892 is the only zoologist who appears to have employed the twelve districts of Babington to indicate distribution.

Carpenter in his paper (3) on Irish Spiders in 1898 indicates the distribution in each of the four provinces and also in the counties. Johnson and Halbert adopt the same subdivisions in their paper on Irish Beetles in 1902.

Stelfox (21) uses Praeger's divisions for the Land and Freshwater Mollusca of Co. Galway in 1907. Welch also intends to use Praeger's scheme in a forthcoming report on the Irish Land and Freshwater Mollusca.

We have next to consider the distribution of the marine species. Wright (23) in a paper on Irish Actiniidæ in 1859 was the first to propose divisions of the coast line. These were as follows:—(1) From Tory Island or Horn Head to Rathlin Island or Fair Head. (2) Fair Head to Downpatrick. (3) Downpatrick to Carnsore Point. (4) Carnsore Point to Cape Clear. (5) Mizen Head to Kerry Head or Mouth of Shannon. (6) Loop Head to Erris Head. (7) Erris Head to Horn Head. This system of division, it will be observed, omits that part of the coast line extending from Cape Clear to Mizen Head.

Holmes and Batters in their paper (6) on British Marine Algæ, published in 1890, divide the Irish coast line into five districts:—(1) Malin Head to Slyne Head. (2) Slyne Head to Crow Head. (3) Malin Head to Howth. (4) Howth to Raven Point. (5) Crow Head to Raven Point.

The same divisions of the coast line were adopted by the authors of "Irish Phæophyceæ," but the "Irish Corallinaceæ" are grouped according to the counties for the most part.

Nichols, in dealing with the Marine Mollusca of Ireland (16) in 1900, divides the coast line into the following six divisions:—(I.) North-east—From Malin Head to St. John's Point. (II.) East—From St. John's Point to Carnsore Point. (III.) South—From Carnsore Point to Cape Clear. (IV.) South-west—From Cape Clear to Loop Head. (V.) West—From Loop Head to Erris Head. (VI.) North-west—From Erris Head to Malin Head. He adopts the 100 fathoms line as the limit of the shallow-water area. Nichols' six divisions have also been adopted for the distribution of Irish Echinoderms (17) and Cœlenterates (22).

Then, in Batters' Catalogue of the British Marine Algæ (2), published in 1902, the old divisions which were previously employed by him and Holmes are abandoned and the counties used instead.

Finally there are the 21 Fishery Districts into which the coast-line has been divided.

It will be clear from the above statements that there is a very considerable difference of opinion as to the distributional areas into which the country should be divided. Several authorities adopt the four provinces, but the majority seem to incline towards the counties or vice-counties, and the modern tendency seems to be distinctly in favour of Praeger's forty divisions—at any rate for the land and freshwater species.

The thought has often occurred to me that it would be desirable to have a series of sub-provinces, intermediate in size between Praeger's 40 counties and vice-counties on the one hand and the four provinces on the other—a series in fact corresponding in size to the 12 districts of Babington but differing from them in the following particulars:—(*a*) Each sub-province should consist of several of Praeger's 40 counties and

vice-counties. (*b*) The sub-provinces should be such that they can be grouped into the four provinces of Ireland. (*c*) The sub-provinces should, if possible, contain a stretch of coast line so that the same divisions could be available for both land and marine species of both plants and animals, and so that a comparison between the fauna or flora of any two sub-provinces could be instituted on a basis of equality. While it may be possible to indicate the distribution of the higher plants and animals in each of the 40 counties and vice-counties, a long time must elapse before this can be done in regard to the lower groups. Consequently, an intermediate series of sub-provinces would seem a desideratum.

I have, therefore, divided each province into three sub-provinces. As each sub-province should perhaps have a name rather than a number, and as this name should be such that it cannot be confused with any that have been employed hitherto, I have thought it advisable to revive some of the ancient titles used to denote sub-divisions of the country, but without intending to convey the idea that these sub-provinces are identical in outline with those denoted by the ancient name. All that is meant is that the present sub-province contains within it part or the whole of the old territorial division whose name it bears. I have also added a more modern name in brackets for those who prefer it, but as some of these were already used by McNab in a different sense their use in this connection is perhaps to be deprecated. I have also denoted each sub-province by a symbol which is, perhaps, preferable to a number, and occupies no more space. The first letter of each province will be used as a contraction for the name of the province, and the numbers 1 to 3 will be attached to denote the sub-divisions, it being understood that 1 means in all cases the sub-province which extends furthest south, and 3 the sub-province which extends furthest north. Thus if a species occurs in all the sub-provinces its distribution can be briefly indicated as follows :—M123, L123, C123, U123. Its distribution in the provinces can, therefore, be seen at a glance much more easily than would be the case if the sub-provinces were numbered continuously from 1 to 12. The division into sub-provinces and their boundaries are indicated below :—

MUNSTER.

1. Desmond (South-west Munster). West Cork and Kerry. M1.
2. Ormond (South-east Munster). Mid Cork, East Cork, Waterford, South Tipperary. M2.
3. Thomond (North Munster). Limerick, Clare, North Tipperary. M3.

LEINSTER.

1. Ossory (South Leinster). Wexford, Carlow, Kilkenny. L1.
2. Offaly (Mid Leinster). Dublin, Wicklow, Kildare, Queen's County, King's County. L2.
3. Oriell (North Leinster). Louth, Meath, West Meath, Longford. L3.

CONNAUGHT.

1. Clanrickard (South Connaught). Galway. C1.
2. Tirawly (North-west Connaught). Mayo. C2.
3. Brefney (North-east Connaught). Sligo, Leitrim, Roscommon. C 3.

ULSTER.

1. Mourne (South Ulster). Down, Armagh, Monaghan, Cavan. U1.
2. Tirowen (North-east Ulster). Antrim, Derry, Tyrone. U2.
3. Tirconnell (West Ulster). Donegal, Fermanagh. U3.

These sub-provinces do not differ very materially in size. The smallest, Ossory, contains 2,043 sq. miles, and the largest, Ormond, contains 3,316 sq. miles, the average area being 2,710 sq. miles. Each sub-province contains at least one mountain over 2,000 ft. high, with the exception of Oriell, where the highest point, Slieve Ban, is 1,935 ft.

The limits of each province, sub-province, and county or vice-county are shown on the accompanying map (Plate 7). It will be observed that the divisions of the coast line are such that they can easily be grouped into a northern and a southern series of six each by a line extending from near Balbriggan to Killary Bay. They can also be grouped into an eastern and a western series of six each by a line drawn from Lough Foyle to Kinsale Harbour.

It is to be understood that these are only suggestions which may not meet with the approval of other biologists. There is enough diversity at present existing in the various sub-divisions of the country which have been proposed, and my aim has been not to add another group to these, but rather to co-ordinate those already in existence, so that we should have four provinces, twelve sub-provinces, and forty counties and vice-counties, all composed of the same units. But while uniformity is desirable, unanimity amongst biologists is equally so, and I should be glad to know the views of others on this question.

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THE EXTINCTION OF CRYPTOGAMIC PLANTS IN IRELAND.

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AT the Leicester meeting of the British Association the author described certain changes in the cryptogamic flora of Charnwood Forest, Leicestershire, chiefly owing to the effect of smoke. The present communication deals with the causes affecting cryptogams in Ireland. Whilst it forms part of an interim report on the extinction or diminution of cryptogams generally throughout the British Isles, it is hoped that the attention here drawn to the matter in a preliminary way will have the effect of eliciting further facts from those areas in Ireland from which reports are forthcoming, as well as from those districts from which at present no information has been obtained.

CAUSES.—From a study of reports received from all parts of the British Isles, and from personal observation, it appears that extinction or diminution of cryptogams is due principally to the following causes:—

A. *Climate.*

(*a.*) Changes in temperature.
*(*b.*) ,, humidity or dryness (rainfall or drought).
(*c.*) ,, pressure of atmosphere.
(*d.*) ,, movements of atmosphere.

B. *Effects of spread of higher state of civilization or extension of industries, etc.*

*(*a*) Drainage and reclamation of land (agricultural).
*(*b*) Cultivation (agricultural).
*(*c*) Deforestation or planting (agricultural).
*(*d*) Smoke and injurious gases, &c. (generally industrial).
*(*e*) Building operations, and demolition of buildings or mud walls (industrial).
(*f*) Sport, golf links (recreative).
*(*g*) Hawking (commercial).
*(*h*) Collecting (amateur rapacity; scientific indiscrimination).

Minor Causes.—In addition to the foregoing main causes contributing either to the extermination or diminution of these plants, either locally or over extensive areas (noticed under "Effect"), there are a number of minor causes at work that at different localities produce marked effects. These are principally :—

*1. Burning of furze and heather.
2. Road-scraping and cutting down of roadside hedges, scraping out of ditches and the throwing of their contents upon the ditch banks. Paving, &c., of foot paths.
*3. Action of steam rollers, motor cars, &c., on roadside plants.
4. Pollution of waters by chemical and dyeing works.
*5. Formation of railway embankments, causing barriers to the dispersal of spores, &c., or the concentration of plants produced therefrom in unsuitable habitats.
6. Clearing away of stones from fields, especially calcareous pebbles and plants, detrimental to the distribution of Lichens and some Mosses and Hepatics.
*7. Clearing away of undergrowth in woods, &c., depriving mosses of shelter and moisture.
*8. Cutting out of bogs for peat or digging "turves" for fuel.
*9. Lowering of levels of lakes.
10. Fouling of soil by sea-birds.
11. Dressing trees with insecticides and lime-washing; destructive to mosses and lichens.

12. Browsing of sheep in confined sheep-pens.
13. Whaling industry, pollution of stations with offal and refuse from whales.
14. Use of sea-weeds (when not drifted) as manure.
15. Drying beaches, clearing of vegetation for drying of fish.
16. Marine denudation and erosion.
17. Collection of mosses, &c., for table decoration, &c.

Since this investigation has to do with abnormal external conditions, and their effect and extent, it is not concerned with the question of the natural distribution of the plants themselves so much as with the recent changes in the nature of their environment, due to abnormal climatic conditions or causes observed as following in the wake of human industry.

EFFECTS.—Of the above causes (main or minor) only those marked with an asterisk (*) have been reported so far as at work in Ireland.

Since the same causes that affect Cryptogams likewise influence Phanerogams, information as to the latter is here taken into account where it throws light on their extinction. In estimating the effects it is to be noted that in some areas no change has occurred, whilst in others external conditions are even more favourable. The following is a summary of the changes so far noted :—

A. *Climate.*—The climate of Ireland, except where locally forests have been felled, as in Limerick, parts of Clare, Dublin, Wicklow, Down, remains more or less unchanged. Owing to the prevalent S.W. winds, the smoke evil, such as it is, and confined mainly to the east counties, is considerably diminished. Desiccation is noticed on the east coast, from Co. Down to Wexford, in abnormally hot summers.

B. *Spread of Civilization, &c.*

Drainage.—This is responsible for the disappearance of some mosses and hepatics in Dublin, Wicklow, Down, Antrim, and must be operative elsewhere, especially where bogs have been drained.

Cultivation.—In Co. Cork, Co. Clare and Co. Galway, the ploughing, tilling, and artificial manuring of lands has tended to extinguish some species.

Deforestation or Plantation.—See remarks under "Climate." Ireland, which was once extensively wooded, has been largely deforested, but data are lacking as to statistics of plants more than a century ago.

Smoke.—Only in the north, north-east, and east—*e.g.*, near towns of Dublin, Belfast, Cork (in S.), and counties of Dublin and Wicklow especially—has smoke been the cause of extinction.

Building Operations, &c.—In Limerick *Asplenium marinum*, and in Dublin and Wicklow many mosses and hepatics have been exterminated by building or removal of mud walls, and in Sligo by demolishing of thatched roofs.

Hawking.—In Kerry (N. and S.) and Co. Cork *Trichomanes radicans*, and in Co. Down *Osmunda regalis* have been more or less exterminated by professional hawkers.

Collecting.—In S. Kerry various mosses and hepatics; in Cork *Hookeria lætevirens*; in Clare *Adiantum Capillus-veneris*, in Sligo *Osmunda regalis*, in Antrim *Asplenium marinum* and in Co. Down many plants have become extinct or diminished by rapacity of collectors.

Of minor causes several are locally as potent as the main causes in bringing about the disappearance of plants. We may instance the following :—

Burning of furze and heather.—In Galway and in Donegal, the burning and grubbing up of furze or heather is responsible for some changes.

Action of steam-rollers.—In Counties Dublin and Wicklow mosses and hepatics have disappeared from this cause.

Cutting out of bogs for peat.—In Ireland where peat is formed on a large scale, and where coal is not extensively found, peat has been dug for ages, or turf has formed a substitute for it amongst the poorer population. In Limerick extensive areas up to high altitudes have been thus denuded of peat, likewise areas in Monaghan, Fermanagh, Donegal (where both peat and turves are used), Tyrone, Armagh, Co. Down (causing disappearance of *Mylia anomala*), Antrim and Derry. An interesting article on peat moss industries appeared in *Nature*, Sept. 19, 1907, pp. 528–530.

Lowering of level of lakes.—The lowering of the level of Lough Neagh is responsible for the disappearance of *Osmunda*

regalis in Armagh, and in Antrim of *Lastrea Thelypteris*. In County Clare, though some plants have decreased, others have become more abundant, especially cryptogams. No change has been witnessed in Wexford, and in N. E Galway cryptogams are on the increase. Similarly in Waterford, S. Tipperary, King's County, Mayo, and Louth, no changes have been noticed. From North Tipperary, Kilkenny, Carlow, Queen's County, Kildare, Meath, Westmeath, Longford, Roscommon, Leitrim, Cavan, reports are still wanted.

REMEDIES.—As the causes enumerated have brought about marked changes in the extent and gravity of their effect it is essential that remedies be sought. It is suggested that for the different classes of causes (excluding climate, which cannot, except in so far as deforestation is concerned, be controlled), three ways of arresting the evil be considered. At the British Association Meeting at Leicester, 1907, Prof. Conwentz introduced an important discussion on the Preservation of Natural Monuments,[1] describing the action of the Prussian Government in this direction, and indicating how the same measures might be adopted in England.

Agricultural (see list *ante*).—The appointment of an official (government) botanist (with assistants) in each county is advocated, since it would be the means of estimating accurately present or likely cases of extinction, and a report could be kept, owners of lands being requested to preserve plants threatened by drainage, cultivation, deforestation, or planting, burning of furze, cutting of peats, lowering of level of lakes, &c. Not only would such an official (appointed by the State, like the National Museum officials, Geological Surveyors, Board of Agriculture and Fisheries Inspectors, &c.) thus be able (when empowered) to prevent any wide-spread extinction, but he should be trained and able to give advice on questions of forestry and economics, and he could systematically work out the flora of his district, and form or direct local arboreta, &c. Thus, a systematic botanical survey could be carried out. Causes affecting animal life could be dealt with in a similar way by a zoologist, and biology would be greatly advanced with not only scientific but also practical results.

[1] See *Nature*, Sept. 26, 1907, p. 556.

Industrial—Smoke.—Not only for sanitary purposes, and the preservation of buildings, and æsthetic reasons, but for the preservation of vegetation in and near towns, regulations as to the smoke nuisance should be drawn up and enforced. The foundation of an endowed research for the invention of a smoke accumulator or utilizer is necessary.

Building operations, &c.—Some restriction as to the ruthless devastation of districts by building operations should be made and worked on the lines of the National Trust in connection with the preservation of National Monuments (under which demolition of old buildings comes). The effect of minor causes *e.g.*, action of steam rollers, &c., pollution of waters, road scraping, &c., could be minimised by enlisting the sympathies (and securing the action) of urban and town councils who are in turn responsible to the State.

Recreative; Commercial; Injudicious Collecting.—The botanist appointed to watch cases of extinction from agricultural activities would likewise have under his charge cases coming under this heading, either where golf or other forms of sport threatened the welfare of rare plants.

As to the hawker and collector, only summary methods are likely to be efficacious, and for this purpose, a Wild Flowers Protection Act (which should be extended to ferns and other cryptogams) as suggested by Professor Boulger and supported by Lord Avebury, is required. Offenders against this Act would be brought to book also by the official county botanist.

The author is convinced that measures similar to the above are essential, in order to avert a condition of things which must arise in the near future if steps are not taken. Such a climax when found out too late, will readily call forth the necessary remedial action. Only by the accumulation of a vast number of instances of extinction, causes and effects, in which inquiry a biological problem, that of the struggle for existence of plants, is simultaneously being pursued, can we hope for parliamentary action to follow the publication of the full results of this investigation, so that the co-operation of all botanists is asked in the completion of this report. Especial thanks are due to all those who have already assisted the author in this matter, detailed acknowledgment for which will be given elsewhere.

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REVIEWS.

LIVE ZOOLOGY.

Animal Life. By F. W. Gamble, D.Sc., F.R.S. Pp. xviii. + 306. With 63 illustrations. London: Smith, Elder, & Co.; 1908. Price, 6*s*. net.

In his preface, Dr. Gamble describes this volume as "a small work dealing with the adaptations and factors of animal life in a broad and connected manner." His performance abundantly justifies the description; the book is an admirable exposition of "live" natural history. The structure of various animals belonging to all the great phyla is discussed in relation to the functions and environment of the living organism, and the reader cannot fail to obtain a comprehensive view of the history—in its wide sense—of animal races. There are three short chapters dealing respectively with the interest of animal life, the abundance of animals on land and in water, and a brief survey of the animal kingdom, with especial reference to the vertebrata. Then follow a series of chapters devoted to various functions with illustrations drawn from diverse groups of animals; in this manner Movement, Feeding, Breathing, Sensibility, Colour, and Reproduction are successively discussed at length; and, arising as a natural appendix to the chapter on Reproduction—the "Welfare of the Race," as Dr. Gamble entitles it—we have in conclusion a chapter on the specialized types of reproductive and social activity afforded by the Life Histories of Insects.

The treatment and scope of these chapters will be evident from a few examples. Under "Movement" is included a discussion on ciliary motion, and an account of the migration of birds. In the history of the "Quest for Food" we are reminded both of the elaboration of the molars in Ungulata and the snare-making instincts of spiders. The chapter on coloration gives a summary of the facts about cryptic and warning appearance, now familiar to all readers of popular natural histories, but there is also an interesting account of Dr. Gamble's own researches on the development in pattern in Hippolyte, and a suggestive discussion on the part played by chlorophyll and by blood-pigments in the origin of animal colour generally.

Of course in such a general introduction to the study of zoology as he gives us in this book, Dr. Gamble may be considered too dogmatic in some of his statements on points that are still subjects of discussion among naturalists. The "selection value" of protective coloration and mimicry, and the development of male adornment through female choice might be regarded by the uninstructed reader as results beyond all doubt, from the treatment of these subjects by Dr. Gamble. The Peckhams' observations on the habits of the Attidæ are referred to as if they applied to spiders generally; the support afforded by these observations to the theory of sexual selection is the more striking if we remember that the family (Attidæ), in which these observations of courtship and choice have been made, is the one family of spiders in which

brilliant males and dull females are common. The discussion of social life among insects is one of the most suggestive sections in the book, but in the survey of insect metamorphosis generally, while attention is called to the increasing difference between larva and imago in the higher order of insects, there is no suggestion as to how this divergence has come about. The claim for the Collembola as the ancestors of sucking insects generally will not be admitted by modern students of that group.

The illustrations in the book are somewhat uneven. There are a number of photographs from specimens in the Manchester Museum, many of which are good; in some cases—the caterpillar of the Cabbage Butterfly for example—it should have been easy to procure live rather than dead specimens. Most of the live drawings are rough in execution and reproduction. The centipede described as a Lithotius is really a Scolopendrid.

Such blemishes are, however, slight when we consider the admirable plan and felicitous style of the book as a whole. Dr. Gamble seems to have written for what is called the "popular" reader. Such cannot fail to derive help and instruction from the book. But the earnest student and teacher of zoological science will find the work truly inspiring.

G. H. C.

A STUDY OF THE QUEEN ANT.

Anatomie du Corselet et Histolyse des Muscles Vibrateurs, apres le Vol Nuptial chez la Reine de la Fourmi Lasius niger. Par CHARLES JANET. Pp. 149 + 20, pls. 13 and 45 text figures. Limoges: Ducourtieux et Gout.

This beautiful memoir forms the twenty-sixth fascicule of M Janet's monumental "Études sur les Fourmis, les Guêpes et les Abeilles." Like its predecessors it is characterized by wonderful minuteness of detail in its descriptions, beauty in its drawings, and distinction in its style. This author combines, in a manner too rare among modern naturalists, the power of elaborate histological research with the faculty of patient observation in the field.

It is well known that a young queen ant loses her wings after the nuptial flight, either herself removing the now useless organs, or suffering their removal by the workers. The author believes that help in the operation by the workers is unusual except in artificial nests. In this volume M. Janet traces the degeneration undergone by the muscles of flight, accompanying this loss of the wings, until the firm bundles of muscular fibres become replaced by loose columns of fatty tissue.

Before entering on the histological details that form the bulk of his work, M. Janet gives some interesting notes on the habits of ants as regards pairing and nest-founding. Young winged males and females may emerge from their native nests on fine summer days, to return again. But the nuptial flight generally involves final separation from the old home. Occasionally pairing takes place on the ground, but usually in

the air, and while, after the flight, the males quickly die, the females become the founders of new colonies. According to M. Janet, a new ant-colony is always founded by a single queen, but in some species—such as *Myrmica rubra* and *Formica rufa*—the workers bring back to the nest some of their own young queens which have paired at no great distance; thus the community comes to contain a number of queens. M. Janet kept a queen of *Lasius alienus* for nearly ten years.

When the wings are shed the rupture of course takes place at the base of the organ, but the exact position of the scar is not constant. "There is not, as in the leaf-stalk, a special, dehiscent layer which determines precisely a surface of rupture. This rupture indeed always takes place nearly at the same spot in the basal region of the wings, but it varies somewhat markedly in form and position." Of a number of queens of *Lasius niger* observed by M. Janet, only one retained her wings three days after the nuptial flight.

Attention is drawn by the author to the great size of the flight-muscles in these queen-ants, filling, as they do, most of the space in the large convex, thoracic skeleton. Yet these "heaviest and largest organs in the queen's body are functional only once during her life, and that only for some hours, in the early period of an existence that lasts normally for at least twelve years." Their work over, these great muscles disappear by a process of histolysis; leucocytes and granular amœboid cells become numerous among the muscle-fibres, whose contractile substance and nuclei undergo a somewhat rapid degeneration. As a result the blood becomes greatly enriched by the albuminous constituents of the broken-down muscles, and, in this way, the young queen is provided with a supply of food, and is able to produce numerous eggs, and—through pharyngeal pouches—to feed her larvæ until these develop into the first workers, who undertake to procure food for the colony.

With the process of histolysis occurs the replacement of the muscles by columns of fatty tissue, developed from groups of cells of diverse origin. Some are present before the nuptial flight, others develop later between the bundles of muscle-fibres, and others again arise within the muscular envelopes. It thus appears that the result is analogous to a fatty degeneration, though, as we have seen, it is not truly brought about by such a process, and it has a high physiological value in the life of the queen ant.

Many other points of great interest to the entomologist are discussed by M. Janet. The structure of the thoracic exoskeleton is described in detail, with an account of the origin of the chitinous cuticle and the method of attachment of muscle-fibres to its inner surface. The memoir abounds in facts and suggestions of the highest value; the concluding summary, in which comparison is drawn between the post-nuptial process described and the histolysis and histogenesis that take place during metamorphosis, is worthy in particular of careful study. M. Janet has added to the obligation under which he has already laid all lovers of insects and their ways.

G. H. C.

NOTES.

BOTANY.

The New Flora of the Burnt Ground on the Hill of Howth.

Mr. Adams' short article on this subject in the last number of the *Irish Naturalist* is very interesting, but I think it is open to question whether it might not have been perhaps more appropriately entitled a study of *survival* rather than one of dispersal. It must be remembered that although, as stated, the fire smouldered for over a week, it was largely spreading at its edges during this time, and probably no one patch of ground was involved in actual fire for anything like this whole period. On the contrary, I imagine that here and there the period of actual burning may have been a very short one indeed. I think it quite possible that seeds of the majority of plants mentioned in the list given survived the fire, and that, therefore, there is no need to seek for methods by which they may have subsequently arrived there. Particularly is this the case with the Whin. I have often seen seedlings of this plant coming up in hundreds beneath comparatively recently burned bushes. The very large numbers in which they occur point surely to the fact that the seeds, having previously fallen in quantities from the plants, survived the fire. Had they arrived afterwards would not their numbers have been far less? Similarly, when the heathery vegetation is burned on our moorlands, the regeneration occurs, surely much faster than it would do if it depended only on seeds transported subsequently from without the area? I do not think a close parallel can be drawn between this instance and that of Krakatoa, for in the latter case the whole vegetation of the island was blotted out by a mantle of red hot lava and ash, and the effect of the fire at Howth cannot possibly have been anything like so severe as this.

With regard to the species of plants occurring after the fire, representatives of the great majority of them were certainly there before it occurred, though perhaps the two Epilobiums, *Senecio vulgaris*, and *Sonchus oleraceus* amongst others may be exceptions. The most striking absentee is certainly *Ulex Gallii*; I am not sure whether in the seedling stage this can readily be distinguished from *U. europæus*, and if not I rather expect that some of the seedlings put down as the latter may really belong to the former species. I am inclined to believe that seeds of most of the plants named were lying in plenty, more or less burned, when the fire took place, and that very many of them survived it. If so they would probably have germinated in the following season. Mr. Adams' list was made three years after the fire, and if this was the first season in which plants were to be observed at all on the burned area possibly they *were* derived from seeds carried there subsequently. It would be interesting to know if anyone visited the area the season next following the fire, and if seedling plants were observed then and in what numbers.

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Note on Dicranum Scottii.

In the paper on *Rosa hibernica*, reprinted from the *Journal of Botany* in the *Irish Naturalist* for October, 1907, p. 309, Mr. Britten, while correcting certain errors regarding the references for *Rosa hibernica* and the two mosses, *Schistidium maritimum* and *Dicranum Scottii*, unconsciously confers a further favour upon Irish botanists by correcting another error concerning one of these plants. The passage to which I refer occurs in a paper by Dr. David Moore, entitled "A Synopsis of the Mosses of Ireland," which was published in the *Transactions of the Royal Irish Academy* for 1872, p. 448. In this Moore wrote concerning the moss *Hypnum revolvens*—"It was for the discovery of this moss and *Schistidium maritimum*, and for a vegetable substance, that Dr. Robert Scott received a premium of £17 1*s*. 3*d*. from the Dublin Society in 1803." And he gives the reference, "Dublin Society Proceedings, xxxix., p. 82 (1803)." This reference should be "Vol. iii., p. 158," and the name of the moss should read *Dicranum Scottii*.

The Dublin Society had offered (*Trans. Dub. Soc.* iii., p. 36, 1803) amongst other "Premiums," one for "Producing native plants not hitherto described.—To any person who shall in the year 1803 produce to the Society any plant, tree, shrub, or herb, so far peculiar to Ireland as that it is native, and is not described in any work of Linnaeus or the late botanists, the sum of five guineas." As Mr. Britten has shown John Templeton got for the rose £5 13*s*. 9*d*., and Dr. Scott got £17 1*s*. 3*d*., the equivalent of fifteen guineas Irish currency, for "Three new species of mosses."

And in the same volume (iii.), at p. 158, is a communication by Scott giving brief descriptions, with excellent copper-plate illustrations, of the two mosses, which undoubtedly are as they are named, *Dicranum Scottii* and *Schistidium maritimum*. I have not discovered what led Moore into the error, but it is manifest that he had not consulted the Dublin Society's Proceedings, and, curiously enough, the volume in the Society's library, which the Librarian courteously allowed me to consult, had never been opened at the place in question till one day in last April when I cut the pages.

Mr. Britten has made a slip when he writes of Turner's work as his *Muscologiæ Hibernicæ Specimen*, this last word should read *Spicilegium*. Dr. Scott, after whom Turner named this moss, discovered it in 1802, "among the mountains that lie to the S.W. of Swanlinbar, on the banks of a rivulet."

H. W. Lett.

Loughbrickland, Co. Down.

Mayo Mosses and Liverworts.—A Correction.

The title of my paper on "Musci and Hepaticæ from Co. Mayo," in *Irish Naturalist* for November, 1907, should read "Musci and Hepaticæ from West Galway," as all the localities mentioned lie in the latter area.

D. McArdle.

Glasnevin.

Botanical Notes from Co. Antrim.

On June 14 last I went to Knock Dhu, the only known station in this county for *Dryas octopetala*, and found it in full bloom and great profusion on the northern cliffs. These grim basaltic crags are at present transformed into an exquisite rock garden; from a hundred rock-ledges drooped clusters and garlands of the beautiful Dryas, the large white flowers gleaming like ropes of pearls against their dark background, while other ledges literally foamed over with white masses of the Mossy Saxifrage, and in tiny crevices on the face of the rock dark blue gleams of Polygala mingled with the pure white stars of *Arenaria verna*.

On June 21 I found a fine clump of *Ligusticum scoticum* among rocks at the western end of Brown's Bay, Islandmagee, distant about half a mile from its station at Skernaghan Point, recorded in 1896.

Having been long intending to explore Skerrywhirry, a remote basaltic escarpment facing south and west (whereas most of our basaltic cliffs face N. and E.) in the heart of the hills between Larne and Ballymena, I got there on June, 24, and was amply rewarded for a long cycle ride under a roasting sun. First on the southern slope, above the hamlet of Magherabane, I found *Vicia orobus* in some abundance—a sure sign that this was "terra incognita" from a botanical point of view; the place is nearly four miles (as the crow flies) N. W. of Ballyboby Junction, where Mr. Tomlinson found this plant last year, and over four miles S W. of the Sallagh Braes station. Then, high up among the rocks on the Western face, I came upon a small ledge of heather, interlaced in all directions with the long trailing branches of *Arctostaphylos Uva-ursi*—a plant unknown to me before, but subsequently identified by Mr. Praeger. I searched for a long time among the rocks, but did not succeed in finding any more of this rare plant, which was last seen (so far as the N. E. of Ireland is concerned) in 1837 at Fair Head, its only local station. On June 29 I revisited Skerrywhirry, and made another long search for more of the Bear-berry among the heather and rocks, both at higher and lower levels, but without success. I found *Vicia orobus* in profusion on the western slopes also, and *Habenaria albida* rather sparingly, and saw *Galium boreale* flowering in abundance on the banks of the Glenwhirry river, where it was seen by Templeton in 1793.

C. J. Lilly.

Larne.

ZOOLOGY.

The Woodlice of Ireland.

We are attempting to make a systematic survey of the Irish Woodlice, and should, therefore, be very grateful for collections of specimens from any part of Ireland which may be sent to either of us at the addresses given below.

Fenagh House, Bagnalstown. D. R. Pack Beresford,
Hillsboro', Co. Down. N. H. Foster,

Testacella Maugei, Fer., at Cork.

Miss May Johnson, while walking in her garden at Rath Lee, Cork, found a living specimen of this rare carnivorous slug. Having never seen a slug before which carried its shell "on the tip of its tail," she sent it on to me to identify. The Testacellas are very rare in Ireland, and confined to a few counties on the south and south east coasts (Kerry to Dublin inclusive). They are predaceous, living mainly on worms, though they do not despise other slugs, snails, &c., when the worm diet fails. They should be looked for at dusk, when they often follow worms to the surface, or in very wet weather in spring and autumn, the wet driving them out of the ground. Old gardens seem to be their favourite habitat in this country. Of the three species we have in Ireland, there have been only about fifteen records since 1835. Dr. Scharff confirms my identification of the species; I was a little doubtful as neither shell nor animal was quite typical.

R. WELCH.

Belfast.

Testacella haliotidea in the North of Ireland.

As Mr. Welch points out above Testacellas had hitherto only been observed in the South of Ireland. It is of great interest, therefore, to note that Rev. A. Delap recently found a specimen of *Testacella haliotidea* in his garden at Strabane, in the province of Ulster. The garden is a very old one, and has been cultivated, according to Mr. Delap, for the past 200 years. Mr. Delap has been accustomed to dig in his garden since he came to Strabane seven years ago, but never saw a Testacella until this spring.

R. F. SCHARFF.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Hooded Crows from Mr. Pierce Mahony, three Meyers' Pigeons (Mauritius) from Lieut.-Col. Peterkin, a Spider Monkey from Dr. H. C. Carden, a Cayuga Drake from Mrs. Mangin, Peacocks from the Rev. S. R. McGee and Mr. E. O'Keeffe, a Kinkajou and a Puffin from the Hon. Cecil Baring, a Panther Cub from Mrs. Rogers, a Kittiwake from Mr. R. E. Wynne, a Ringed Plover from Dr. J. Trumbull, an Indian Mungoose from Mrs. St. George. Six young Great Black-backed Gulls from Sir Charles Ball, eight Pigeons from Mr. J. Clifton, a Sulphur-crested Cockatoo from Mrs. Bradshaw, two Peregrine Falcons from Mr. J. C. Carter, two Little Bustards from Mr C. Williams, and four dozen Crayfish from Dr. H. Drury. The Rheas, which are allowed the greatest possible liberty as to roaming about the Gardens, laid a number

of eggs during June. Eleven of these have been given to one of the females for incubation, and the result is awaited with much interest. Two black Guinea Pigs and a litter of Rabbits have been born in the Gardens. A Hairy Armadillo has been purchased.

BELFAST NATURALISTS' FIELD CLUB.

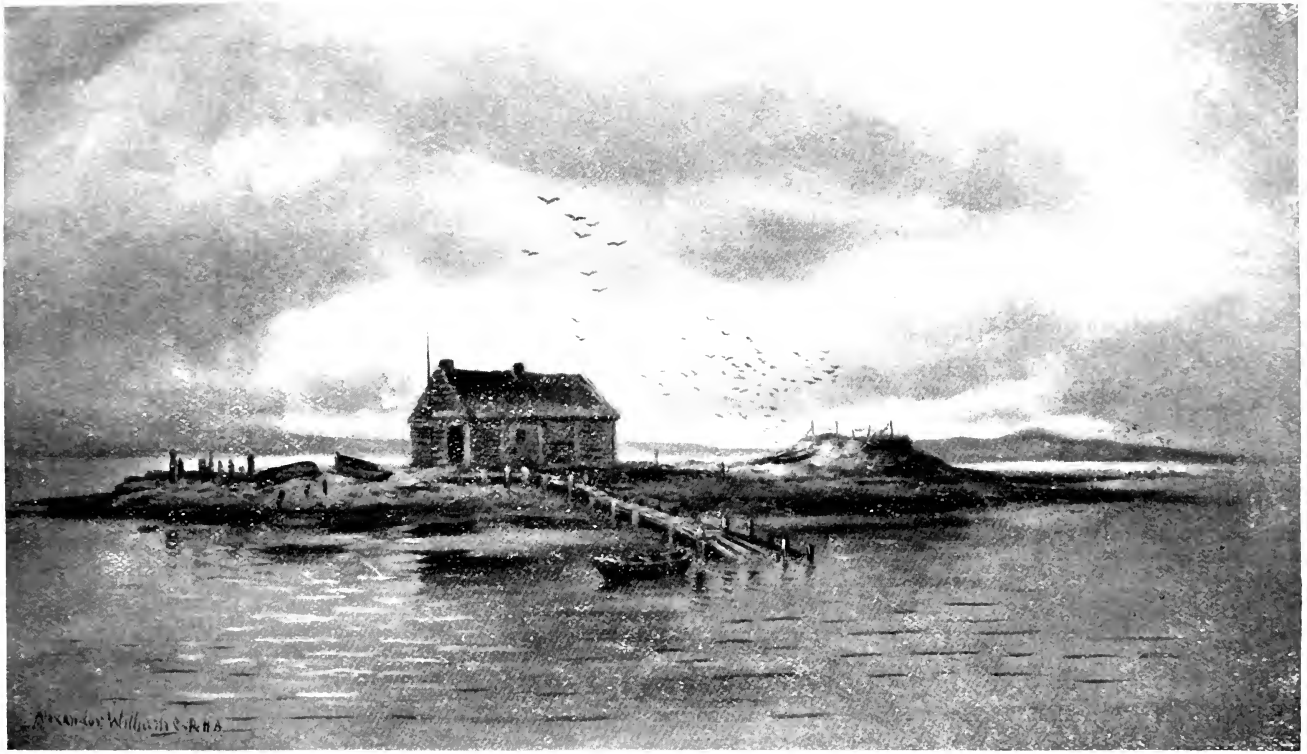
JUNE 27.—EXCURSION TO LISSANOURE CASTLE.—A party of 54 members and friends travelled to Dunloy station by the 9.15 a.m. train. Cars were in waiting for the 4½ miles drive to Lissanoure. A short stop was made on the way at Knockahollet to enable members to inspect the fine earthen fort. On reaching Lissanoure a brief inspection of the old ecclesiastical remains in the demesne, and also of the old castle, was made, after which the members scattered to pursue their various interests. The demesne is splendidly wooded, and is the site of a long-established Heronry, now consisting of about 20 nests.

The plants found included—*Ranunculus heterophyllus, Rosa arvensis, Salix pentandra, Epipactis latifolia, Carex dioica, C. curta, C. riparia, C. versicaria, Poa nemoralis.* Thence the party drove to Ballymoney. Here tea was served, after which three new members were elected. Belfast was reached at 8.35. The President's prize for the best list of flowering plants and ferns noted at Lissanoure was won by Mr. N. Carrothers, who recorded 148 species.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 13.—EXCURSION TO DALKEY ISLAND.—Owing to the very heavy showers of the morning, only a small number of members and visitors took part in this excursion. Travelling from Westland Row by the 2.15 train and collecting members here and there along the route, eventually a party of 18 left Colemore harbour for the Island. The principal work of the afternoon was shore-collecting, under the guidance of J. B. Butler, M.A., who gathered a large number of typical specimens of the littoral fauna in a bell-jar, and pointed out the different characteristics of the animals. The catch included most of the common species of the Echinoderms, anemones and Mollusca. Amongst the species of Mollusca collected the most interesting were the following, all of which were found living in sea-weed taken from rock-pools by N. Colgan:—*Actæonia corrugata* (8 specimens), *Runcina Handcocki* (3), *Odostomia spiralis* (1), and *Rissoa Cingillus* (1).

An interesting addition to the botany of the Island was *Trifolium scabrum*, which was found by N. Colgan and W. B. Bruce. Before the party left the Island a meeting was held, A. Roycroft being moved to the chair, and after a ballot the following were elected:—As a member, J. H. Lloyd; as associate members, Stafford Johnson and T. Harford. After tea in Dalkey the party returned to town.



Old Clontarf Island.

From a Sketch by Alex. Williams, R.H.A., 1878

To face page 105.]

BIRD LIFE IN DUBLIN BAY.

The Passing of Clontarf Island.

BY ALEXANDER WILLIAMS, R.H.A.

Perhaps few cities are so favourably situated and possess such varied surroundings of woods and plains, rivers, hills and sea-coast as our capital, and the lover of nature, in his rambles through the woodlands or by the margin of the sea, can daily see much to awaken interest and inspire habits of observation. Even when walking at night-time in the city the voices of birds that pass in the night often strike on the ear, and the observant naturalist can easily discern the different species. This is especially the case in the vicinity of St. Stephen's-green Park, for many birds unobservable in the night-time are attracted by the sounds made by the waterfowl on the ornamental pond there, and may often be heard wheeling in their flight over the park and uttering their call-notes. During the dark nights in the month of October the shrill, cheep-like cry of the Redwing is commonly heard as the migrating flocks pass over the housetops coming from the north, and it has been noticed that the sounds seem nearest when the nights are misty, and the birds, probably attracted by the lights of the city, fly low. The whistle of the Curlew, also, is one that is very frequently heard, and its weird cry, sounding over the gas-lighted streets amid the rumble of traffic, often excites in the mind a pleasurable emotion, so intimately is it associated with the wild moorland, or the sea shore and the sullen murmur of the surf.

To many of the town dwellers perhaps the large number of aquatic birds to be seen about the city will attract most attention, and the seashore stretching from Clontarf to Howth, and from the South Wall to Kingstown, presents an everchanging field for observation. During the last twenty-five years some very remarkable alterations have taken place in the Bay of Dublin, affecting the distribution of sea and land birds. On the south side we have had a serious encroachment of the sea between the Pigeon-house Fort and the Poolbeg Lighthouse. An important range of sandhills of some height and rich in verdure existed some years ago along the edge of the sea in

line with the lifeboat house, and protected the White or Shelly Bank from the waves; they also served as a background to the artillery targets, and were high enough to prevent the shells going out to sea when the Royal Horse Artillery were practising with the guns on Irishtown strand. On public holidays numbers of people used to spend the day on the sandhills, picnicing and indulging in various sports. The larger portion of this fine range has completely disappeared owing to the incursions of the sea, leaving only a small green island away out on the Shelly Bank, and now, during very high tides in stormy weather, the waves are driven over the intervening space. The lifeboat house, now unroofed and useless, stands a long way seaward, and the coast has to be protected by wooden piling and immense quantities of loose limestone blocks placed along the shore to break the force of the waves and prevent further encroachment or damage to the South Wall, whilst the remains of the old targets may be seen 100 yards seawards of the new high-water mark.

Few people would realise that on the Shelly Bank, three miles and a quarter from the General Post Office, as the crow flies, a colony of the Lesser Tern (*Sterna minuta*) has existed for many years in varying numbers, nesting under many difficulties. Visitors can hardly fail to admire those exceedingly graceful little birds, with silvery plumage, black heads, and long tapering wings, as they dash from a height into the shallow waters in pursuit of fish. Their eggs, placed in a slight hollow in the sand and shingle and resting on bits of broken shells, have to depend for protection on their remarkable similarity of colouring to their surroundings, and they often have the companionship of the Ringed Plover, both species nesting closely together. Unfortunately, in recent years bicyclists in increasing numbers and youngsters have found their way to the bank, chiefly on Sundays, often accompanied by dogs, and the nests have been frequently raided. However, owing to the success attending the protection of the Terns at Malahide Island by the Irish Society for the Protection of Birds, arrangements have been made to place a watcher on the Shelly Bank, and it is hoped that the birds may now have a better chance of their numbers increasing, especially since the flattening down and spreading-out of the sand-banks have

broadened the zone selected by them. Rooks and Herring Gulls search the place for eggs and young birds, and I have often been interested in watching the way in which all the birds join together in buffeting the intruders when they approach too closely to the nests. Over the luxuriant grassy banks which have been swept away the song of the Skylark was frequently heard, and in addition to the many sea-birds visiting the place, I have noticed the Snow Bunting, Corn Bunting, Common Linnet, Meadow Pipit, Pied Wagtail, House Sparrow, Starling, Rook, Jackdaw, and Greenfinch.

Whilst the sea has been making such havoc with the coast-line at the south side of the entrance to the Liffey, it is satisfactory to see that there has been a steady increase and addition to the dry land taking place near the extremity of the North Bull opposite to Sutton. In the seventies there existed here a tract of land composed of sand-hills covered thickly with vegetation called the "Green Island," which was separated from the main part of the North Bull at high water by a wide portion of sea. The old Clontarf fishermen used to relate how during a heavy easterly gale a coasting vessel was driven across this submerged part on to the shore of the inner channel near the ruined church at Kilbarrack. For many years there has been a gradual and almost imperceptible accumulation of sand and shingle taking place, and the intervening space has been in the course of time completely filled up, so that now one can walk to what used to be the island, over a wide district reclaimed by nature from the sea, carpeted thickly with vegetation, and raised several feet above the reach of the highest tides. Here during the winter months immense flocks of sea-fowl, both swimmers and waders, congregate and rest during high water on the salt-marshes along the inside channel.

But leaving the North Bull and its interesting inhabitants and coming quite close up to the city, one of the most remarkable changes that has taken place is the total disappearance of what used to be a very romantic feature in the landscape, the Island of Clontarf, commonly known as "Mud Island." Thirty years ago this place was a conspicuous object and of considerable dimensions, measuring about 400 yards long, and about 40 yards wide, and 16 feet in height. It was situated

close to the road which bounds the City on the east, and which extends from the Alexandra Basin, North Wall, as far as the River Tolka at Annesley Bridge, Fairview. To-day at high water the sea-mew swims over its ancient site. Yet at the time to which we refer, it was a busy and populous place, and between the island and the well-known East Wall bathing-slip a deep and swift current ran at ebbing tide that sometimes proved fatal to swimmers. It was also the scene of some splendid rescues effected by members of the Dublin Metropolitan police force on duty there. This stream ran along the south side of the island, past Walpole's and Goulding's works, and found its way into the Liffey nearly opposite the Pigeon-house. The island was bounded on the north and east by the stream flowing from the middle railway arch, which took a turn near the east point of the island, and here joined the south stream.

The highest part of the island was composed of coarse banks of yellow clay, full of pebbles and layers of sea-shells, and those banks bore a thick covering of grass, which with a profusion of Sea-pink made the place look gay and bright. Here the fishermen used to spread their nets on poles to dry, and various kinds of craft were hauled up on the grassy banks out of the reach of the tide during the winter.

There were two picturesque wooden cabins where the men lived all the year, and a large covered bathing-shed stood close to the big swimming-pond, which was enclosed by wooden stakes and tree stumps. This bath was about 30 yards long, and here many youngsters learned to swim in safety, as the bottom sloped gently from one end, to about a depth of 7 feet. During the long warm summer evenings there was plenty of animation as the boats full of bathers were ferried across from the city side, and the grassy banks were a favourite resting place for tired artizans.

On Clontarf Island and in its vicinity my late brother Edward and myself for years had many opportunities of becoming acquainted with the appearance and habits of nearly every species of bird that frequented the shores of Dublin Bay. The early frosty mornings of September used to find us wading along the sandy margins of the streams that skirted the island, searching closely among the flocks of

Dunlins for the Little Stint or the Curlew Sandpiper, and sometimes late into moonlight nights lying among the long grass and listening to the confused cries of the multitudes of sea-fowl spread all over the island to the water's edge.

The rising of the tide away down at Sutton and Dollymount, and the covering up of the mud-flats and feeding-grounds, both by day and night, brought great flocks of birds up the bay, and gradually as the tide approached high water they crowded on Clontarf Island. On a day in winter it used to be a great delight to watch through a field-glass the movements of this great collection of wild-fowl.

Afloat at some distance might be seen big quantities of wild ducks in distinct flocks, Wigeon forming the largest portion. Sheldducks, Golden-eyes, active little Tufted Ducks and Pochards, strong-looking Scaups, Red-breasted Mergansers, occasionally the Buff-breasted Goosander, Common Mallards and Teal, and the Great Northern and Red-throated Divers. More prominent and darker was a fairly big flock of Brent Geese that every winter came to the bay and stayed till spring-time. Standing just at the water's edge a row of Great Cormorants were always a feature, and higher on the shore a few Herons rested motionless, whilst flocks of Curlew and Oyster-catchers stood preening their feathers. Of the smaller waders Golden Plover, Godwits, Knots, Redshanks, Ringed Plovers and Dunlin in flocks of various sizes rested along the gravelly shore. In the company of this living mass of ducks and waders the great family of the gulls were always well represented, a couple of pairs of adult Great Black-backed Gulls usually resting with the others, and Herring Gulls, Common Gulls, and Black-headed Gulls, the most numerous and noisy of all, made up the flock. This scene of repose and enjoyment would sometimes suddenly change, the birds at the same instant becoming violently agitated, and springing into the air in masses, wheeling and curving as the different flocks swept away from the island, their loud call-notes and alarm cries making a babel of musical sounds. The startled onlooker might gaze in surprise, thinking a boat had suddenly appeared to cause so great a disturbance, but the quick eyes of the birds had discerned their natural enemy, the Peregrine Falcon, high over-

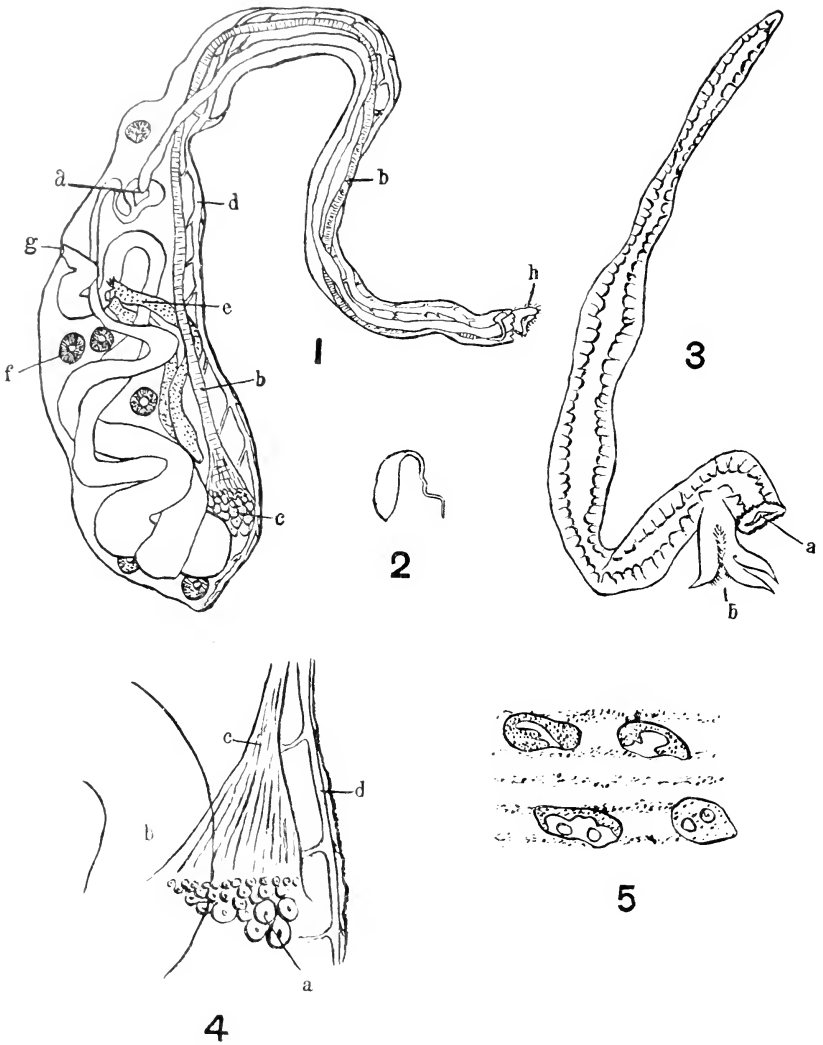
head, coming from his eyrie over the rugged slopes of Ireland's Eye, where the Falcons have bred for years, and in a few seconds he might be seen in a long swooping flight in search of his prey, alarming and putting up every flock of birds from Howth to Clontarf.

Owing to the want of cover for shooters few of the rarer birds have been obtained on the island. A friend once on a moonlit night obtained a Little Stint by firing at random at a flock of Dunlin. My brother secured some Curlew Sandpipers more than once from a boat at the tail of the Bank, and one misty morning in September I had the pleasure of getting quite close in my boat to a Grey Phalarope swimming in a bend of the stream off the island. It was just like a miniature Little Gull, floating so buoyantly, and pecking at something minute on the surface of the water.

Those who remember the charm of the place cannot banish a feeling of regret that this romantic spot, so easy of access to the Dublin people, so splendid a recreation ground, where the artist found so many subjects for his pencil, where the naturalist could so conveniently study the aquatic birds of Dublin Bay, and where the fowler exercised his ingenuity amongst the great flocks of sea-fowl, has disappeared as completely as if the sea had swallowed it up. At high water the moonlight is reflected over the glassy tide where once the weather-beaten old wooden houses stood, and the tops of a few blackened and decayed stakes are all that now remain to mark the site.

The demand that sprang up for the materials to make concrete led to the sale of the island, and long strings of carts and horses conveyed away the gravel, of which it was composed, at low water to the Clontarf shore, and at high water iron and wooden barges came sailing round from the Liffey and anchored, and when the tide fell, leaving them high and dry, were filled with gravel of all sizes, and sailed away with their cargoes when the sea returned. This work was carried on for so many years that, almost imperceptibly and apparently unnoticed, the whole place became flattened down and brought level with the surrounding mud at low water, and even at the present time barges may daily be seen slowly carrying out the process of destruction, and scraping away anything that may still remain to show the site of "Old Mud Island."

Dublin.



K. S. del.

PETALOSTOMA MINUTUM.

To face p. 171.

DUBLIN MARINE BIOLOGY COMMITTEE.

A NEW IRISH GEPHYREAN.

BY ROWLAND SOUTHERN, B.SC.

[PLATE 9.]

IN the year 1862 Keferstein[1] gave a preliminary description of a new species of Gephyrean, *Phascolosoma minutum*, which he had found at St. Vaast, on the coast of Normandy. In the following year he figured the species adequately[2], and supplemented his previous description. Keferstein recognised the characters which distinguished this new species from other members of the genus Phascolosoma, and in 1865 he created the new genus Petalostoma for its reception[3]. The species was also found by Selenka at St. Malo. Its only British record is from Plymouth[4], where it is said to be "common in crevices of shale."

In April, 1907, a single specimen was dredged from several fathoms in Dalkey Sound. In June of this year I found numerous examples under stones near the bathing place at Sandycove, Kingstown, Co. Dublin.

This species is one of the smallest of the Gephyrea. When contracted it is 5–7 mm. long. It expands to a length of 10–14 mm. The retractile proboscis is longer than the body. The general anatomy of the body, and the structure of the tentacles are well shown in Keferstein's figures. The body is cylindrical in shape (Plate 9, figs. 1, 2), sharply conical behind, and tapering gradually in front. It is somewhat more active in its movements than is usual among the Gephyrea. The proboscis is being constantly protruded and retracted, so that the structure of the tentacles at the tip is

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[1] *Nachrichten d. K. Gesell. d. Wissenschaften zu Göttingen*, 1862, p. 66.

[2] *Zeitschrift f. wiss. Zoologie, Bd.* xii., 1863, *p.* 40, *Tab.* iii., *figs.* 7–10.

[3] *Zeit. f. wiss. Zoologie*, Bd. xv., 1865, p. 438.

[4] *Journal Marine Biol. Assoc.* vol. vii., 1904, p. 233.

difficult to make out. These consist of two solid leaf-like lobes, surrounded at the base by a lobed collar; the whole being covered with very active cilia. This species can be studied microscopically with ease whilst in the living condition, and the accompanying figures are all drawn from living specimens.

The epidermis is covered with faint rings of a pale, golden-brown, granular pigment (fig. 5). At intervals along these rings are flat, inconspicuous, oval glands or papillæ. Some of these papillæ are granular, others are partly granular and partly clear. The body-cavity is full of liquid, in which are suspended numerous corpuscles. These are round, flat, and thin. Some of them are clear, some granular, and they are in a constant state of active movement, passing along the body to the tip of the proboscis and back again in regular order. Numerous developing ova are also freely suspended in the cœlomic fluid.

The structure of the alimentary canal agrees with Keferstein's figures, except in one point. At the junction of the œsophagus with the intestine there is a bulbous swelling (fig. 1 *a*.) which is not mentioned by Keferstein. The intestine, which is only slightly folded, is not attached at its base. The retractor muscles (fig. 1 *b*) are attached to the body-wall in the posterior third of the body. At the base of the retractor is the ovary (fig. 1 *c*., fig. 4). It was very easily seen in some specimens. As the ova mature, they drop into the cœlomic cavity, and probably reach the exterior through the nephridia, which is the usual method. In no case, however, were eggs found in the nephridia. All the specimens examined were females.

The nerve-cord can be clearly seen (fig. 1*d*.) running along the body-wall near the retractor muscles. It gives off numerous branches to the muscles and to the alimentary canal.

The "brown bodies," or nephridia (fig. 1 *e*, fig. 3) are two in number. Keferstein gives little information as to their structure. The external pores (fig. 3 *a*) are situated laterally just behind the anus. The length of the nephridium is about half that of the trunk. Just behind the external opening is the ciliated funnel (fig. 3 *b*) which opens into the cœlomic cavity. It is bounded by three pointed lobes,

ciliated on their inner surfaces. In living specimens the movements of these cilia can be easily seen under the microscope.

The genus Petalostoma, of which this is the only species described, is characterised by the leaf-like tentacles, absence of a vascular system, fused retractor-muscles, and the structure of the nephridia. The bulb at the end of the œsophagus is an unusual structure in the Sipunculoidea, to which this genus belongs; but in the Echiuroidea, a muscular organ, the crop, is usually present in a similar position.

DESCRIPTION OF PLATE 9.

Petalostoma minutum.

Fig. 1.—General anatomy.
- *a.* bulb at the end of the œsophagus.
- *b.* retractor muscle.
- *c.* ovary.
- *d.* nerve-cord.
- *e.* nephridium.
- *f.* ovum, in the body-cavity.
- *g.* anus.
- *h.* tentacles.

Fig. 2.—Animal, × 1½.

Fig. 3.—Nephridium.
- *a.* external opening.
- *b.* ciliated funnel, opening into the body-cavity.

Fig. 4.—Ovary.
- *a.* ova.
- *b.* stomach.
- *c.* retractor muscle.
- *d.* nerve-cord.

Fig. 5.—External appearance of the epidermis, highly magnified, showing dotted pigment and papillæ.

National Museum, Dublin.

ON TWO COLLEMBOLA NEW TO THE BRITANNIC FAUNA

BY PROF. GEO. H. CARPENTER, B.SC., M.R.I.A.

[Read before the Dublin Naturalists' Field Club, 14th April, 1908.]

Both the species of Springtails or Collembola described in this paper belong to the Isotominæ, a group regarded by students as among the most primitive of the order, and characterised by the absence of scales, the close equality in length of the third and fourth abdominal segments, and the presence of a well-developed spring inserted, in some cases, evidently on the fourth, in others apparently on the fifth abdominal segment. Moreover, both are geographically members of the Northern faunistic group, and one is so characteristically arctic and alpine in its range that its presence in our islands is distinctly noteworthy. In the mode of their occurrence, however, there is a marked difference between the two species. One has been found only beneath stones in our hill-streams at a considerable elevation. The other has drawn attention to itself by its presence in vast numbers on tobacco plants in a single lowland locality.

Isotoma tenella, Reuter.

This species was noticed in large numbers during April, 1907, on tobacco seedlings growing near Kilkenny, by Mr. G. W. Keller, the tobacco expert of the Irish Department of Agriculture. The leaves of the young plants were covered with little dark-grey insects, which microscopic examination showed to be referable to *Isotoma tenella*. As the epidermis of the leaves was abraded, and the intestines of the springtails contained chloroplasts, there can be no doubt that they had fed on the leaf-tissues. The species, therefore, must be added to those Collembola which are known to be directly injurious to the higher plants, although, as a rule, the members of this order feed on decaying organic matter The introduction of an exotic crop-plant, such as tobacco, into the country affords to the biologist a good opportunity of noting the effect of change of environment on the native fauna. In the present instance the vicinity of this new and seemingly appropriate

food-plant seems to have had the effect of increasing enormously the numbers of a hitherto obscure species of insect, whose existence in the country had been previously unsuspected.

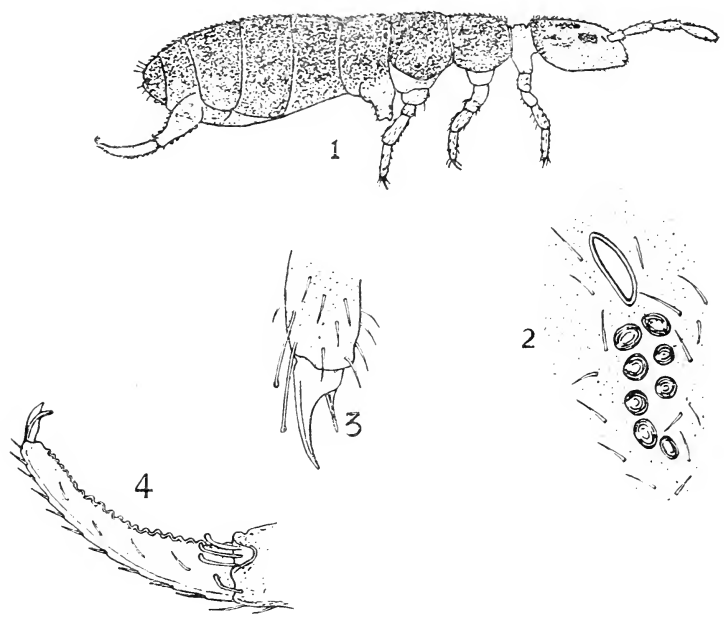

Fig. A.—*Isotoma tenella*—1, side view, × 75; 2, ocelli and post-antennal organ of left side, × 520: 3, foot, × 520; 4, end of manubrium, dens, and mucro of spring, × 520.

Isotoma tenella is a small springtail (fig A, 1), measuring only 1 mm. in length. The head as well as the dorsal and lateral regions of the trunk are mottled with dark slaty blue, the legs, spring and feelers being pale. In the main points of its structure the species is a typical Isotoma. On each side of the head may be seen the usual eight ocelli and a long, narrow, crescentic post-antennal organ (fig. A, 2). Towards the end of the foot are two distinct clubbed tenent hairs (fig. A. 3), as mentioned in the description given by Reuter ('95, p. 28), not one only, as shown in his figure. The claw is elongate, simple and slightly curved, while the empodial appendage ("lower claw") is slender, pointed and almost straight. The

spring is somewhat short, the proportional length of manubrium and dentes being as 8 : 9. At the extremity of the manubrium are a number of clubbed, curving bristles. The mucro has only two teeth, the forward of which is strengthened by a distinct posterior ridge (fig. A, 4) The combined characters of the feet and spring render this insect markedly distinct from any known British or Irish species.

There can be little doubt that *I. tenella* awaits discovery elsewhere in Ireland than at its present single Leinster locality (Kilkenny), and it will very likely be found also in Great Britain as well. The species was described by Reuter ('95) from specimens taken in Finland, and it has since been recorded from Weiburg, in Germany, by Börner ('01, p. 135.)

AGRENIA BIDENTICULATA (Tullb.) var. nov. ELONGATA.

I had the pleasure of finding the first Irish examples of this species in County Waterford in June, 1906, on the occasion of the annual "long excursion" for natural science study with students from the Royal College of Science. We were on the road from Dungarvan to Carrick-on-Suir, which skirts the Comeragh Mountains, and we halted for a while at the stream that comes down from Lough Coomshinghaun. Colonies of the springtail were found lurking beneath partly submerged stones in the stream. In March of the next year (1907) further specimens were obtained, under similar auspices, in the Glen River above Newcastle, County Down. And in September, 1907, when visiting Powerscourt, County Wicklow, with the Dublin Naturalists' Field Club, a few specimens were found in the Upper Dargle above the Waterfall. The species thus inhabits three at least of our Irish provinces—Munster, Ulster and Leinster.

This species was described by Tullberg ('76) as *Isotoma bidenticulata*, but it differs so markedly from typical Isotomæ that Börner ('06) has lately proposed the genus Agrenia for its reception. The dentes of the spring are closely covered with rounded tubercles (fig. B, 4), and on the inner face of each dens is a long, conspicuous, pointed bristle which extends beyond the tip of the mucro ; the claw of the foot has a small but distinct tunica (fig. B, 3, *t*), and the empodial appendage

is provided with a double membrane (fig. 3 *a*); these characters are not found in any other species included in Isotoma in its wide sense. As the specific name implies, the mucro has two teeth (fig. B, 4), which are sharp and prominent.

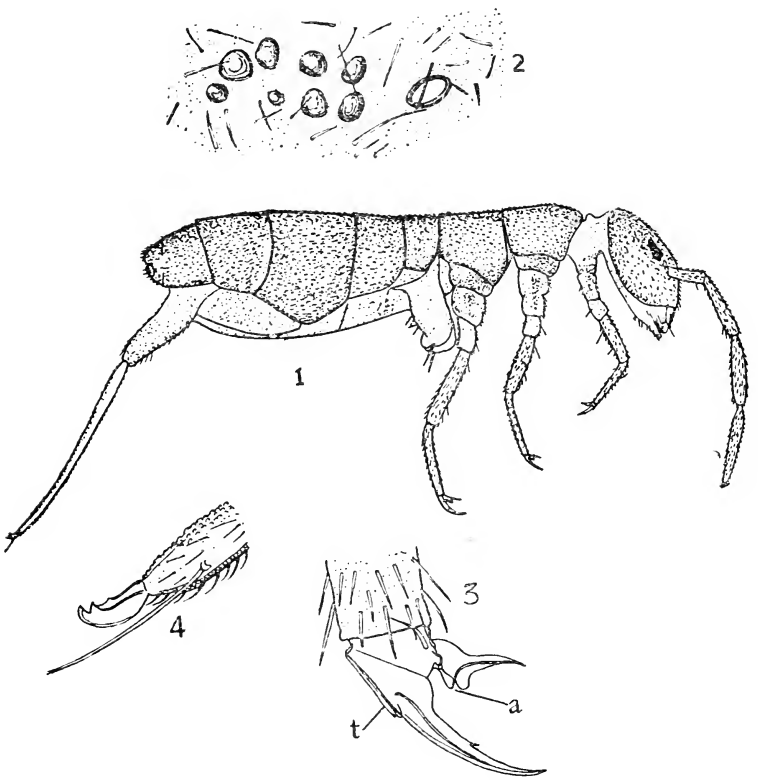

Fig. B.—*Agrenia bidenticulata*—1, side view × 27; 2, ocelli and post-antennal organ of left side, × 375; 3, foot × 260 (t, tunica of claw, a, double membrane of empodial appendage); 4, tip of dens and mucro, × 260.

As Agren ('04) in his full description of this species has pointed out, there is some fusion between the fifth and sixth abdominal segments. The head bears on each side eight ocelli, and the post-antennal organ is broadly oval in form (fig. B, 2.)

All the Irish examples of this springtail are remarkable on account of the elongation of the feelers, legs and spring. I propose, therefore, to regard them as types of a distinct variety (*elongata*) of the species. In typical *A. bidenticulata* from Franz Josef Land, the relative lengths of head and trunk, feelers, hind legs, and spring are as 15, 5, 5, 7. In the Irish variety these lengths are as 15, 7, 6, 8. In colour, the Irish specimens are a fine purple or green, with pale legs and spring. Adults attain a length of 2·5 mm.

Agrenia bidenticulata has a wide range in arctic and northern regions. Schaeffer ('00, p. 247), enumerates records from Greenland, Spitzbergen, Novaya Zemlya, Franz Josef Land, Cape Chelyuskin (the extreme northern point of Siberia), and the mountains of Scandinavia. He also states that *I. lanuginosa* described by Carl ('99, pp. 307–310) from the Swiss Engadine (altitude 1250 m.), is identical with the present species. Agren ('04) and Linnaniemi ('07), have since recorded *A. bidenticulata* from Lapland. The presence of such a distinctively arctic and alpine insect in these islands is therefore of exceptional faunistic interest. Last year, after I had identified my Waterford and Mourne specimens, I received examples of the species from Mr. R. S. Bagnall, who had collected them under stones in the Upper Tyne. Subsequently Mr. Bagnall sent me specimens from streams in Arran and on the opposite mainland of Ayrshire, while quite recently my friend Mr. W. Evans of Edinburgh, has told me that he collected the species some time ago near Callander. It is evident, therefore, that this arctic springtail has a wide distribution in the northern part of Great Britain, as well as in Ireland. In structure the British specimens are somewhat intermediate between the typical arctic form and the Irish variety *elongata*. The habitat of the species in Great Britain, is however, as in Ireland, under partly submerged stones in hill streams. In its arctic and alpine localities, the insect has been found in similar situations. Carl ('99, p. 310) states that in the Engadine he found the insect on the surface of the snow, into which they burrowed to protect themselves from the sun's heat. We shall probably be safe in including this interesting species among the many remnants of glacial conditions that may be found in our Irish uplands.

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REVIEW.

THE BRITISH ASSOCIATION HANDBOOK.

Handbook to the City of Dublin and the Surrounding District. Prepared for the Meeting of the British Association, September, 1908. Dublin, printed at the University Press, by Ponsonby & Gibbs. Pp. 8 and 441, 2 maps, 37 plates and 55 Figs. in text.

Thirty four years ago Ireland led the way in producing, for the first time, at the Belfast Meeting of the British Association, a well-written and, for the times, a well-illustrated Guide to the Counties of Antrim and Down for the use of the members and visitors present; this being the area included in the various excursions planned for the Meeting. Four years later a Guide to the County of Dublin was issued for the benefit of those attending the Dublin Meeting, but on less popular lines, and without illustrations. An outline map was, however, provided, as in the case of the Belfast Guide, and a geological map. This year again Dublin welcomes the British Association, and another Guide, up-to-date in its general features and embodying, as far as possible in such a work, all the main discoveries that have been made since 1878 in various branches of science, is provided. Rather thick and heavy for a convenient pocket-manual—as most of these annual guides are supposed to be—we said as we examined it; an excellent reference book, evidently

well got up and profusely illustrated, was our impression as we turned over the pages; and here was the key to the weight, in part at least—thirty-seven plates on art (that is, loaded) paper, one of the unfortunate requirements of the printer if really good results are to be obtained from modern half-tone blocks with their shallow relief. A closer examination only confirms our first impression. The book is a succesful attempt to combine the best points of the popular (and, so far as scientific information goes, too often carelessly edited) Guide, with the strictly scientific reference book, and its complete lists of the fauna, flora, &c. While these full scientific lists were of great service locally in the past, they are not the form in which information should be given in a Guide of this sort to-day. We are glad to see that those responsible for this Dublin Guide realise this, and have taken advantage of the fact that the lists in the Fauna and Flora Reports of the Royal Irish Academy, the *Irish Naturalist*, etc., provide the scientific student with full details of many subjects. So that instead of long bald lists of animals and plants, we have a concise general survey, comparative and analytical in the majority of cases, giving just those facts and details that interest, and are useful to, both the strictly scientific and the dilettante worker. The Bibliography of published papers at end of most of the Sections provides what is necessary for more detailed study. For instance, while the 1878 Guide, out of the 260 or so pages devoted to Natural History, contained about 180 pages of lists without notes, the present Guide out of 220 similar pages gives only about 13 pages of such lists, mainly in Cryptogamic Botany. These are either lists of additions to the district since the last visit of the Association, or of specially rare species, and as they are mainly in groups that have received but little attention up to the present, only a carping critic could object to them in this case. We are not surprised that such experienced workers as Barrington, Carpenter, Colgan, Scharff, and Wright, in Zoology, and Pethybridge and Praeger, in Botany, should have abandoned the old style, and we are glad to see that the younger workers associated with them have followed on the same lines; even in the less worked groups, where more than a mere list could hardly have been expected. The book is divided into seven main sections, all edited by well-known authorities, with many sub-sections.

The opening pages are devoted to Science instead of to General Topography or History as usual. In this case these follow the Natural History sections. Geology comes first, and occupies fifty-nine pages. It is edited by Professor Cole, Director of the Irish Geological Survey, and is divided into three parts: General Geology and Scenery, Glacial Deposits, and Mineralogy. For the first, Professor Cole is personally responsible, and he gives a good account of the scenic and geological features of the district, written in that clear and lucid style for which he is well known. He reverses the usual order and gives his list of works of Reference at the commencement. These are mainly old papers, but he supplements them by copious references to recent papers by well-known workers, in foot-notes to almost every page of his article. There are only two little woodcuts in the text, so far as illustrations go. Surely such

an interesting district justifies this part being as well illustrated as the next, Glacial Deposits, for which two plates and five illustrations in the text are provided. At the same time, we know that the Glacial deposits of the Dublin district are of special interest, and J. R. Kilroe, in his descriptive matter, does justice to those fine old geologists like the late Rev. Maxwell H. Close,[1] who studied the high-level drifts so carefully, as well as those later workers in the same subject, Lamplugh and Sollas, while Hinch's work is not overlooked. Mr. Kilroe, in his remarks on the origin of the Glacial deposits, agrees with Lamplugh and the late Carvill Lewis that these high-level gravels containing marine shells are the results of a great Irish Sea glacier rather than the proof of a submergence in Glacial times.

Following such a controversial subject as this, Mr. Seymour gets into quieter waters in Mineralogy, giving a concise description of the more recent discoveries, a list of 58 local minerals, and notes on the alluvial gold deposits of the Wicklow hills. He gives an exceedingly full bibliography of the subject. Meteorology is treated by Sir John Moore, who gives the result of observations made at four stations in or near the city.

Botany occupies but 36 pages, only one-third of the space given to it in the former Guide; like Zoology, it is treated on totally different, but we think, more acceptable lines. The Editor of the section, R. Ll. Praeger, contributes an article on "Vegetation Study in the Dublin District"; this is a new feature as far as the Irish Guides go. The various Plant Associations, both of the eastern margin of the Central Plain and of the upland area, are well described. N. Colgan's article on the Phanerogams and Vascular Cryptogams is another concise contribution to our knowledge of plant distribution in eastern Ireland, and as the flora of the Dublin area, including Lambay, is now probably the best worked in Ireland, he has had ample material for drawing correct conclusions. In the Mosses, D. McArdle gives lists of special plants peculiar to Dublin and Wicklow, of rarer mosses of the same area, of those remarkable for their geographical distribution, or which seem to have become recently extinct in the two counties. He also gives what is evidently a very interesting list of Hepaticæ, classifying them under seven heads, such as "Found only in Dublin or Wicklow," "Local Hepaticæ remarkable for their Geographical distribution in the Tropics and Sub-Tropics," "North American Types," etc.; records, the significance of which will not be overlooked by those who study insular floras and believe in the very ancient origin of the Irish flora. Fungi, Lichens, and Algæ are treated respectively by Dr. Pethybridge, D. McArdle, and J. Adams. Though much remains to be done in these groups, a comparison with the 1878 lists shows a distinct advance. For instance, in the Algæ 138 species have been recorded since 1878 (137 only mentioned in the text.)

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[1] Mr. Close was responsible for the Geological chapter in the 1878 Guide.

Zoology is given 114 pages, and opens with an excellent but too brief introduction by the sectional editor, Professor Carpenter. For non-Irish readers, this part might have been extended. Mammals, by C. B. Moffat, occupy four pages, and, as might be expected, are well done. The Grey Seals of Lambay are illustrated by Mr. Baring's photographs, in fact this small section is given three plates and one wood-cut, one of which (Plate IX.) could have been omitted with advantage. The birds of the district were left in the experienced hands of R. M. Barrington, and his excellent account of them runs to sixteen pages. Ninety species that appeared in the 1878 Guide are dropped for reasons given, so that the number dealt with is only 145. On page 114 is a slight error—the "41 species" omitted as not having been observed for 30 years, total up to 43. Can the Wood-Lark really "now be counted among our breeding species?" Considering that the record rests on one isolated occurrence in 1894, we doubt it. We are informed three times in two pages that the Woodcock breeds in every Irish County. The Lapland Bunting occurred in January, 1906, not in 1907, and the Osprey in 1896, not 1898. Throughout the list we do not observe any reference to the recent account of the Birds of Lambay (*Irish Nat.*, 1907, pp. 23-30.)

Reptiles and Amphibians are dealt with by Dr. Scharff, who reiterates his opinion on the status of the Frog as a native of Ireland, and gives good reasons for his contention. Mr. Farran writes on the Fishes and Cyclostomes of the district, and no better qualified authority could have been found. He treats the subject in an interesting manner, dealing only with "the more interesting or important Fishes," amongst which we note the Stickleback is included. The scientific name of the Opah in the text differs from that on the plate. It is curious that H. J. Buchanan-Wollaston, writing on the Tunicates, ignores his own list of seven Lambay species published last year (*Irish Naturalist*, 1907, p. 33), all of which seem to be additions to the county fauna.

In Mollusca, which occupy twelve pages, N. Colgan writes on the Marine, while Dr. Scharff gives information on the Land and Fresh-water species. Both review the progress made in recent times, correcting old errors. Their method of treatment suggests the lines on which further work should be carried out, Colgan drawing attention to southern types absent in the Dublin area which occur further north; he gives a bibliography, which is wanting in the Land and Fresh-water section. The latter, however, is illustrated by a most interesting map showing the distribution of that local species, *Helix pisana*.

J. N. Halbert describes the Hymenoptera, mentioning that no local list of the Sawflies has ever been published. He gives the result of the late researches into relationships between *Vespa austriaca* and *V. rufa*. Professor Carpenter follows with the Diptera; it is evident from his remarks that little has been done here since Haliday's time. In his list of the rarer Lepidoptera of the district, W. F. de V. Kane gives an introduction dealing with distributional details, mentioning some interesting members of the Howth fauna. For the Coleoptera, Neuroptera, Hemiptera and Orthoptera J. N. Halbert is responsible. In the first group

he describes and illustrates the Pyrenean Weevil, among other southern forms; in the water beetles, the meeting of north and south is shown by the presence of such species as *Agabus arcticus* and *Pelobius tardus*.

The list of Thysanura and Collembola is welcome, and Professor Carpenter does well to illustrate the new species, so little attention has been given to them in Ireland. He follows with a short account of the Myriapods. Crustacea occupy eleven pages, the authors being G. P. Farran, S. W. Kemp, and W. M. Tattersall. It is evident from their remarks that there is plenty of room for further work in some divisions. Arachnida are divided between Professor Carpenter and J. N. Halbert. R. Southern writes on the Annelids, Nemertines and some other worms, A. R. Nichols on Molluscoidea and Echinodermata, Miss Stephens on Cœlenterata and Porifera. She mentions that only two freshwater sponges are found in Co. Dublin, both being very common on the Continent of Europe and in the United States of America.

Last in the Zoological Section comes Protozoa, occupying seven pages, by J. B. Butler and Joseph Wright, both of whom treat their subject well; the former mainly in an historical, the latter in a comparative, manner.

No one who compares the various groups as dealt with in this book with those of the 1878 Guide can fail to see how much Irish natural science has advanced in the interval, but at the same time it is clear how much yet remains to be done, and what splendid opportunities for research offer themselves in many groups to those members of the Dublin Naturalists' Field Club or Microscopical Club who can spare a little time and energy to the work.

What we might call Part 2 of the book contains 217 pages devoted to History and Archæology, edited by a sub-committee; Education and Research, edited by Professor Carpenter; and Industries and Commerce, edited by Dr. Adeney. These sections are divided into chapters by various authors, and are naturally much more fullyillustrated than the Natural History sections. While all the chapters are necessary and well written, we think those that should prove most useful are the first three—"The Environs of Dublin," "Early Christian and Medieval Antiquities," and "Antiquities of the Boyne Valley," the last being the best illustrated. At the same time, other chapters are distinctly novel features, treated in a most interesting manner. Count Plunkett's well illustrated chapter on "The Architecture of Dublin" will appeal to many who care little for antiquities, while Dr. Cosgrave's notes on "Old Dublin as represented in Engravings," also well illustrated, gives a good idea of the city streets and buildings in the 18th century, when so many of the buildings described by Count Plunkett were erected.

Gaelic place-names form the matter of a short chapter by E. Fournier D'Albe, who treats his subject in a clear and useful manner. A chapter on "General Educational Institutions" is contributed by John Cooke, who deals with the principal Colleges and Schools; he mentions these cases in which Dublin University has taken a leading part in removing

old restrictions on Education. We agree, and are sorry that he can find little to say that is good of the present Primary School System. Accounts of twenty-two Scientific Institutions follow in short chapters by various writers, the whole edited by Prof. Carpenter; among others described are Trinity College, Royal College of Science, National Library, National Museum, Albert Agricultural College, Forestry Station, Botanic and Zoological Gardens. Good terse notes are given, but they are unequally illustrated, a fault common to most sections of the sort in similar Guides. Next follows the final Section—Industries and Commerce, edited by Dr. Adeney, which consists of eighteen short chapters by over a dozen writers. Such subjects as "The Port of Dublin," "Fisheries," "Electricity," and "Agriculture," are dealt with. In the last, N. Leitch makes it clear that the much vaunted "Fat Lands of Royal Meath" are anything but models of good and productive farming; while the chapter on Tobacco growing in Ireland by J. R. Campbell shows that there is evidently a chance of its becoming a staple of the country. City of Dublin industries, such as brewing, distilling, Irish poplin, &c., occupy about 23 pages, some being illustrated. An index, by no means as full as it might be, is given at the end of the book, but the contents table at the front is excellent. The illustrations, though numerous, are unequally distributed; most are good, some very good; but others would have been better left out. Such, for instance, as fig. 29, on page 250, would mar any book; while figs. 31 and 34 are little better. The 37 plates on art paper are clearer of course, though a few have printed slightly "rotten," or are unequally trimmed. Nos. 14, 16, and 17, with some in the chapter on Dublin architecture, are examples of good work, yet the average is not equal to those in last year's guide (Leicester), while the book in all other respects is much superior. Two excellent coloured maps, scale 4 miles to 1 inch, by Bartholomew are provided. An area from about Clogher Head in Louth to Wicklow Head is given, with an average width inland of about 28 miles, this taking in the most westerly bend of the Liffey. One is a geological, the other a physical and topographical sheet. Maps of this size in a Handbook for open air use should be mounted on linen, if at all possible.

Taking the book as a whole we consider it unquestionably the best and most accurate local handbook yet provided for the British Association. This is what might be expected from a book edited jointly by Professor Cole and R. Ll. Praeger, who have been fortunate in their sub-editors and contributors. There is little evidence of the careless hurry at the last minute which often mars similar efforts. While the book shows clearly the advances made in local scientific research since 1878, it is certain to remain the standard scientific reference book on the Dublin district for many years to come.

R. W.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a male Swan from Lady Palmer, Rabbits from Mrs. Dent and Mr. E. Gerrard, an Amazon Freshwater Turtle from Dr. H. C. Arden, and two Ringtailed Coatis from Mr. R. Casement. A female Coypu has been purchased.

Ten of the Rhea's eggs lately laid in the Gardens have been successfully hatched by the male bird, and the chicks are now a month old and thriving. They have been placed in a paddock at the end of the lake, where they may be seen under the careful wardship of their father picking up food from the ground and snapping flies in the air. The three Chimpanzees continue in excellent health and condition.

DUBLIN NATURALISTS' FIELD CLUB.

JULY 4.—EXCURSION TO KING'S RIVER.—Members and visitors to the number of 13 left Terenure by the 11 a.m. train for Blessington, with W. F. Gunn as conductor. The heat haze prevented an extended view in any direction during the day, and the excursion was mainly devoted to the botany of the Liffey between Blessington and the King's River, and the latter river for some distance before its junction with the Liffey. *Mimulus guttatus* appeared in considerable abundance by the Liffey, and on the King's River *Carduus pratensis*, recently found here by W. B. Bruce, turned up. Late in the afternoon the party forded the King's River, and after viewing the striking windings of the Liffey from the southern bank, returned to Blessington.

JULY 25.—EXCURSION TO KILMESSAN AND BECTIVE.—A small party left Dublin by the 9.30 train from the Broadstone under the conductorship of J. de W. Hinch (Hon. Sec.). On arrival at Kilmessan the road to the Boyne at Bective was taken, and during the walk *Verbascum Thapsus* and *Centaurea Scabiosa* were observed, the first in a gravel-pit, the second by the roadside. When the Boyne at Bective was reached rain was falling very heavily, which put a stop to field work for some time, but during the afternoon some collecting of water plants was done by boating. Among the plants found during the excursion were *Ranunculus Lingua*, *Dipsacus sylvestris*, *Matricaria discoidea*, *Verbena officinalis*, *Ballota nigra*. At a meeting held in the Wingfield Arms Hotel, Kilmessan, C. F. Ball was elected a member of the Club.

NOTES.

BOTANY.

Flora of Burnt Ground at Howth.

I was over the burnt area at Howth in the August following the fire—about a year after the extinction of the flora; and though I took no notes of the exact state of affairs, I can contribute a few facts. The fire, as Mr. Adams has said, burned very deeply, often consuming the peaty soil right down to the rock. Nevertheless, the flora was not quite exterminated. Dwarf vegetation on well-beaten paths had escaped to a small extent; also little plants in cracks of bare rocks, which the fire passed by. Several species of plants were seen in each of these situations, including a frond or two of bracken, and several grasses which I cannot now name. Seedlings of gorse were also seen in places of this kind. By the way, as regards a point raised by Dr. Pethybridge, seedlings of *Ulex europæus* can easily be distinguished from those of *U. Gallii* by being trifoliate, while those of *U. Gallii* have leaves consisting of a single leaflet. This is a difference which I do not see mentioned in books, and I cannot say whether it is invariable; but it is true so far as my own observation goes. I agree with Dr. Pethybridge, that so far at least as perennial plants are concerned, the present scanty flora of the burnt ground arises by survival rather than by immigration. The recent conflagration on the hill should afford an excellent opportunity for studying the regeneration of the flora during the next few seasons—an opportunity that was not availed of last time.

R. Lloyd Praeger.

Dublin.

The Biological Subdivision of Ireland.

I have been much struck with the simplicity and excellence of the scheme of subdivision proposed by Mr. Adams in the last issue of this Journal, and the more I study it the better I like it. The provinces of Ireland form a four-fold partition of the country which is convenient not only on account of its familiarity, and its north-south-east-west character, but also because it provides four fairly natural provinces. The 40-fold subdivision which I have employed, while not perfect, is also, I believe, a fairly convenient one. Mr. Adams' linking up of these two by a 12-fold division is, I think, particularly happy, especially in its applicability to marine as well as to terrestrial life. A multiple scheme of this kind has everything to recommend it, and I trust it will be universally adopted in future work in Ireland. If a number of our naturalists would agree to use it for distributional studies, I have no doubt that others would follow suit.

The only regret one feels in this matter is that the scheme involves the loss of the time-honoured twelve-fold subdivision of Babington, which is endeared to every Irish botanist by its association with "Cybele Hibernica" and its honoured authors, David Moore and A. G. More. But the best compliment which we can pay to the memory of those pioneers is to be ourselves pioneers, and to use whatever new tool will aid the study of those distributional problems to the solution of which they so materially contributed.

R. Lloyd Praeger.

Dublin.

Dicranum Scottii.

Canon Lett's interesting history of this moss in last month's number of this Journal led me to endeavour to find out how Dr. Moore, in his "Synopsis of the Mosses of Ireland," was led unconsciously to associate *Hypnum revolvens* with *Schistidium maritimum* instead of Scott's moss, as two of the plants for the discovery of which in Ireland Dr. Scott received the premium from the Royal Dublin Society in 1803. At the time Dr. Moore wrote the paper above referred to (often under difficulties), Wilson's "Bryologia Britannica" was the standard work, which Moore constantly used when examining critical mosses. At p. 388, under *Hypnum revolvens*, one of the localities given is "near Swanlinbar, Ireland, Dr. Scott," while under *Dicranum Scottianum*, at p. 75, no locality is recorded. He writes, "Hab.—On rocks in mountainous districts," so that Wilson also was unaware of its previous history. Turning to Mackay's "Flora Hibernica," at p. 23 of Part II., there is an excellent description of Dr. Scott's plant, the localities given are "wood at Blackwater bridge," and "banks of Looscaunuch Lake," Co. Kerry. In Hooker and Taylor's "Muscologia Britannica" (1827), p. 100, no locality is given for the same moss; "On rocks in mountainous districts" is all the information given, so that these excellent authorities on the subject were also unaware of the previous history of Scott's moss, probably for want of a bibliography of work done by previous authors.

Turner, in his "Muscologiæ Hibernicæ Spicilegium," describes *Dicranum Scottianum*. At p. 76 he writes—"Primus hanc speciem in saxis prope Swanlinbar detexit D. Scott, cujus nomen imposui." There is a drawing of the plant at fig. VI. At page 189, under *Hypnum revolvens*, he writes, "In Hibernià prope Swanlinbar, sed absque fructu, legit D. Scott." If Dr. Moore quoted from Wilson when writing his work, (and it is more than probable he did), finding no locality recorded there for *Dicranum Scottii*, and Swanlinbar quoted by both Wilson and Turner, he would naturally conclude that *Hypnum revolvens* was the moss to include with *Schistidium maritimum*.

David M'Ardle.

Glasnevin.

GEOLOGY.

Sounds of Seismic Disturbance.

On a fine, calm day in summer an observer seated on the sandhills at the mouth of the Boyne will be very likely to hear from time to time sounds like distant peals of thunder. For many years I have been listening to and puzzing over these mysterious noises, and I wish to ask if anyone can explain them. They sound like muffled explosions or distant peals of thunder, are never loud, and sometimes almost inaudible (rather to be felt than heard), never very long, but longer as a rule than the sound of a heavy gun. They are only to be heard in fine and calm weather, but that may be because wind and noise may render them inaudible. They often go on at intervals for a whole day, notably on May 27 and 29 last. I have heard them all along the E. coast from Wicklow to Carlingford. They always seem to come from the sea, and, at the mouth of the Boyne, from the E. to S.E. The common explanations of these sounds are quite inadequate: distant thunderstorms, guns at sea, fog signals, quarry explosions, &c, all quite incompatible with the conditions. These sounds appear to resemble the noises known in Italy as "Brontidi," which are heard over a great part of that country, and have lately been enquired into by the Director of the Seismological Observatory of Urbino. He seems to think that the cause is the same as that of earthquakes, and that the phenomenon has its origin in the soil rather than in the air. Professor Grenville Cole thinks the sounds "point to something like the Brontidi or the famous Berisal or Borisal guns of India," and he also thinks that "books on earthquakes mention these phenomena, which are now commonly attributed to earth movements along lines of faulting." I am writing this note at his suggestion. Mr. Lloyd Praeger tells me that, as is well known, similar sounds are heard about Lough Neagh, and that he himself has heard them. Both of these gentlemen consider the subject to be one of great interest and well worthy of discussion and observation, and I hope readers of the *Irish Naturalist* will help to throw light on it. I would venture to suggest that hearers of these sounds should note the circumstances, and especially the direction from which they come. A few cross bearings taken along the coast would locate them effectually. Yachtsmen should note them if heard I have often heard them when far at sea, but I don't think they would be audible on a steamer. It will also be necessary for observers to remember that one, or even a dozen distant muffled sounds may not belong to this class of sounds at all, but may really be the reverberations of a distant storm, or of gun firing, or quarry explosions, or some such cause. Care will be necessary to discriminate. The direction, too, is not always easy to determine. I hope some observers will take this matter up and help to cast some light on an obscure and interesting phenomenon.

G. H. Pentland.

Black Hall, Drogheda.

RAMBLES ON ACHILL ISLAND.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

My primary intention in selecting Achill as a holiday resort was to observe the bird-life there however, the island proved so pregnant with other interesting features that it afforded me no small amount of pleasure to record them in my daily journal.

Most of the bird notes were made in the district of Achill Sound, where, owing to the presence of extensive slob-land, wading-birds are tolerably abundant, but, under the guidance of Mr. A. Williams, I was able to extend my rambles over various parts of the island, and to obtain notes of considerable interest.

I took with me a prism-binocular, magnifying ten diameters, and a hand-camera with telephoto attachment. It was possible to secure several interesting bird-studies with the camera, but, unfortunately, the plates were rather under-exposed for making successful reproductions.

My visit extended from September 10th to September 26th, 1907, during which period a daily journal was kept regularly. As fully twelve months have elapsed, it seems advisable, in order to secure accuracy, not to depend on memory for any part of the narrative, but rather to publish my observations in the form in which the journal was written from notes taken in the field. I made Achill Sound my headquarters, and, when not on the march, had the opportunity of observing and taking photographs from an open window in Mr. Williams' house, overlooking the slob-lands of Breanaskill Bay. This was, indeed, an excellent observatory, for when the tide was high the birds were often only thirty yards off, and were unconcerned at one's presence at the window.

Tuesday, September 10th.—The morning being very wet, I remained indoors until after luncheon. At 2.30 p.m., Mr. Williams and I started for Breanaskill Bay, which was reached in about half-an-hour. The tide was out, and the slob-land thickly studded with Curlews and Redshanks, while racing up and down the fresh-water stream, which intersected the slob, were two Greenshanks. With the aid of the binocular, the

Greenshanks and Redshanks could be seen splashing about in ecstacies of delight in the fresh-water rivulet, and apparently indulging in a refreshing bath. Sometimes the ablutions of a pair were interfered with by their colliding, whereupon the birds rose to their feet, and with lowered heads, momentarily sparred like fighting-cocks.

At 6 o'clock I reached Ashleam Bay, one of the many inlets of the Atlantic-facing side of the island. Here, sheer, barren cliffs form a noble background to Nature's charming marine picture, and yet a gigantic precipice of solid rock, projecting as a great knife-edge, seems as though it would threaten destruction to the occupants of the peaceful waters below.

To the west, six miles off, I saw through the misty showers the Bills Rocks, where the lordly Great Black-backed Gull brings forth its brood safely, being not seriously disturbed when the gunners of the battleships of the British Fleet use these rocks as a target.

Southward, could be dimly discerned the outline of some of the Galway islands; to the north was Dooega Head, capped with a canopy of deep grey clouds. But the day was dull, and much of the grand coast scenery was invisible. I hoped on another day to witness the panoramic view from the Achill coast, where the stupendous precipices form part of "Europe's first barrier against the fury of the Atlantic."

Scattered on the rocks of Ashleam Bay, were many Shags, always an attractive sight, especially when viewed through a binocular. A flock of Herring-Gulls indulged in extraordinary aerial antics, precipitating themselves, with closed wings, Gannet-like, from a height far above the cliffs, but, unlike that bird, they stayed their course, spreading their wings before reaching the surface of the water. The ascending flight, which took a spiral path, was also remarkably rapid, though by no means so swift as the downward swoop. This movement was continued for some time, and, from my position on the cliff (half way between the highest and lowest points of flight), the view of the ascending and descending birds was an imposing sight.

This habit is indulged in by other than sea-birds, and the presence of high cliffs seems to offer a peculiar inducement: thus Rooks, Jackdaws, and Choughs swoop and ascend over

the face of precipitous cliffs with a speed which, judging from their wing-movements in other localities, is truly surprising. As I turned my back on the beautiful cliff-land scenery, a flock of Curlews flew upwards from the rocks. The birds winged their way across the cliff-tops, alighting in the fields adjoining the sea, presumably to feed on earth-worms,[1] a habit which I have noticed in other localities.

In accordance with what I have already noted, Mr. Williams informed me that on Achill Island, Curlews may be seen plucking blackberries[2] from the bushes.

Returning by the same route, just as the Ashleam road was reached, six Choughs flew overhead. They evidently formed a family party; the adult birds, taking the lead, were cawing loudly; the brood, with more sportive twisting flight, followed closely. Almost immediately afterwards a pair of Hooded Crows appeared, their heavy form and lumbering flight offering a pretty contrast to the graceful and buoyant movements of the Choughs.

On the road from Breanaskill, and about a mile from the Sound, Mr. Williams drew my attention to a large flock of Starlings returning to roost. It would appear that this species is a comparatively recent addition to the avifauna of the island; now, five hundred may be seen at one time, and, as a rule, even during the day, the flock keeps together, not dividing into small companies. Indeed, it is rare to find Starlings scattered in small numbers over the island. I noticed an immature male Sparrow-Hawk flying leisurely towards a cottage, the spot being only a stone's throw from the breeding haunts in the fir-trees at Glandarary. Two immature birds had been killed during the spring: Mr. Williams shewed me the skin of one—an exceptionally heavy female—which when procured proved to be in a very fat condition.

On returning at 7 o'clock to the Sound, I found that Swallows were abundant, and in the fading twilight I observed four Wheatears on the wall-tops, a fine big Hare on a turf-bog, and a half-grown black Rabbit running about on a cultivated grass field.

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[1] Patten, *Irish Naturalist*, 1902, p. 127.

[2] Watters, *Birds of Ireland*, p. 144; Patten, *Aquatic Birds*, p. 363.

Wednesday, September 11th.—Starting at 9.30 a.m. for Breanaskill Bay, I took up a position at the open window in Mr. Williams' house. Here I remained until 6 o'clock, p.m., experimenting with the telephoto camera and making observations with the prism-binocular. For telephotography, requiring short exposures, the light was very poor, and few birds, even when driven in by the rising tide, came into the photographic field, and when they did, they were so incessantly active, that time exposures were useless, while instantaneous work with the telescopic attachment was equally so, especially with the poor light at my disposal.

We again watched the Redshanks splashing in the channel; I was interested to learn from Mr. Williams that here the water, flowing down from the bog, was soft and fresh, and, no doubt, more refreshing for shore-birds to bathe in than the briny sea-water. Along several points on the Dublin coast, where fresh-water rivulets enter the beach, I have noted different species of wading-birds bathing.

Presently the scene was marred by the arrival of three tame ducks; these birds having wandered the whole way across the slob, took up their position in the channel, obscuring several of the waders, with whom they seemed quite out of place.

But the presence of the ducks sank into oblivion when a great flock of Curlews alighted at the edge of the channel, and marched boldly into it. The majority of the birds contented themselves with wading until their breasts touched the water, but a few launched themselves into the channel, swimming successfully against the current for several yards, and reaching the other side, rapidly mounted a seaweed-covered rock and commenced to peck vigorously at the wet, slippery weed.

In the room where I was making observations, a Swallow had built her nest, and just at that moment she flew in by the window, out through the door of the room, and coursing up and down the hall, gained exit through the open hall-door.

It was interesting to see a Wood-Pigeon alight among the shore-birds and remain for several minutes picking on the sands. Returning to the Sound at eventide, I noticed

numbers of Black-headed and Common Gulls on the water. I learned from Mr. Williams that of the two species the latter is much more abundant in Achill, except during the breeding-season, and at all times the Black-headed Gull is much less numerous here than it is in Dublin Bay. Cormorants were more numerous in the Sound than Shags, the latter being always more partial to the open sea and cliff-bound coast. Nevertheless, when Shags appeared in the Sound, they occurred in groups of half a dozen or so; Cormorants more often singly.

Thursday, September 12th.—Accompanying Mr. Williams to his house at Breanaskill, I spent the day experimenting with the telephoto apparatus. The light was better than on the previous day, though far from good. As the tide ebbed I discovered that on a certain rock, covered with brown sea-weed, Redshanks, Ringed Plovers, and Curlews frequently alighted.

Friday, September 13th.—Another day at Breanaskill Bay with the camera. The chief subjects photographed were Redshanks, Ringed Plovers, and Curlews scattered over the slob-lands.

Saturday, September 14th.—This being a bright, beautiful day, I gave up the forenoon to telephotography, hoping at last to get successful results. I took up my usual position at Breanaskill Bay. Arriving at the house, I peeped out of the window and descried several Curlews asleep on a reef of sand nearly surrounded by water. It was here an easy matter to make time exposures, but the birds formed a bad subject, as the heads and beaks rested on the backs, and only the breasts faced the camera, so that the birds resembled little else than a number of round grey stones. Presently the sun shone out so brightly that the water of the slob-land glittered like silver spangles, and, under the focussing cloth, it was evident that this vivid halation would cause complete effacement on the photographic plate of considerable flocks of birds. Abandoning photography, I next watched with interest how a Herring-Gull and two Hooded Crows walked several times round the carcase of a drowned pig, now and again halting to make a closer inspection. It was amusing to see the Crows tilting their heads sideways with a philosophic air as though they were deeply considering how they should commence to

dispose of the much coveted prize. However, they and the Gull made little advance, for after a few feeble strokes with their beaks they hastened away on foot, and rooted along the slob for garbage. It was quite evident that the carcase was too fresh and the hide too tough for their liking, and that the animal would remain there for several days before these useful scavengers would trouble to make a good meal off it.

Next I watched closely the movements of a Greenshank as it raced up and down the fresh-water channel which intersected the slob-land. The channel was very shallow, and, through the binocular, I could plainly see the long green legs of the bird. When feeding, the Greenshank stretches its neck forward, lowers its head, and thrusts its beak horizontally forward. The slightly upcurved beak, when pushed along the mud, subserves the function of a very narrow spoon. This is a very different attitude from that assumed by the Curlew when feeding on the slob. The latter plunges its decurved beak with great rapidity into a "worm-hole." The entire beak right up to the forehead is boldly thrust downward, the curvature helping to enlarge the worm-track and facilitate the capture of the worm as the bird rotates its head and pushes it vigorously forward. I have watched Curlews feeding in several localities, but never have I witnessed this remarkable action of the beak better than at Breanaskill Bay. Here, I was able to see the worms brought up and swallowed while the beak was only partially withdrawn from the mud. This took place in most instances, though sometimes the beak was wholly withdrawn first. From the amount of plunging of the forehead that goes on in soft ooze, I have little doubt that the Curlew feasts on numbers of worms which are captured by the sense of touch when the beak is probing in the mud. I am strongly of the opinion that the primary use of the long slender decurved beak of the Curlew is to act as a pick-axe when submerged in estuarine mud or sandy soil.

In the afternoon, I left Breanaskill with Mr. Williams and party, and wandered barefooted along the strand toward the Sound, searching for Sand-eels. I noticed numbers of Herons picking up small fish and other creatures from the shallows, also several Turnstones and Oyster-catchers feeding on the sands. Among the numerous gulls which passed overhead

was a Common Gull in the interesting brownish nestling plumage.

Sunday, September 15th.—Mr. Williams and I left the Sound at 10 a.m. I took with me the prism-binocular, but as the day was misty and the weather unsettled I left the camera at the house. We walked along the main road to Mweelin valley, and then commenced the ascent of that mountain. Part of the ground at the foot of the mountain was swampy and harboured numerous dark-coloured frogs, while higher up several beautiful Stonechats, perching on the heather-tops, attracted our attention. It was a delightful ascent; vegetation was luxuriant, and insects abundant, judging from the enormous numbers entangled in the geometrical webs of the fat mountain spiders set over the furze and heath. Towards the summit the mountain became so steep that with each step we clutched the heather-stems to aid us in our ascent. Now, and again, after a stiff climb we halted, and from our pronograde position rolled over on our backs and lay at full stretch almost breathless. With active exercise and a sultry day the heat proved too much for us, so off went, not only our coats, but our waistcoats, collars, and ties. In our lighter attire we scambled up, and after half an hour's hard climbing reached the summit.

During the ascent the midges proved very troublesome, and it was not until we traversed the top and came in sight of the mighty Atlantic and felt its refreshing breeze that the tiny pests left off attacking us. Here the atmosphere was surprisingly different from that of the leeward side which we had just left. The breeze from the ocean was so sharp that we quickly attired ourselves in our discarded garments, and even while making a rapid descent we were none too warm. Far beneath us lay Keel beach in full view; the gulls which lined the fringe of the breakers appeared as little white dots, and yet their harsh scolding cry was audible 1,500 feet above the sea. Otherwise the beautiful stretches of sand appeared void of bird-life, for the greyish shore-birds, whose colours so admirably harmonize with their surroundings, were as yet undiscernible by the naked eye. But the powerful binocular revealed the presence of numbers of Redshanks, Oyster-catchers, and Ringed Plovers, pattering about or flitting

hither and thither in search of food. Half way down the mountain my attention was arrested by the appearance of a Fox. He was a fine fellow, fully grown, and as he scampered down the hillside scattering a flock of sheep on his way, he displayed the white of his "brush" admirably. It was delightful to see him quietly but steadily beat his retreat on this vast open tract, so different from the terror-stricken victim which dashes across half-cultivated lawns to escape the fatal clutches of the blood-thirsty huntsmen and hounds. Nearing the Cathedral Cliffs, two Ravens flew past, appearing smaller than Jackdaws against the stupendous rocky precipices. Reaching Keel strand we bathed, the cold sting of the ocean water proving most exhilarating. The Common and Herring Gulls on the strand were remarkably tame; while an immature Great Black-backed Gull came so close, that, with the sun shining on its back, the pattern of its chequered plumage could easily be made out. It was now four o'clock in the afternoon, and, having halted for half a hour to rest and eat our sandwiches, we passed through Dukinelly village, where from a field two Hooded Crows and two Choughs arose, and the shrill cry of a Merlin sounded from the adjoining turf-bog. We then marched back along the main road reaching the Sound about 8 o'clock, p.m.

Monday, September 16th.—The day was wet and misty, and neither camera nor binocular were of much service. I did not venture far afield.

Tuesday, September 17th.—Another wet and misty day, on which it was useless to take the camera. The greater part of the day was spent along the beach at Ashleam Bay. Rock-Pipits were numerous, while a Robin was perched on a boulder near the water's edge, a curious spot in which to see this familiar species. Here, also, I had a fine view of nine Rock-Doves, which flew, at a considerable height above the cliffs, out to sea. On the return route, I noticed several Rock-Doves and a pair of Choughs in a field, also numerous Yellow-Hammers and a flock of Twites. A soft, relaxing mist, which settled down in the afternoon, prevented further observations being made, and to add to this misfortune, we were troubled with swarms of midges, which pursued us even into the house.

Leaving, for a moment, the wild animals of the Island, my attention was drawn to the extraordinary surefootedness of the domestic Ass, which, encumbered with baskets laden with seaweed, and with unshod, unkempt, overgrown, and crooked hoofs, marched up and down the narrow cliff-paths at a rapid rate. In some instances, boys or girls mounted the animals: sometimes the owners marched behind, driving the animals before them.

Wednesday, September 18th.—The morning was beautiful. With Mr. Williams, I started from the Sound at 10.30 a.m., taking the mail-car for Dugort. With the exception of a few Meadow-Pipits, and two Kestrels which hovered over the fields in search of their prey, nothing was added to the list. Indeed the paucity of bird-life as we traversed the main road across the island—a distance of some nine miles—struck me as remarkable.

Arriving at the "Capital of Achill," we repaired to Slievemore Hotel, where I had the pleasure of making the acquaintance of Mr. Sheridan. Among his collection, he showed me the famous American Goldfinch which he captured on the island. This specimen was of particular interest to me, as I had seen scores alive in Canada the previous summer. His Hooded Crow was a great pet. It was in perfect plumage, and had complete liberty to go where it liked: it would alight at a window-pane and demolish flies, picking them off the glass with great rapidity, and despising none from the Blue-bottle to the tiny Gnat. In the afternoon, we noticed at Dugort a great assemblage of Cormorants on the massive rocks jutting out from the sea. We had a good view of these birds through the binocular from the cliffs above.

Thursday, September 19th.—We left Dugort by car in the morning, and returned to the Sound. In the afternoon I sallied forth, and was able to evade the onslaught of the midges only during a most refreshing bathe. Even while drying, the little pests swarmed round, so that one's only chance was to get clothed as soon as possible, and decamp. In the evening, Mr. Williams took me for a ramble through Glandarary woods. The fuchsias were in blossom, and most luxuriant, but the blackberries were slow to ripen, despite the genial climate. We added nothing more to the bird-notes.

Friday, September 20th.—The morning sun shone so brightly that I resolved once more to repair to my studio at the open window at Breanaskill, and work the telephotographic camera. The scene on the slob-land was beautiful. The shallow sand-pools and gullies left by the receding tide were absolutely tranquil, and, like mirrors, reflected the images of hundreds of shore-birds, which, still and listless, were enjoying the genial weather of early autumn.

But ere many photographs were secured, the scene began to change; a mist went up from the water, which enveloping the birds, rendered them indistinct, as though their material forms were being reduced to vapour. I have noticed this curious effect on several occasions on the extensive slob-lands of Dublin Bay. The heat-mist arising from perfectly smooth waters seems to carry the birds upwards, and, while not excluding them from view to any extent, seems to transfigure them into gaseous, ghost-like, avian forms.

At last the opportunity came to take a few photographs.

Only a hundred yards off, a pig appeared on the foreshore, and commenced to root with its snout at some garbage; a Hooded Crow, which happened to be perched on the top of a hay-cock close by, attracted by the loud grunts, perceived the pig trespassing on its preserves. Without hesitation, the bird quitted the field, and, perching on a stone beside the garbage, gave forth such hoarse, angry cries, and made so many attempts to peck, that the lumbering animal was content to move along the beach in search of food. I obtained several photographs of this amusing scene. Anyone who witnessed it must have sympathised with the poor Crow, in finding, to his dismay, a live pig demolishing his store of refuse on the beach, instead of a dead one contributing to it.

Having indulged in a mid-day dip and some lunch, I put up the camera and started along the shore for a ramble. I have always had a predilection for watching about old walls, especially when built of loosely piled-up stones, knowing such to be a favourite run of the Stoat, a little creature which I take the greatest delight in observing. On the beach, adjoining Mr. Williams' house, such a wall was to be found, and, as I strolled along leisurely, enjoying an afternoon pipe, my little friend—indeed a very big one of its kind—showed itself.

It first appeared from over the top, and, dropping down on the side of the wall facing me, commenced to examine systematically every nook and corner. Nothing could be more interesting than to watch the daring of this little animal. Predatory by nature, and intent on seizing its prey alive, it shows none of the timidity so common among many other animals when man appears on the scene. A rat at a stone wall disappears from one's gaze at once not to return; a squirrel rushes up the tree and hides among the topmost foliage. The big herbivores and even many of the carnivores take to their heels at the sight of man; but, undaunted in courage and bent on business, the nimble Stoat treks along the wall in and out, ever and anon disappearing and re-appearing to the delight of the naturalist. Keeping apace with the little animal, I had it in view for a full hundred yards until finally it jumped into a potato-field and disappeared.

During my ramble along the beach, the only other species of bird which I came across was a Whimbrel, which passed overhead attracting my attention by its loud whistles.

Saturday, September 21st.—The afternoon was spent on the slob-lands of the Sound, where I observed a small flock of Dunlins in immature plumage associating with numbers of Ringed Plovers.

Sunday, September 22nd.—At 11 a.m. Mr. Williams and I left the Sound. It was a hot misty day with a gentle S.W. wind. We took the road to Breanaskill Bay, thence by Derreen to Kildavnet. At the churchyard here we saw pipes, some in boxes, laid on the graves, a habit still kept up in numbers of remote country places in Ireland.

Watching the birds on the beach, I saw two Hooded Crows feeding with Redshanks. It is interesting to think how the force of circumstances acts so instinctively among lower animals. That both Crow and Redshank were hungry there was no doubt, and that several times the former could have easily seized and killed the latter was equally true. But, here one sees the Crow, not purely predatory by nature, instinctively fraternizing with shore-birds, to satisfy a common want; though had one of the latter been even slightly disabled, the Crow would have set upon it and torn it to pieces at once.

Proceeding along the Sound in a southerly direction, and not far from Darby's Point, were several trawlers, and it was interesting to watch the Cormorants diving and coming up just in front of the bow of a boat, at the sight of which they instantly dived again to escape collision. Some of the birds swam quickly across the bow, and when alongside, looked anxiously at the fishermen. Here the Cormorants were thickly distributed on the water; in one small area I counted sixteen fishing. In the fields I noticed three Rock-Doves among the cut corn. From their build and general demeanour I came to the conclusion that two were cocks and the third a hen. I watched them closely with the binocular for several minutes as they picked up the corn, and noticed that on the ground they did not coo. The bird which I suspected to be the hen rose and alighted on the wall of an adjoining field, and was soon joined by one of the remaining birds which had followed her with a loud clapping of wings. The sexes now became manifest, for the first bird passively received the addresses of the second, which pattered up and down in front of her, after the fashion of all male domestic pigeons, spreading his tail, which he dragged on the ground, and, at the same time, cooing with inflated crop. Moreover, the male bird "took possession" of a sod of turf which was lying on the wall, and proudly pirouetted up and down it as though master of the ceremonies, driving off the other cock bird which in the meantime had approached the hen and endeavoured to court her. Assuming that the Rock-Dove of the present day resembles a generalized ancestral Rock-Dove in its habits, it would seem that this habit of "taking possession" of certain spots on the house-top or dove-cot, so well known to the keeper of domestic birds, had already existed in the wild ancestor (*Columba livia*), and has been handed down to the domesticated descendants. In the light of Darwin's evidence, which goes to prove that all our domestic breeds are descendants of the wild Rock-Dove, we have here an interesting example of conservation of habit over thousands of years.[1]

[1] "The earliest known record of pigeons is in the fifth Egyptian Dynasty, about 3000 B.C., as was pointed out to me by Professor Lepsius; but Mr. Birch informs me that pigeons were given in a bill of fare in the previous dynasty." (Darwin, "Origin of Species.")

Passing Darby's Point, we came to Cloghmore, where we saw several Common Gulls in adult and immature plumage, also a Greenshank running over the sands with great rapidity. Having descended to the beach we made for the Blind Sound, and having scrambled down the rocks to the water's edge, we halted for a bathe.

Keeping to the coast-line we wheeled round, and going northward, made for Bunnafahy, taking occasional rambles up and down the cliffs, where accessible. At Bunnafahy, the cliffs, black and barren, are steep and fissured. Here also are chasms whose narrow walls project beyond the cliffs. Through the vestibule thus formed, with its narrow strip of Atlantic floor, I saw many Rock-Doves enter and perch on the ledges within the gloom of Nature's Dove-cot. Just then I suddenly detected a flock of Turnstones, old and young, numbering in all about eighty. It was a grand spectacle, and I longed for my camera, especially as the birds allowed of near approach, and showed little disposition to move. The sheer, black rock formed a bold background as the birds arranged themselves on shelf-like ledges, their bright yellow legs showing up against the dark stone. The summits of many rocks were tenanted by groups of Herring-Gulls, while some dozen Curlews and a few Red-shanks rested at highwater mark on the beach below. It was now past mid-day, and as we sat at lunch, our attention was aroused by the hoarse cry of a Raven. Looking up, we saw its black figure in the distance flying over the face of the cliffs. During the bird's approach we remained quietly seated and had a very good view as it flapped past us some eighty yards off. Continuing our walk to the hills overlooking Ashleam Bay, we again saw the Choughs, this time a flock of twelve. As they disported themselves in the air with buoyant and glancing flight, and, alighting on the cliff, uttered their cheerful though unmusical Kee-aw, Kee-aw, I could not think of one of Nature's creatures which took fuller enjoyment out of life. Between Ashleam and Breanaskill I observed two Hooded Crows, several Yellow-Hammers, a Wren, and flocks of Twites, Redpolls, and Sparrows. Throughout the day Swallows were plentiful. At 8.30 p.m. we reached the Sound after a good day's outing.

Monday, September 23rd.—At 10 o'clock in the morning I started for Dugort alone. I journeyed on foot with a view of noting what birds might be seen when crossing the island. My observations were practically the same as those made on the previous occasion when we drove to Dugort. A Kestrel again showed itself, this time sitting on an old gate-post, and a few Lapwings crossed the bogs. It was my intention to return to the Sound the same day, but the kind hospitality offered me by Mr. and Mrs. Sheridan induced me to remain on.

Tuesday, September 24th.—I joined Mr. Sheridan's party on the long car. We drove westward, passing through the villages of Keel and Dooagh. At the latter we were assailed by children selling Achill amethysts. Proceeding half a mile or so further, we alighted and lunched. We made the rest of the expedition towards Achill Head on foot, some of the party taking ponies. Mr. Sheridan remained behind at Dooagh, having entrusted us to a native guide who told us many a good story. Enquiring of him if he had seen Eagles, he informed me that he remembered when he had seen them *by the hundreds* round Achill Head!! During our ascent we came upon an amethyst quarry lately worked; here we collected several specimens of amethysts in the rough. Our guide showed us a piece of rock full of these crystals which he kept hidden under a stone in a stream. It was for sale to anyone who would bid 5*s.* for it, but we had collected so many stones that we felt we could not oblige the old gentleman by taking it.

Bird-life was not prolific; a Kestrel, sitting on a rock far down the heather-clad cliff, viewed with the naked eye appeared as small as a Sparrow. With the powerful prism-binocular it appeared as large as ever, and the plumage-markings were readily seen. Shags and Gulls were fishing in the waters below, while a flock of fifty Choughs (according to Mr. Sheridan, an unusually large number to see together at Achill) alighted and commenced to feed in a field on the brow of the cliff above us Having reached Keem Strand, we retraced our steps, and joining the long car, drove back and had tea in the village of Dooagh; thence we returned to the hotel in the evening.

Wednesday, September 25th.—Mr. Sheridan kindly drove me back to the Sound, where the afternoon was spent witnessing the "Sports" which included horse races on the strand, boat-races, and swimming races.

SUMMARY.

The reader who is cognizant with the bird-life of Achill will at once see how comparatively few in number are the species which I have observed. That many common species were overlooked I have not the slightest doubt. Nor have I any reason to disbelieve in the existence of the Eagle, Wild Goat, and many other interesting creatures on this beautiful isle; but they did not come under my own observation. That several rare birds have been observed and procured on the island is also known to many of us, and recently published records[1] are accessible to those who may wish to look them up. In one's daily journal, notes of all sorts are jotted down, so that part of the information given may be already known to the reader; that which contributes to the furthering of our stock of knowledge will, I trust, prove acceptable. The whole was gleaned during a holiday ramble on an island visited for the first time by the writer, who feels sure that the lover of nature who visits it will be more than amply repaid.

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[1] Mr. Sheridan has contributed several notes on the occurrences and captures of rare birds in Achill Island to the pages of the *Irish Naturalist*, *Field*, and other Journals: Mr. Ussher and Mr. Warren, in "The Birds of Ireland" published in 1900, and the writer in "The Aquatic Birds of Great Britain and Ireland," which appeared six years later, have endeavoured to incorporate all available records of rare Achill birds in these books.

The University, Sheffield.

NOTES.

BOTANY.

Eurhynchium striatulum in Co. Limerick.

This is a rare moss in Ireland, and has seldom been observed of late years. It was found first by Wilson many years ago at Muckross, Killarney, where Rev. C. H. Binstead collected it again in 1896 on shady walls. Dr. Moore recorded it from Devil's Glen, Co. Wicklow, and noted that it was apparently rare. It has not been found since in Co. Wicklow. In 1905 I found a small patch of it at Askeaton, Co. Limerick, but the specimen was lost. This year, on making further search, I was glad to find it in several localities in that district. It is a southern species, extending from Italy and Dalmatia as far north as Anglesea and Derbyshire, in England, and Wicklow, in Ireland. I have a fruiting specimen collected by Rev. C. H. Binstead, near Wells, Somerset, in December, but it seldom fruits in this country. The Limerick plants were barren, but it was too late in the season for fruit, which matures in winter and early spring. I give some particulars of habitat and appearance in hope it may be looked for in other suitable localities in Ireland.

E. striatulum is not more than half the size of *E. striatum;* the leaves are striate, but quite different in shape and cell structure. It resembles *E. myosuroides*, Schp. more than any other of our mosses, and may have been overlooked as that species; while the stems creep close to the rock, the branches are somewhat dendroid as in that species, but the leaves are striate with longer nerves. I found it only on limestone, not in exposed or warm places, but always in cool or shady spots on the north or east sides of dry stone walls. It grows plentifully for 200 yards at the foot of the wall of the field opposite the gate of Askeaton Rectory. It occurs sparingly on a wall near the river Deel above the town, and more plentifully on a wall by the roadside at Ballynort half way between Askeaton and Beigh Castle. Search on the rocks of the crag country was not successful. It seemed to be confined to the localities indicated, at the foot of walls having a northern or eastern exposure.

C. H. Waddell.

Saintfield, Co. Down.

Ditrichum tortile (Schrad.) in Ireland.

According to the Census Catalogue of British mosses published in 1907, the little moss *Ditrichum tortile* has hitherto been found in six of the vice-counties of Great Britain, but not in Ireland, while the var. *pusilla* occurs in four of the British and in two of the Irish vice-counties, the two Irish records being, Dodge's Glen in East Cork, in Moore's "Synopsis of the Mosses of Ireland," and several Co. Antrim localities specified in the "Flora of the North-East of Ireland." It is therefore

interesting to note the discovery of what Mr. H. N. Dixon, who kindly examined the specimens, considers to be normal *D. tortile*, in two counties of Ulster. In May, accompanied by my friend the Rev. C. H. Waddell, I gathered a fair sized tuft of it on sandstone at Scrabo Hill, Co. Down; and in July I received a miscellaneous parcel of mosses picked amongst the sand-dunes at Rosnowlagh, in Co. Donegal, by the Rev. W. F. Johnson and his wife, amongst which I detected a small tuft of this plant. These two localities being so far apart, one on the N.W. coast and the other almost on the N.E. coast of Ulster, encourages one to hope that *D. tortile* will be discovered in some of the other counties of Ireland.

H. W. LETT.

Loughbrickland.

Wood Betony in Co. Wexford

On July 31st I found this rare plant, *Stachys Betonica*, growing in some abundance in the lane leading from Killowen to Ballykelly between this townland and New Ross. It is, I believe, nearly twenty years since was last recorded from this county in other localities.

G. E. H. BARRETT-HAMILTON.

Kilmanock, Waterford.

Plantago media in Co. Down.

Last June, Miss Florence Wilson, who resides at Belvoir Park, sent me a plant for identification. I recognised it as *Plantago media*. I went to examine the locality, and found several specimens within a very restricted area. It would seem to be fairly well established there, and evidently has been there for some years.

W. P. CARMODY.

Knockbreda, Belfast.

ZOOLOGY.

The Crayfish in the Shannon.

The freshwater Crayfish, though known to be plentiful in a few of the eastern counties of Ireland (Cavan, Dublin, Kildare, and Wicklow), does not appear to have been recorded from elsewhere in the country. have seen it in the Shannon at Castleconnell, Co. Limerick, and Doonass, Co. Clare, where it occurs abundantly.

R. A. PHILLIPS.

Cork.

Some New Irish Woodlice.

I have to record the capture on the sea shore, at Howth, Co. Dublin, of *Philoscia Couchii* Kin., in considerable numbers. This species which has not previously been taken in Ireland, has only been found in Great Britain in three localities in Devonshire and Cornwall. The habitat is amongst the rocks and shingle of the sea shore above high water mark, where its active habits make it somewhat difficult to capture, and no doubt account for the fact that it has escaped notice so long. It will probably be found again in suitable localities along the southern coasts of Ireland, and may possibly occur further north, but it is a southern species ranging as far south as North Africa and the Canary Islands.

During the latter part of August, too, I have taken, in considerable numbers on the southern cliffs of the Hill of Howth, what I believe to be an Armadillidium new to the British Isles, nor can I identify it with any of the better known European species. I have given specimens to Dr. R. F. Scharff, who has kindly promised to make further enquiries into its identity.

DENIS R. PACK-BERESFORD.

Fenagh House, Bagnalstown.

Stock-Dove in County Wexford.

We have had a small colony of Stock-doves here for the last four or five years. I cannot, however, report any definite increase in their numbers, which as yet, as far as I can observe, do not exceed half a dozen.

G. E. H. BARRETT-HAMILTON.

Kilmanock, Waterford.

Fecundity of the Chaffinch.

Mr. Butterfield, in his note in the July number (p. 140), refers to Herefordshire instead of Hertfordshire. It is in the last-named county that my friend the Rev. Allan Ellison has carried out *his* studies, and it affords me considerable pleasure to support his statement that clutches of six eggs are by no means uncommon, and that clutches under five are unusual. I write thus after more than twenty years' continuous observation of Hertfordshire birds.

I regret I can offer no opinion as to this most interesting question, but I am inclined to agree with Mr. Butterfield that Mr. Ellison's theory is hardly correct.

W. PERCIVAL WESTELL.

St. Albans.

Whiskered Bat in Co. Wexford.

This Bat (*Myotis mystacinus*), although probably of wide distribution is rarely distinguished from the Pipistrelle, and seldom recorded. It may be well, therefore, to mention that one flew into a window of this house on the 8th August. It was a young one of the year, but fully grown. Mr. C. B. Moffat had previously found this Bat in this county, where we now know of the existence of at least four Bats, viz.:—Leisler's, Pipistrelle, Long-eared, and Whiskered, to which Daubenton's, although never captured, may almost certainly be added.

G. E. H. BARRETT-HAMILTON.

Kilmanock House, Waterford.

REVIEWS.

FIELD BOTANY FOR BEGINNERS.

The Young Botanist. By W. PERCIVAL WESTELL, F.L.S., M.B.O.U. and C. S. COOPER, F.R.H.S., Headmaster, Dewhurst School, Cheshunt. With eight coloured, and sixty-three black and white plates, drawn from nature, by C. F. NEWALL. Pp. 40+200. Methuen & Co., 1908. Price 3*s.* 6*d.* net.

This book is intended to meet the wants of a beginner in field botany—quite a beginner, in fact, since the plants dealt with in the volume consist of 202 of our most familiar wild-flowers. While some may find the arrangement and illustrations as here displayed more to their individual taste than those which obtain in similar books already on the market, the volume cannot claim, like so many recent books to supply a "long-felt want," nor to possess much originality of treatment. A short practical introduction leads to a chapter on classification and external structure, from which we pass to the brief descriptions of selected species which make up the remainder of the volume. These descriptions are arranged each under nine heads—habitat, time of flowering, and description in brief of the characters of the various parts of the plant: and as each of these, consisting of from one to ten words on the average, is allowed a separate paragraph, the result is a profuse spinning out of the paging. The English name is given the place of honour in each species, but the attempt to place the substantival before the adjectival portion of the name is not always happy, as in the case of "Parsnip, Cow," and "Violet, Water." The illustrations are irregular in quality, and while some are excellent, others, such as that of Angelica (p. 74) and the Corn Mint (p. 128) cannot be commended. The drawing of Scentless May-weed (p. 105) recalls rather *Anthemis Cotula*, and that of the White Goose-foot (p. 147) represents an Atriplex. In a "Colour Index" at the end of the book some confusion has occurred, by which Gorse figures among the white flowers, and Carline Thistle among the purple. But these are minor blemishes in an attractively got-up book, which will probably help many a child to take his first steps in field botany.

R. LL. P.

A MOTH-COLLECTOR'S GUIDE.

Practical Hints for the Field Lepidopterist. By J. W. Tutt, F.E.S. Part I., 2nd edition. Pp. 28+106. London: Elliot Stock, 1908. Price (interleaved), 6*s*.

It is seven years since the first part of this well-known work was published, and now the repeated calls for a second edition have led the author to issue it in a revised form. The principal addition to the book is the new introductory section, comprised in the first 28 pages and divided into seven chapters, in which are given valuable "hints" on such subjects as preserving, killing, pinning, setting, labelling, and holiday collecting. An entire chapter is devoted to the important subject of "Entomological Pins," and every naturalist who has handled a large number of preserved insects, in his own collection or in a museum, knows the importance of these indispensable implements. Mr. Tutt does not hesitate to write plainly on the merits and demerits of the pins supplied by various makers, but he advises the collector to look carefully with a powerful lens over his stock, and to pick out the really good pins for use, rejecting those with points too fine, too blunt, or hooked, and those with bent shafts.

It is surprising to find in the chapter on "setting" that a naturalist so open to new ideas as Mr. Tutt continues to acquiesce in the "British" style of setting Lepidoptera low down on the pins so as to fall readily a prey to mites and psocids, and with the wings drooping towards the surface of the drawer or box, so as to give those pests every possible chance. The example of modern museums must tell in time on all collectors of insects, and the peculiar "British" style of setting must give way to the rational "Continental" method in the future. In his insistence on the necessity for labelling the specimens themselves, however, and not being content with a diary record, Mr. Tutt has our warm sympathy. But, as he points out, the difficulty of effective labelling is immensely increased by the irrational "British" setting.

The bulk of the volume consists of "hints" for collecting and other work arranged as a calendar. A section is devoted to each month—or group of months—and the insects to be looked for at the particular time of year are mentioned under their "superfamily" or family headings. Here the student will learn where and how to find eggs, larvæ, and imagos, how to dig for pupæ, what plants to collect with a prospect of emerging moths at a later date. In most of the statements made, it is clear that the author is giving us the benefit of his unrivalled personal experience—notably in his directions for larvæ-hunting among coast sandhills or in the East Anglian fens. Some qualification might be advisable to the statement that "during the second week in June larvæ of *Lithosia caniola* and *L. complana* are to be found at Howth." The London collector who indulges in a trip to Dublin in confidence of taking these rare species may be disappointed!

G. H. C.

THE BRITISH ASSOCIATION IN DUBLIN.

THE Dublin meeting of the British Association for the Advancement of Science, for long anticipated with pleasure by Irish naturalists and men of science generally, was held as arranged during the week from the 2nd to the 9th September. We believe that the general verdict of cross-channel visitors pronounced the meeting to have been a distinct success. Nearly 2,300 members and associates attended—a larger number than at most of the meetings held during recent years, but 300 fewer than at the Dublin meeting of 1878. It is to be feared that this falling off from the standard of thirty years ago shows a want of advance in scientific interest among the people of the Irish capital. We can but hope that the great meeting of this year may lead to a true "Advancement of Science" among us, a recognition of the claims and importance of science in the fields of general culture and of special industry, an increasing interest in the progress of science among the intelligent public.

FORMER MEETINGS IN DUBLIN.

This year's gathering of the Association has been its eighth on Irish soil and its fourth in the Irish capital. Belfast has entertained the "Parliament of Science," three times—in 1852, 1874, and 1902; Cork once—in 1843; Dublin four times—in 1835, 1857, 1878, and 1908. It is noteworthy that each of the last three meetings in Dublin has been held a few years after a meeting in Belfast. It is to be hoped that Ireland may have the pleasure of another visit from the Association before many more years shall have passed. Is it not time for Cork to take steps to secure a second meeting in the near future?

PREPARATIONS AND ARRANGEMENTS.

A strong desire had been expressed that the Association should visit Dublin in 1907, and in 1906 steps had already been taken for the reception. When the invitation for 1908 was accepted, therefore, a strong local committee soon got to work, the chairman being Dr. A. Traill, Provost of Trinity College, and the vice-chairman Very Rev. Dr. W. Delany, President of University College. The local honorary treasurers were Justice Dodd, Sir J. Creed Meredith, W. M. Murphy, J.P., and I. A. Waldron, M.P. The secretaries were Dr. J. McGrath, J. Mulligan, Prof. W. H. Thompson, and Prof. W. E. Thrift. On these naturally fell the brunt of the work of preparation. Special sub-committees settled the arrangements for meetings, hospitality, and lodgings, excursions and entertainments, finance, and the handbook and other publications The handbook has already been reviewed in these pages.

The accommodation for the meetings of the Association was judiciously distributed among the educational and scientific institutions of the city. Trinity College supplied the reception rooms, the official refreshment rooms, and many of the sectional meeting rooms. But Economics was located at the Royal Irish Academy, its sub-section Agriculture at the Royal College of Science, Geography at the Royal Dublin Society, Zoology at the Royal College of Surgeons, Anthropology at the Royal College of Physicians, and Education at the Royal University. The large hall of the latter institution also served for the Presidential Address, the Evening Discourses, and the General Meetings. The Conference of Delegates from affiliated societies met at University College.

Facilities were afforded to members who wished to flit from section to section, by means of telephonic communication between the various meeting rooms, enabling a board to be displayed in each section, announcing papers in progress elsewhere, and by special tramcar and motor services.

The proximity of the National and other museums rendered any extensive special local collection needless. A good series of photographs illustrating the geology, botany, zoology, and antiquities of the district was, however, got together by Prof. Cole, Dr. G. H. Pethybridge and H. J. Seymour, and exhibited over the dining hall of Trinity College.

PROCEEDINGS OF THE ASSOCIATION.

THE PRESIDENTIAL ADDRESS.

Dublin was supremely fortunate in entertaining the British Association in the year of Francis Darwin's presidency, a year which marked the jubilee of the theory of Natural Selection as promulgated in July, 1858, before the Linnean Society by Charles Darwin and Alfred Russell Wallace. It was hoped that the President might deal with the progress of the evolution idea from the work of his great father to the present time. But in his opening remarks he declared himself "quite unfitted" for such a "gigantic task." Nevertheless, starting from the subject of his own special work—the movements of plants—he threw light from many points on the burning biological problems of the day. A few quotations may give an idea of the course of the argument of his most notable address.

"The fact that plants must be classed with animals as regards their manner of reaction to stimuli has now become almost a commonplace of biology. . . . We can as a rule only know the stimulus and the response, while the intermediate processes of the mechanism are hidden in the secret life of the protoplasm. We might, however, have guessed that big changes would result from small stimuli since it is clear that the success of an organism in the world must depend, partly at least, on its being highly sensitive to changes in its surroundings. . . . Morphological alterations produced by changes in environment have been brought under the rubric of reaction to stimulation, and must be considered as essentially similar to temporary movements. The very first stage in development may be determined by a purely external stimulus. . . . Klebs kept *Saprolegnia mixta* in uninterrupted vegetative growth for six years; while by removing a fragment of the plant and cultivating it in other conditions the reproductive organs could at any time be made to appear.

"If a sleeping plant is placed in a dark room after it has gone to sleep at night, it will be found next morning in the

light position, and will again assume the nocturnal position as evening comes on. Here we see the leaves rising and falling in the absence of the accustomed stimulation; this change of position . . must be the result of the internal conditions which habitually accompany the movement. This is the characteristic *par excellence* of habit. It is consistent with the doctrine of continuity that in all living things there is something psychic, and if we accept this point of view we must believe that in plants there exists a faint copy of what we know as consciousness in ourselves.

"We have been considering the mnemic quality of movements. The development of the individual takes place by a series of stages, each stage apparently serving as a stimulus to the next . . like the movements linked together in a habitual action. The rhythm of ontogeny is actually and literally a habit. . . . There is a resemblance between the two rhythms of development and memory, and there is at least a *prima facie* case for believing them to be essentially similar. My view is the same as that of Hering, which is generally described as the identification of memory and inheritance. . . . Evolution depends on a change in the ontogenetic rhythm; we have to ask in what ways the rhythm can be altered. If ontogeny is a routine, each generation must be mnemically connected with the next. This can only be possible if the germ cells are, as it were, in telegraphic communication with the whole body of the organism. . . . The mnemic theory of development depends on the possibility of somatic inheritance or the inheritance of acquired characters. . . It is clear that there must be war to the knife between the theory of Weismann and that of the somatists. . . The strength of Weismann's theory lies in its explanation of heredity. . . [but] I am not satisfied with Weismann's theory. . . I incline to deny the distinction between germ and soma, to insist on the plain facts that the soma is continuous with the germ cell and that the somatic cells may have the same reproductive qualities as the germ cells (as is proved by the facts of regeneration.) . . The mnemic theory . . is strong precisely where Weismann's views are weakest—namely, in giving a coherent theory of the rhythm of development. We know that by

making a dog sit up and then giving him a biscuit we build up something in his brain in consequence of which a biscuit becomes the stimulus to the act of sitting. The mnemic theory assumes that the determinants of morphological change are of the same type as the structural alteration wrought in the dog's brain.

"The nucleus is the centre of development; in Semon's phraseology the nucleus contains the engrams in which lies the secret of ontogenetic rhythm. But . . its function is comparable to that of a nerve-centre; it does not cast out engrams, as Weismann's nucleus is assumed to drop armies of determinants. . . The nuclei of the whole body may be believed to become alike. The mnemic hypothesis harmonises with the facts of heredity and ontogeny. But the difficulties, . . I confess, are of a terrifying magnitude. . . How are the changes arising in the soma telegraphed to the nerve-cells? . . In plants the flow must be conceived (according to Semon) as travelling by intercellular plasmic threads, but in animals primarily by nerve trunks. . . To me it seems conceivable that such telegraphy is possible. But I shall hardly wonder if a majority of my hearers decide that the available evidence in its favour is both weak and fantastic. Nor can I wonder that . . the existence of somatic inheritance is denied for want of evidence. But . . it seems to me certain that in development we have an actual instance of habit. If this is so, somatic inheritance must be a *vera causa*.

"The great engine of natural selection is taunted nowadays, as it was fifty years ago, with being merely a negative power. The mnemic hypothesis of evolution makes the positive value of natural selection more obvious. If evolution is a process of drilling organisms into habits, the elimination of those that cannot learn is an integral part of the process. . . It is surely a positive gain to the harmony of the universe that the discordant strings should break. . . ."

The address was delivered in a quiet, yet impressive, style, not closely read, and with such judicious omissions from the printed copy as to keep it within an hour's limit. Unfortunately, the speaker's voice did not reach the farther parts of the

hall. The vote of thanks to the President was proposed by the Lord Lieutenant (the Earl of Aberdeen) in a tasteful and humorous speech, in which the "waking" action of sleeping plants—even in the absence of any luminous stimulus—at the habitual time, was held up as an example to the human organism. Sir Archibald Geikie seconded the vote, in a few admirable sentences, pointing out the likeness of the President to his great father, in indicating so candidly the weaknesses of the position that he himself held.

No student of the history of evolutionary thought can help being struck by the fact that the President of the British Association for 1908—apart from the "mnemic" theory that especially characterised his address—holds the doctrine of natural selection as Charles Darwin held it, in conjunction with a belief in use-inheritance. The naturalist son of Charles Darwin is a Darwinian, and not a "Neo-Darwinian."

THE EVENING LECTURES.

The usual two evening discourses were delivered on Friday, 4th, and Monday, 7th September. The first, by Professor H. H Turner, F.R.S., on "Halley's Comet," held a large audience deeply interested. The second, on "The Lessons of the Colorado Cañon," by Professor W. M. Davis, of Harvard University, was remarkable for its great lucidity and the completeness and beauty of its illustrations. The sequence of sediments, upheavals, and denudations to which the great physical feature described owes its formation, were brought before the eyes and minds of the audience by a striking series of lantern slides, several of which were repeatedly used as occasion required. In proposing a vote of thanks to Professor Davis, Professor Grenville Cole urged the claims of geography as a subject of University study.

The "Artizans' lecture" was given on Saturday evening, 5th September, by Dr. A. E. H. Tutton, F.R.S. His subject was 'The Crystalisation of Water."

THE DELEGATES' CONFERENCE.

The conference of delegates from affiliated societies is always an interesting feature in a British Association meeting, especially to members of Field Clubs and other local scientific bodies. At Dublin the delegates met in University College on Thursday, 3rd, and Tuesday, 8th September. At the first meeting, the chairman of the Conference (Professor H. A. Miers), presided over a large gathering, and delivered an address so suggestive and valuable that a somewhat extended summary will be welcomed by readers of this magazine. We print also a full summary of a paper by Mrs. Hobson, of the Belfast Naturalists' Field Club, on the establishment of local "Sanctuaries."

THE EDUCATIONAL OPPORTUNITIES OF LOCAL SCIENTIFIC SOCIETIES.

BY PROFESSOR H. A. MIERS, F.R.S.

The affiliated and associated societies number some which came into existence nearly a hundred years ago, and many of them date back to a time when there was no organisation which attempted to diffuse a taste for science throughout the country at large. These societies were doing pioneer work by creating a general scientific atmosphere. In fact, before the birth of the British Association they were almost the only agencies occupied in this sort of pioneer work. The British Association itself may be regarded as a magnified society of the same character, changing its habitat from year to year; and the importance of the early work which it effected in popularising and promoting scientific ideas cannot be over-estimated. During this period the work of the societies was not supplemented in any very adequate manner by the publishers or the Press; public interest in the general laws that underlie the processes of Nature was only dawning; the prevailing attitude of mind was indulgent curiosity; there was as yet no intellectual thirst for scientific knowledge sufficient to create a demand for a special literature. It was not easy even for those who had a personal interest in some scientific subject to ascertain what progress was being made.

It was only at a much later period, after the stimulus had been supplied by the British Association, and by the Local Societies (whose rapid increase was no doubt due in a great measure to the influence of the British Association) that a real thirst for information made itself felt, and created a sufficiently widespread demand for a new class of scientific literature. This resulted in the appearance of a number of excellent cheap text-books of elementary science, designed to give a certain

amount of sound general knowledge and to stimulate the desire for more, and for a considerable time these continued to fulfil precisely the object for which they were intended. Written by acknowledged leaders of thought, they challenged the attention of educated and intelligent people to whom perhaps science had not meant much before. But by fostering the desire for more accurate and detailed knowledge these primers contributed perhaps to their own extinction, for with the increase of special training and the dissemination of expert knowledge they have been more and more supplanted by the educational text-book used in schools, and the advanced specialist treatise. From the point of view of the amateur this is to be regretted; for he can no longer get an adequate insight into the modern advances of science without either going through a course of special reading in text-books of various grades—for which he has no time—or attempting to master a treatise which he can hardly be expected to understand without a preliminary training of some sort.

Moreover, it must be remembered that the intelligent amateur no longer necessarily belongs to a class outside scientific circles as he did formerly, but he is frequently quite learned in one branch of science though he may be the merest amateur in another. And yet he is in danger of being placed in a position somewhat similar to that of his predecessor, the amateur of sixty years ago. For him the introductory text-book is too laborious and in a sense too elementary, the treatise is too technical and is expressed in a language which he cannot understand. On the other hand, the magazine or newspaper article he dare not trust. Several good scientific journals exist which appeal to a wider public than the specialist, but even here the articles are too often expressed in language which cannot be understood by the ordinary reader.

Is not this also true about the societies? The greater societies are becoming every day more highly specialised both in their publications and in their membership; there are very few which occupy themselves with more than one branch of science; and even those few which profess to cover a wider field break up into sections.

If it be difficult for the intelligent amateur to extract information from the scientific text-book or treatise, how much more difficult is it for him to learn anything from the proceedings and meetings of these societies, in which it often happens that a paper, though read in a meeting of specialists, can only be fully followed by two or three of those present?

The result is that our intelligent amateur, whether he be a scientific man or no, is placed very much in the position where he was sixty years ago; and I believe that now, as then, he may find salvation in the local scientific society, if it really attempts to meet his wants. Cannot the Local Societies, in addition to their ordinary work, make a special effort to satisfy the educational needs of the great many intelligent people who have not been trained in, or have not had access to, laboratories, museums, and scientific libraries, or biological field-work.

It is true that for their working purposes, especially if they are naturalist or field clubs, it is advisable for societies to break up into sections, but if only they could succeed in keeping their members together upon

some common ground in which they are united by a general interest in science, and could offer educational help, they would be doing work which cannot be performed by any other sort of society or by the publication of any ordinary text-book or treatise. In the present state of scientific knowledge and specialisation nothing can be more useful than to bring together persons interested in different subjects and to enable them to understand one another. The most useful function that can be performed by the Local Societies, in addition to that of kindling an interest in local problems and in the methods by which they are to be studied, is to encourage a habit of expressing scientific result in simple and intelligible language that will appeal to the whole society. Indeed, nothing can be better or more useful for the scientific specialist himself than to attempt to explain his own work in simple language to a mixed audience.

The educational opportunities which lie before the local scientific societies can only be developed by co-operation between the professional and the amateur; let the professional scientist become less professional and let the amateur become less amateurish when they come together at the meetings of such societies. Everyone must have seen how the utility of a society is undermined by a single pedantic address, which only causes members to drop their attendance, or by the reluctance of some members to attend unless they can expect to be amused by lantern-slides or showy experiments or witty talk. And yet where can better material exist for the teaching of science than among the members of a society who have joined it voluntarily, and in the first instance because they really wished to learn?

An account of some piece of original work actually in course of progress, and described by the enthusiast who is himself carrying it on, is far more interesting and stimulating than any secondhand account in text-books and treatises of the work that has been done at some previous time by others, and should not require any additional embroidery to make it attractive. Anyone who hears a keen naturalist describe the excitement with which he has watched something new in the habits of animal or plant must catch the spirit of enthusiasm, and feel the stir of interest that is the inspiration of all successful teaching.

I am aware that to many it will seem that popularisation of the newest thing in science is being overdone at the present time, I am suggesting, however, that not only the brilliant discoveries, should be taken up by the Local Societies, but that the more ordinary work of everyday science, equally necessary and perhaps equally momentous in its consequences, which is at present buried in the proceedings of one sort of society, should be made a real and living thing by the humbler societies of another sort.

Up to the present, however, I have left out of sight the really great educational advantage that science possesses over all other subjects, namely this: that science is not only talk and thought, but action; that there is always ready to hand, not only something new to be described or narrated, but something new to be actually done by both

teacher and pupil. Either some natural object or occurrence to be seen that has never been seen before, or some experiment to be made that has never been made before. It is this which fires the enthusiasm and stirs the imagination, and makes scientific research so enthralling; and the educational work which the Local Societies can best perform is the encouragement of original research. A good deal is already done by some of them; but on the whole how little compared with what might be done by some co-operation between scientific workers and the societies, and some organisation of the societies themselves. Education requires teacher and pupil: it would not be enough in general that the members of a society should be interested by the address of a specialist and then be left to their own devices to imitate his work and endeavour to research for themselves. After he has stimulated their interest, they need his guidance and advice. But I believe that many a scientific investigator could enlist an army of willing workers through the Local Societies if he were given the opportunity of interesting them in his own researches, of suggesting to them lines of simple investigation which they could profitably pursue, and of continuing to guide them by advice and criticism.

Let the Local Societies initiate a new Science Extension movement, in which they contribute from their members the willing workers who are ready to act under the guidance and inspiration of those who have had the advantage of special training and experience. Let them attract new members with this object. There are so many persons anxious and able to do something in the way of scientific work who only want the sympathy and guidance of a leader more experienced than themselves; such leaders may not infrequently have to be sought among the teachers or researchers outside the society.

In this way, and by some such co-operation, will the professional cease to be a professional, and the amateur cease to be an amateur, when they meet upon common ground in the local scientific society.

Surely anything that tends to break down the barrier between the professional scientist and the amateur, between expert and layman, is for the good of scientific progress. That the one should ever be actually discouraged by the other seems almost incredible; and yet one has to make the humiliating confession that this happens again and again.

In this connection I would beg all who can to read the most fascinating and illuminating address delivered to one of our societies, the Yorkshire Naturalists' Union, by Mr. Lamplugh, when he was its President in 1906—an address which protested forcibly against the unhealthy distinction between amateur and professional, and put forward a plea for the need of the amateur spirit in scientific work. If I have succeeded in this Address in making a practical suggestion that embodies the spirit of his appeal, I may hope in some measure to repay the debt that I owe to one who has always inspired me with the example of true and undivided allegiance to the call of pure science.

SANCTUARIES FOR OUR NATIVE FLORA AND FAUNA.

BY MRS. MARY HOBSON.

The present time seems most opportune to introduce the desirability of establishing Sanctuaries, for here in Ireland the farms are being purchased by the tenants from the landlords, and many spots of value to science, of general interest and beauty, are in danger of disappearing. The demesnes are to be retained by the landlords, and it is to them that we must look for help. It is suggested that Field Clubs, and kindred Societies, should first consider the most likely spots suitable for Sanctuaries, say, one in each county or area, and then send a deputation of their members to the owners, asking them to fence them in, and guard them from the ravages of intruders, the cost of which would be slight.

It might be thought that county councils, or other public bodies, could assist: some of them have not the power to acquire land, and it is useless to ask the Government; for so much money is wanted for relieving congestion, etc. Happily, Sanctuaries do exist, and Lambay, Clonbrock, Knocknarde, etc., are well known to readers of this journal. I do not advocate the preservation of these for the admission of the man who fondly imagines himself a naturalist, because he is making a collection, and excluding for his benefit the man in the street. In journals one reads abuse of the professional bird-catcher, and the woman who has the wings of wild, and often rare, birds in her hat. I have no defence for them; but what one does object to is, that where the former are killing the commoner sort, the so-called scientific person is not only collecting, but advertising, every rare bird, and it seems absolutely absurd for one class to throw stones at the other. The same with the botanists; they are scouring the country for rare plants, and the excuse is that they rarely take roots. I know cases to the contrary; and, even so, the scarcer the plant, the greater the loss of the seed. A mania for collecting is rampant; societies should face the fact that rare birds, plants, eggs, butterflies, etc., are being collected on too generous a scale, and that public opinion should be formed to stop the vast destruction of life going on about us. How often one reads of cases like the Large-billed Reed Bunting, the Red-throated Diver, etc. These birds are captured, and are not allowed to breed, by the persons and for the objects I have indicated. Have we made up our minds that no new species shall be added to our lists? It looks like it. One of the usual pleas for collecting is, that eventually they will find their way to Museums. I venture to say that our curators often resent the dumping into them of much indifferent property, which fills the space so very badly wanted for objects of true educational value. I think that "Primitive Man" might often be applied to our state. We are not very far on the road to civilisation; we are only beginning, child-like, to notice the things about us. We are children let loose in the Father's Beautiful House, and are guilty, sometimes in ignorance, of breaking and marring the beautiful things with which He has surrounded us.

At the second meeting Prof. Grenville Cole presided. The attendance at the opening was good, but became thin as the afternoon passed away—perhaps through the attraction of the party at the Zoological Gardens. Several papers of interest were read and discussed.

THE SURVEY OF RESTRICTED AREAS WITH REGARD TO THEIR FLORA AND FAUNA.

BY PROF. GEO. H. CARPENTER.

The writer gave a short account of what had been done, and what was proposed to be done in Ireland, to impress upon all interested in the work of local societies the important results that might be obtained from the really systematic survey of restricted areas with regard to Flora and Fauna, and their relations to the country in its wider aspects. Lambay had been surveyed with considerable care during the last few years. The results were surprisingly good. They found five animals new to science, twelve new to the Britannic Fauna, and eighty animals and plants new to the Irish Fauna and Flora. One of the principal objects of this survey was to trace the paths of migration of animals and plants along the east coast of Ireland. A survey is now being conducted by the Dublin Naturalists' Field Club of the North Bull, a sandbank known from the evidence of old maps to be only a century old, the object of the survey is to ascertain what species first occupy new portions of land. A survey of Clare Island is about to be conducted, and very important results are hoped to follow from such a research on the west coast where the Fauna and Flora are of exceptional interest. In conclusion, the writer trusted that his remarks would have the effect of directing the efforts of local societies to the desirability of having such surveys in Great Britain as complete as possible.

THE ADVISABILITY OF RE-STOCKING HAUNTS FROM WHICH RARE SPECIES HAVE DISAPPEARED.

BY H. DAVEY (BRIGHTON).

In this paper the writer gave evidence for the view that extinction of many rare species has not always followed as the result of over-collecting, but frequently from climatic or other uncertain cause. For example, the Large Copper Butterfly was, doubtless, exterminated by collectors in some of its haunts, but not in all. Attention was also called to the unaccountable restriction of many insects to small areas, and their total absence from exactly similar, or apparently equally suitable places in the neighbourhood. The judicious introduction of fresh broods of extinct or vanishing species was advocated.

In the discussion that followed, the importance of recording all artificial introductions was strongly urged by several members.

On the motion of Rev. R. A. Bullen, seconded by Mrs. Hobson (Belfast), a resolution was adopted, bringing under the notice of local societies the necessity for preserving the fauna and flora of their respective districts as against wanton destruction or careless or needless collecting.

ON PERMANENT RECORDS OF NATURAL HISTORY OR OTHER OBSERVATIONS BY MEANS OF THE CARD CATALOGUE SYSTEM.

BY F. A. BELLAMY, M.A., F.R.A.S.

In this paper the importance of efficient research work by local societies was enforced. Each society can make a permanent county or other district natural history record by the use of a card catalogue, stored in appropriate cases, at some convenient centre. The catalogue should contain all published references to the species of the local flora and fauna, geological features, etc., and also the yearly additions to knowledge made by the members of the local society.

WORK IN THE SECTIONS.

SECTION C.—GEOLOGY.

In the Geological Section, the most original feature was the address of the President, Prof. J. Joly, F.R.S., which was an exposition of personal research and reasoning on the relations of "Uranium and Geology." He pointed out that the accumulation of radium in the earth's crust, in great excess of the proportion that can be conceived to exist in the earth as a whole, may be accounted for by the rise of the hot radio-active nuclei towards the surface in a period when convection-currents were still possible. He quoted a number of measurements made by himself to determine the radium-contents of surface rocks, and enquired whether the world is heated throughout by radio-thermal action. If, as is likely, uranium, the parent or grandparent of radium, exists also in the core of the earth, this central part is rising in temperature; but the amount of heat added in a given time is always diminishing as the uranium decays. If this heat maintains the temperature of layers round the core, its reduction will allow of the cooling of these layers and the consequent giving off of a great amount

of heat from the surface. Hence the heat escaping from the earth cannot be taken as a measure of the radium within. Yet the earth has probably reached the stage when the loss of its heat is balanced by that supplied by radium, and when its future cooling depends on the decay of the uranium within, and the consequent diminution in the supply of fresh radium to the mass. An examination of the proportions of radium in the rocks from the St. Gothard and Simplon tunnels shows that the abnormalities of temperature in these tunnels are related to the radium locally present. The next section of the address dealt with the effect of the accumulation of sediments, naturally containing uranium and radium, on the temperature of the underlying crust. A weakening of this part of the crust must result through the rise of temperature towards the base of the deposit, and it will hence yield to stresses readily. The sedimentary region, commonly of a band-like form, will then become bulged up into a mountain-chain, a fact which is well known to occur in geological history. Since the rise of temperature at the base of a deposit is proportional to the square of the thickness of the deposit, it by no means follows that sediments, such as deep-sea red clays, of high radio-activity, are as effective in promoting crustal movements as others of less radio-activity but greater thickness. Prof. Joly's address appears in full in *Nature* for September 10th, 1908.

The whole subject connecting radium and temperature being only five years old, it is remarkable that conclusions of such high interest should already be forthcoming. Prof. Joly does not conceal the assumptions made when he comes to calculations: but the mere comparative measures, obtained with considerable labour, offer a sound basis for future dissertations.

The second distinctive feature of this section was the discussion that was arranged on Mountain-building, in which the President also took part. Here, again, heating due to radio-active bodies was brought into play. Since recumbent folds and *nappes de recouvrement* absorbed much of the attention of the speakers, Sir A. Geikie usefully pointed out the formation of certain mountains by block-faulting, without conspicuous folding. Prof. Lapworth gave what was practically

a brilliant lecture of an hour's duration, in which he developed the relations of mountain-ranges to the earth as a whole. Prof. Sollas urged that attention should be directed to the transference of lava to considerable distances as the result of earth-pressures engaged in rearing mountain-chains. He quoted the President's views as to the rise of temperature under regions of sedimentation as being in complete harmony with the present position of our mountain-axes on the globe. He also entered into interesting details of some of the overthrust folds in Switzerland. Prof. Cole endeavoured to emphasise the importance of gravitational sliding in producing some of the features of recumbent folds, and stated that Reyer's views, recently revived, were really in themselves a revival of those prevalent about 1820. Scrope's conception of an ideal mountain-chain, where the strata had slipped away outward on either side of a central protrusion, might, after all deserve an equal place beside theories of lateral compression,

The papers relating to Ireland are specially reported below, except that by H. B. Muff and R. Carruthers on the Geology of the Leenane District, which will be published in full in an early issue. It may be noted with pleasure how the difficult problems of western stratigraphy are attracting the attention of a keen body of younger workers. The boundaries at present suggested between Ordovician and Silurian (Upper Silurian) beds in Ireland, are, as is generally recognised, liable to much reconsideration.

Egypt and the Sudan were represented by Dr. Hume and Mr. Grabham, respectively. Dr. Hume's paper on Egyptian petrography took a properly broad view of rock-description, and was illustrated by numerous original lantern-views. Mr. Hayden and Mr. Fermor, of the Indian Survey, and Mr. Muff, who has made such valuable observations in Uganda, contributed to the discussion on laterite and pisolitic iron-ore, to which Professor Cole's paper, dealing with Antrim, was merely an introduction. Dr. Tempest Anderson illustrated the modification of features in St. Vincent since the great eruption of 1902. Professor W. M. Davis brought his wide experience to bear on the conditions of the Snowdon area during the Glacial epoch, and his characteristic sketches on the blackboard were among the best features of the meeting.

At a time when Dr. Smith Woodward was opportunely in the chair, Professor H. G. Seeley described, with characteristic power of exposition, a new reptile from the Karroo beds of South Africa, the skull of which clearly indicates the existence of a proboscis of some length, capable, as may be judged from the muscular attachments, of being waved like that of an elephant.

Although papers on physical geology perhaps somewhat preponderated, workers in all branches contributed by their presence to the success of these well-attended conferences. It is not invidious to say that a gathering which included such senior workers as Mr. W. Whitaker, Sir A. Geikie, Professor Seeley, and Professor Lapworth, was certain to be stimulating. Mr. H. J. Seymour, as local Secretary, organised a most successful series of excursions; remarkable among these were the two whole days on the Saturday and Sunday. On the former, Dr. Matley conducted a party of sixty members over the Carboniferous section from Rush to Skerries; and on the latter, some thirty members enjoyed a drive and walk, in brilliant sunlight throughout, from Rathdrum to Glenmalure, Glendalough, and the Vale of Clara.

Section D.—Zoology.

The zoologists of the Association were admirably housed in the Royal College of Surgeons, Professor Alex. Fraser acting as local secretary, and making excellent arrangements. Dr. S. F. Harmer, F.R.S., of Cambridge, was President of the Section, and local naturalists were gratified that Dr. R. F. Scharff, of the National Museum, was accorded the honour of a Vice-Presidency.

In his address, Dr. Harmer dealt particularly with the morphology and variability of the Polyzoa, a group in which, as he reminded the Section, an Irish zoologist, J. Vaughan Thompson, was the pioneer student, and G. J. Allman, another Irish naturalist, author of the "classical monograph." Dr. Harmer's own researches on the Polyzoa are known to all zoologists. In a lucid and comprehensive survey of the Polyzoan "colony," he discussed the function of the curiously modified individuals known as "avicularia," supporting the view that, "like the pedicellariæ of Echinoderms, they are

defensive organs," and that their services are valuable against "encrusting organisms, including other species of Polyzoa; . . indeed, the enemies against which a polyzoon has to provide are probably in a special degree the members of its own class." Attention was called to the extreme variability of the avicularia among the Polyzoa, and the difficulties raised by this variability. "What conclusion can we draw from the association in one and the same colony of the vicarious type of avicularium with adventitious avicularia of the most specialized description? How can we explain the fact that each kind of avicularium occurs in certain species, but not in all the species, of many distinct and not specially related genera? And lastly, what is the significance of the fact that certain species of a genus which is normally provided with avicularia may be totally destitute of these organs?" It is not surprising that Dr. Harmer, meditating on these problems in the Cambridge of the twentieth century, suggests "that some of our difficulties might be removed by appealing to the results obtained by workers on Mendelian inheritance . . . that the perplexing occurrence of vicarious avicularia in some of the colonies of certain species may be interpreted as a reversion due to the combination of two or more allelomorphs that may not have occurred together in the parental forms."

The meetings of Section D were, on the whole, of very great interest. Abstracts of papers dealing, directly or indirectly, with Irish questions are given below. Perhaps the most striking feature was a joint discussion with Section K on the "Determination of Sex," on Monday, 7th September, opened by Mr. L. Doncaster, and continued by Miss N. M. Stevens, Mr. W. Heape, F.R.S., and Professor W. Bateson, F.R.S. Mr. Doncaster, from breeding experiments with the common Magpie Moth (*Abraxas grossulariata*), and its variety *lacticolor*, concludes that "sex determinants behave as Mendelian characters, maleness and femaleness being allelomorphic with one another, and femaleness dominant. All females are heterozygotes, carrying recessive maleness, and producing male-bearing and female-bearing eggs in equal numbers; all males are homozygotes, carrying only maleness, and producing only male-bearing spermatozoa." This theory was supported by the remarkable researches detailed by Miss

Stevens, through which Professor E. B. Wilson, herself, and other American cytologists have demonstrated the presence of an odd number of chromosomes (one less than the normal number) in some spermatozoa of certain species of insects, these spermatozoa apparently fertilizing female-bearing eggs, those with the full number male-bearing eggs. Professor Bateson also supported the theory from breeding experiments with Canary Finches. Mr. Heape, on the other hand, gave reasons—derived for the most part from human birth-statistics —in support of somatic influence on the determination of sex.

Evolutionary problems of an older and simpler type were raised on Thursday, 3rd, by Professor Poulton, Dr. F. A. Dixey, and Mr. J. C. Moulton, who exhibited and discussed series of butterflies, illustrating "convergent mimicry" of distasteful forms. Embryologists were well pleased to welcome Professor A. W. Hubrecht as a vice-president; he took the chair on Monday afternoon, September 7th, when Professor J. P. Hill described the "Segmentation of the Marsupial Ovum," and Professor E. W. MacBride "Gastrulation in Amphioxus." These two authors defended respectively the ancestral value of the monotreme yolked egg, and the ectodermal nature of all the inpushed cells in the Amphioxus gastrula. Both of these familiar positions were genially attacked by the great Dutch embryologist. Later in the same afternoon, Dr. A. Smith Woodward, F.R.S., of the British Museum, delighted the Section with a lecture on the "Evolution of Fishes." On Friday afternoon (4th Sept.), Professor Cossar Ewart lectured on the "Wild Ancestors of the Domestic Horse," expressing his belief that the North-western and Libyan races of domestic horses are both derived from *Equus gracilis* of the French Pleistocene.

Geographical zoology was represented by Dr W. A. Cunnington, who described his recent expedition to Lake Qurun, in Upper Egypt; of very special interest were the announcements of a freshwater gymnolæmatous polyzoon with a circular lophophore and eight tentacles, and of a freshwater medusa with its hydroid stage. Professor W. A. Herdman contributed "Notes on a recent visit to the Ceylon Pearl Bank," and Professor G. H. Carpenter gave an account of newly-discovered Arctic and Antarctic Collembola.

On Tuesday, September 8th, the Section held a joint meeting with I (Physiology) to consider the biological and pathological relations of blood parasites, especially Trypanosomes. R. Newstead contributed an account of the Bionomics of Tsetse flies, while J. E. S. Moore and A. Breinl described some newly-discovered features in the life history of the Trypanosoma of sleeping sickness. When the flagellate parasites disappear from the blood they are present as small, non-flagellate cells in the spleen and marrow. Drs. Breinl and Hindle gave a paper on the life history of *Piroplasma canis*. Besides the ordinary amœboid and "twinned" forms in blood corpuscles, they detected two flagellate forms—one round, the other oval, in the plasma of the vertebrate host. But they had no results as to the life-cycle in the tick.

A discussion on nomenclature was opened on Friday morning, 4th September, by Mr. G. A. Boulenger of the British Museum. He protested against the changes, in well-known, classically-used names, that are supposed to be required by the "law of priority." Apparently Mr. Boulenger carried the meeting with him, as a strong resolution on the subject was passed.

The Section did not meet for business on Saturday, 5th September, but a party of seventy paid an early visit to the Zoological Gardens in Phœnix Park, where the Council of the Royal Zoological Society entertained them at breakfast in the Haughton House. This gathering was generally admitted to have been very enjoyable, and much interest was afterwards displayed in the fine set of animals on view, especially the three Chimpanzees at present in the Anthropoid House, two well-grown litters of Lion-cubs, and the Pacific Sea Lions and Irish Grey Seals in their new pond. In the afternoon, by kind invitation of Rev. W. S. Green, a party of zoologists travelled to Kingstown and boarded the new fisheries cruiser "Helga." The vessel steamed out towards Lambay, and practical demonstration of the admirable gear and apparatus for collecting and preserving marine specimens was given.

Section E.—Geography.

The Geographical Section met in the Lecture Theatre of the Royal Dublin Society—an ideal place for its meetings, both as regards accommodation and lantern facilities. The President (Major E. H. Hills, C.M.G., R.E.), chose as his subject the present and future work of the Geographer, especially with regard to the British Empire. It is interesting to note that, speaking of survey work, he made a strong appeal for a new primary survey of the British Isles, pointing out that among modern national surveys it was recognised as one of the least accurate, the average error in triangulation being far in excess of that which is to be looked for in good modern work. During the meeting the Section had before it papers dealing with almost every part of the world, and every aspect of geography from survey instruments and school geography to Mediterranean man and Peruvian forests. Of three papers dealing with Irish subjects, only one was read by an Irishman—Rev. W. Spotswood Green; the others being contributed by Dr. C. A. Hill and Mr. Harold Brodrick, two of a band of explorers who have been working energetically at British caves and pot-holes for some years past.

Sub-section F.—Agriculture.

The votaries of Agriculture met as a Sub-Section of F (Economics), being located in the Royal College of Science, and with a chairman, vice-chairmen, and secretaries formed in all essentials a distinct Section. Sir Horace Plunkett presided over the meetings, and in a brilliant address dealing with agricultural co-operation and the policy of small holdings, especially as affecting Ireland, drew attention to the need for a general revival in rural life and the part that scientific instruction might be expected to take in bringing the people "back to the land."

In the proceedings of the Sub-Section, economic and biological subjects, were pleasantly mingled. The biologists enjoyed a field day on Friday, September 4th, when Prof. W. Bateson, F.R.S., opened a discussion on "Breeding and Modern Theories of Heredity," giving a brilliant and lucid account of the Mendelian principles. R. Punnet and Prof. J.

Wilson followed from the same standpoint, while W. Heape, F.R.S., insisted on the need of rational nutrition for the mother. On Saturday, 5th September, one party visited Colonel Everard's tobacco farm in County Meath, while another were received at the Albert Agricultural College, Glasnevin, and shown over the buildings and lands.

Section H.—Anthropology.

Section H met in the Royal College of Physicians under the presidency of Professor William Ridgeway. The programme was a long and varied one, lasting the full five days, and the meetings were well attended throughout, the excellent acoustic properties of the lecture hall adding greatly to the success of the Section. The President's address, "The application of Zoological Laws to Man," in which he attacked the almost universally-held theory that Europe was first peopled by a non-Aryan race, and also called attention to certain tendencies of modern legislation, which he deemed unwise from the anthropologist's standpoint, was one of the best and most original of the presidential addresses. Papers which attracted much interest were those of Dr. Elliot-Smith, dealing with the history of mummification in Egypt, and a fully illustrated account of the Veddas, by Dr. C. G. Seligmann. Considering that the Section met in Dublin, and under an Irish President, Irish Archæology was not as well represented as it might have been; but Dr. Scharff read an important paper on the Irish crannog horse, and Mr. Goddard Orpen furnished a contribution on the vexed question of Irish motes, while Mr. Coffey and his assistant were responsible for four fully illustrated papers, which included an account of the distribution of gold lunulæ in Ireland and portions of Northern Europe, and a paper on a leather shield of Bronze age type, recently discovered in Co. Longford, and presented to the Royal Irish Academy. It was gratifying to hear the President, when discussing these papers, tell the Section that they had beside them, in the Royal Irish Academy's collection, the best arranged Museum in the British Islands, and probably in Europe. Plenty of time was allowed for discussions after each paper, and these were, in nearly every case, illuminating and useful.

Section K.—Botany.

The botanists were faithful to their craft, and the attendance throughout the meeting was steady. The President, Prof. F. F. Blackman, D.Sc., F.L.S., in choosing a physiological subject for his address, set an example which was maintained in many of the papers read—plant physiology bulking large in the programme. This pabulum was varied by a good discussion on the origin of Dicotyledons, and by ecological papers on the woodlands of Northern and Southern England. Outside the meeting room, however, various diversions lightened a rather heavy programme. Saturday was spent in an excursion to the Murrough of Wicklow, where even the physiologists condescended to field botany. A visit to the National Herbarium, followed by tea, was much appreciated; a very successful Section dinner was held in Jury's Hotel; while the members of the British Vegetation Committee, accompanied by some friends, including Prof. Bower, Prof. Weiss, and Prof. Praeger, spent the week before the meeting in Connemara and Clare, and had also a day's outing on the Dublin Mountains, studying the plant formations there.

Section L.—Education.

The fact that so distinguished a biologist as Prof. L. C. Miall, F.R.S., presided over this Section caused naturalists to take no small interest in its proceedings. The presidential address on useful knowledge made great but not excessive claims for the value of science and its place in education both scholastic and professional. A most suggestive feature of the address was its insistence on the need of selection and of concentration. "The truly useful knowledge is mastery. Mastery does not come by listening while somebody explains, it is the reward of effort." No wonder that in subsequent discussions the President feared that lantern slides and elaborate museum specimens meant only to be looked at may not always help scientific education. A discussion of special interest to naturalists on "Education in relation to Rural Life" took place on Friday, September 4th. D. Houston, F.L.S., G. Fletcher, F.G.S., and Rev. Dr. Foley were among the speakers, and the value of nature study was warmly advocated.

ABSTRACTS OF PAPERS BEARING ON IRISH NATURAL HISTORY.

SECTION C.—GEOLOGY.

ON THE CAVE OF CASTLEPOOK, NEAR DONERAILE, CO. CORK.

BY R. J. USSHER, H. J. SEYMOUR, E. T. NEWTON, AND R. F. SCHARFF

Castlepook Cave, north of Doneraile, consists of an extensive series of deep parallel galleries in limestone. Most of them are narrow, with vertical sides up to a certain level, where the walls recede with a wide sweep, forming an arched tunnel. Near the top of this the galleries are still spanned in places by an ancient stalagmite floor. Some of the sand on which the latter was formed is still adhering to it underneath. Beds of sand filled the lower parts of many galleries. This sand contained, sometimes down to 12 feet, numerous remains, chiefly of Reindeer.

The geological evidence as to the age of the cave is unsatisfactory. Only rolled and unstriated pebbles have yet been discovered in the cave, and no foreign erratic. This would seem to indicate that the material now in the cave, and hence the cave itself, is pre-Glacial in age, for otherwise a pebble of the granite known to be widely distributed throughout the overlying Boulder-clay might reasonably have been expected to occur amongst the large number of boulders found in the various passages. No such pebble has, however, been found. The inference, therefore, on more or less negative evidence, is that the cave was formed in pre-Glacial times.

The bird remains found in the cave call for no special remarks. More than half are referable to the Domestic Fowl, Turkey, and Duck, though some of the latter may belong to the wild form. Like the bones of the Rook, which are also numerous, they may have been brought in recently by Foxes. The remainder all belong to such species as are now found in the neighbourhood.

The Mammalian remains are of a very different character. It is true that the bones of the Rabbit, Sheep, Ox, Horse, Pig, Fox, Cat, and Rat seem mostly of comparatively recent origin. By far the greatest number of the bones found belong to the Reindeer and Bear. The exceedingly numerous bone splinters, the gnawed bones of Reindeer, and the presence of many bones of old and young Hyænas seem to indicate co-existence in Ireland of the latter and the typically Arctic species. The Hyæna, which had not previously been known to have ever inhabited Ireland, is closely related to that now living in South Africa. Other animals, whose remains were probably dragged into the cave by Hyænas, are the Mam-

moth, Irish Elk, Red Deer, and Wolf. Among the smaller Mammals the bones and teeth of the Arctic Lemming (*Dicrostonyx torquatus*) and of the Scandinavian Lemming (*Lemmus lemmus*) are very abundant. They may have been brought in by the Arctic Fox.

No human remains or implements were found, except parts of modern iron tools and charred wood, indicating the presence of man only within quite recent times

In so far as Ireland is not generally believed to have been joined to England by land in Glacial or post-Glacial times, the presence in the country of the Mammoth, Irish Elk, and Hyæna apparently confirms the opinion, arrived at from geological evidence, that Castlepook Cave must be a pre-Glacial one. This view is supported by the absence of many animals from Ireland which seem to have made their first appearance in England during the Glacial period.

PROBABLE CRETACEOUS AND CAINOZOIC OUTLINES OF THE COAST OF CO. KERRY.

BY PROFESSOR GRENVILLE A. J. COLE.

The dredgings made since 1901 by the Fisheries Branch of the Department of Agriculture and Technical Instruction for Ireland have amply supported the conclusions then put forward,[1] to the effect that the geological structure of the sea-floor off western Ireland can be deduced from a study of the stones lying on it from point to point. The most interesting recent results are the discovery of abundant flints, chalk, glauconitic chalk, and two specimens of Milioline limestone in dredgings off the coast of Kerry. Mr. Worth's observations in 1908 on similar materials in the English Channel thus receive confirmation from areas much further west, and it is clear that both the Cretaceous and Eocene seas extended to an unknown distance in that direction, though we can trace their boundaries fairly on the north-west. Many of the flints of southern Ireland may have been derived from local strata rather than from ice-borne drift.

ON DOPPLERITE FROM SLOGGAN BOG, CO. ANTRIM.

BY R. WELCH, M.R.I.A.

As early as 1812, a black, gelatinous-looking substance was noted in Irish bogs by the late Sir Richard Griffith, who mentioned it in his Report to the Bog Commission. Later, Mr. Moss (Registrar of the Royal Dublin Society) noticed a jet-like substance in dried peat, which he now believes was the same substance. In 1903, Mr. Robert Bell, a member of the Belfast Naturalists' Field Club, found a black, jelly-like mass occurring as veins in the lower or black-peat of Sloggan Bog, Co.

[1] Cole and Crook, *Report on Fisheries of Ireland for* 1901.

Antrim, which seemed new to him. This was sent to Mr. Moss, who came to the conclusion, after a careful analysis, that it was Dopplerite, a mineral found in Germany about fifty years ago by Herr Doppler, a mine inspector. As found, Dopplerite looks like a black jelly, but is practically non-elastic, breaking very easily under tension, with a conchoidal fracture like jet or glass. It dries into a jet-like mass, losing most of its bulk, and where it saturates the surrounding peat, rendering the latter almost as hard as a brick. Mr. Moss describes the mineral carefully in the Scientific Proceedings of the Royal Dublin Society for July, 1903, and in this Journal in the following month. He gives a list of the places in which it has been found in Germany and Switzerland, and mentions that in one case a stem of a tree, embedded in sand under peat, was found quite converted into Dopplerite. Mr. A. W. Stelfox, in recent years, noticed it in a bog in the West of Ireland; and I found it plentiful, not in veins, as at Sloggan Bog, but in small isolated patches, and saturating the peat, at Drumshambo, near Cookstown. Here the dried peats cut from it were as firm as bricks. The only instance I can find of its occurrence in the British Isles outside Ireland is in Co. Durham, in a pitfall at Tantobie, where a substance was found in 1905 in pockets and clefts that seems to be Dopplerite from the description given by Dr. G. A. Smythe in the Proceedings of the University of Durham Philosophical Society for 1906. There seems to be more carbon in the Irish specimens than in the English examples. Mr. Moss and Dr. Smythe both consider the substance well worth more attention and research, the former stating that he considers it the nearest approach to prussic acid occurring in nature.

ON THE IGNEOUS ROCKS OF THE OUTER BLASKET ISLAND.

BY PROF. J. JOLY, D.SC., F.R.S.

This contribution had reference to an investigation of the most westerly of the Blasket Islands, the two small rocks known as the Foze Rocks. A landing was effected in specially favourable weather and samples of the rocks secured. These show that the two islands are alike composed of black fine-grained lava, containing in parts many vesicles and even pumiceous in structure. The sections show much more or less turbid glass, with minute lath-shaped crystals and fine opaque dust, probably magnetite. It is suggested that this represents part of the lava plains of Silurian age which appear on the mainland and at Inishvikillane; thus enlarging this volcanic area to one of the most extensive in Great Britain.

ON A SECTION OF THE LOWER COAL MEASURES AT EMERALD PIT, DUNGANNON.

BY H. BOLTON, F.R.S.E., F.G.S.

A shaft was sunk in 1894-5 some little distance to the north of the old Drumglass Colliery, and was carried to a depth of 197 yards, penetrating five coal-seams before reaching the Main Coal, which was known to the miners as the "Congo" seam. During the course of the sinking a measured section was obtained of the strata passed through, and a collection of fossils brought together. After work had commenced on the deeper coal-seams, water broke into the colliery on two occasions, causing its abandonment. A generalised section of the measures passed through is as follows:—

	Yds.	ft.	in.
Strata,	46	2	7
1. Coal (inferior),		1	10
Strata.	3	2	2½
2. Coal,			½
Strata,	65	2	3
3. Coal (in thin partings with shale),	2	0	5
Strata,	44	0	11
4. Coal,			3
Strata,	25	0	5
5. Coal. (Top coal, 1 0; Brown shale, 7; Coal, 1 3; Inferior coal, 3; Coal, 9)	1	0	10
Strata,	5	0	6
6. Coal,		3	3

Down to the level of the 4th coal, the strata consisted mainly of red, yellow, and grey sandstones, with grey bind partings. Below the 4th coal, black and grey shales predominated. At a depth of 133 yards from the surface occurred a black shale containing a typical lower coal measures Marine Fauna.

The following species have been determined:—

BRACHIOPODA—
Discina nitida.
Lingula squamiformis.
Spirifera trigonalis.
Camarophoria isorhyncha?
Chonetes, sp.

PELECYPODA—
Sanguinolites plicatus, Portlock.
Nucula gibbosa.
Nuculana attenuata.
Protoschizodus axiniformis.
Parallelodon, cf. *Verneuillianus* de Kon.

GASTEROPODA—
Pleurotomaria, cf. *gemmulifera.*

CEPHALOPODA—
Orthoceras koninckianum? d'Orb.

VERMES—
Serpulites membranaceus.

FISHES—
Palæoniscid scale and tooth.

THE LATERITE AND BAUXITE ZONE OF NORTH-EAST IRELAND.

BY PROFESSOR GRENVILLE A. J. COLE, F.G.S.

This paper was merely explanatory of an exhibit of the types of rock formed during the interval between the basaltic eruptions in the North of Ireland in Eocene times. It was urged, in agreement with the views of Richardson and Tate, and Holden, that the red lateritic zone represents basalt altered *in situ* even down to depths of forty feet, the so-called "volcanic bombs" in the layer being residual lumps of less altered basalt. Such a type of alteration is clearly connected with the climatic conditions of Eocene times. Some of the pisolitic iron-ore may have accumulated on the surface of the laterite in pools formed during the rainy seasons. The pale bauxites are derived from sporadic eruptions of rhyolite, and the bi-pyramidal crystals of quartz in them prove this over a wide area. The thin bauxitic layer, occurring as it does above the pisolitic iron-ore, may be in part formed by wind-borne material.

NOTE ON THE OCCURRENCE OF (SO-CALLED) CAVE PEARLS.

BY HAROLD BRODERICK, M.A.

Cave pearls, as they were first called in "Cave Hunting" (Professor Boyd Dawkins), seem to be of comparatively rare occurrence. They consist of a nucleus of some foreign material, frequently a small pebble of Yoredale rock (in one case a small fragment of lead ore), coated by numerous concentric rings of calcite. All those found have been formed in what might be called nests in the rock, into which drops of water have fallen at comparatively long intervals from a considerable height. Each falling drop will have the tendency to slightly turn the nucleus, and also, by deposition, to coat it with a thin film of carbonate of calcium; this deposition is continued until what is called a cave pearl is formed, ranging in diameter from ·5 cm. up to 2 cm.

The three types with which I am acquainted come from three separate caves: 1. The Blue John (Derbyshire). This type consists of a nucleus of Yoredale Sandstone covered with layers of calcite, which become harder towards the outside, the exterior being extremely hard, smooth, and opaque; sp. gr. 2·75. 2. The Bagshawe (Derbyshire). This type consists in many cases of a nucleus of Yoredale Sandstone, or, in one case at least, of lead ore; the concentric deposit in this type is somewhat translucent, the outer surface is slightly crystalline; sp. gr. 2·71. 3. Marble Arch (Co. Fermanagh). This type has a nucleus of Yoredale Sandstone, while the covering is composed of carbonate which seems to have included in it a considerable admixture of contained mud the colour is a dirty grey, and the deposit is comparatively soft; sp. gr. 2·40. As will be seen from the specific gravity in each case, the deposit is in the form of calcite, a condition which might be anticipated from the mode of occurrence.

ON THE IGNEOUS ROCKS AND ASSOCIATED SEDIMENTARIES OF THE TOURMAKEADY DISTRICT, CO. MAYO.

BY C. J. GARDINER, M.A., F.G.S. AND PROF. S. H. REYNOLDS, M.A., F.G.S.

The district described lies along the western shores of Lough Mask, and has a length of about 4½ miles with an average width of about a mile. The oldest rocks are a series of grits, tuffs, conglomerates, red and black cherts, and graptolitic slate met with chiefly in the south-eastern part of the area. Graptolites have been found in the slate at three localities, a large series having been obtained in the stream near Mount Partry. These were examined by Miss G. L. Elles, and are of Upper Arenig age. Succeeding these Arenig rocks is a series of grits and gritty tuffs, associated with a remarkable development of limestone breccias. A large collection of fossils has been made from these rocks and examined by Mr. F. R. Cowper Reed. The general character of the fauna, and especially the presence of the genus Pliomera (Amphion) indicates that these rocks are of Llandeilo age.

A great series of acid igneous rocks (felsites and rhyolites) plays a prominent part, and probably includes both intrusion and contemporaneous members Small intrusions of various types of intermediate and basic rocks also occur.

SECTION D.—ZOOLOGY.

THE RESPIRATION OF LAND ISOPODS.

BY E. L. UNWIN.

Wood lice are derived from aquatic ancestors and the different species are suited to different degrees of dryness. *Trichoniscus pusillus* soon dies, unless kept very damp, while *Porcellio scaber* can live four or five days in a dry box. *Ligia oceanica*, *Trichoniscus pusillus*, *Oniscus asellus*, *Porcellio scaber*, and *Armadillidium vulgare* form a series showing transition from damp to dry conditions of life, and a corresponding gradation from simple gills to gills supplemented by air-tubes branching through some of the abdominal exopodites.

THE MIGRATORY MOVEMENTS OF CERTAIN SHORE-BIRDS AS OBSERVED ON THE DUBLIN COAST.

BY PROF. C. J. PATTEN, SC.D.

The majority of the author's observations, extending over twenty years, on the migratory movements of shore-birds on the Dublin coast have been incorporated in his work entitled "The Aquatic Birds of Great Britain and Ireland," published at the end of the year 1906; but he has still continued to visit the scenes of his former hunting-grounds, and, with the aid of trustworthy correspondents, he has collected further information. Among the birds dealt with he referred particularly to the

Sanderling (*Calidris arenaria*). He had now strong evidence to show that this bird is found in adult plumage through the breeding season on the Dublin coast. The observations of Mr. A. Williams, made in July, 1906, in this locality, on the Sanderling were of interest, as there was an unusually large gathering of adult birds recorded. In many ways the Turnstone repeated the migratory movements of the Sanderling, and was found throughout the year in adult plumage on the Dublin coast. The author, moreover, had dissected the genitals of this bird, shot at the height of the breeding season on the Dublin coast, and had found quite ripe ova. He believed the time would come when the Turnstone would be discovered breeding on the Irish sea-board, or perhaps along the shores of inland lakes. The movements of the Little Stint were apparently irregular—a few pairs usually appeared during some autumn seasons, but in 1902 he had records of flocks from the locality in question. Reference was also made and personal observations described of the extraordinary tameness of certain shore-birds on their first arrival on the Dublin coast, such species often only remaining a few days.

AN INQUIRY INTO THE FEEDING HABITS OF BRITISH BIRDS.

BY C. GORDON HEWITT, M.SC.

It is becoming increasingly difficult, with the introduction of scientific methods into agriculture, horticulture, and forestry, for zoologists studying economic problems to form a definite opinion with regard to the economic status of many species of the birds of our islands, such as, for example, the Rook, Jay, Starling, Chaffinch and other finches.

This difficulty is entirely due to the almost complete absence in this country of any precise information as to the food habits of our birds. There exists a large amount of evidence obtained from observers, such as fruit-growers, gamekeepers, sportsmen, and others; and although some of this may be and is useful, much of it has been distorted. It is necessary in order to obtain as accurate a conception as possible of the economic status of any species of bird is the actual dissection and recording of the contents of the crops and stomachs of a large number of individuals killed, not only in different months of the year, but also in different localities.

Such evidence is the only real and safe guide, and observational evidence, after careful selection, must only be taken as supplementary.

Very little work of this nature has been accomplished in this country. The Biological Survey Bureau of the United States Department of Agriculture furnishes an excellent example of the kind of work that should be carried out. The Central Bureau for Ornithology of the Hungarian Department of Agriculture is doing similar work.

It is proposed to form a British Economic Ornithological Committee, as such work can be best carried out by a number of biologists working together. The Board of Agriculture have promised to help the inquiry.

NOTES ON THE DISTRIBUTION OF IRISH FRESHWATER (MITES HYDRACHNIDÆ).

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

The mites in general are among the most widely distributed animals, and the Hydrachnidæ are no exception to the rule. The winged insect hosts to which these mites attach themselves during their parasitic larval stage are very effective agents in the spreading of the species. It has been suggested that the freshwater mites may be divided into two great faunistic groups, according to the nature of the waters they inhabit, and these two divisions serve equally well for a preliminary grouping of the Irish species from a distributional point of view. One group contains those widely distributed species inhabiting the standing and slowly-flowing waters of lowland lakes, ponds, etc., of a comparatively high temperature. To the second group belong those interesting forms found in waters of a constantly lower temperature, especially those of cold highland lakes and streams. These forms possess a more restricted range, typically northern and alpine in character, reaching their greatest development in Scandinavia and the alpine regions of Central Europe.

THE DEVELOPMENT OF LITTORINA.

BY W. M. TATTERSALL, M.SC.

The eggs of *L. litorea*, each enclosed in a hat-shaped capsule are laid freely on the shore, not aggregated together in a gelatinous mass. There are trocosphere and veliger larval stages. *L. litorea* lives low down in the zone of Laminaria and *Fucus serratus*. *L. obtusata* lives higher among *Fucus vesiculosus*: its larva leaves the egg as a veliger. *L. rudis* and *L. neritoides* which live near high-water mark are both viviparous. Thus the genus exhibits three stages in the evolution of land from marine mollusca, with the suppression of larval forms with successive specialisations of habitat.

THE VASCULAR SYSTEM OF STYLODRILUS.

BY ROWLAND SOUTHERN, B.SC.

The genus Stylodrilus has hitherto been distinguished from other European genera belonging to the Oligochæte family Lumbriculidæ by the complete absence of the blind contractile appendages of the blood-vessels which are so characteristic of this family. The new species investigated (but not yet described) from the River Annalee, County Cavan, undoubtedly belongs to the genus Stylodrilus, but differs from all other species in the possession of very simple contractile appendages to the dorsal vessel. These blind sacs are restricted to the posterior end of the

worm, and are simpler in structure than those of any other Lumbriculid. This species thus forms an interesting link between the normal Lumbriculid type and the aberrant genus Stylodrilus. The relations of the dorsal and ventral vessels to the intestinal blood-sinus are also investigated, and shown to differ considerably from the condition typical of the Oligochæta.

SECTION E.—GEOGRAPHY.

IRELAND—HER COASTS AND RIVERS.

BY REV. W. SPOTSWOOD GREEN, C.B.

This paper described the succession of events in the geographical history of Ireland from the time that the river valleys were being sculptured and the present configuration of the country determined through the great Arctic and forest periods to the coming of man into the island, the evolution and admixture of races, and finally dwelt upon the beauty spots with which Ireland abounded, and which the author hoped that many who had come to the British Association might go and see for themselves.

MITCHELSTOWN CAVE.

BY C. A. HILL, M.A., M.B.

Mitchelstown Cave, the largest yet discovered in the British Isles, is situated in County Tipperary, in the valley of the Blackwater. There are actually two separate and distinct caves. The existence of one, the "old" cave, is now forgotten, though this cave was known and exhibited in 1777. The "new" cave, first discovered in 1833, is now the only one shown to visitors. It was first described by Dr. Apjohn, of Dublin, who partially explored and surveyed it in 1834, and published a map, which has been the basis of all others up to the present time. It was further explored by M. Martel, of Paris, in 1895, and described by him, and was also visited by Dr. Lyster Jameson, of Dublin, who described the cave fauna found therein. Very little is known of the full extent of the caves even at the present day, and no reliable plan or map exists.[1] The cave was visited in 1905 by the author, who took many photographs, now shown for the first time, and also explored portions hitherto unvisited. The cave was found to be of much greater extent and complexity than was previously imagined.

There is great need for systematic exploration and surveying, as the existing plan of the "new" cave has been found inaccurate and misleading, and practically nothing is known of the "old" cave. Geologically the "new" cave is of great antiquity, as evinced by the enormous

[1] The cave has been since thoroughly explored and mapped by Dr. Hill, Dr. A. Rule, H. Brodrick, and R. Ll. Praeger. An account will shortly be published in the *Irish Naturalist*.

size and number of the stalactite and stalagmite formations. There is no evidence of present active water-action, the cave being practically dry, except at two points erroneously called "the River." The explored passages are estimated at a mile and a quarter in length.

THE MARBLE ARCH CAVES IN CO. FERMANAGH.[1]

BY HAROLD BRODRICK, M.A.

Three streams flow down the northern slope of Cuilcagh and sink into the limestone at three points about a quarter of a mile apart; the central stream goes by the name of the Monastir. The narrow limestone valley through which it runs is cut off, at its lower end, by a limestone cliff 130 feet high. The cave at the base of this has a total length of 40 yards, and ends in a fissure of unknown height. Within 40 yards of the top of the cliff is a pot-hole (Pollbwee) 100 feet deep, with a pool and a narrow passage 60 feet in length at the bottom. Further north is an opening in the moor called Pollnagapple; this is a pot-hole with a diameter of 80 feet and a depth of 60 feet. Its floor is composed of jammed boulders, below which the river can be heard; a high cave with good stalactitic deposits leads from the bottom of this pot. About 150 yards further north is Cradle Hole—a pot-hole 80 yards in diameter and 120 feet deep; at the base are two caves in which the stream is met with; upstream the passage, 15 feet wide and 25 feet high, has been explored for 55 yards, but has not been surveyed. The downstream cave is from 10 to 25 feet high and 30 feet wide; it is 104 yards long and ends in a pool within about 20 feet of the upper end of Marble Arch Cave. The roof seems too low to admit of passage. The Marble Arch Cave is entered from lower down the hillside. At the upper end of the stream course is a pool, probably the continuation of the one met with in Cradle Hole. The stream flows for 123 yards along the "Grand Gallery," through boulders and shingle, to the "Junction." The "Grand Gallery" is from 5 to 20 feet high and about 15 feet wide. At the Junction the roof is at least 50 feet high; from here the stream turns to the left and then to the right, filling the whole of the passage; it here forms a lake at least 10 feet deep in the centre. At 84 yards from the Junction a beach is reached and 10 yards further the open air, at the floor of a wide pot-hole 60 feet deep; from this beach the stream flows under low arches to another lake, from which it emerges into the open just above the Marble Arch itself. A high-level passage leads from above the beach to the shore of this lake, and a second branch leads through boulders to the open at the bottom of a wide pot-hole 30 feet deep, in the floor of which is also another opening, which will be referred to later.

From the Junction a dry passage runs to the right, and at a distance of 45 yards becomes 20 yards wide and about 40 feet high; the floor rises to

[1] A full account of these caves, with plans, will be published shortly in the *Irish Naturalist*.

the left, but the passage continues forward to the right. To the left the rising floor is composed of boulders and sand, cemented together and covered with stalagmite. At the upper end of the slope is a fine collection of stalactites. A low passage 15 feet wide leads from here into a fissure cave 30 feet high and 50 feet long. The low-level passage at the bottom of the boulder slope continues for 93 yards, 15 to 25 feet in height and about 10 feet in width, to the 'Pool Chamber.' This is about 15 yards in diameter, and 20 feet high, and has a still pool at its lowest point. Beyond this chamber the passage continues 15 feet wide and about 4 feet high, and in 12 yards is blocked with boulders. A climb of about 15 feet vertically upwards through these boulders leads into the bottom of a chamber about 80 feet high and 25 yards in diameter, the floor of which is entirely composed of a slope of large boulders. The upper end of the boulder slope leads to the bottom of a narrow pot-hole 30 feet deep, for the descent of which ladders are necessary. At the far corner of this chamber there is a small hole leading, between jammed boulders, into the floor of the pot-hole into which the high-level passage opens, and within 20 feet of the end of the passage. The portion of the cave beyond the Pool Chamber and the two openings there were unknown before this year. Fluorescine put into the Monastir Sink at 11.30 a.m. in dry weather was clearly visible at Cradle Hole at 10 45 a.m. the following day, and at 6.45 the same evening began to emerge at the Marble Arch spring.

SUB-SECTION F.—AGRICULTURE.

THE EDUCATIONAL WORK OF THE IRISH DEPARTMENT OF AGRICULTURE.

BY PROF. J R. CAMPBELL, B.SC.

There was an agricultural school in Ireland as early as 1826; those interested in this early venture will find an account of it in Thackeray's "Irish Sketch Book." In 1838 the Commissioners of National Education began their system of agricultural instruction, which they continued up to the creation of the Department of Agriculture and Technical Instruction in 1900. It was as a demonstration farm in connection with such lessons that the present Albert Agricultural College, Glasnevin, was founded in the same year, 1838. Later, about twenty agricultural schools were established in various parts of the country. In 1900, when the Department of Agriculture was established and charged with the duty of providing agricultural education in Ireland, all that remained of the provision made by the Commissioners were two institutions—one the Albert Agricultural College, Glasnevin, and the other the Munster Institute, Cork. Agriculture can only be taught by men who have had a systematic training in science and practice, and teachers in elementary schools

can best help agriculture by giving a sound general education with "Nature-study" as an influence pervading the atmosphere of the place. At present, in Ireland, agricultural education is carried on in provincial winter schools, by itinerant instructors in the counties, in large provincial agricultural stations, such as Ballyhaise, Clonakilty, and Athenry, at the Albert College, Glasnevin, and at the Royal College of Science. The agricultural courses at the Royal College of Science and at the Albert College are ample for training in the technology of agriculture. There is, however, a class of the community whose position and influence in the nation demand that they should have clear and sound ideas on agriculture in its broadest aspects. Those destined for public life, members of the clerical, legal, and other learned professions, journalists, administrators, teachers, and all those whose position demanded for them a liberal education—for such full provision should be made in our educational system. Agriculture, as now taught in most universities, both in Great Britain and elsewhere, being largely concerned with the details of an industry, belongs to the domain of technology, and not to pure science or to the humanities But agriculture can also be treated as a branch of the wide subject of national economics. Its importance in the national life is such as to demand from all public men a knowledge of its history, development, laws, potentialities, and relation to our social and economic systems—a knowledge which too few public men possess. Agriculture, taught as a profession, is already fully provided for by the Department, whose business it is to supply instruction of this nature to those engaged in the industry, or intending to be agricultural leaders, teachers, or scientists. To the university belongs the function of shaping the general higher education of the class indicated, and it is to be hoped that agriculture, in its humane aspect, will receive from the new Irish colleges the attention it merits.

IRISH SOIL MAPS.

BY T. HALLESSY, B.A.

The work of preparing soil maps of Ireland was begun in 1837, but abandoned in 1840. Since then very little had been done until a few years ago, when the work was resumed under the direction of Professor Cole. In soil mapping the physical properties of the soils, rather than their chemical composition, are the important matters to consider. The important thing to take into account is how the soil gets up water to the crops rather than what it is composed of Farmers show that they know this by classifying soils as clays, loams, and sands, rather than as potash or phosphoric soils. In a district a little over a mile square, of which a soil map was shown, nine different sorts of soil had been found. The work done has shown that it is not necessary to make a detailed map of Ireland, but that it is quite sufficient to make a drift map, and to take samples in the various drifts in Ireland and describe them.

IN-BREEDING, MENDELISM, AND THE ELUCIDATION OF LIVE-STOCK HISTORY.

BY PROF. J. WILSON, M.A., B.SC.

(1.) Having discovered the animal or plant desired, it should be the breeder's chief endeavour to keep his stock pure; and in order to do so he must give great consideration to the question of in-breeding.

(2.) Indeed, it may be necessary to revise the Darwinian pronouncement on in-breeding. It is a bold thing to suggest that Darwin's ideas about in-breeding may be wrong; but so many of our breeds of domestic animals have been brought to the position they occupy by severe in-breeding that the subject requires, at least, reconsideration. If we look round among wild polygamous animals, we find in-breeding the rule rather than the exception. Deer are a good example. The strongest male retains command of a flock until he is ousted by some other animal who is in all probability a younger brother or a son of the previous master male.

The greatest stock-breeder yet known in Britain was Robert Bakewell, a Leicestershire farmer, who was born in 1725 and died in 1795. He established the Leicester long-horned breed of cattle and the Leicester breed of sheep, and he also took a hand at improving the breed of horses we now call the "Shire." The pedigree of his greatest bull, called D (born about 1772), is known and shows Bakewell's procedure. Bakewell searched the country for the very best animals he could find, and bred from them; then unable to find other animals as good, bred from those in his possession.

D's pedigree:—

A cow from Canley called Comely > A Westmoreland bull Twopenny > Twopenny Comely > Their daughter > D

Bakewell's D was the sire of a still better bull called Shakspear, born about 1778, belonging to Mr. Fowler, of Rollright, in Oxfordshire. Shakspear's dam was also a daughter of Twopenny.

Marshall writes of these two bulls:—"D is the sire of Shakspear, by another daughter of the same bull, and is probably the most robust individual of the longhorned breed; while D himself, at the age of 12 or 13 years, is most active and higher mettled than bulls in general are at 3 or 4 years old."

One of the Collings, the early breeders of the Shorthorns, was a pupil with Bakewell while Hugh Watson, the first of Aberdeen Angus breeders, was a pupil with one of the Collings. These breeders employed Bakewell's methods; copied them almost to the last detail.

(3.) Mendelism is evidently going to be of great service to the historian of live stock. For instance, history tells that the shorthorn breed of cattle is a combination of two races—a red race and a white. Mendelism confirms this, since the cross of red with white among shorthorns gives reds, whites and roans (hybrids) in the proportion required by "Mendel's Law." History also shows that the Dexter Kerry is a cross

between the native Kerry cattle and some other intruding breed, in all probability a red breed brought from the south of England. There are several theories as to the origin of the Dexter, each in succession trying to give a more satisfactory explanation of the facts than that given by its predecessor. The oldest theory is that the Dexter originated in the hands of a Mr. Dexter, agent to Lord Hawarden. But this Mr. Dexter was dead 50 years before he was credited with having originated the breed. Besides, Dexter lived in Tipperary, far away from the country the Dexters come from. The next theory got over that difficulty by fixing upon Dexter's grandson, a coastguard officer who lived in Kerry. But unfortunately he "never had anything to do with cattle."

But, according to another theory, since the Dexters are a Kerry breed, and the coastguard officer had nothing to do with them, the man who really originated them must have been someone called Dexter, who lived in Kerry, away up in the north, near where the coastguard officer lived. Who could he have been? The cattle must have originated in some out-of-the-way place. Did the Knight of Kerry ever have a steward called Dexter? Of course he must. The Dexters originated, therefore, with the Knight of Kerry's steward called Dexter.

Others, not satisfied with any of these theories, tell us that in Kerry stout-bodied, short-legged animals, and even men, are called Dexters; that the Dexter breed of cattle were "sports "from the Kerries, and that of course they came to be called by the local name describing such animals.

Unfortunately, here again there is a strong suspicion of the cart being put before the horse. The original Mr. Dexter was an Englishman who was a well-known importer and breeder of Leicester sheep. These sheep, which were much stouter and shorter-legged than the native sheep, came to be called "Dexters." They spread over the south-west, and along with them spread the word to express an animal of their type.

But against all these theories we must place the fact that animals of Dexter type were to be found elsewhere than in Kerry, and that too early and too far away for any of the Dexter family to have had anything to do with them. They were to be found all over Ireland wherever the native cattle were being pushed out by intruding races—by Longhorns, Herefords, Shorthorns, and Devons. Presumably these Dexter-looking animals were crosses between the native and the intruders.

Down in the south there were only two intruding races, the Longhorns and the Devons. But the Longhorns could not have given rise to the present Dexters, for the colours and size of the two breeds are inconsistent. We are thus driven back on the Devon breed, and Mendelism shows clearly that the Dexter is a hybrid breed, the original races being a slender black race and a stout red one, like the Devon breed of cattle. To bring this home, we need only set a red Dexter and a red Devon cow side by side.

SOME IRISH EXPERIMENTS ON WARBLE-FLIES.

BY PROF. GEO. H. CARPENTER, B.SC., M.R.I.A.

For the past four years experiments have been carried on by the Irish Department of Agriculture as to the life-history of the warble-flies and the effect of the commonly accepted means for checking their attacks on cattle. The experiments were, for the most part, carried on at Ballyhaise, Co. Cavan.

In January of this year, a first report of these experiments was published in the Department's *Journal* by the writer and Mr. J. W. Steen. The most important practical result of the experiments has been to show the uselessness of dressing cattle either with carbolic "dip," oil and tar "smear," or paraffin emulsion with the object of preventing egg-laying.

For example, six yearlings were smeared all over every day from May till September, 1906. In 1907 they showed warbles averaging over 30 per beast. Four calves sprayed all over daily during the same period showed an average of 15 warbles per beast the next spring. The average number of warbles on untreated animals at the same time was 31 for heifers and 11 for calves.

In the spring of 1907 a systematic squeezing-out and destruction of maggots was set on foot: 2,000 maggots were obtained from 194 head of cattle on the Ballyhaise farm, an average of nearly 11 per head. The good effect of this operation has been strikingly shown in the spring of the present year, when from 166 head of cattle only 694 maggots were obtained—an average of 4·2. Equally instructive is the fact that five cows grazed on the outskirts of the farm, and therefore open to the attacks of flies from the surrounding country, had an average of 16 warbles per beast, while 94 cows grazed near the centre of the farm had an average of only 3 warbles per beast. Observations show that the flies lay their eggs usually on the legs, very rarely on the backs of cattle. During the summer of 1906 six calves were muzzled by day and tied up between stakes at night, so as to prevent them from licking themselves. All but one of these had warbles in the spring of 1907, whence it was surmised that the maggots may gain entrance through the skin, and not, as is now generally believed to be the case, through the mouth. During the summer of 1907 two calves were muzzled and tied, with additional precautions. These were the only two calves on the farm that as yearlings are entirely free from warbles this spring (1908). It is likely, therefore, that the protection from licking in the 1906 experiments was in some way incomplete. During the present summer six calves are being again treated in this way, and it is hoped that the method of entrance by the mouth will thus be conclusively tested.

Hypoderma bovis seems to be far commoner in Ireland than *H. lineata*. In both species the interval between the emergence of the maggot from the beast's skin and the appearance of the fly is about seven weeks.

BARLEY-GROWING AND SELECTION IN IRELAND.

BY HERBERT HUNTER, B.SC.

After dealing with the manner of origin of many of the varieties of cereals which are to-day in cultivation and the methods of improvement adopted by early workers, such as Le Conteur and Sherriff, the author proceeded to describe some of the leading varieties of barley in use in Ireland to-day. Some recent experiments in the cultivation of this cereal carried out by the Department of Agriculture in Ireland were referred to, and the main conclusions of these investigations dealt with. The special requirements of barley for malting purposes were described, together with the effect of pure and mixed seed on the quality of the produce. The author then proceeded to enumerate the various methods adopted for the production of pure seed supplies, and showed by actual examples from experimental single-ear cultivations of Old Irish Chevallier and Archer varieties the existence of many closely related strains of the same variety. The constancy of the characteristics of each type was then dealt with, and their adverse influence on a pure-seed supply demonstrated.

The existence of "quality" in barley as a specific character was pointed out, and the possible lines of improvement indicated.

As good "quality" and high yield do not appear to be co-existent in present-day varieties, selection of the forms possessing these characteristics in the highest degree must eventually lead to hybridisation. In all cases, however selection of varieties with demonstrated characteristics must precede hybridisation, as this process results in forms new rather in the combination of definite characters than in the production of intensified ones.

It was pointed out that, whether dealing with hybrids or pure natural varieties, it is desirable to propagate seed for commercial purposes from single grains or ears, as this method results in seed possessing a minimum amount of variation in any direction.

SECTION H.—ANTHROPOLOGY.

SOME REMARKS ON THE IRISH HORSE AND ITS EARLY HISTORY.

BY R. F. SCHARFF, PH.D., F.L.S.

That the modern Connemara pony possesses certain features of resemblance to Arab horses is well known, and has been recently emphasised by Professor Ewart in his description of the various Irish breeds of ponies. This character is currently believed to be due to a comparatively recent introduction into Ireland of Eastern stock. Professor Ridgeway not only puts the date of this introduction further back, to pre-Christian times, he contends that these supposed Eastern horses were imported from France, and were originally of Libyan origin.

The most complete remains of the Horse discovered in Ireland were obtained by Mr. George Coffey in the Craigywarren crannog, County Antrim. The human implements and weapons found with them imply that the occupation of the crannog dates back to early Christian times. The horses were then, no doubt, domesticated. Their resemblance to the Arab type of horse is quite as striking a feature as that in the modern Connemara pony.

The remains from a tumulus and from Irish bogs, marls, and caves in the Irish National Museum are less complete, but they all indicate that in still more remote times a small race of horse, apparently similar to that of the crannog period, lived in Ireland. It is important to note that some of these remains probably belonged to wild races.

The available evidence seems, therefore, to support the view that the resemblance of the modern Connemara pony to the Eastern or Libyan race of horse is not entirely due to human introduction of foreign stock, but to the fact that the wild horse of Ireland possessed the same characteristics as the latter and transmitted them to the existing ancient domestic breeds.

EXCURSIONS AND ENTERTAINMENTS.

THE Dublin meeting was notable for the number of entertainments provided ; indeed receptions, garden-parties and various festivities crowded almost too quickly one upon the other. On the opening day, Wednesday, 2nd September, the Lord Mayor and Lady Mayoress were "At Home" in the Mansion House during the afternoon, and many early-arrived members enjoyed the civic hospitality. At noon on Thursday, September 3rd, a large party accepted Messrs. Guinness's invitation to visit the St. James's Gate Brewery. The garden party given the same afternoon at Trinity College by the Provost and Senior Fellows was somewhat spoiled by rain. In the evening a brilliant gathering attended the conversazione given at Leinster House by the Council of the Royal Dublin Society. A large series of scientific exhibits was arranged in the reading room and library, and by permission of the authorities the whole of the National Museum was thrown open. Two very interesting lantern displays were given during the evening, Rev. W. S. Green showing cinematograph views of fishery life on the west coast, and Dr. E. M'D. Cosgrave illustrations of old Dublin. On Friday afternoon,

September 4th, there was a special performance of Irish plays at the Abbey Theatre, and Messrs. Jacob entertained a large party at their biscuit factory. Two semi-private parties were given the same afternoon, 200 members being invited by the Royal Astronomer and Mrs. Whitaker to the observatory and gardens of Dunsink, and another 200 by Dean and Mrs. Bernard to the historic close of St. Patrick's Cathedral.

Saturday, September 5th, was the day for excursions. The special excursions organized by the various natural history sections have already been mentioned. The official outings were mainly of antiquarian interest. Among the places visited were (1) the Boyne Valley (including New Grange, Mellifont and Monasterboice); (2) the Devil's Glen and Glendalough, Co. Wicklow; (3) Killaloe and Lough Derg; (4) Athlone and Clonmacnoise; (5) the Rock of Cashel and Holy Cross; (6) the Dargle and Powerscourt, Co. Wicklow. On the last named excursion the party were kindly entertained on their return journey by the Earl and Countess of Meath at Kilruddery. The Dean of Clonmacnoise both guided and entertained the Athlone party. The weather was fair if somewhat dull. For members who stayed in town, the Council and Principal of Alexandra College gave an afternoon reception, and the Classical Association of Ireland, provided a most interesting evening conversazione.

On the afternoon of Monday, 7th September, a very large garden party was given by Lord and Lady Ardilaun at St. Anne's, Clontarf, while on Tuesday, 8th, the local committee entertained over 2,000 guests at the Zoological Gardens. In the evening there was another special performance of Irish plays at the Abbey Theatre, and a brilliant reception by Lord and Lady Iveagh at St. Stephen's Green, where, in spite of the very wet weather, the invited guests enjoyed themselves thoroughly. On Wednesday, September 9th, the Lord Lieutenant and Lady Aberdeen gave the closing entertainment —a garden party at the Viceregal Lodge. Fortunately the weather cleared up just in time for this gathering, and the guests enjoyed a fine if cool afternoon in the beautiful grounds. Here scientific friends met for a parting chat, to talk over the work and pleasure of the meeting, and to express hopes for a reunion at Winnipeg in 1909.

HENRY CHICHESTER HART

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HENRY CHICHESTER HART.

HENRY CHICHESTER HART was born at Raheny, Co. Dublin, on July 29th, 1847, and died at his beautiful residence, Carrablagh, on the shores of Lough Swilly, on August 7, 1908, aged 61 years.

His mother delighted in gardens and wild flowers, and his father, Sir Andrew S. Hart, was a distinguished mathematician, and Vice-Provost of Trinity College, Dublin, so that his son's ability and taste for botany were doubtless hereditary. Donegal was the native county of the family, and when about seventeen years of age, Henry, in company with his eldest brother, George V. Hart (now K.C., of Woodside, Howth), began to scour the mountains of Donegal each summer for wild flowers; and the two brothers determined, by means of that well-known and ingenious key in Bentham's British Flora, to make out the name of every plant gathered. Bentham was, indeed, the British botanist's bible in the sixties of the last century, and the writer of this notice well remembers the keen interest taken at that period in ascertaining the correct name of a species by comparison with the key above referred to.

Hart distinguished himself in three spheres of activity—physical, scientific, and literary, the combination of which in a single individual is exceptional. He entered Trinity College, Dublin, in 1866, and took his B.A. Degree with honours in 1869 by obtaining a Moderatorship in Experimental and Natural Science. He was a well-known athlete, tall (6 feet 1 inch) and handsome, a powerful swimmer, and the champion walker for some years at the College Races, his chief competitors being his younger brother, William H. Hart, W. J. Craig, who subsequently became, like himself, an eminent Shakespearian scholar, and Abraham Stoker, afterwards the late Sir Henry Irving's secretary and biographer.

Hart was conscious of his athletic superiority, and most walking companions who could not keep up with him were left behind unnoticed, and for this reason many of his botanical expeditions were made alone. The writer's only chance of keeping up with him in the mountains was to suggest the ascent of some difficult gully or a traverse along the ledge

of a nasty precipice. A common interest, however, in the study of nature made these expeditions specially enjoyable. In the survey of a new district no naturalist is ever likely to approach Hart in the amount of ground covered in a single day, and some of his records, where the plant is confined to a scarcely accessible situation on the face of a cliff, are never likely to be verified by the ordinary explorer. He used to say, "Always look for alpines in Ireland high up on the north-east face of the precipice.

For a wager with the writer, Hart walked from Dublin to the summit of Lugnaquilla, the highest of the Wicklow Mountains, (about 75 miles) and back in less than 24 hours, keeping to the hills much of the way. The time-table of this extraordinary performance is now before me. He was accompanied by Frederick Cullinan (now Sir Frederick Cullinan, C.B.), also a member of the Alpine Club, who equalled Hart in endurance, if not in speed.

In 1889, in company with the writer, Hart ascended the Weisshorn (14,800 feet) and the Dent Blanche (14,300 feet), in Switzerland. The days were fine and five or six other parties were climbing the same peaks independently. Hart proposed to give them all at least an hour's start, and, notwithstanding these tremendous odds, the Irishmen on each occasion reached the summit first.

In 1895, when Mr. Haskett Smith was writing "Climbing in the British Isles," it was Hart who contributed the Irish portion. It may be well to warn readers of these little volumes, that some walks and climbs in this country mentioned therein, in a light and airy fashion, would be quite impossible for an ordinary man to accomplish in the times given.

Hart was indifferent to weather, and treated rain, wind and mist, even amongst mountains, as negligible quantities. Small incidents are often the best indications of character. The following may be mentioned:—By appointment he turned up at Fassaroe one dreadful day to botanize on the cliffs around Powerscourt Waterfall and to hear, if possible, the Wood-Wren. Well knowing that if the expedition failed the incident would for years afterwards be a theme for ridicule, a few slices of bread were hastily wrapped up, and we started

in torrents of rain, absolute silence being observed regarding the atmospheric conditions. Both wet to the skin "in no time," Hart deliberately kept walking amongst the scrub, briars, and long grass by the river's edge, so as to discourage his companion. To prove utter indifference to moisture, the writer walked into the river and sat down on a submerged stone and began to eat lunch. Hart, with the utmost nonchalance and without saying a word, did likewise. Saturation was soon complete. All rivalry ceased, and friendship prevailed during the remainder of the day.

Physical and scientific qualifications induced the Government to select him as naturalist to H.M.S. "Discovery" when that vessel started on the Polar Expedition in 1875, under the command of Captain Nares. Colonel Fielden, who was naturalist to H.M.S. "Alert" on the same expedition, writes: "Physically, he was I think the finest man I ever knew." Hart published his results in the *Journal of Botany* and the *Zoologist*.

The Committee of the Palestine Exploration Fund in 1883 enlisted his services in a widely different region, when sending out an expedition to examine the geological structure of the Jordan Valley and Western Palestine. Several collateral subjects were kept in view. Professor Hull, F.R.S., then Director of the Irish Geological Survey, was in command, and amongst the other members of the Expedition was Major H. H. Kitchener, R.E. (now Lord Kitchener). Hart added considerably to the recognized flora of the district traversed.

In the preface to the second edition of the *Cybele Hibernica*, 1898, the editors thus refer to his contributions to Irish botany: "No attempt will be made here to estimate the precise share "contributed by each of many field-workers to the advance in "Irish botany which is marked by the publication of the pre-"sent edition. The broad results alone are of general interest, "but it seems only just that particular mention should be "made of the services of Henry C. Hart, who has done more "to further our knowledge of Irish plant distribution than "any other explorer of recent years." When on a tour in the Scottish highlands, he discovered *Arabis alpina* (with which he had been familiar in Greenland) near the summit of one of the Cuchullin mountains in Skye, a most interesting addition to the alpine flora of the British Isles.

Hart's keen eye was well shown when he found the rare *Rubus Chamæmorus* after it had been lost for sixty-six years. Though not the originator of the search expedition, it was he who re-discovered the plant. There were two mountains separated by a shallow valley. He took one and I took the other. Both of us had almost reached the respective summits, when my friend waved his hand and shouted. When I joined my companion, he said, "It is within a circle of thirty yards from where I stand." Notwithstanding the small area to be examined, the plant was not detected by me for nearly ten minutes.

The botany of the British Polar Expedition, 1875–6, and three reports on the Flora of Palestine were, apart from his work in Ireland, Hart's chief contributions to botanical literature. His "Flora of Howth" and "Flora of Donegal" were published in book form. Eight reports and papers on Irish botany appear in the *Proceedings* of the Royal Irish Academy, 1881 to 1890. What I believe to be a complete bibliography of his papers, &c., 45 in number, relating to the Irish Flora up to 1901 is given in Praeger's "Irish Topographical Botany."

Though botany unquestionably occupied the first place in Hart's writings, birds, mammals and shells, were always studied with interest. From 1878 to 1898, many notes appear in the *Zoologist* and a few in the *Irish Naturalist*. In 1888 he wrote a book on the animals of the Bible. Latterly he had been assisting the Rev. W. C. Piercy in compiling Murray's Bible Dictionary.

In recent years purely literary work engrossed most of his attention. He edited "Othello," "Love's Labour's Lost," "Measure for Measure," and the "Merry Wives of Windsor" for the "Arden" Shakspeare, and Ben Jonson's Works for the "Standard Library," his knowledge of Elizabethan literature being remarkably wide and wonderfully minute. Having no regular occupation, he was enabled to pursue his studies without the hampering ties of business, of professional life, or of official routine. Exploration in one form or another was most attractive to him, since the physical side of it was especially congenial to his athletic nature. Every expedition was discussed and thrashed out beforehand with his life-long friend, the late A. G. More—the central figure in Irish natural history for over thirty years—on whose co-operation

and encouragement he could always rely with confidence. More's personality greatly attracted him, especially the gentle, persuasive, cheery and sanguine manner, and the enthusiasm with which a new plant-locality was greeted. After More's death, he said "half the pleasure of a discovery had vanished," and less interest was certainly taken by him in botany.

His garden at Carrablagh was a source of delight, and nothing gave more pleasure than to show a friend, one by one, the many rarities therein. No more delightful walking companion could be imagined. Botany, zoology, and natural history in its widest sense, folklore, local songs, habits, and expressions were all discussed in turn. He left a great deal of MS., chiefly relating to Ben Jonson and Shakespeare, as well as collections of Ulster and other proverbs, songs, etc.

He was buried at Glenalla, in a spot chosen by himself, amidst the beautiful scenery and surroundings of his ancestral home, and in the county which he loved so well, and among whose wild glens and valleys he had spent the happiest days of his life.

RICHARD M. BARRINGTON.

H. C. HART'S PAPERS AND NOTES ON ZOOLOGY.

A.—ORNITHOLOGY.

(i.) In the *Zoologist*.

1878 "Wood-Wren in Ireland." p. 348.
,, "The Grey Wagtail gregarious at roosting time." p. 390.
,, "Tree-Pipit in Ireland." p. 454.
1879. "Wood-Wren in Co. Wicklow." p. 341.
1880. "Notes on the Ornithology of the British Polar Expedition 1875-6." pp. 121, 129, 204, 214.
,, "Supposed occurrence of the Tawny Owl in Ireland." p. 255.
,, "Blackcap in Ireland." p. 512.
1881. "Birds roosting in Reeds." p. 63.
,, "Supposed occurrence of the Crane at Howth." pp. 259, 307.
,, "Occurrence of the Blackcap in Donegal." p. 336.
1883. "The Note of the Manx Shearwater." p. 81.
,, "Birds of Lambay Island." pp. 155, 225.
,, "Cormorants resorting to Freshwater Lake in Summer." p. 257.
1889. "Woodcock carrying its Young." p. 454.
1891. "Notes on the Birds of Donegal." pp. 297, 334, 377, 421, 459.

1892. "Additions to the Avi-fauna of Donegal." pp. 32, 108, 191, 270.
,, "Sand-Martin in Donegal." p. 270.
,, "Ruddy Sheldrake in Donegal." p. 359.
,, "Blacktailed Godwit in Donegal." p. 361.
,, "Iceland Gull in Lough Swilly." p. 412.
1893. "Additional Notes on the Birds of Donegal." p. 22.
,, "Wood-Wren and Blackcap in Wicklow." p. 225.
,, "Sabine's Snipe in Donegal." p. 459.
1894. "Cuckoos calling on the wing." p. 340.
1896. "Wood-Wren in Donegal." p. 195.
,, "Nesting Habits of Cormorants in Donegal." p. 231.

(ii.) In the *Irish Naturalist.*

1893. "Sabine's Snipe—a Correction." p. 324.
1907. "Grasshopper Warbler at Lough Swilly." p. 47.

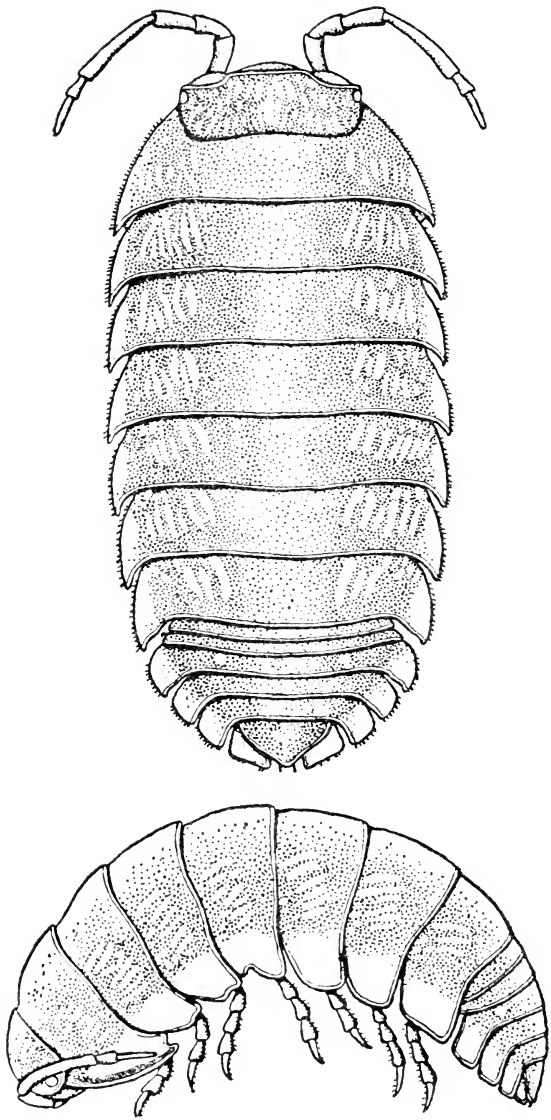
B.—Other Zoological Papers and Books.

1880. "Pine Marten in Ireland." *Zoologist*, p. 18.
1881. "Red Deer formerly in Donegal." *Ib.*, p. 336.
1886.? "Voices from the Irish Woods." Dublin, Sealy, Bryers and Walker.
1888. "Scripture Natural History: the Animals mentioned in the Bible." London: Religious Tract Society.
1891. "Natterer's Bat in Donegal." *Zoologist*, p. 271.
1892. "Notes on Marine Mollusca collected in Donegal and Dublin." *Zoologist*, pp 51, 105, 139, 181.
,, "Spirula, Ianthina and Velella at Lough Swilly." *Zoologist*, p. 414.
1899. Black-Fish at Lough Swilly. *Irish Naturalist*, p. 26.
,, Lesser Rorqual at Lough Swilly. *Ib.*, page 28.

H. C. Hart's Papers and Notes on Botany.

In addition to those mentioned in List in "Irish Topographical Botany," p. cxxii.

1880. "The Botany of the British Polar Expedition," 1875-6. *Journ. Botany.*
1885. "Report on the Botany of Sinai and South Palestine." *Trans. Roy. Ir. Acad.*, vol. xxviii., p. 373
1885 "Botany of the Jordan Valley and Western Palestine." *Quart. Journ. Pal. Expl. Committee*, pp. 231-286.
1887. "Irish Hepatics and Mosses." *Journ. Bot.*
1887. "Arabis alpina in Skye." *Journ. Bot.*
1891. "Some account of the Fauna and Flora of Sinai Petra and Wâdy 'Arabah." London (Palestine Exploration Fund), 4to
1896. Measurement of a Scotch Fir Stump. *Ir. Nat.* p. 189.



ELUMA PURPURASCENS, Budde-Lund.
Dorsal and Lateral Views. Magnified 9 times.

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ELUMA PURPURASCENS.

A Woodlouse New to the British Isles.

BY DENIS R. PACK-BERESFORD, B.A., M.R.I.A.

(Plate 10.)

In the October number of the *Irish Naturalist* (p. 206, *supra*), I recorded the capture during the latter half of the month of August last, of a large number of specimens of what I believed to be an Armadillidium, on the southern cliffs of the Hill of Howth. Dr. R. F. Scharff, who has most kindly made inquiries for me into the identity of this species, now informs me that it proves to be not an Armadillidium, as I had thought, but to be referred to the closely allied genus of Eluma.

This genus, which until quite lately contained only the single species *E. purpurascens*, was described by Prof. Budde-Lund in his work on "Crustacea Isopoda Terrestria," published in 1885, and though closely related to the genus Armadillidium, has not previously been found in the British Isles. It may perhaps be remarked here that Prof. Budde-Lund distinguished these two genera—Armadillidium and Eluma—from Armadillo and other allied genera by the presence of the very broad and flattened uropods, which in the latter genera are small and rounded.

The characteristics which distinguish Eluma from Armadillidium will be apparent from the following translation of Prof. Budde-Lund's definition of the genus :—

ELUMA.

The exterior antennæ slightly shorter than half the length of the body, hairy. The second segment of the scape wider but hardly longer than the fourth segment; flagellum biarticulate.

The interior antennæ conical, very small.

The eyes simple, very small.

The upper margin of the clypeus plain, not lobed.

The triangular frontal lobe depressed in the middle, forming on each side, with the prominent oval lateral lobes, the groove for the antennæ.

The vertical marginal line reaching the frontal line.

The lateral plate of the first body-segment slightly divided behind.

The telson nearly triangular.

The exopodites of the first and second pairs of pleopods modified as tracheæ.

The uropods short, equal in both sexes, extending beyond the telson, but not beyond the lateral plates of the penultimate segment: the basal segment wide, oblique, four-sided, very unequally divided; the terminal segment laminate and flattened.

The points by which Eluma is to be distinguished from Armadillidium can be easily seen from the foregoing description. For instance, the simple eye, the slightly divided corner of the lateral plate of the first segment, and the telson not extending as far back as the uropods on either side of it; whereas in Armadillidium the eye is always compound, the corner of the lateral plate of the first segment is always undivided, and the uropods never extend beyond the telson.

The following is a translation of Prof. Budde-Lund's description of the species *E. purpurascens*, which at the time he described it was the only species of Eluma known. Prof. Verhoeff of Bonn, has, however, lately described another species from the Island of Teneriffe, which he calls *Eluma Helleri*.

ELUMA PURPURASCENS.

? *Armadillidium celatum*, Miers, *Proc. Zool. Soc. Lond.*, 1877.

Oblong-oval, very convex, smooth, rather shiny, closely and minutely punctured, clothed with thick short hairs.

The basal joint of the flagellum of the antennæ shorter by half than the terminal, narrow at the base, the tubercle of the antennæ thick, oblique.

The frontal lobe shortly triangular, slightly convex or flat in front, rising slightly over the frontal margin. The line of the frontal margin slightly curved on both sides, merging in the middle into the upper margin of the frontal lobe.

The posterior margin of the first body-segment slightly curved on both sides, with the lateral edge thickened, the upper part slightly furrowed, the lower part slightly and not very unevenly divided. The lateral plates of segments 3-4-5 rectangular.

The telson short, shorter than wide, rather shorter than the uropods, nearly triangular, with the apex rounded, nearly flat above.

Colour purplish, or pale purple.

Length, 11 mm. Width, 4-4.8 mm. Height, 2.5 mm.

Most of the characteristics described above can be easily made out by the aid of a hand-lens; the colour is, however, by no means so distinct, in fact, it was not until I got the specimens in spirit under a good strong light, that I could see it at all, and then only in some specimens.

The general colour of the animal to the naked eye is a pale coffee colour, and it may quite easily be passed over at first sight as a young specimen of *Armadillidium vulgare*. I did in fact so pass over two or three specimens, and it was not

until I was struck by the very uniform brown colour in so many specimens that I examined one with a lens, when its distinct character at once became apparent. The younger the specimen the paler the colour, and I found many very young specimens that were pure white.

The measurements given correspond very well to the majority of specimens, but I found a good number which were considerably larger, being as much as 12 mm. in length, 5 mm. in width, and 3 mm. in height.

I was under the impression when I first found it that this was a shore-haunting species, as I took it in such numbers amongst the shingle and debris at the base of the cliffs in company with *Ligia oceanica*, *Philoscia Couchii*, and *Porcellio scaber*. Subsequently, however, I found it extended all up the cliffs, and even as high on the hill as above the Baily Post Office, and I have since learnt that in the Island of Teneriffe it is found at a height of 800 metres.

The chief interest I think in finding a species of this sort, which is evidently a wanderer far from its original home, is to study its present distribution in the world, and to draw what inferences one can.

Prof. Budde-Lund, in his work already referred to, gives the following localities. He says:—"This species is commonest in the Island of Madeira." "I have seen some from Cayenne, taken by Don Gelski." "Two specimens taken by Prof. Reinhardt, in the Island of Nicobar, and described by Cl. Kroyer, under the name of *Armadillidium purpurascens* are preserved in the Museum at Copenhagen."

M. Adrien Dollfus refers to the curious distribution of *E. purpurascens* in many of his papers on Woodlice.

In a paper on the terrestrial Isopods of North Africa[1], published in 1896, where he records the finding of this species in Algeria, he says:—"Recognisable at once by its single-lens eye, *Eluma purpurascens* has a considerable Atlantic distribution. The centre is without doubt the Islands of the Azores, Madeira, and the Canaries, but it is found again so far away as Cayenne."

[1] A. DOLLFUS. "Les Isopodes terrestres du Nord de l'Afrique du Cap Blanc à Tripoli." *Mem. Soc. Zool. France*, vol. ix., 1906, p. 528.

In a previous paper[1] on the geographical distribution of Armadillidians in Europe, published in 1895, he says :—"The genus Eluma is entirely western, and contains only one species, *E. purpurascens* B.-L., a woodlouse of a purple-red colour, remarkable for its simple eyes. Very abundant in the Atlantic archipelagos, in the Canaries, the Azores and Madeira ; it occurs again at Cintra (Portugal), and in Western Algeria, but the most curious fact about it is its range northwards to the French Department of Les Charentes, where it is acclimatised from Angoulème to Royan (very common twenty years ago in this locality, it has become much rarer lately), and southwards to Cayenne!"

In yet another paper on the woodlice of Spain,[2] he records it from Constantina in the Sierra Morena, and in the same paper referring to its French locality of Les Charentes, he says, "where it has certainly been introduced." I am in hopes that, now that it has been found again so much further north, M. Dollfus may change his view on this point. I cannot find that M. Dollfus refers in any of his papers to Prof. Budde-Lund's record from the Island of Nicobar, but even omitting that record, it can be seen that this species has a very wide distribution round the shores of the Atlantic ; it must therefore be ancient, and may be undoubtedly classed as an addition to the list of Lusitanian species which are such an interesting element in the fauna of Ireland.

These southern species must in all probability have migrated northwards in ages long past, at a time when these islands had a land connection with the Continent, and when the climate was much warmer than it is now, and must, in fact, be regarded, as Dr. Scharff points out, as one of the most ancient elements in our fauna. How they managed to reach these islands, and then to survive what is known as the Glacial period, are amongst the most interesting problems discussed by Dr. Scharff in his books on "The History of the European Fauna" and "European Animals."

Fenagh, Co. Carlow.

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[1] A. Dollfus : "Sur la Distribution Géographique des Armadillidiens en Europe." *3me Congres Inter. Zool*, Leyden, 1895, p. 357.

[2] Id.: "Catalogue raisonné des Isopodes terrestres de l Espagne." *Ann. Soc. Espan. Hist. Nat.*, vol. xxi., 1892.

RECORDS OF SOME IRISH WOODLICE

With Note on Eluma purpurascens.

BY RICHARD S. BAGNALL, F.E.S.

During a few days spent in Ireland at the beginning of September, 1908, I collected several woodlice, and purpose shortly to record those species which occurred in the Glasnevin gardens and hot-houses. In the following short list of truly indigenous forms *Eluma purpurascens* is of exceptional interest, the genus being previously unknown from the British Isles or Central Europe. Eluma is, in fact, another link in that interesting chain of South European species which in these islands are so strongly represented in Ireland as to make the study of Irish natural history highly important.

Armadillidium album, Dollfus,[1] a rare species allied to Eluma, which was discovered on the Devonshire coast this year, is another relic of the Lusitanian group, described in Dr. Scharff's very interesting works on the European fauna[2]. Mr. Denis R. Pack-Beresford was fortunate enough to discover *E. purpurascens* at Howth, near Dublin, in August of this year, and is giving a full account of it. My specimens were mostly found at the foot of a hedge-row, from which we beat out the Pyrenean Weevil *(Otiorrhynchus auropunctatus)* another representative of the same faunistic group

TRICHONISCIDÆ.

Trichoniscus pusillus, Brandt.—No doubt common and widely distributed. Near Lurgan, on the shore of Lough Neagh; Howth, Portmarnock, and Dublin. September, 1908.

ONISCIDÆ.

Porcellio scaber, Latr. } From the same localities as *T. pusillus*;
Oniscus asellus, L. } common.

Philoscia muscorum, Scop.—Portmarnock, Lurgan, common.

P. Couchii, Kin.—On September 5th I saw a single specimen of what was undoubtedly this interesting species, on the shore near Howth, but the too close attention of two wasps, prevented me from

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[1] Bagnall, R. S.—"On *Armadillidium album*, Dollfus, a rare woodlouse new to the fauna of Great Britain." *Zoologist*, pp. 152-4, 1908.

[2] Scharff, R. F.—"The History of the European Fauna," 1899. "European Animals," 1907.

capturing the Philoscia. On mentioning this to Mr. Beresford he told me that *P. Couchii* occurred commonly at Howth, this species being one of his recent interesting additions to the Irish fauna, and belonging like the Eluma, to the ancient Lusitanian group.

Cylisticus convexus, De Geer.—A rare species in Ireland, of which I can record a single specimen from a heap of vegetable refuse on the sea-shore near Howth, September 5th, 1908.

ARMADILLIDIIDÆ.

Eluma purpurascens, Budde-Lund.—In large numbers under sods and in vegetable refuse in hedge-rows near Portmarnock station September 4th and 6th, and a single example with Cylisticus at Howth.

My specimens have been examined by Prof. Budde-Lund, of Copenhagen, and the Rev. Canon Norman, F.R.S., to whom my thanks are due; and Canon Norman has also kindly sent me specimens collected by himself in Madeira, pointing out that the Irish examples have decidedly stronger pubescence.

Armadillidium vulgare, Latr.—Portmarnock; with Eluma and equally common.

Winlaton-on-Tyne.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Kestrels from Mr. W. R. Woodrow, three Doves from Mr. Buckland, a Peregrine Falcon from Dr. MacDowel Cosgrave, a Landrail from Mr. Crawford Donnelly, a Sparrow-hawk from Mrs. E. C. Murphy, two Mute Swans from Mr. Nathaniel Hone, two Rabbits from Mr. C. Treacy, some Brown Trout from Mr. R. T. Blackburne, a Muscovy Duck and Drake from Mrs. Newell, a Lizard from Miss Snowden, a pair of Pochards from Dr. Phillips, a Pluto Monkey from Dr. Beauchamp Dooley, an Angolan Vulture from Capt. Corsellis, a Hedgehog with young from Mr. F. Ussher, a Siamese Cat from Mr. J. N. Lentaigne, a Marmoset from Miss Taylor, a Barnard's Parrakeet from Mr. W. W. Murphy, a Badger from Mr. F. Hughes, a pair of Barn Owls from Mr. Rea, ten Golden and Amherst Pheasants from Lt.-Col. Butt, a Ring-necked Parrakeet from Mr. Taplin, a Guinea-pig from Mr. J. Dolphin, a pair of Cayuga Ducks from Mrs. Morgan, a Buzzard from Mr. J. M. Johnson, a Curlew from Capt. C. O. Ibbetson, a Salamander from Mr. T. Carton, a young Barn Owl from Mr J. Caddow, four Doves and two Pigeons from Mr. C. C. Sloane, and a Green Plover from Mr. V. Carton. A Green Monkey has been temporarily deposited in the Gardens, and two Toucans have been bought.

The birth of a litter of three Pumas in September was a noteworthy event, as these great "American Lions" have rarely bred in the Gardens.

The tawny mother, with her three spotted young, playing in the sunshine formed a beautiful sight for several weeks, but, unfortunately, she was not able to rear the cubs, and two of them died. It is hoped that the third may be saved by hand-feeding. Two litters of Lion cubs were born in October—one of them from "Conn" and "Vesta" in the open-air den; the other from "Niger" and "Nigeria," the two West African lions given by H. M. the King.

The Council lately decided to publish some of the missing records of the Society which had been collected from old Dublin papers by the late Mr. Cæsar Litton Falkiner and Professor D. J. Cunningham. During the many changes through which the Society has passed, the reports of the Society of about twenty years were lost, and it was only by hunting up the old newspapers that some of these have been found, and are now printed. The period referred to covers from 1840-1860. The number of copies is limited. Some extra copies have been retained and these can be obtained from the Hon. Secretary of the Society.

DUBLIN MICROSCOPICAL CLUB.

MAY 13.—The Club met at Leinster House. Prof. G. H. CARPENTER (President) showed the first larval stage of the Apple Sucker (*Psylla mali.*)

Dr. G. H. PETHYBRIDGE exhibited the parasitic fungus *Ustilago longissima*, Sow., which he had collected on the shore of Lough Melvin Co. Fermanagh, growing on the leaves of *Glyceria fluitans*. It has previously only been recorded in Ireland as growing on *G. aquatica* on the banks of the Boyne and at Enfield.

R. SOUTHERN exhibited a polychaet worm. *Branchiomma vesiculosum* (Mont.), belonging to the family Sabellidae. It was first described by the English naturalist Montagu from the South Devon coast, about 100 years ago. It lives in sandy tubes near low-water mark. The species is chiefly remarkable for the presence of a single compound eye, just below the tip of each gill filament. The Irish specimens were obtained at Ross shore, on the west coast, this being its first Irish record. It occurs on the shores of the English Channel and the Mediterranean.

W. F. GUNN showed leaves of carnations attacked by *Uromyces dianthi* (Niessl.), and also a slide of the uredospores. The latter are spheroid or elliptical, pale brown, with thick walls, and are produced in blisters or pustules on the surface of the leaves. It is a difficult parasite to eradicate, and burning the affected plants would appear to be the only certain and effective procedure in severe cases.

It was agreed to hold the annual excursion on June 20, and to visit the Devil's Glen, Co. Wicklow.

OCTOBER 14.—The Club met at Leinster House.

DR. G. H. PETHYBRIDGE (President) exhibited the fungus *Dichomera Saubinetti* (Mont.), Cooke, which is new to Ireland. It was found growing parasitically on the bark of young trees of *Ulmus montana*, var. *vegeta*, at the Department of Agriculture's Forestry Station, at Avondale, Co.

Wicklow. Out of about 300 young trees, it was difficult to find examples without the fungus on them, and many have already been killed. Whether the others will throw the disease off or not remains to be seen. Saccardo records it on twigs of Buckthorn, Elder, and Oak in France, Italy, and Great Britain, but not on Elm, and apparently not as a parasite. The fungus has, in all probability, been introduced with the young trees which, although purchased from an Irish firm, probably came from France.

Prof. G. H. CARPENTER showed a new species of Pallenopsis from the Indian Ocean, dredged off the coast of British East Africa by Mr Charles Crosland. The species, which is remarkable for a series of beautifully-pinnate sensory bristles on the legs, will shortly be described in a paper to be communicated to the Linnean Society.

R. SOUTHERN exhibited a polychaet worm, *Autolytus pictus* (Ehlers), belonging to the family Syllidæ. This species is coloured in a very regular and striking way, and is also noteworthy for its life-history, which shows periods of budding, alternating with normal sexual reproduction. The specimen shown was the asexual nurse-stock. It was dredged in two fathoms in Malahide Inlet, by the Dublin Bay Marine Biological Committee. It has not previously been recorded from Ireland, but occurs round Great Britain, in the Mediterranean, &c.

W. F. GUNN showed a specimen of an Aphis, *Lachnus viminalis* (Pass.), which was found feeding in large numbers on the bark of a Weeping Willow at Blackrock. The species is fairly common in Britain, and sometimes proves very harmful to willows and osiers. It is a comparatively large Aphis, and has a peculiar horn-like eminence on the centre of the dorsum, the use of which is not certainly known. Buckton, in his monograph of the genera, says that "although the apex is furnished with several minute pores, the organ may be regarded as blind, or imperforate. It has not the function of a nectary, but probably that of an odoriferous gland."

BELFAST NATURALISTS' FIELD CLUB.

JULY 11–14. BUNCRANA AND DISTRICT.—Forty-seven members and friends joined this excursion, which proved to be of a most enjoyable character. The weather was not all that could have been desired, but the long day that was spent in the open air turned out quite fine. The party left Belfast at 8.25 a.m. on Saturday, July 11, and just caught the 12 o'clock train for Buncrana at the Lough Swilly Railway. The Lough Swilly Hotel, Buncrana, was the headquarters, and here lunch was served immediately on arrival. After lunch, the drive to Dunree Head was commenced in heavy rain, but, in spite of this, the whole programme for the afternoon was carried out. On arrival at the head, the naturalists explored the river and the mountain, while the other members were taken over the modern fort by kind permission of the Colonel in charge. At 6 o'clock the return drive to Buncrana was begun.

The next day being Sunday, members were free to make their own arrangements. Many of them explored the places of interest in the neighbourhood of Buncrana, whilst some visited the sand-dunes and strand of Culdaff, on the eastern shore of the peninsula. On Monday morning, a special train conveyed the party to Ballyliffin, where the entire day was spent on the very extensive sand-dunes there. The day was beautifully fine, and the members made the most of their opportunities for studying the fauna and flora of the district. In the afternoon, some members from Londonderry joined the party, and a most enjoyable day was spent. The 6.55 train brought the members back to Buncrana. After dinner, the usual business meeting was held, the President being in the chair. On Tuesday, 14th, the party left the hotel at 9.15 on cars, the destination being the Mintiaghs Lakes, situated among the mountains amid typical Donegal scenery. On reaching Lough Fad, the members explored the shores of the lakes and the surrounding country, making their way slowly down to the lower lake, over a mile distant. Cars were remounted, the hotel reached at 2 o'clock, and after luncheon a special train at 3.25 conveyed the party to Londonderry. Here conveyances were in waiting to bring the members to the Municipal Museum, Brook Park, where they were received by several members of the Derry Corporation, and Mr. D. C. Campbell, the founder and Honorary Curator. The members were conducted through the Museum, the scheme of the exhibits explained, and the more interesting specimens pointed out by Mr. Campbell. The 5.40 train was taken to Belfast, dinner being partaken of *en route*.

Large collections of insects, crustaceans, spiders, and mollusca were obtained and preserved for future examination.

JULY 25. EXCURSION TO LAGAN CANAL.—Forty members and friends travelled by the 2 o'clock train to Hillsborough, from whence a walk of less than a mile brought the party to Newport Bridge. From this point the walk down the canal to Lisburn was begun, and 2½ hours being allowed for it, there was ample opportunity for collecting the many forms of plant and animal life with which the canal abounded. At 5.30 tea was served in the Temperance Institute, Lisburn, and after tea the usual business meeting was held, the Vice-President, W. H. Gallway, in the chair. One new member was elected.

AUGUST 8. EXCURSION TO CARLINGFORD.—Forty-eight members and friends travelled by the 9.30 train to Carlingford. On arrival the party scattered, a large contingent climbing Carlingford Mountain, and coming back laden with botanical spoils. The chief interest of this excursion was archæological, and the Priory and old castles were inspected with much interest. At 5 o'clock the members had tea, and outside the railway station the usual business meeting was held, the President (Robert Patterson) in the chair. Two new members were elected. The President's prize for the best list of birds noted during the day, was won by Mrs. Nevin H. Foster.

AUGUST 29. EXCURSION TO DUNDRUM.—The last excursion for the season was attended by thirty-two members and friends, who travelled

by the 12 o'clock train to Dundrum. After inspecting closely the well-known castle, the party proceeded on foot to Slidderyford cromleac, and from thence scattered over the Newcastle sand-dunes, where the Secretary found a very perfect arrow-head. Heavy rain came on, which impeded the work of the collectors. After tea in Newcastle, the business meeting was held, the President in the chair. Belfast was reached at 8.30.

The *Report and Proceedings* of the Belfast Naturalists' Field Club for 1907-8, recently issued, again contains a record of a good year's work. The eight field meetings (including the Cork Field Club Union Conference) and twenty winter meetings held, were well attended. Attention is drawn to the excellent discoveries made by members among the Mollusca and Land Isopoda. The most interesting of the several illustrations is a photograph by R. Welch of *Spiranthes Romanzoffiana* in flower *in situ* on the shores of Lough Neagh.

DUBLIN NATURALISTS' FIELD CLUB.

OCTOBER 3,—EXCURSION TO AVONDALE FORESTRY STATION.—Twenty-two members and visitors left Dublin by the 10.15 train from Harcourt-street. On arrival at Rathdrum, Mr. A. C. Forbes, the Director of the Department's Forestry Station, who acted as conductor during the day, met the party. The woods on the western banks of the Avon were traversed, during which many fine species of Fungi were obtained. On arrival at Avondale the real work of the day commenced, Mr. Forbes taking the party through the arboretum and the forest plots, pointing out the different varieties of trees the station was testing, and discussing the probabilities of success. He also drew attention to the fine timber (Turkey oaks, planes, Spanish chestnuts, &c.) which had been planted by the Hayes family over a hundred years ago, when the Avondale estate was in their possession. The members returned to Dublin by 6.5 train from Rathdrum.

NOVEMBER 3.—CONVERSAZIONE.—The twenty-fourth winter session was opened by a Conversazione held in the Royal Irish Academy House (by permission of the Council) and attended by a large number of members and visitors. The meeting opened at 7.30, and at 8.30 the President (Geo. H. Pethybridge, Ph.D.) took the chair, and after welcoming the visitors and explaining to them the special objects of the Club, introduced Mr. P. E. DALLINGER, B.A. (Hon Sec. Omagh Field Club), who delivered a lecture on "The Camera in the Service of Natural History." The lecturer dwelt principally on the great simplification which had taken place during recent years in photographic methods, and the many lines of investigation which could be aided by the use of photography. The use of the camera in the study of animal life was also dealt with at some length as well as its possibilities in photo-micrography, and Mr Dallinger showed a very beautiful series of lantern slides of birds and

insects, and also a number of auto-chrome slides. The President thanked the lecturer on behalf of the Club, and the members returned to inspect the exhibits, of which the following is a list:—J. ADAMS.—Botanical Photographs: (1) Scotch Pine *in situ*, at 1,700 feet, Glenmalure; (2) "Peat Mushrooms," at 2,000 feet, near Kelly's Lake, Co. Wicklow. C. F. BAILL.—Insectivorous Plants PROF. BARRETT.—Meteorological Instruments. J. BAYLEY BUTLER and STAFFORD JOHNSON.—Small Aquarium, containing Marine Animals and Algæ. PROF. CARPENTER.—Some Irish Eriophyidæ (Gall-mites), with their galls. PROF. CARPENTER and ISAAC SWAIN, B.A.—A new Devonian Isopod (*Oxyuropoda ligioides*), from Kiltorcan. PROF. G. A. J. COLE —Samples of the Archæan Floor of Europe, from Finland, Scotland, and Tyrone. J. M. DUFFY.—*Trigonoceras paradoxicum*, Sow.; *Asymptoceras crassilabrum*, Foord; from Lower Carboniferous Limestone, St. Doulagh's. G. P. FARRAN and S. W. KEMP—Marine Animals, dredged off West of Ireland, showing adaptation to deep sea conditions (Dept. of Fisheries). A. H. FOORD.—Rocks from Switzerland. W. F. GUNN.—(1) Nature Prints of *Sisyrinchium californicum*; (2) Microscopic Exhibit. J. N. HALBERT.—*Paromola Cuvieri* (Risso), from the South Coast of Ireland. PROF. JOHNSON.—(1) Card Bibliography of Irish Botany. (2) Album of Wild Flowers painted from nature by the Hon. Frederica and the Hon. Katherine Plunkett. MISS KNOWLES.—(1) Photographs and Specimen of (1) *Atropa Belladonna*, Coney Island, Co Clare; (2) *Leucojum æstivum*, Ballinacurra Creek, Limerick. (3) *Typha* sp. growing in the Shannon at Limerick. W. J. LYONS.—Some Meteorological Graphs. A. R. NICHOLS.—A "Waterhouse" Museum Microscope, and 12 Slides of Echinodermata, Polyzoa &c. G. H. PETHYBRIDGE.—(1) Photographs of Botanical interest; (2) A Species of Claviceps, producing large "ergots" in *Triticum junceum*, from the North Bull; (3) Potatoes attacked by "Black Scab," with Microscope Section, showing the "spores;" (4) Some recent additions to the Irish Fungus Flora. R. LL. PRAEGER.—Specimens illustrating the different sections of the genus Saxifraga. R. F. SCHARFF.—Remains of Mammoth, Irish Elk, Reindeer, Bear, Hyæna, Wolf, and other animals obtained in Irish caves. ROWLAND SOUTHERN.—Annelids new to Ireland. MISS J. STEPHENS.—Alcyonarian Corals obtained off the Irish Coast. ISAAC SWAIN.—Photographs illustrating the geology around Dublin. R. WELCH.—Photographs of the Coralline Strand, Mannin Bay, and sample of the Coral Sand.

ROYAL ZOOLOGICAL SOCIETY.

The Council have arranged for a short course of free popular afternoon lectures in the theatre of the Royal Dublin Society during the winter months. The first lecture, which has been fixed for Wednesday December 9th, at 4.15, will be delivered by Prof. G. H. Carpenter, and the subject will be "Our Friends in the Monkey House."

REVIEWS.

A BOOK ON BEES.

The Lore of the Honey Bee. By TICKNER EDWARDES. Pp. xxii. + 277. 24 illustrations. London: Methuen and Co., 1908. Price, 6*s*.

The impression that this book leaves is that the author loves his bees and has carefully studied their habits. The volume is in no sense of the word a text-book on bee-keeping, nor does it deal with the methods of managing bees for profitable honey-production: but it contains an account of the history of bee-keeping, of many of the legends connected with bees in ancient times, and of the salient facts of their life-history as we know them at present.

In the introduction the author claims for bee-keeping the right to be called the oldest craft under the sun. In support of this claim he mentions the fact that many nectar-producing plants, such as the apple, pear, blackberry, and plum, flourished in the later Stone Age, while the elm—a famous pollen-producer—is known to have existed even earlier. "Therefore," he states, though we must confess ourselves unable to follow his logic, "it would be as unreasonable not to infer that the honey bee was ready on the earth with her stores of sweet food for man, as that man did not speedily discover that store." He goes on to say that wax was used in the Bronze Age for the casting of ornaments and weapons, while the Egyptians, by their use of the bee in their hieroglyphic symbols as an emblem of royalty, showed some knowledge of the insect. Although Mr. Edwardes cannot trace the actual time when bees were first domesticated, he indulges in some ingenious, if far-fetched, speculations as to man's beginning as a bee-keeper.

In the first chapter, entitled "The Ancients and the Honey Bee," the author gives us an account of some of the quaint beliefs held by Virgil, Pliny, and others concerning the life-history of the insect. Virgil believed that in windy weather bees carried with them small pebbles as counterpoises, much as ships carry ballast; he also held the extraordinary notion that swarms of bees could be spontaneously generated from the decaying carcases of oxen. This latter belief was widespread among the ancients, and the only explanation offered is that drone flies, whose larvæ feed on decaying flesh, were mistaken for bees.

The bee-masters of the Middle Ages, according to Mr. Edwardes, made very little attempt to investigate the life-history of bees owing to the difficulty of observing them in the old-fashioned hives, and it was not until Huber's leaf hive was invented that any real progress in bee-knowledge was made. Coming to our modern knowledge of the life-history of bees, Mr. Edwardes deals, sometimes in rather fanciful language, with the main facts of bee life. He maintains, for example that in the way they build their combs and in many other of their actions they exhibit reason rather than instinct.

Mr. Edwardes displays an intimate knowledge of bee life. In one point alone is he guilty of a trifling inaccuracy. He says that in removing dead brood from the hive, bees always fly some distance away before depositing it. This is not invariably the case. I have seen drone brood scattered about on the grass just beneath the hive entrance, and have noticed sparrows devouring it there. His observation that a cast or second swarm will leave a hive in any weather agrees with our own experience. We have known one to leave on a dull afternoon just previous to a very heavy shower of rain. The book should provide pleasant and interesting reading for all bee-lovers.

G. O. SHERRARD.

The Story of the Sea and Seashore. By W. PERCIVAL WESTELL, F.L.S., M.B.O.U. Pp 343; 128 illustrations and 8 coloured plates. London: Robert Culley. Price, 5*s*. net.

We have every sympathy with the attempt to popularise natural history at which Mr. Westell so perseveringly labours, but we are constrained to say that his treatment of "Sea and Seashore" subjects betrays no special qualification for the handling of that task, and the merits of the book seem to consist almost entirely in the eight coloured plates and 128 other illustrations with which it is furnished. If the matter had been compressed into a volume of half the size, we believe that it would have been quite as readable as well as equally instructive. The different subjects, too, are very disproportionately treated. Seaweeds, for instance, are discussed in the same chapter—a short one of twenty-four pages—with the seashore plants; some half-dozen species of each are figured, and a very few others briefly noticed. One is almost tempted to think that the writing of this chapter at all may have been an afterthought. Of the birds, fishes, marine mammals, crustaceans and mollusca, the author has more to say, and it is possible that his occasional efforts to be amusing may assist some of his readers in their efforts to digest the instructive and descriptive passages. But the rapidity with which books conceived on this plan are now produced is almost calculated to make one quake.

C. B. M.

NOTES.

BOTANY.

Notes on Irish Plants.

Rev. E. S. Marshall's paper, "Notes on 'the London Catalogue,' ed. 10," which appears in the *Journal of Botany* for September and October, contains some notes on Irish plants that ought not to be overlooked by the worker.

The Burnt Ground on Howth Head.

Perhaps it may be desirable to add a few remarks to my previous communication on this subject. And, first, let me say, that had the fire been one of ordinary intensity, I should not have thought it worth referring to. But it occurred after a period of continued drought, and the thin layer of peat below the vegetation smouldered for a long time after the brunt of the fire had passed. It is quite true that towards the edge of the burnt area some of the vegetation escaped, but in making out my list of species I avoided these places, selecting the more central region where the fire had done its work most completely. In fact, as I mentioned, I came across only one individual of Bracken and one of Whin which were sprouting from the old stems.

Although seedling Whins were one of the most dominant species still, the total number of individuals was few, as there are still large patches of soil devoid of vegetation of any kind. These seedlings were most numerous on one side of the burnt ground, and near this spot there is a clump of Whins growing on the area just outside the burnt zone. On the date of my last visit (5th Sept., 1908), the wind was blowing directly from the clump of Whins over the spot where the seedlings were. But higher up, and nearer the centre of the burnt area, some seedlings were observed, and numerous charred stems of the old Whin bushes. The distance in this case is too great, I fancy, for the seeds to have been ejected by the explosion of the fruit of the parent plant, or to have been carried by wind, and there is a strong probability, therefore, that they survived the fire. But I suggested the possibility of this in my previous account of the species observed. I may add that *Ulex Gallii* does occur on the burnt ground, as it is now in flower. Other seedlings higher up may prove to be *U. europæus*.

With regard to most of the other species observed, I do not see any necessity to assume that they survived the fire. The wind, at an altitude of 500 feet, could easily carry them the required distance. *Aira præcox* increases in number of individuals towards the edge of the burnt area just outside which the parent plants may still be found growing. But if we assume that this and other species (except Whin) survived the fire, the seeds must have been already present on the surface of the soil. They must have been carried to these places by wind or other agency, and, if wind could transport them before the fire, there is nothing unreasonable in assuming that the same agent could carry them after it. As I stated in the July number of the *Irish Naturalist*, my list of species was made *two* years after the fire, not *three*.

J. Adams.

Royal College of Science, Dublin.

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FEBRUARY, 1908.

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MAY, 1908.

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JUNE, 1908.

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Vol. xvii., No. 8. August, 1908.

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SPECIAL DUBLIN BRITISH ASSOCIATION NUMBER.

VOL. XVII. No. 9.
SEPTEMBER, 1908.

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